PORT HEDLAND REGIONAL FAUNA ASSESSMENT

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Prepared for

BHP Billiton Iron Ore

Prepared by

ENV Australia Pty Ltd
Level 1, 503 Murray Street
PERTH WA 6000
Phone: (08) 9214 6100
Fax: (08) 9226 4109
Email: env@env.net.au

Job Number: *J100490*

Report Number: *11/139*

Prepared by: *John Trainer*

Status: *Final*

QA Review: *Damian Buller*

Technical Review: *Colin Trainor*

Content Review: *Denise True*

Date: 22 November 2011

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STATEMENT OF LIMITATIONS

Scope of Services

This environmental site assessment report ('the report') has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and ENV.Australia Pty Ltd (ENV) ('scope of services'). In some circumstances the scope of services may have been limited by factors such as time, budget, access and/or site disturbance constraints.

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The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report, nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

EXECUTIVE SUMMARY

ENV.Australia Pty Ltd was commissioned by BHP Billiton Iron Ore, in February 2011, to undertake a Level One Regional Fauna Assessment of the Port Hedland area, located adjacent and surrounding the town of Port Hedland in the coastal Pilbara region in Western Australia. The study area is 808.7 km^2 in size.

The purpose of the assessment was to provide a background to the regional fauna of the Port Hedland area. The assessment included a review of previous surveys conducted in the area and additional field survey work to provide any supplementary information required. The field survey was undertaken between the 11th and 20th July 2011.

The study area consists of five major fauna habitat types: Beach/Dunal, Tidal Flats, Mangroves, Riverine and Sandplain. Additional minor habitats were located throughout the study area: Billabong, Low Hill, Granite Tor, Quartz Hill, Rockpile and Quarry. The Beach/Dunal, Tidal Flats, Mangroves and Riverine habitats were all given High habitat value and Sandplain habitat was deemed as having Moderate habitat value.

Habitats considered to be of High habitat value constitute approximately 10.87% of the study area. The majority of the study area (67.9%) was composed of the Moderate value Sandplain habitat.

A total of 13 species listed as Migratory under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), and 14 species gazetted as Scheduled Fauna under the *Wildlife Conservation Act 1950* (WA) were recorded. A further three conservation significant species (Australian Bustard *Ardeotis australis*, Bush Thick-knee *Burhinus grallarius* and Woma *Aspidites ramsayi were also recorded* in the study area.

During the 2011 survey, 108 vertebrate species were opportunistically recorded, including two amphibians, 20 reptiles, 79 birds, and seven mammal species.

Using the combined results of the fauna database review and the 2011 survey, a total of 316 vertebrate species have been recorded within the vicinity of the study area. This includes 11 amphibian, 74 reptile, 189 bird and 42 mammal species.

A total of 61 conservation significant species were considered to potentially occur in the study area from the desktop assessment. A total of 38 conservation significant species (two reptiles, 33 birds and three mammal species) were recorded in the study area by either the current or past surveys. Of these, 29 species are listed as Migratory under the EPBC Act, while eight are considered rare or threatened: Northern Quoll (*Dasyurus hallucatus:* Endangered, Schedule 1), Woma (Schedule 4), Little Northern Freetail-bat (*Mormopterus loriae cobourgensis*: Priority 1), Australian Bustard (Priority 4), Bush Stone-curlew (Priority 4), Eastern Curlew (*Numenius madagascariensis*: Priority 4 and Migratory), Star Finch (*Neochmia ruficauda subclarescens*; Priority 4) and Western Pebble-mouse (*Pseudomys chapmani*: Priority 4).

Of the remaining 24 potentially occurring conservation significant species, 17 species were assessed as 'Likely' to occur, four species were considered as 'Possible' to occur, two species was considered 'Unlikely' to occur and one species was considered 'Highly Unlikely' to occur.

1 INTRODUCTION

1.1 THE PROJECT

1.1.1 Objectives

ENV.Australia Pty Ltd (ENV) was commissioned by BHP Billiton Iron Ore (BHPBIO), in April 2011, to undertake a vertebrate fauna review of the Port Hedland region (the study area). The purpose of the assessment was to provide BHPBIO with a regional assessment of the terrestrial vertebrate fauna of the Port Hedland area.

The objectives of the fauna assessment were to:

- collate historical knowledge of the study area through a fauna database review;
- review and summarise previous fauna surveys within and in the vicinity of the study area;
- conduct a vertebrate fauna habitat assessment of the study area;
- conduct targeted searches for conservation significant fauna; and
- document opportunistic records of vertebrate fauna within the study area during the current field survey undertaken in 2011.

1.1.2 Location

The study area is approximately 808.74 square kilometres (km^2) or 80,874 hectares (ha) in size and located in the Port Hedland district (Pilbara region) of Western Australia (Figure 1).

1.2 ENVIRONMENTAL ATTRIBUTES

1.2.1 Climate

The Pilbara has an arid-tropical climate with two distinct seasons, a hot summer from October to April and a mild winter from May to September. The area experiences a wide temperature range, with an average annual maximum daytime temperature of 33.2°C (1948-2011). In summer, maximum daytime temperatures may reach 49°C, whilst in winter, minimum night time temperatures may fall to 3.2°C (Bureau of Meteorology (BoM) 2011). Rainfall in the Pilbara is often sporadic, and occurs mostly during the summer period.

The nearest accessible long-term climate data is available from the BoM Port Hedland Airport weather station, which is located within the study area.

The Port Hedland area has an average annual rainfall of 313.6 mm (1948-2011) (BoM 2011) with the majority of rainfall occurring during the summer months (Figure 2). Summer rainfall is typically associated with tropical monsoonal storms in the north, or tropical cyclones that cross the coast and move inland. Winter rainfall is commonly the result of cold fronts moving north-easterly across the State.

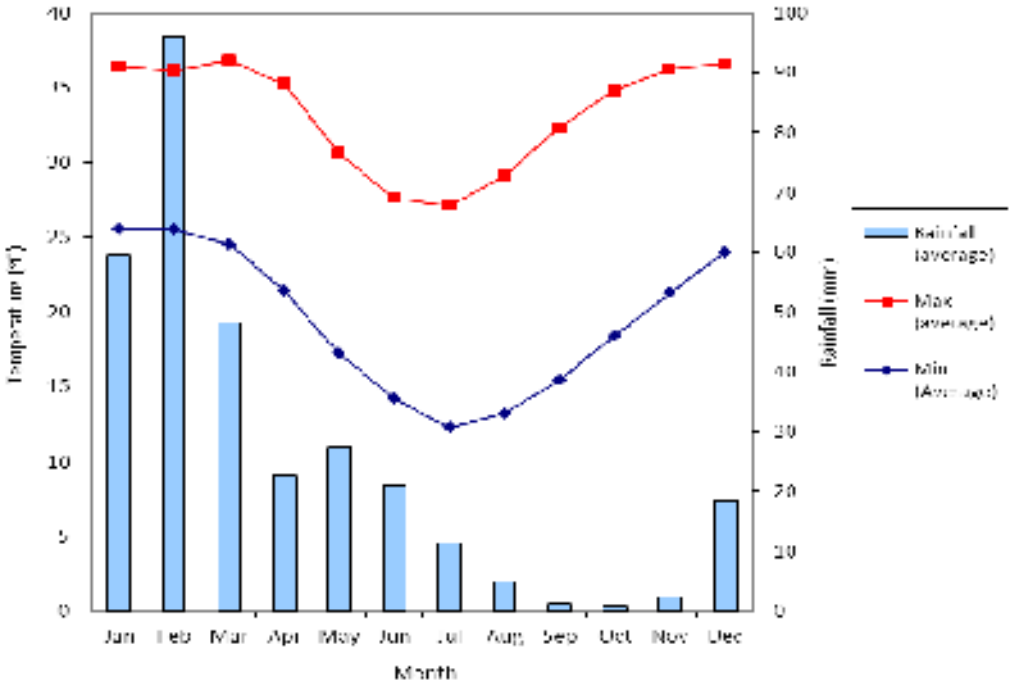

Figure 2: Average long-term (1948-2011) Monthly Rainfall and average Maximum and Minimum Temperatures at Port Hedland Airport (BoM 2011)

1.2.2 Interim Biogeographic Regionalisation for Australia

The Interim Biogeographic Regionalisation for Australia (IBRA) divides Australia into 85 bioregions based on major biological and geographical/geological attributes (Thackway and Cresswell 1995). These bioregions are subdivided into 403 subregions, as part of a refinement of the IBRA framework (Department of Sustainability, Environment, Water, Population and Communities [DSEWPaC] 2011a).

The study area is located within the Roebourne subregion (PIL4) (574.92 km^2 of the study area) and the Chichester subregion (PIL1) (140.53 km^2) of the Pilbara bioregion (Thackway and Cresswell 1995).

The Roebourne subregion is characterised by coastal and sub-coastal plains with a grass savannah of mixed bunch and hummock grasses, and dwarf shrub steppe of *Acacia stellaticeps* or *A. pyrifolia* and *A. inaequilatera* (Kendrick and Stanley 2001). This subregion covers over 70% of the study area.

The Chichester subregion is characterised by plains with a shrub steppe of *Acacia inaequilatera* over *Triodia wiseana* hummock grassland and *Eucalyptus leucophloia* tree steppe on rangelands (Kendrick and McKenzie 2001). This subregion occurs only in the south-eastern 17% of the study area. The remaining proportion of the study area is ocean or estuaries.

1.2.3 Land Systems

Land system mapping is based on regional patterns in topography, soils and vegetation. The land system mapping classifies the Pilbara region into 102 land systems (van Vreeswyk *et al.* 2004). The study area comprises six land systems and one land unit (Table 1).

The majority of the study area is dominated by the Uaroo Land system, which occupies over 60 % of the study area. The Littoral Land System occurs along the coastal region to the north, and the Macroy Land System occurs only in the south eastern corner of the study area. Areas of River Land System occur along the western and eastern boundaries of the study area, with small occurrences of the Mallina and Yamerina Land Systems along the western boundary.

Table 1: Land Systems of the Study Area

		Area of Land System within Pilbara Bioregion		Area of Land System within the Study Area		
Land System	**Description**	**Area (km²)**	**% of Pilbara Region**	**Area (km²)**	**% of Study Area**	**% of total in Pilbara Bioregion**
Littoral Land System	Bare coastal mudflats with mangroves on seaward fringes, samphire flats, sandy islands, coastal dunes and beaches.	1,577	0.9%	127.4	15.75%	8.1%
Macroy Land System	Stony plains and occasional tor fields based on granite supporting hard and soft spinifex grasslands.	13,095	7.2%	37.8	4.67%	0.008%
Mallina Land System	Sandy surfaced alluvial plains supporting soft spinifex (and occasional hard spinifex) grasslands.	2,557	1.4%	11.2	1.38%	0.44%

Land System	Description	Area of Land System within Pilbara Bioregion		Area of Land System within the Study Area		
		Area (km²)	% of Pilbara Region	Area (km²)	% of Study Area	% of total in Pilbara Bioregion
River Land System	Active flood plains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands.	4,088	2.3%	32.2	3.98%	0.79%
Uaroo Land System	Broad sandy plains supporting shrubby hard and soft spinifex grasslands.	7,681	4.2%	495.4	61.26%	6.45%
Yamerina Land System	Flood plains and deltaic deposits supporting tussock grasslands, grassy woodlands and minor halophytic low shrublands.	1,207	0.7%	8.9	1.1%	0.74%
Other	River Bed Land Unit and Marine Environment	N/A	N/A	95.8	11.86%	N/A

1.2.4 Geology

Eight geological units occur in the study area (Table 2), based on mapping at a scale of 1:250,000 by the Geological Survey of Western Australia (1990).

Table 2: Geological Units of the Study Area

Unit	Description	Area (km^2)
ACDcsw	CONSTANTINE SANDSTONE, subunit: Wacke; locally subarkosic; fine- to coarse-grained; well-developed graded units; minor pebble beds and shale; turbiditic; metamorphosed	12.04
AgPMA	Granitic rock, unassigned, interpreted from aeromagnetic data	48.94
APIxmbmuts	Interleaved amphibolite and talc-tremolite-serpentine-chlorite schist	19.1
ACDms	MALLINA FORMATION: interbedded shale, siltstone, sandstone, and medium- to fine-grained wacke; metamorphosed	27.07
AmyyPWP	Mylonitic granitoid, felsic and mafic volcanic, ultramafic, and sedimentary rocks	8.93
APIxbs	Pilbara Supergroup, unassigned: mafic and ultramafic volcanic rocks; minor chert; metamorphosed	236.63

Unit	Description	Area (km^2)
AgPI	PIPPINGARRA GRANITIC COMPLEX: undivided granitoid rocks; metamorphosed	332.42
AgmPMA	Unassigned monzogranite, interpreted from aeromagnetic data; metamorphosed	20.98
Other	Unassigned geological areas	102.63

1.2.5 Soils

The following five soil groups (Tille 2006) occur in the study area:

Tidal soils (104): Intertidal soils are inundated regularly and supratidal soils are inundated infrequently. Soils are deep (>100 cm) sandy clay loams or silty light to medium clays overlying silty medium clays.

Calcareous deep Sands (442): This soil group comprises deep white, grey and brown calcareous sands of the coastal margins of the survey area. The sands tend to be white to light grey on the beach and foredune zones, trending to yellowish brown to strong brown away from the beaches.

Red deep sandy duplex soils(405): These soils have medium (10-30 cm) topsoils of loamy sands to sandy loams overlying medium to thick (30-60 cm) subsoils of clay loams or light to medium clay. These soils are mostly deep (>100 cm).

Red/brown non-cracking clays(622): Shallow (<50 cm) red/brown non-cracking clays have thin clay loam or light clay topsoils overlying subsoils of light clay or are uniformly clay throughout.

Red deep sands (445): The majority of the deep red sands occur on sandplains, sand sheets and sand banks. These soils are deep and have thin to medium (10-30 cm) topsoil textures of loamy sand overlying thick (>60 cm) subsoils of clayey sand or sandy loam.

1.2.6 Vegetation Mapping

Vegetation mapping of the Pilbara region was completed on a broad scale (1:1,000,000) by Beard (1975). The study area is situated in the Roebourne plains which forms a part of the Fortescue Botanical District in the Eremaean Botanical Province of Western Australia (Beard 1975). Seven broad vegetation units occur in the study area (Beard 1975: Table 3).

Shepherd *et al.* (2001) re-assessed the mapping of Beard (1975), and updated vegetation boundaries to account for clearing in the intensive land use zone, and divided some larger vegetation units into smaller units. Vegetation types 43, 93, 117, 127, 589, 619 and 647 described by Shepherd *et al.* (2001) correspond with that of Beard (1975) as shown in Table 3.

Shepherd *et al*. (2001) vegetation type 647 dominates the north and west, accounting for about 37% of the study area. Other dominant broad vegetation types are 589 and 93, which chiefly occur in the central and south eastern parts, and account for approximately 22% and 15% of the study area respectively (Shepherd *et al*. 2001).

Table 3: Pre-European Vegetation Mapping of the Study Area

Beard (1975) Vegetation Mapping		Area (km^2) of study area	% of study area	Shepherd *et al.* (2001) Vegetation Type
Vegetation Description	Unit Code			
Hummock grasslands, dwarf-shrub steppe; *Acacia translucens* over soft spinifex	a18Zr t1Hi	300.54	37.16%	647
Hummock grasslands, shrub steppe; kanji over soft spinifex	a2Sr t1Hi	118.96	14.71%	93
Hummock grasslands, grass steppe; soft spinifex	t1Hi	13.61	1.68%	117
Bare areas; mudflats	mud	75.77	9.37%	127
Low forest; mangroves (Kimberley) or thicket; mangroves (Pilbara)	mangrove	34.3	4.24%	43
Mosaic: Short bunch grassland - savannah / grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex	xGc/t1Hi	177.48	21.95%	589
Medium woodland; river gum (*Eucalyptus camaldulensis*)	e18Mi	2.82	0.35%	619
Areas not mapped by Beard (1975)	-	85.26	10.54%	-

1.3 PREVIOUS BIOLOGICAL STUDIES

Fauna surveys of the of the Port Hedland district have been conducted by a number of organisations including: Coffey Environments Australia (Coffey), Biologic, Biota Environmental Sciences (Biota), ecologia Environment (ecologia), ENV, and Mattiske Consulting (Mattiske). These surveys have been commissioned by clients including BHPBIO, Sinclair Knight Merz (SKM), Fluor and SKM Iron Ore Joint Venture (FAST) and

North West Infrastructure (NWI). The following reports, which are summarised later in this report, are listed in order of survey type and then chronologically.

Desktop Assessment

- A Biodiversity Assessment of the Utah Point Berth Development, Port Hedland (Biota 2008a).

Level 1 Fauna Assessment

- Bird Survey of Nelson Point Wetlands in April 2011 (Bennelongia 2011);
- Level 1 Terrestrial fauna Survey for the Multi-User Iron ore Export Facility: Port Infrastructure Project (Coffey 2011);
- Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010);
- Port Hedland Nelson Pt Dredging Approvals Flora and Fauna Review of DMMA H (Biota 2009);
- A Flora and Fauna Assessment of RGP5 DMMA A, Port Hedland Harbour (Biota 2008b);
- A Flora and Fauna Assessment of RGP5 Spoil Areas A and H, Port Hedland Harbour (Biota 2008c);
- Rail RGP5 Fauna Survey Bing to Walla Siding and Repeater 1 (ecologia 2008a);
- Rail RGP5 Fauna Survey: Quarry 1 (ecologia 2008b); and
- Goldsworthy rail Duplication Fauna Assessment (ENV.Australia 2008).

Level 2 Fauna Assessments

- RGP5 Northern Quoll Wider Area Survey (ecologia 2009);
- Outer Harbour Development Fauna Assessment (ENV.Australia 2009);
- Port Hedland Solar Saltfield Expansion Fauna Survey (Biota 2006);
- Fauna Habitats and Fauna Assemblage of the Proposed FMG Stage A Rail Corridor (Biota 2004);
- Hope Downs Rail Corridor from Weeli Wolli Siding to Port Hedland Vertebrate Fauna Survey (Biota 2002); and
- Hedland HBI Project – Boodarie Site- Flora Vegetation and Vertebrate Fauna Survey (Mattiske 1994).

2 METHODS

2.1 BACKGROUND TO THE PROTECTION OF FAUNA

Fauna are protected formally and informally by various legislative and non-legislative measures, which are as follows:

Legislative Protection

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *Wildlife Conservation Act 1950* (WC Act); and
- *Environmental Protection Act 1986* (EP Act).

Non-Legislative Protection

- Western Australian DEC Priority lists for fauna;
- International Union for Conservation of Nature Red List (IUCN);
- International Bilateral Agreements (Japan-Australia Migratory Bird Agreement [JAMBA], China-Australia Migratory Bird Agreement [CAMBA], Republic of Korea-Australia Migratory Bird Agreement [ROKAMBA] and Bonn Convention); and
- Recognition of locally significant populations by the DEC.

A short description of each is given below; other definitions, including species conservation categories are provided in Appendix A.

EPBC Act

The EPBC Act aims to protect matters of national environmental significance. Under the EPBC Act, DSEWPaC lists threatened species and communities in categories determined by criteria set out in the Act (*www.environment.gov.au/epbc/index.html*).

Projects likely to cause impacts to matters of national environmental significance should be referred to DSEWPaC for assessment under the EPBC Act.

WC Act

The Western Australian DEC lists fauna under the provisions of the WC Act as protected, and fauna are classified as Schedule 1 to Schedule 4 according to their need for protection.

EP Act

Threatened Ecological Communities (TECs) are given special consideration in environmental impact assessment, and have special status as Environmentally Sensitive Areas (ESAs) under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

DEC Priority Lists

The DEC lists fauna that have not been assigned statutory protection under the WC Act, but which are under consideration as 'Scheduled' fauna.

Fauna assessed as Priority 1-3 are in urgent need of further survey; Priority 4-5 fauna are in need of monitoring as they are not currently threatened but could become so.

In addition, the DEC maintains a list of Priority Ecological Communities (PECs) which identifies those communities that need further investigation before possible nomination for TEC status.

Once listed, a community is a PEC, and when endorsed by the Western Australian Minister of Environment becomes a TEC, and protected as an ESA under the EP Act.

International Union for Conservation of Nature

The International Union for Conservation of Nature (IUCN) publishes a listing of species of conservation importance, known as the IUCN Red List (IUCN 2011). This list identifies those species threatened with extinction and most in need of conservation attention. The IUCN Red List is often acknowledged as one of the most comprehensive global approaches for evaluating the conservation status of plant and animal species.

International Bilateral Agreements

These bilateral agreements include the JAMBA, CAMBA, ROKAMBA and Bonn Convention. These agreements require all signatory countries to protect migratory birds by: limiting the circumstances under which migratory birds are taken or traded; protecting and conserving important habitats; exchanging information; and building cooperative relationships.

Fauna of Local Significance

In addition, certain populations of fauna may be of local significance or interest because of their patterns of distribution and abundance. For example, fauna may be locally significant because they are range extensions to the previously known distribution or are newly discovered taxa (and therefore have the potential to be of more than local significance). In addition, many species are in decline as a result of threatening processes (primarily land clearing), and relict populations of such species assume local importance to the DEC.

2.2 SURVEY METHODS

The survey was carried out in a manner designed to be consistent with the Environmental Protection Authority (EPA) requirements for the environmental surveying and reporting of fauna surveys in Western Australia, as set out in the following documents:

- *Terrestrial Biological Surveys as an Element of Biodiversity Protection. Position Statement No. 3* (EPA 2002);
- *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia. Guidance Statement No. 56* (EPA 2004); and
- *Technical Guide - Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA 2010).

The survey was also designed according to the BHPBIO Guidance for Vertebrate Fauna Surveys in the Pilbara (BHPBIO 2010).

2.2.1 Database and Literature Review

The purpose of the desktop review was to gather background information on the study area and the fauna that it may support. This involved a search of the following sources:

- Western Australian Museum (WAM) and DEC combined biological database *NatureMap* (DEC 2011a);
- DEC Threatened and Priority Fauna database (DEC 2011b);
- DSEWPaC Protected Matters Search Tool (DSEWPaC 2011b), also known as an EPBC search;
- Birdata, Birds listed by Birds Australia (Birdata 2011); and
- Previous fauna surveys (e.g. previous ENV reports, other consultant's reports, and DEC reports as per Section 1.3).

Collectively, these sources were used to compile a list of species that have been recorded and that may potentially occur in the region (Appendix B). This list will invariably include some species that do not occur in the study area, as some fauna have a limited or patchy distribution, high level of habitat specificity, are locally extinct or were erroneously identified in previous surveys. Extinct species, clearly erroneous records and species with a high level of habitat specificity for habitats not present in the study area were excluded from this list.

2.2.2 Field Survey

The purpose of the field survey was to verify the accuracy of the desktop survey and to further delineate and characterise the habitat and faunal assemblages present in the study area. The field survey was undertaken between the 11th and 20th July 2011.

2.2.3 Habitat Assessment

A total of 19 habitat assessments were completed during the field survey with a minimum of one habitat assessment undertaken for each fauna habitat type (Figure 3). Vegetation communities and landforms were used to identify the broad fauna habitats in the survey area. These fauna habitats were then assessed for their potential to support species of conservation significance and the quality of habitat they provide to a wider suite of fauna assemblages. Habitats were rated as High, Moderate or Low on the basis of their complexity, the presence of microhabitats including caves, significant trees with hollows, loose bark, fallen hollow logs and leaf litter, and their representation in the study area. Data was recorded using standardised field sheets designed in accordance with BHPBIO Guidance (BHPBIO 2010) (Appendix C). The information recorded at each habitat assessment included landscape features, soils and rock type, leaf litter, vegetation cover and disturbance levels. The habitat assessments were used to generate a vertebrate fauna habitat map for the study area (Figure 4).

2.2.4 Targeted Surveys

Species of conservation significance to be targeted during field surveys were identified from the literature review and database searches. Acoustic Bat Recording, Motion Sensitive Camera and Transect and Opportunistic Searches were used to attempt to identify these species.

Acoustic Bat Recording

Acoustic bat recordings were undertaken from dusk until dawn using AnaBat recording units to document the presence of bat species in the area. A total of five nights of acoustic bat recordings was completed in five independent sites throughout the study area (Figure 3 and Appendix D). Mangrove habitat, including those on Finucane Island were targeted, because the conservation significant Little Northern Freetail-bat (*Mormopterus loriae cobourgensis*) was previously recorded there (ENV.Australia 2009). Additional sites were targeted that would provide potential roosting or foraging sites for microbat species, i.e. the Riverine habitat, Billabong (Coolarin Pool) and Quarry were sampled to target likely foraging locations of two conservation significant bats: Ghost Bat (*Macroderma gigas*) and Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*).

Motion Sensitive Cameras

Two Moultrie Game Spy D-55IR Digital Game Cameras were set up at three locations in the study area. The cameras were placed in areas where Northern Quolls (*Dasyurus*

hallucatus) had been previously recorded and in habitats where it is considered likely to occur. Cameras were set out for a total of six nights (Figure 3 and Appendix D).

Transects and Opportunistic Searches

Transects and opportunistic searches of suitable habitats were conducted across the study area. These searches targeted habitats that potentially support fauna of conservation significance (based on literature and database review). Specific searches were undertaken within suitable habitat for the Brush-tailed Mulgara (*Dasycercus blythi*) and Northern Quoll. Transect searches for Brush-tailed Mulgara burrows and signs were completed within the Sandplain habitat - totalling approximately 36.7 km of transects (Figure 3 and Appendix D). Northern Quoll targeted searches were completed through all rocky habitats within the study area, with a particular focus on areas where Northern Quolls had previously been recorded. Searches involved two zoologists walking approximately 50 metres (m) apart investigating burrows, tracks, and sampling of scats.

Targeted searches were conducted in rocky areas of the study area, in particular quartz and granite outcrops for the presence of the gecko *Gehyra nana*. This gecko was recorded in the Boodarie survey (Mattiske 1994) but there is some taxonomic uncertainty with this species in the Pilbara.

2.3 TAXONOMIC IDENTIFICATION

If any taxonomic uncertainty existed for species identified during the desktop assessment (as a result of recent taxonomic reviews) an effort was made to determine the current scientific name for each taxon. In some cases, old scientific names may be presented when correct nomenclature could not be determined. Some taxon names may be followed by 'sp.', meaning that the species name was not given in the data source or the identification is in doubt. Where there are previously recorded taxa such as this that have the potential to be conservation significant species, they are discussed specifically in the results section.

Taxonomy and nomenclature in this report follows the accepted listing of terrestrial vertebrate species by Western Australian Museum (WAM) and the EPA. For example the listing for amphibians and reptiles follows Aplin *et al.* (2001), for birds by Christidis and Boles (2008) and for mammals by van Dyck and Strahan (2008).

3 RESULTS

3.1 LITERATURE REVIEW

A total of 16 fauna surveys have been previously completed within the study area. A summary of survey methods and major findings are detailed below. Conservation status

of species recorded has not changed since surveys were completed for all surveys except Mattiske (1994).

3.1.1 Summary of Survey Methods and Major Findings

A Biodiversity Assessment of the Utah Point Berth Development

Biota (2008a) undertook a desktop fauna review in the vicinity of the port site and access road.

Bird Survey of Nelson Point Wetlands in April 2011

Bennelongia (2011) conducted a bird survey of seven disturbed wetlands within and adjacent to industrial infrastructure at Nelson Point on 15 April 2011. This survey comprised of a systematic bird survey, during which five conservation significant species were recorded: the Star Finch (*Neochmia ruficauda subclarescens*), which is listed as a Priority 4 under the DEC priority list and four shorebirds which are listed as Migratory under the EPBC Act: Little Curlew (*Numenius minutus*), Whimbrel (*Numenius phaeopus*), Grey-tailed Tattler (*Tringa brevipes*) and Wood Sandpiper (*Tringa glareola*).

Multi-user Iron Ore Export Facility: Port Infrastructure Project

Coffey (2011) undertook a Level 1 terrestrial fauna survey of the Multi-user Iron Ore Export Facility: Port Infrastructure Project in Port Hedland. This survey comprised a desktop assessment and a three day site visit in which habitat assessments were completed. The field survey was conducted between 21 June and 23 June 2010.

A total of 36 conservation significant fauna species were classified as possible visitors to the project area (26 migratory birds, five mammals, two reptiles and three other bird species).

Mooka Siding Level 1 / Targeted Survey

Biologic (2010) undertook a Level 1 survey of the proposed Mooka Siding Project. The work involved a desktop assessment, reconnaissance surveys and targeted surveys. Two, six day reconnaissance surveys were completed which entailed systematic bird surveys, targeted searching, microhabitat sampling for reptiles, short-range endemic species (SRE), acoustic bat surveys, motion-sensitive cameras and habitat assessments. The surveys were conducted over the 20 – 26 July and 1 - 5 November 2010.

A total of six conservation significant fauna were recorded during this survey: the Northern Quoll which is listed as Endangered under the EPBC Act and Schedule 1 under the WC Act, the Australian Bustard (*Ardeotis australis*), Bush Stone-curlew (*Burhinus grallarius*) and Western Pebble-mouse (*Pseudomys chapmani*) which are listed as Priority 4 under the DEC Priority list and the Oriental Plover (*Glareola maldivarum*) and Rainbow Bee-eater (*Merops ornatus*) which are listed as Migratory under the EPBC Act.

Port Hedland Nelson Point Dredging Approvals Flora and Fauna Review of DMMA H

Biota (2009) undertook a Level 1 survey of the proposed Dredged Material Management Area H. The survey consisted of a desktop assessment and a two day site assessment during which bird surveys, habitat assessments, opportunistic recordings and non-intensive searches for SRE species were conducted. The survey was conducted on the 26 and 27 February 2008.

A total of four conservation significant fauna were recorded during this survey: the Eastern Curlew (*Numenius madagascariensis*) which is listed as Priority 4 under the DEC Priority list and Migratory under the EPBC Act and the Whimbrel, Little Tern (*Sterna albifrons*) and Rainbow Bee-eater which are all listed as Migratory under the EPBC Act.

A Flora and Fauna Assessment of RGP5 DMMA A, Port Hedland Harbour

Biota (2008b) undertook a Level 1 survey of the proposed Dredged Material Management Area A. The survey comprised a desktop assessment and a two day site assessment which included bird surveys, habitat assessments, opportunistic recordings and non-intensive searches for SRE species. The survey was conducted on the 26 and 27 February 2008.

A total of two conservation significant fauna were recorded during this survey: the Eastern Curlew which is listed as Priority 4 under the DEC Priority list and Migratory under the EPBC Act, and the Whimbrel which is listed as Migratory under the EPBC Act.

Rail RGP5 Fauna Survey Bing to Walla Siding and Repeater 1

This Level 1 survey was conducted by ecologia (2008a) along the rail line between Walla to Bing Sidings and Repeater One along the BHPBIO Newman to Port Hedland mainline. The work consisted of a desktop assessment and a three day site assessment which included bird surveys, habitat assessments, and opportunistic recordings and spotlighting. This survey was conducted between 19 – 21 April 2008.

A total of two conservation significant fauna were recorded during this survey namely: the Oriental Plover and Rainbow Bee-eater which are both listed as Migratory under the EPBC Act.

Rail RGP5 Fauna Survey Quarry 1

This Level 1 survey was conducted by ecologia (2008b) in and surrounding Quarry 1. The survey consisted of a desktop assessment and a one day site assessment (conducted on the 21 April 2008) during which habitat assessments and opportunistic searches were conducted. Additionally, 24 Elliott traps were left overnight at the site in an attempt to capture Northern Quolls on the 7 May 2008.

One species of conservation significance, the Northern Quoll (Endangered under the EPBC Act) was recorded during this survey. Two male and two female Northern Quolls were captured.

Goldsworthy Rail Duplication Fauna Assessment

ENV.Australia (2008) undertook a Level 1 survey as part of the proposed Goldsworthy Rail Duplication Project. This work comprised a desktop assessment and a four day site visit during which habitat assessments and opportunistic recordings were conducted. The survey was conducted between 13-16 October 2008.

Two conservation significant fauna were recorded during this survey: the Eastern Osprey (*Pandion haliaetus*) and Rainbow Bee-eater which are both listed as Migratory under the EPBC Act.

RGP5 Northern Quoll Wider Area Survey

A targeted survey of Northern Quoll was done by ecologia (2009) between 13 – 18 September 2008. The survey focused on the surrounding areas of Quarries 1 and 2 along the Newman to Port Hedland railway and consisted of 15 trapping sites with a total of 483 trapping nights. A total of 21 Northern Quolls (Endangered under the EPBC Act) were captured from eight locations.

Outer Harbour Development Fauna Assessment

ENV.Australia (2009) undertook a two season Level 2 survey as part of the Outer Harbour Development Project. The survey consisted of a desktop assessment, two season trapping programme, opportunistic recordings, bird surveys, acoustic bat surveys and habitat assessments. In the summer survey eight trapping sites were established. Each site had pitfall, cage, Elliott, funnel and pot traps. An additional two trap sites were established during the winter survey and each site used the same trap types as the summer survey. Total trap effort was 3776 trap nights for the summer survey (12 October to 9 November 2007) and 5600 trap nights for the winter survey (5-16 May 2008).

A total of 29 conservation significant fauna were recorded during this survey: the Woma (*Aspidites ramsayi*) which is listed as Schedule 4 under the WC Act, the Little Northern Freetail-bat which is listed as Priority 1 under the DEC Priority list, the Australian

Bustard which is listed as Priority 4 under the DEC Priority list, the Eastern Curlew which is listed as Priority 4 under the DEC Priority list and Migratory under the EPBC Act, and a further 25 species of birds classified as Migratory under the EPBC Act.

Port Hedland Solar Saltfield Expansion Fauna Survey

Biota (2006) undertook a fauna assessment of the Port Hedland Solar Salt Expansion Area from 17 – 26 September 2005. The assessment involved both systematic and non-systematic sampling. Systematic sampling comprised of 12 trapping grids with a total of 660 pit trap nights, 120 funnel trap nights and 150 Elliot trap nights, avifauna surveys, acoustic bat surveys, and invertebrate sampling, whilst non-systematic sampling comprised opportunistic observations, habitat assessments and fauna searches (for both vertebrates and invertebrates). Two conservation significant species fauna were recorded during this survey: the Little Northern Freetail-bat which is listed as Priority 1 under the DEC Priority list, the Australian Bustard which is listed as Priority 4 under the DEC Priority list.

Fauna Habitats and Fauna Assemblage of the Proposed FMG Stage A Rail Corridor

Biota (2004) undertook a fauna assessment of the FMG rail corridor between 20 March – 7 April 2004. The assessment involved both systematic and non-systematic sampling. Systematic sampling consisted of 18 trapping grids with a total of 1,000 pit trap nights, avifauna surveys and acoustic bat surveys whilst non-systematic sampling comprised of opportunistic sighting, habitat assessments and fauna searches. This survey recorded two species, the Rainbow Bee-eater and Australian Bustard. The FMG rail corridor (Biota 2004) and the Hope Downs rail corridor (Biota 2002) overlap each other at the Port Hedland section of the corridors. As such data obtained from the Port Hedland section of the Hope Downs survey (Biota 2002) was used in the FMG report.

Hope Downs Rail Corridor from Weeli Wolli Siding to Port Hedland Vertebrate Fauna Survey

Biota (2002) undertook a Level 2 survey of the Hope Downs Rail Corridor between 23 April – 14 May 2001 and 23 June – 1 July 2001. The survey comprised a desktop survey, single season trapping programme, opportunistic recordings, bird surveys, acoustic bat surveys, habitat assessments and targeted fauna surveys. Trapping sites consisted of either pit fall traps or Elliott traps with a total of 2,310 pit trap nights and 590 Elliott trap nights.

This survey recorded eight species of conservation significance including: Eastern Curlew, Little Northern Freetail-bat, Australian Bustard, Woma, the skink *Lerista* aff. *bipes*, Rainbow Bee-eater, Bush-Stone Curlew and Ghost Bat.

Hedland HBI Project – Boodarie Site- Flora Vegetation and Vertebrate Fauna Survey

Mattiske (1994) undertook a single season Level 2 survey in the Boodarie Project Area. The survey consisted of a desktop assessment, single season trapping programme, opportunistic recordings, bird surveys, mist netting for bats, spotlighting and habitat assessments. A total of seven trap sites were set up, five of which contained 10 pitfall traps, 10 medium and a single large Elliott trap and two sites that contained 15 medium and two large Elliott traps. Trap sites were open for five nights and total trap effort was 715 trap nights. A reconnaissance survey was conducted between 12-14 September 1994, with the detailed survey conducted in October 1994.

A total of 12 conservation significant fauna were recorded during this survey: Australian Bustard which is listed as Priority 4 under the DEC Priority list, the Eastern Curlew which is listed as Priority 4 under the DEC Priority list and Migratory under the EPBC Act, the White-bellied Sea-eagle (*Haliaeetus leucogaster*), Eastern Osprey, Lesser Sand Plover (*Charadrius mongolus*), Oriental Plover, Common Sandpiper (*Actitis hypoleucos*), Great Knot (*Calidris tenuirostris*), Eastern Curlew, Whimbrel, Common Greenshank (*Tringa nebularia*) and Rainbow Bee-eater which are all listed as Migratory under the EPBC Act. As the survey was completed in 1994 the terminology and status regarding conservation significant fauna has changed. At the time of the survey the Eastern Osprey was not listed as conservation significant, however it is now classified as Migratory under the EPBC Act. Additionally, the Spotted Nightjar (*Eurostopodus argus*) and Collared Kingfisher (*Todiramphus chloris*) were both listed on the Department of Conservation and Land Management Reserve List, but this classification is no longer valid and both species are not listed as conservation significant.

3.1.2 Summary of Results

A summary of the results of each of these surveys is presented in Table 4. It should be noted that differences in survey type, survey timing, extent and the size and location of each study area will have influenced the results. The two surveys that had the highest number of species and conservation significant species recorded were the Level 2 surveys: Outer Harbour Development (ENV.Australia 2009) and Boodarie HBI Project (Mattiske 1994). During these surveys 199 species and 29 conservation significant species, and 105 species and 12 conservation significant species, were recorded respectively. This result is due to the inclusion of a trapping programme and a greater level of survey effort than the other largely Level 1 surveys.

Two reports by Biota (Biota 2002, 2004) are for rail corridors that start in the Port Hedland area but extend for hundreds of km south. Much of the data collected for these reports is irrelevant to this review. Additionally data obtained from the Port Hedland section of the Hope Downs survey (Biota 2002) was used in the FMG Stage A report (Biota 2004). As such only the data obtained from the Port Hedland sites during the Hope Downs survey (Biota 2002) are used in this report.

Table 4: Summary of Previous Fauna Surveys in the Port Hedland Region.

Report Title	Company	Year of Field Work	Level of Assessment	# Conservation Significant Species Recorded	Amphibians	Reptiles	Birds	Mammals	Total
A Biodiversity Assessment of the Utah Point Berth Development	Biota	2008	Desktop	**N/A**	N/A	N/A	N/A	N/A	**N/A**
Bird Survey of Nelson Point Wetlands in April 2011	Bennelongia	2011	Bird Census	**5**	0	0	48	0	**48**
Multi-user Iron Ore Export Facility: Port Infrastructure Project	Coffey	2011	Level 1	**0**	0	0	0	0	**0**
Mooka Siding Level 1 / Targeted Survey	Biologic	2010	Level 1	**6**	0	15	40	17	**72**
Pt Hedland Nelson Pt Dredging Approvals Flora and Fauna Review of DMMA H	Biota	2008	Level 1	**4**	0	0	23	2	**25**
A Flora and Fauna Assessment of RGP5 DMMA A, Port Hedland Harbour	Biota	2008	Level 1	**2**	0	2	13	3	**18**
Rail RGP5 Fauna Survey Bing to Walla Siding and Repeater 1	ecologia	2008	Level 1	**2**	1	10	43	2	**56**
Rail RGP5 Fauna Survey Quarry 1	ecologia	2008	Level 1	**1**	0	9	10	1	**20**
Goldsworthy rail Duplication Fauna Assessment	ENV	2008	Level 1	**2**	0	6	29	4	**39**
RGP5 Northern Quoll Wider Survey Area	ecologia	2008	Target Search	**1**	0	0	0	1	**1**
Outer Harbour Development Fauna Assessment	ENV	2007-2008	Level 2 Combined	**29**	6	53	115	25	**199**
Port Hedland Solar Saltfield Expansion Fauna Survey	Biota	2005	Level 2	**2**	3	38	31	11	**83**

Report Title	Company	Year of Field Work	Level of Assessment	# Conservation Significant Species Recorded	Amphibians	Reptiles	Birds	Mammals	Total
Hope Downs Rail Corridor from Weeli Wolli Siding to Port Hedland Vertebrate Fauna Survey	Biota	2002	Level 2	**8**	0	21	29	5	**55**
Hedland HBI Project – Boodarie Site-Flora Vegetation and Vertebrate Fauna Survey	Mattiske	1994	Level 2	**12**	0	10	69	26	**105**

3.2 LIMITATIONS INFLUENCING THE 2011 SURVEY

It is important to note the limitations that affect the outcomes of individual surveys. These are often difficult to predict, as is the extent to which they influence survey outcomes. There were no constraints to the 2011 survey as all areas were accessible, the survey was completed by experienced staff and timing and weather was appropriate. Survey limitations are detailed below in Table 5.

Table 5: Limitations Associated with the 2011 Survey

Variable	Impact on Survey Outcomes
Access	All of the study area was accessible and surveyed to the appropriate level.
Experience levels	The scientists who undertook this survey were practitioners suitably qualified in their respective fields. • Field Staff: Glen Murray (Senior Zoologist) and John Trainer (Zoologist) • Data Interpretation and Reporting: John Trainer
Timing, weather, season	The rainfall for the six months preceding the survey was above average with 507.8 mm recorded (January to June 2011) compared to the long term average of 274.7 mm for the same period (BOM 2011). Seasonal conditions were considered to be optimal with small pockets of standing water present. The mean daily maximum temperature for the survey period was 27.3^{o}C and mean overnight temperature was 14.5^{o}C (BoM 2011). The weather conditions during the survey did not limit the survey outcomes and would not have impacted the occurrence of conservation significant fauna.
Scope: sampling methods/ intensity	A Level 1 survey was undertaken, along with a review of all previous fauna surveys conducted in the area. All conservation significant species previously recorded in the area have been considered and searched for during the field survey. Based on the habitats present, those species deemed to potentially occur in the study area have been addressed in this report and are discussed in Section 3.6.
Disturbance	No disturbances affected the outcomes of the survey.
Sources of information	At the bioregion level, the Pilbara has been relatively well studied in recent years. Numerous flora and fauna surveys have been undertaken in the vicinity of the study area as part of environmental impact assessment processes.

Variable	Impact on Survey Outcomes
Completeness	A complete Level 1 Fauna survey was undertaken in the study area. All conservation significant species deemed to potentially occur in the study area have been addressed.

3.3 FAUNA HABITATS

Five major fauna habitat types were identified within the study area: Beach/Dunal, Tidal Flats, Mangroves, Riverine and Sandplain. These major habitats cover over 75% of the study area. Five minor habitats were also indentified: Billabong, Low Hill, Granite Tor, Quartz Hill, Rockpile and Quarry.

Habitats were sampled by conducting habitat assessments, the details of which are located in Appendix C. The area of each habitat type in the study area and its habitat value are listed in Table 6 and are illustrated in Figure 3.

The study area contains areas that have been disturbed or developed (Disturbed /Infrastructure); these areas provide little to no habitat value and principally comprise infrastructure, rail lines, roads and tracks. The boundary of the study area encompasses sections of ocean which does not constitute terrestrial fauna habitat; as a result it was not assessed in this survey.

Table 6: Habitat Types of the Study Area

Habitat Type	Area (Ha)	Habitat Value
Beach/Dunal	585.6	High
Tidal Flats	3681.1	High
Mangroves	3238.4	High
Riverine	1289.1	High
Sandplain	54943	Moderate
Billabong	2.4	High
Low Hill	61.2	Moderate
Granite Tor	5.2	High
Quartz Outcrop	1.7	Low
Rockpile	0.9	High
Disturbed/Infrastructure	7404.7	Low
Ocean	9660.7	N/A
Total	**80874.0**	

3.3.1 Major Habitats

Habitat Type: Mangrove

Habitat Rating: High
Habitat Assessments: HA02, HA04, HA12
Area: 3,238.4 Ha

Description

Like the Tidal Flats, Mangrove habitat type is dominated by the tides and is in a constant transition between marine and terrestrial habitats. It differs from the Tidal Flats by the fact that it is dominated by thick groves of Mangrove trees. The vegetation of this habitat type is characterised by high closed *Rhizophora stylosa* and *Avicennia marina* shrubland. The Mangrove trees create a range of microhabitats in the form of tree hollows and foliage for birds to forage, roost and nest in. The Mangroves supports a unique faunal assemblage of Mangrove specialists such as the Mangrove Golden Whistler (*Pachycephala melanura*) and Mangrove Grey Fantail (*Rhipidura phasiana*).

Conservation Significant Fauna

The Mangroves provide refuge and roost sites and in less dense areas foraging opportunities for shorebirds including those classified as Migratory under the EPBC Act. The DEC listed Priority 1 Little Northern Freetail-bat is a mangrove specialist that is likely to roost and forage in this habitat type.

Corresponding Broad Floristic Formation: Mangrove

Landform Description
Soil Attributes: Brown mud
Litter Cover: -% Logs, -% Twigs and -% Leaves
Disturbances: 4WD tracks and rubbish

Habitat Type: Beach/Dunal

Habitat Rating: High
Habitat Assessments: HA03, HA13, HA14
Area: 585.6 Ha

Description

The Beach/Dunal habitat type is the buffer zone that exists between the sea and land. The vegetation of this habitat type is characterised by scattered *Acacia bivenosa* shrubs over **Cenchrus ciliaris* (Buffel Grass) open tussock grassland. Given the large tides experienced in the Port Hedland region this habitat type is in continual change. Above the high tide mark limestone outcrops and sand dunes provide roost and nest locations for marine and shorebirds.

Conservation Significant Fauna

At low tide the exposed reef platforms and sand/mudflats provide an important foraging resource for many shorebirds including those classified as Migratory under the EPBC Act. The sandy beaches of Port Hedland provide known nest sites for marine turtles (DEC 2011c); however, the assessment of these is outside of the scope of this survey.

Corresponding Broad Floristic Formation: Dunes A, B, C and D

Landform Description

Soil Attributes: White sand with sandstone and limestone outcropping
Litter Cover: -% Logs, -% Twigs and -% Leaves
Disturbances: 4WD tracks and rubbish

Habitat Type: Riverine

Habitat Rating: High
Habitat Assessments: HA01, HA05, HA08
Area: 1,289.1 Ha

Description

The two major Riverine habitats of the study area are located along the western and eastern boundaries and are called the Turner and Beebingarra rivers respectively. The vegetation of this habitat type is characterised by low open *Eucalyptus victrix* woodland over a high open *Melaleuca - Acacia* shrubland over open *Triodia epactia* hummock grassland. A large diversity of microhabitats are present in this habitat and include tree hollows, logs, leaf litter, thick vegetation and soft soil suitable for digging and burrowing fauna. Isolated areas of surface water were still present during the survey providing an important water source for the local fauna and shorebirds including those classified as Migratory under the EPBC Act. This habitat type contains mature eucalypt trees that are larger than other trees in the surrounding plains. These trees that line the watercourses most likely function as wildlife corridors. In particular, birds, bats, large mammals (such as the Euro *Macropus robustus*) and wide-ranging reptiles (such as snakes and goannas) are likely to use these drainage lines as a corridor for dispersal. Taking into consideration these factors, this habitat type is considered to be of High habitat value.

Conservation Significant Fauna

Conservation significant fauna likely to forage in this habitat type include the Peregrine Falcon (*Falco peregrinus*), Rainbow Bee-eater, Caspian Tern (*Sterna caspia*) and Ghost Bat.

Corresponding Broad Floristic Formation: Major Drainage Line A, B, C, D and E

Landform Description
Soil Attributes: Cream and red coarse sand
Litter Cover: <1% Logs, <1% Twigs and 5-10% Leaves
Disturbances: 4WD tracks, cattle, bridge and rubbish

Habitat Type: Sandplain

Habitat Rating: Moderate
Habitat Assessments: HA09, HA10, HA15
Area: 54,943 Ha

Description

The Sandplain habitat type dominates the majority of the study area. The vegetation structure consists of a Low *Acacia* shrublands over *Triodia* hummock grasslands. A moderate diversity of microhabitats was present and includes shrubs, grass hummocks and leaf litter. In addition, the soils were suitable for digging and burrowing animals. Due to the microhabitat diversity and the number of conservation significant species this habitat may support, it has been classified as having Moderate habitat value.

Conservation Significant Fauna

Conservation significant fauna likely to utilise this habitat type included the Woma, Rainbow Bee-Eater, Australian Bustard and Bush Stone-curlew.

Corresponding Broad Floristic Formation: Sandplain A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R and S

Landform Description
Soil Attributes: red sand
Litter Cover: -% Logs, 1% Twigs and 1-5% Leaves
Disturbances: 4WD tracks and rubbish

Habitat Type: Tidal Flats

Habitat Rating: High
Habitat Assessments: HA06, HA07, HA11
Area: 3,681.1 Ha

Description

The Tidal Flats is dominated by the tides and is in constant transition between marine and terrestrial habitats. At high tide most of the habitat type is inundated with seawater, however some areas of mudflats remain dry until the highest tides. The vegetation of this habitat type is characterised by scattered *Avicennia marina* shrubs over a low open *Tecticornia* spp. shrubland. The Tidal Flats have a distinct lack of vegetation and associated microhabitats, however due to the importance of this habitat type as a foraging resource for Migratory waders it is classified as having High habitat value.

Conservation Significant Fauna

At low tide large areas of mudflats are exposed and provide important foraging and roosting sites for shorebirds including those classified as Migratory under the EPBC Act.

Corresponding Broad Floristic Formation: Samphire A and B

Landform Description
Soil Attributes: Brown mud
Litter Cover: -% Logs, -% Twigs and -% Leaves
Disturbances: 4WD tracks

3.3.2 Minor Habitats

The Minor habitats Billabong, Low Hill, Granite Tor, Rockpile and Quartz Hill have been mapped in Figure 4. However the Quartz Hills, Rockpiles and Quarry have been mapped as location points only, as they were too small to accurately portray the extent of habitats on a map of that scale.

Habitat Type: Billabong

Habitat Rating: High
Habitat Assessments: HA18
Area: 2.4 Ha

Description
A single Billabong, known as Coolarin Pool, was located in the study area. At the time of the survey Coolarin Pool contained surface water and was an important source of water for local fauna including many waterbirds.
Conservation Significant Fauna
Billabongs provide important foraging and roosting sites for several species of birds including those classified as Migratory under the EPBC Act.

Corresponding Broad Floristic Formation:

Landform Description
Soil Attributes: Granite bedrock
Litter Cover: -% Logs, -% Twigs and -% Leaves
Disturbances: None

Habitat Type: Low Hill

Habitat Rating: Moderate
Habitat Assessments: HA16
Area: 61.2 Ha

Description

The Port Hedland region is dominated by flat and sandy terrain; however to the south of the study area isolated rocky hills are located. The Low Hills provide small pockets of habitat for rock dwelling species, in particular reptile species such as *Gehyra punctata* and *Egernia depressa.*

Conservation Significant Fauna

Low hills provide suitable habitat for the priority listed Western Pebble-mouse.

Corresponding Broad Floristic Formation:

Landform Description
Soil Attributes: Red sandy loam
Litter Cover: -% Logs, 1% Twigs and -% Leaves
Disturbances: Tracks

Habitat Type: Granite Tor /Rockpile

Habitat Rating: High
Habitat Assessments: HA17
Area: 6.1 Ha

Description

Like the Low Hills these habitat features are isolated stony habitats in areas dominated by flat sandy terrain. As such they provide small pockets of habitat for rock dwelling reptile species such as *Gehyra punctata* and *Egernia depressa*.

Conservation Significant Fauna

The Granite Torrs and Rockpile provide many caverns and potential den sites for the Endangered Northern Quoll.

Corresponding Broad Floristic Formation:

Landform Description
Soil Attributes: Granite
Litter Cover: -% Logs, -% Twigs and -% Leaves
Disturbances: None

Habitat Type: Quartz Hill

Habitat Rating: Low
Habitat Assessments: HA19
Area: 1.7 Ha

Description

The Port Hedland region is dominated by flat and sandy terrain with isolated quartz hills. The quartz hills provide small pockets of habitat for rock dwelling species, in particular reptile species such as *Gehyra punctata* and *Egernia depressa*.

Conservation Significant Fauna

The low quartz hills do not provide suitable habitat for the priority listed Western Pebble-mouse.

Corresponding Broad Floristic Formation:

Landform Description
Soil Attributes: Quartz rock
Litter Cover: -% Logs, -% Twigs and -% Leaves
Disturbances: None

Habitat Type: Quarry 1

Habitat Rating: Low
Habitat Assessments: -
Area: -

Description

Although it is not a natural habitat feature, the abandoned granite quarry has a moderate sized pool of water and large boulders that provide habitat for a variety for fauna including the Northern Quoll.

Conservation Significant Fauna

Northern Quolls have been previously recorded on this site (ecologia 2008b and Biologic 2010).

Corresponding Broad Floristic Formation:

Landform Description
Soil Attributes: -
Litter Cover: -% Logs, -% Twigs and -% Leaves
Disturbances: Former quarry

3.4 FAUNA RECORDED DURING THE 2011 SURVEY

During the 2011 survey, a total of 108 vertebrate fauna species was recorded which included two amphibian, 20 reptile, 79 bird, and seven mammal species. Species recorded are listed in Appendix B.

3.4.1 Amphibians

Two species of amphibian, the Desert Tree Frog (*Litoria rubella*) and the Green Tree Frog (*Litoria caerulea*) were recorded during the survey. The Green Tree Frog has not been previously recorded in the vicinity of the study area.

3.4.2 Reptiles

A total of 20 species of reptile were recorded during the present survey with one species, the Mosaic Desert Skink (*Eremiascincus musivus*), not previously recorded in the results of the database search. However this species has been recorded in the study area as part of its recent taxonomic division (Mecke *et al.* 2009).

Gehyra geckos recorded in rocky habitats in the study area all shared the same morphological traits, such as, the same number of subdigital lamellae and shape of the rostral scale. Two individuals from separate locations were collected as specimens and sent to the Western Australian Museum. These were subsequently identified as *Gehyra punctata*, a common and morphologically similar species to *Gehyra nana*. *Gehyra nana* is typically found in the Kimberley and has been recorded once in the vicinity of the study area (Mattiske 1994).

3.4.3 Birds

The current survey recorded 79 bird species. The most speciose families recorded during the survey were Accipitridae (Kites, Hawks and Eagles) with eight species, followed by Ardeidae (Herons and Bitterns) and Columbidae (Doves and Pigeons) each with five species. One bird, the Banded Lapwing (*Vanellus tricolor*) was recorded during the survey but has not previously been recorded within or in the vicinity of the study area.

3.4.4 Mammals

Seven mammal species were recorded in the study area during this survey: Gould's Wattled Bat (*Chalinolobus gouldii)*, Little Broad-nosed Bat (*Scotorepens greyii*), Finlayson's Cave Bat (*Vespadelus finlaysoni*), Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*), Common Sheathtail-bat (*Taphozous georgianus*), Wild Dog (**Canis lupus familiaris*) and Feral Cat (**Felis catus*).

3.5 COMBINED PORT HEDLAND FAUNA ASSEMBLAGES

Fauna assemblages in the study area have been compiled from surveys conducted within and surrounding the study area, NatureMap (DEC 2011a), records from DEC threatened fauna database searches (DEC 2011b) and the DSEWPaC Protected Matters Search Tool (DSEWPaC 2011b), and the results of the recent 2011 survey (see Appendix B).

A total of 316 species have been recorded within and in the vicinity of the study area. This includes 11 amphibian, 74 reptile, 189 bird and 42 mammal species.

3.5.1 Amphibians

Eleven species of amphibians have been recorded from all surveys (Appendix B1). Of these, ten had been previously recorded in surveys conducted in the area with one additional species added during the current survey (Green Tree Frog *Litoria caerulea*).

Common species of amphibian that occur in the area include the Desert Spadefoot (*Notaden nichollsi*) and the Main's Frog (*Cyclorana maini*). The Desert Spadefoot and Main's Frog are burrowing frogs and may be found in the Sandplain and Riverine habitat types, emerging after significant rain events (Cogger 2000, Wilson and Swan 2010).

3.5.2 Reptiles

A total of 74 species of reptiles have been recorded in the vicinity of the study area (Appendix B2). Seventy three of these were recorded previously and one new species, the Mosaic Desert Skink was recorded in the current survey.

Common dragons that occur based on the fauna database review include the Long-nosed Water Dragon (*Amphibolurus longirostris*) and Central Military Dragon (*Ctenophorus isolepis isolepis*). Common geckos include the Spotted Dtella (*Gehyra punctata*) and Fat-tailed Gecko (*Diplodactylus conspicillatus*). Common skinks that occur include the Leopard Ctenotus (*Ctenotus pantherinus ocellifer*), Rock Ctenotus (*Ctenotus saxatilis*) and *Lerista bipes*. Common snakes that occur include the Black-headed Python (*Aspidites melanocephalus*), Gwadar (*Pseudonaja mengdeni*) and the blind snake *Ramphotyphlops ammodytes*.

The Flowerpot Snake (**Ramphotyphlops braminus*) is the only introduced reptile recorded in the general vicinity of the study area.

3.5.3 Birds

A total of 189 species of birds have been recorded within or in the vicinity of the study area (Appendix B3). Of these, 188 have been recorded previously with one additional species (Banded Lapwing) identified during the 2011 survey.

The study area and general vicinity are particularly rich in waterbirds with a total of 83 species listed (Appendix B3). This includes 41 shorebirds (29 species listed as migratory

by EPBC), 31 typical waterbirds (four migratory species) and 11 coastal seabird species (five migratory species).

Common raptors that occur include the Whistling Kite (*Haliastur sphenurus*), Nankeen Kestrel (*Falco cenchroides*) and Brahminy Kite (*Haliastur indus*). Common parrots occur include the Galah (*Cacatua roseicapilla*) and Little Corella (*Cacatua sanguinea*). Common nocturnal birds that occur in the study area include the Spotted Nightjar and Tawny Frogmouth (*Podargus strigoides*).

Common small passerines occur include the Variegated Fairy-wren (*Malurus lamberti*), White-winged Fairy-wren (*Malurus leucopterus*), Magpie-lark (*Grallina cyanoleuca*), Willie Wagtail (*Rhipidura leucophrys*) and Singing Bushlark (*Mirafra javanica*). Common honeyeaters that occur include Singing Honeyeater (*Lichenostomus virescens*), White-plumed Honeyeater (*Lichenostomus penicillatus*) and Brown Honeyeater (*Lichmera indistincta*).

Other common birds that occur in the study area include the Spinifex Bird (*Eremiornis carteri*), Tree Martin (*Petrochelidon nigricans*), Torresian Crow (*Corvus orru*) and Black-faced Woodswallow (*Artamus cinereus*).

Two introduced birds have previously been recorded in the general vicinity of the study area: Domestic Pigeon (**Columba livia*) and Eurasian Tree Sparrow (**Passer montanus*).

3.5.4 Mammals

A total of 42 mammal species have been recorded within and in the vicinity of the study area (Appendix B4). No new species were identified during the current survey.

The Little Red Kaluta (*Dasykaluta rosamondae*) and the Euro (*Macropus robustus*) are the most common marsupials that are expected to occur. Common rodents expected to occur include the Spinifex Hopping-mouse (*Notomys alexis*) and Sandy Inland Mouse (*Pseudomys hermannsburgensis*). Common bats expected to occur include the Gould's Wattled Bat (*Chalinolobus gouldii*) and the Little Broad-nosed Bat (*Scotorepens greyii*).

A total of ten introduced mammals have previously been recorded in the general vicinity of the study area: the House Mouse (**Mus musculus*), European Rabbit (**Oryctolagus cuniculus*), Wild Dog (Note that this taxon is not counted in the species tally, as it is included with Dingo *Canis lupus dingo*), Fox (**Vulpes vulpes*), Feral Cat, Horse (**Equus caballus*), Camel (**Camelus dromedarius*), Pig (**Sus scrofa*), European Cattle (**Bos taurus*) and Sheep (**Ovis aries*).

3.6 CONSERVATION SIGNIFICANT FAUNA

A total of 61 conservation significant species were considered to potentially occur in the study area. Of these 61 potentially occurring conservation significant species, 38 have been recorded in the study area during either this 2011 survey or previous surveys

(Appendix E). This includes 33 birds, three mammals and two reptiles. A total of 16 species of conservation significance were recorded during the 2011 survey, consisting of one reptile and 15 birds (Figure 5a-b and 6a-b). A summary of the ecology and habitat requirements of these 33 recorded conservation significant species is described in Table 7.

Of the remaining 24 potentially occurring conservation significant species, 17 species were assessed as 'Likely' to occur, four species were considered as 'Possible' to occur, two species were considered 'Unlikely' to occur and one species was considered 'Highly Unlikely' to occur. The ecology and habitat requirements for each of these 24 potentially occurring species are detailed in Table 8. The likelihood of a species occurrence was determined based upon habitats present in the study area and the ecological requirements of the species in question.

Table 7: Conservation Significant Fauna Recorded in the Study Area

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance
REPTILES			
Gehyra nana	Locally Significant	*Gehyra nana* inhabits rocky outcrops and ranges in the north of Australia from the Kimberley to Cape York Peninsula. This species was recorded in the Port Hedland region in the Boodarie survey (Mattiske 1994) and there is some taxonomic uncertainty with this species in the Pilbara.	The rocky minor habitat types such as the Granite Outcrop, Rockpile and Quarry provides suitable habitat for this species. The study area is outside of this species known distribution and there have been no subsequent records of this species in the Port Hedland region since the original record in 1994 (Mattiske 1994).
Woma (*Aspidites ramsayi*)	S4, EN (IUCN Redlist)	The Woma inhabits spinifex within woodlands, heaths and shrublands. It occurs in the subhumid and arid areas across Australia's interior with a separate sub-population occurring in the Wheatbelt and Goldfields of Western Australia (Wilson and Swan 2010). The Woma shelters in hollow logs, animal burrows or thick vegetation (Cogger 2000).	The Sandplain habitat of the study area provides ideal habitat for this species as it contains a thick ground cover of spinifex. This species was recorded during this survey in the Sandplain habitat and has been previously recorded nearby (Approximately 3 km away) in the same habitat type during the Outer Harbour Development survey (ENV.Australia 2009). Two recent records of the Woma exist from adjacent areas, from Indee (20 km south) and Pippingarra (5 km east) (DEC 2011b).
BIRDS			
Lesser Frigatebird (*Fregata ariel*)	Mi,S3	The Lesser Frigatebird occurs in coastal areas of northern Western Australia and extends south to the Dampier Archipelago (Johnstone and Storr 1998). This species breeds on the tropical islands to the north of Western Australia and is a regular visitor during Summer- Autumn (Pizzey and Knight 2007).	This species is predominantly pelagic and no breeding records exist for the Port Hedland region. As such this species is likely to be restricted to the Beach/Dunal habitat type. The Lesser Frigatebird has been previously recorded in the study area (ENV.Australia 2009).

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance
Cattle Egret (*Ardea ibis*)	Mi,S3	The Cattle Egret occurs in the wetter parts of Western Australia, in particular the Kimberley and the south-west. The species inhabits pastures, garbage tips, crops, wetlands, tidal flats and drains (Pizzey and Knight 2007). This species also In Western Australia it is an irregular visitor, occurring mostly in autumn, and is not thought to breed regularly in Western Australia (Johnstone and Storr 1998).	The Cattle Egret was recorded in the Tidal Flats of the study area during the 2011 survey, however, this is not the typical habitat for this species. The Sandplain habitat type particularly during the wetter months when standing water is present provides suitable habitat for this species.
Eastern Great Egret (*Ardea modesta*)	Mi,S3	The Eastern Great Egret occurs in the Kimberley, Pilbara, and on the west coast from the Murchison River south, throughout the south-west, and east to Cape Arid in WA. It inhabits mostly shallow fresh lakes, pools in rivers, lagoons, lignum swamps, clay pans and samphire flats, large dams and sewage ponds. It also inhabits shallow saltwater habitat such as mangrove creeks, tidal pools, samphire swamps and salt work ponds. It breeds colonially at wooded swamps and river pools, nesting in various riparian trees (Johnstone and Storr 1998)	The Riverine, Mangrove and Tidal Flats of the study area provide suitable foraging habitat for this species. The Eastern Great Egret has been previously recorded in the vicinity of the study area (DEC 2011a and ENV.Australia 2009) and was recorded foraging in a small pool of water in the Riverine habitat during the 2011 survey.

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance
Eastern Reef Egret (*Egretta sacra*)	Mi,S3	The Eastern Reef Egret occurs in coastal areas along the entire West Australian coast, although it is more common in the warmer regions to the north. The species inhabits beaches, rocky shores, tidal rivers and inlets, mangroves, and exposed coral reefs. Although it is listed as migratory, the Eastern Reef Egret is largely sedentary in nature (Johnstone and Storr 1998).	The Beach/Dunal, Tidal Flats and Mangroves provide suitable habitat for this species. The Eastern Reef Egret has been previously recorded in the vicinity of the study area (DEC 2011a and ENV.Australia 2009) and was recorded foraging in the Tidal Flats during the 2011 survey.
White-bellied Sea-eagle (*Haliaeetus leucogaster*)	Mi,S3	The White-bellied Sea-eagle is distributed along the coast, islands and estuaries of WA but not the lower west and south-west or far east (Johnstone and Storr 1998). They feed on fish, sea snakes and nesting seabirds. White-bellied Sea- Eagles are known to breed almost wholly on islands or near coastal areas (Johnstone and Storr 1998). Nests are usually placed on high ground such as rock pinnacles, rigid shrubs or in tall trees (Simpson and Day 2004).	The Beach/Dunal, Tidal Flats, Riverine and Mangroves the survey area provides suitable habitat for this species. The White-bellied Sea-eagle has been previously recorded in the vicinity of the study area (DEC 2011a, ENV.Australia 2009 and Mattiske 1994) and was recorded foraging over the Tidal Flats and Mangrove habitats during the 2011 survey. No nesting habitat is present within the study area.
Eastern Osprey (*Pandion haliaetus*)	Mi,S3	The Eastern Osprey is distributed along the coast, islands and lower river courses of Western Australia. They feed on fish and other marine animals (Johnstone and Storr 1998). They nest in trees, cliffs and sometimes structures such as radio towers, often close to the water.	The Beach/Dunal, Tidal Flats, Riverine and Mangroves the survey area provides suitable habitat for this species. The Eastern Osprey has been previously recorded in the vicinity of the study area (DEC 2011a, ENV.Australia 2008, 2009 and Mattiske 1994) and was recorded in the Beach/Dunal habitat during the 2011 survey. This species has been observed nesting in lighting towers within the vicinity of the Port Headland townsite.

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance
Australian Bustard (*Ardeotis australis*)	P4	The Australian Bustard is typically widespread and nomadic, but locally scarce. This species is distributed across most of Western Australia, although is most prevalent in grasslands, especially tussock grasses, arid scrub and dry open woodlands (Ziembicki 2010). The abundance of this species varies according to habitat and season, in particular with the abundance of grasshoppers. Habitat loss has led to a decline in this species in the Pilbara (Johnstone and Storr 1998).	The Sandplain habitat of the study area provides ideal habitat for this species. The Australian Bustard has been previously recorded in the vicinity of the study area (DEC 2011a and b, Biologic 2010, ENV.Australia 2009, Biota 2006 and Mattiske 1994) and footprints were recorded in the Sandplain habitat during the current survey.
Bush Stone-curlew (*Burhinus grallarius*)	P4	The Bush Stone-curlew inhabits dry open woodlands with groundcover of small sparse shrubs, grass or litter of twigs. It tends to avoid dense forest, closed-canopy habitats (Morcombe 2000). The species generally occurs near a watercourse or swamp (Geering *et al.* 2007). Bush Stone-curlews are locally rare because of predation by foxes - the main cause of their regional decline (Johnstone and Storr 1998).	The Riverine, Sandplain habitat, particularly that around the Riverine habitat and Coolarin Pool provides ideal habitat for this species. The Bush Stone-curlew has been previously recorded in the vicinity of the study area (DEC 2011b and Biologic 2010) and a roadkill individual was recorded in the Sandplain habitat during the current survey.
Greater Sand Plover (*Charadrius leschenaultii*)	Mi,S3	The Greater Sand Plover is a summer non-breeding migratory shorebird that is common on the north and west coast of Western Australia. It inhabits exposed sand and mud flats (Geering *et al.* 2007).	The Beach/Dunal and Tidal Flats habitat provides ideal habitat for this species. The Greater Sand Plover has been previously recorded within and in the vicinity of the study area (DEC 2011a, ENV.Australia 2009 and Mattiske 1994).

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance
Lesser Sand Plover (*Charadrius mongolus*)	Mi,S3	The Lesser Sand Plover is a summer non-breeding migratory shorebird that occurs on the north and west coast of Western Australia, but rarely south of Shark Bay. It inhabits exposed sand and mud flats and often intermingles with flocks of the Greater Sand Plover (Geering *et al.* 2007).	The Beach/Dunal and Tidal Flats habitat provides ideal habitat for this species. The Lesser Sand Plover has been previously recorded within and in the vicinity of the study area (DEC 2011a and ENV.Australia 2009).
Grey Plover (*Pluvialis squatarola*)	Mi,S3	The Grey Plover is a common summer migrant that inhabits coastal areas, preferring marine shores of estuaries or lagoons on broad open mudflats, sandy bars or beaches and rocky coasts as well as coastal salt lakes and swamps (Morcombe 2000). They occasionally are found in drying freshwater lakes (Johnstone and Storr 1998).	The Beach/Dunal, Tidal Flats and Riverine habitat particularly towards the mouth of the river, provides suitable habitat for this species. The Grey Plover has been previously recorded in the vicinity of the study area (DEC 2011a, ENV.Australia 2009 and Mattiske 1994) and was recorded in the Tidal Flats habitat during the 2011 survey.
Oriental Plover (*Charadrius veredus*)	Mi,S3	The Oriental Plover occurs in the Kimberley and in the north-eastern interior at Lake Gregory and on the north-west coastal plains (Johnstone and Storr 1998). It is found on sparsely vegetated plains including Samphire, Spinifex plains (particularly after fire), as well as beaches and tidal flats (Johnstone and Storr 1998). This species often feeds on insects (Johnstone and Storr 1998).	The Beach/Dunal, Tidal Flats and Sandplain habitat provide suitable habitat for this species. The Oriental Plover has been previously recorded in the study area (Biologic 2010, ecologia 2008a, ENV.Australia 2009 and Mattiske 1994).

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance
Common Sandpiper (*Actitis hypoleucos*)	Mi,S3	The Common Sandpiper occurs along the coast of Western Australia and in much of the interior. It inhabits sheltered salt and fresh waters such as estuaries, mangrove creeks, rocky coasts, salt lakes, river pools, lagoons, claypans, drying swamps, flood waters, dams and sewage ponds (Johnstone and Storr 1998). It occasionally occurs inland in a variety of wetlands (Geering *et al*. 2007). The species is a non-breeding migrant to Western Australia occurring at any time of year, but mostly September to March in the south-west (Johnstone and Storr 1998).	The Beach/Dunal, Tidal Flats, Mangrove and Riverine habitats provides suitable habitat for this species. The Common Sandpiper has been previously recorded in the study area (DEC 2011a, ENV.Australia 2009 and Mattiske 1994).
Ruddy Turnstone (*Arenaria interpres*)	Mi,S3	The Ruddy Turnstone is a summer non-breeding migratory shorebird that occurs on the coast of the north-west and west coast from Beagle Bay to Shark Bay (Johnstone and Storr 1998). It occurs primarily on rocky coasts and rocky reefs, as well as tidal mudflats and beaches and pebbly shores of near-coastal salt lakes and salt-work ponds (Johnstone and Storr 1998).	The Beach/Dunal and Tidal Flats habitat provides suitable habitat for this species. The Ruddy Turnstone has been previously recorded in the vicinity of the study area (DEC 2011a and ENV.Australia 2009) and was recorded in the Tidal Flats habitat during the 2011 survey.
Red Knot (*Calidris canutus*)	Mi,S3	The Red Knot is a summer non-breeding migratory shorebird that occurs along most of the coast of Western Australia (Johnstone and Storr 1998). It inhabits larger inter-tidal mud and sand flats (Geering *et al.* 2007).	The Beach/Dunal and Tidal Flats habitat provides suitable habitat for this species. The Red Knot has been previously recorded in the study area (DEC 2011a and ENV.Australia 2009).

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance
Curlew Sandpiper (*Calidris ferruginea*)	Mi,S3	The Curlew Sandpiper is a summer non-breeding migratory shorebird that occurs along most of the coast of Western Australia. It inhabits exposed tidal mudflats, and less frequently on inland freshwater wetlands (Geering *et al.* 2007).	The Tidal Flats habitat provides suitable habitat for this species. The Curlew Sandpiper has been previously recorded in the study area (DEC 2011a and ENV.Australia 2009).
Red-necked Stint (*Calidris ruficollis*)	Mi,S3	The Red-necked Stint is a summer non-breeding migratory shorebird that occurs along most of the coast of Western Australia. It inhabits a wide range of fresh and saltwater habitats such as tidal mudflats, salt marshes and sandy beaches (Pizzey and Knight 2007).	The Beach/Dunal and Tidal Flats habitat provides suitable habitat for this species. The Red-necked Stint has been previously recorded in the vicinity of the study area (DEC 2011a and ENV.Australia 2009) and was recorded in the Tidal Flats habitat during the current survey. The Port Hedland Saltworks supports more than 1% of the global population of this species (Birddata 2011).
Great Knot (*Calidris tenuirostris*)	Mi, S3,Vu (IUCN Redlist)	The Great Knot is a summer non-breeding migratory shorebird that occurs along most of the coast of Western Australia. It inhabits larger inter-tidal mud and sand flats (Geering *et al.* 2007).	The Beach/Dunal and Tidal Flats habitat provides suitable habitat for this species. The Great Knot has been previously recorded in the study area (DEC 2011a, ENV.Australia 2009 and Mattiske 1994).
Bar-tailed Godwit (*Limosa lapponica*)	Mi,S3	The Bar-tailed Godwit a relatively common summer non-breeding migratory shorebird that occurs along most of the coast of Western Australia and typically inhabits inter-tidal mudflats (Geering *et al.* 2007).	The Tidal Flats habitat provides suitable habitat for this species. The Bar-tailed Godwit has been previously recorded in the vicinity of the study area (DEC 2011a and ENV.Australia 2009) and was recorded in the Tidal Flats habitat during the 2011 survey.

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance
Eastern Curlew (*Numenius madagascariensis*)	Mi, S3, P4, Vu (IUCN Redlist)	The Eastern Curlew is a large non-breeding migratory shorebird, found commonly along the north coast of Western Australia, but rarely south of Shark Bay. It inhabits a range of coastal habitats, but primarily inter-tidal mudflats, particularly on exposed seagrass beds or mudflats feeding on burrowing crabs or shrimps (Geering *et al*. 2007).	The Beach/Dunal and Tidal Flats habitat provides suitable habitat for this species. The Eastern Curlew has been previously recorded in the study area (DEC 2011a,b, Biota 2009, Biota 2008b, ENV.Australia 2009 and Mattiske 1994).
Little Curlew (*Numenius minutus*)	Mi,S3	The Little Curlew is a medium sized shorebird and is typically found on short, dry grasslands. Flocks are highly mobile moving unpredictably according to grassland conditions, often congregating in wetlands to drink when conditions are hot. This species breeds in north-east Siberia and migrates to the sub-coastal plains of northern Australia during summer (Geering *et al.* 2007).	The Sandplain habitat particularly around the Riverine habitat and the Billabong (Coolarin Pool) provides suitable habitat for this species. There have been numerous recent records of the Little Curlew from the vicinity of the study area (DEC 2011a and Bennelongia 2011).
Whimbrel (*Numenius phaeopus*)	Mi,S3	The Whimbrel is a large non-breeding migratory shorebird, found commonly along the north coast of Western Australia, but less commonly south of Shark Bay (Geering *et al*. 2007). This species typically inhabits mudflats of estuaries or lagoons (Morcombe 2000).	The Tidal Flats habitat provides suitable habitat for this species. The Whimbrel has been previously recorded in the vicinity of the study area (DEC 2011a, Bennelongia 2011, Biota 2009, Biota 2008b, ENV.Australia 2009 and Mattiske 1994) and was recorded in the Tidal Flats habitat during the 2011 survey.

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance
Grey-tailed Tattler (*Tringa brevipes*)	Mi,S3	The Grey-tailed Tattler is a non-breeding migratory shorebird, common on the north and west coasts of Western Australia, but rare on the south *coast* (Geering *et al.* 2007). It inhabits sheltered coasts with reef and rock platforms or with inter-tidal mudflats (Morcombe 2000).	The Beach/Dunal and Tidal Flats habitat provides suitable habitat for this species. The Grey-tailed Tattler has been previously recorded in the study area (DEC 2011a, Bennelongia 2011, ENV.Australia 2009 and Mattiske 1994).
Wood Sandpiper (*Tringa glareola*)	Mi,S3	The Wood Sandpiper is a summer non-breeding migratory shorebird that occurs along the coast and inland regions of Western Australia. It primarily inhabits shallow fresh waters such as lagoons, swamps, claypans, dams and sewerage ponds (Johnstone and Storr 1998).	The Riverine habitat and the Billabong (Coolarin Pool) provide the fresh water wetland habitat which is preferred by this species. There have been numerous recent records of the Wood Sandpiper from the vicinity of the study area (DEC 2011a and Bennelongia 2011).
Common Greenshank (*Tringa nebularia*)	Mi,S3	The Common Greenshank, is a non-breeding migratory shorebird, common along most of the coast of Western Australia (Geering *et al*. 2007). It inhabits intertidal mudflats, as well as fresh and saltwater wetlands of the coast or inland (Geering *et al*. 2007).	The Tidal Flats, Riverine habitat and Billabong (Coolarin Pool) provide the mudflats and freshwater wetlands preferred by this species. The Common Greenshank has been previously recorded in the study area (DEC 2011a, ENV.Australia 2009 and Mattiske 1994).
Marsh Sandpiper (*Tringa stagnatilis*)	Mi,S3	The Marsh Sandpiper is a summer non-breeding migratory shorebird that occurs along the coast and interior of Western Australia but in the south-west less frequently inland. It inhabits freshwater or saltwater wetlands but avoids open beaches and mudflats unless well protected (Geering *et al*. 2007).	The Riverine habitat and Billabong (Coolarin Pool) provide the freshwater wetlands preferred by this species. The Marsh Sandpiper has been previously recorded in the study area (DEC 2011a and ENV.Australia 2009).
Terek Sandpiper (*Xenus cinereus*)	Mi,S3	The Terek Sandpiper is a summer non-breeding migratory shorebird that	The Tidal Flats particularly those situated close to the Mangroves provide suitable habitat for this

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance
		occurs along the north coast of Western Australia, but rarely south of Shark Bay. It inhabits exposed sea-grass beds in estuaries and bays or on inter-tidal mudflats fringed by mangroves (Geering *et al*. 2007).	species. The Terek Sandpiper has been previously recorded in the study area (DEC 2011a, ENV.Australia 2009 and Mattiske 1994).
Little Tern (*Sterna albifrons*)	Mi,S3	The Little Tern is distributed along the northern coast of Western Australia south to Broome. There are three sub populations that occur, two that breed in Australia and the third that migrates north to breed in Asia but spends the spring/summer in Australia (DSEWPaC 2011c). This species inhabits coastal and estuarine areas, breeding on sandy beaches and sand spits (Simpson and Day 2004).	The Beach/Dunal and near coastal sections of the Riverine habitat provide suitable habitat for this species. The Little Tern has been previously recorded in the study area (DEC 2011a, Biota 2009 and ENV.Australia 2009).
Lesser Crested Tern (*Sterna bengalensis*)	Mi,S3	The Lesser Crested Tern is distributed along the north-western and upper west coasts of Western Australia and occasionally comes as far south as Shark Bay. This species inhabits mainly blue water seas around islands or reefs and commonly visits tidal creeks. It breeds on the many small islands found along the north-west coast (Johnstone and Storr 1998).	The Beach/Dunal and near coastal sections of the Riverine habitat provide suitable habitat for this species. The Lesser Crested Tern has been previously recorded in the study area (DEC 2011a and ENV.Australia 2009).
Caspian Tern (*Sterna caspia*)	Mi,S3	The Caspian Tern is distributed along the coast of Western Australia. It is scarce or uncommon north of Broome and uncommon to moderately common further south (Johnstone and Storr 1998). This species inhabits coastal areas as well as inland watercourses, saline and brackish	The Beach/Dunal and near coastal sections of the Riverine habitat provide suitable habitat for this species. The Caspian Tern has been previously recorded in the vicinity of the study area (DEC 2011a and ENV.Australia 2009) and was recorded foraging in the Riverine habitat during the 2011 survey.

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance
		lakes (Simpson and Day 2004).	
Fairy Tern (*Sterna nereis*)	VU (IUCN Redlist)	The Fairy Tern is distributed along the coast of Western Australia from Port Hedland in the north to Albany in the south (Barrettt *et al.* 2003). This species inhabits sheltered blue-water seas close to land, esturies and near coastal lakes (Johnstone and Storr 1998).	The Beach/Dunal and near coastal sections of the Riverine habitat provide suitable habitat for this species. The Fairy Tern has been previously recorded in the vicinity of the study area (DEC 2011a and ENV.Australia 2009).
Rainbow Bee-eater (*Merops ornatus*)	Mi,S3	The Rainbow Bee-eater is a common and widespread species in Western Australia, except in the drier interior of the State and the far south-west. It occurs in lightly wooded, often sandy country, preferring areas near water. The Rainbow Bee-eater feeds on airborne insects, and nests throughout its range in burrows excavated in sandy ground or banks, often at the margins of roads and tracks (Johnstone and Storr 1998).	The Riverine and Sandplain habitat of the study area provides ideal habitat for this species. The Rainbow Bee-eater has been previously recorded in the vicinity of the study area (Biologic 2010, Biota 2009, ecologia 2008a, ENV.Australia 2008, 2009 and Mattiske 1994) and was recorded in the Riverine and Sandplain habitat during the current survey.
Star Finch (Western) (*Neochmia ruficauda subclarescens*)	P4	The western subspecies of the Star Finch is confined to the Pilbara region of WA (Pizzey and Knight 2007). The species occurs in grasslands with sparse vegetation, and feeds mainly on grass seeds and some small insects (Johnstone and Storr 2004). Like most finches this species needs regular water, so is likely to occur near permanent water for most of the season then disperse out to a wider area during and after the wet season when ephemeral pools have water.	The Riverine, Sandplains particularly those around the Riverine habitat and the Billabong (Coolarin Pool) provide suitable habitat for this species. There have been numerous recent records of the Star Finch from the vicinity of the study area (DEC 2011a and Bennelongia 2011).

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance
MAMMALS			
Northern Quoll (*Dasyurus hallucatus*)	EN, EN (IUCN Redlist), S1	The Northern Quoll occurs mainly in areas of open eucalypt woodland within 200 km of the coast, although it has been recorded in a range of vegetation types, and is known to den in rock crevices and rock piles. It favors rocky areas, taking refuge in rock crevices, and utilises gullies and drainage lines (van Dyck and Strahan 2008). The Northern Quoll may be locally common, but its former range has retracted considerably (van Dyck and Strahan 2008). The Northern Quoll also has a relatively large home range with males in the Northern Territory utilizing areas of up to 153 ha, however this likely to be an underestimate (Oakwood 2002). The maximum distances recorded for movement between successive dens on successive days is 1.85 km for a male and 1.21km for a female (Oakwood 2002).	The Granite Tor, Rockpile and Quarry provide suitable den sites for this species. The Riverine and Sandplain habitats provide suitable foraging habitat. The Northern Quoll has been recently recorded throughout the study area (DEC 2011a,b, Biologic 2010 and ecologia 2008b and 2009). A total of 227 Northern Quoll individuals have been recorded in the vicinity of Pippingarra over the past three years (DEC 2011b). Possible Northern Quoll scats were recorded in three locations during the current survey.
Little Northern Freetail-bat (*Mormopterus loriae cobourgensis*)	P1	The Little Northern Freetail-bat inhabits mangrove communities, roosting in crevices and sprouts of the dead upper branches of the mangrove Avicennia marina (van Dyck and Strahan 2008). The genus for this species is in the process of being renamed in a recent taxonomic review of molossids by Terry Reardon, which has shown the genus Mormopterus	The Mangroves and the surrounding Tidal Flats provide suitable habitat for this species. The Little Northern Freetail-bat has been recently recorded in the study area (DEC 2011a and b, Biota 2006 and ENV.Australia 2009).

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance
		does not occur in Australia (Churchill 2008).	
Western Pebble-mouse (*Pseudomys chapmani*)	P4	The Western Pebble-mouse is restricted to the Pilbara, where it is recognized as an endemic species. Abandoned mounds to the east of its current range indicate a decline in distribution (Menkhorst and Knight 2004). Abandoned mounds in disturbed areas suggest that the species is under threat by grazing and mining activities. The construction of extensive pebble mounds, built from small stones, which typically cover areas from 0.5-9.0 square metres, is characteristic of this species. Mounds are restricted to suitable-class stones, and are usually found on gentle slopes and spurs.	The Low Hills situated to the south of the study area provide small pockets of suitable habitat for this species. Active pebble-mounds were recorded during the Mooka Siding survey (Biologic 2010) which was located both inside and outside of the study area (Figure 5). Numerous recent records exist for the Western Pebble-mouse in the vicinity of the study area (DEC 2011a,b).

KEY:	
EN	Listed as Endangered under the EBPC Act 1999.
VU	Listed as Vulnerable under the EBPC Act 1999.
Mi	Listed as Migratory under the EBPC Act 1999.
S	Scheduled under the WC Act 1950. Schedule 1, 2 and 3 fauna are also protected by the EBPC Act 1999.
EN	Endangered under the IUCN Redlist
VU	Vulnerable under the IUCN Redlist
NT	Near Threatened under the IUCN Redlist
LC	Least Concern under the IUCN Redlist
P	Listed as Priority by the DEC.

Table 8: Conservation Significant Fauna Potentially Occurring in the Study Area

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
BIRDS				
Flock Bronzewing (*Phaps histrionica*)	P4	The Flock Bronzewing is highly nomadic, and is found in open woodland and treeless grass plains (Simpson and Day 2004). This species of pigeon is highly gregarious, usually feeding and drinking in large flocks of many thousands. The Flock Bronzewing has a very patchy distribution through northern Australia, and its abundance appears to be in decline due to the degradation of grasslands by introduced livestock (Johnstone and Storr 1998).	The Sandplain habitat of the study area provides suitable habitat for this species, however there have been no previous records of this species from the vicinity of the study area. The closest record of this species is from more than 70 km away (DEC 2011a).	Possible
Fork-tailed Swift (*Apus pacificus*)	Mi,S3	The Fork-tailed Swift is a summer migrant (October-April) to Australia. This species is an aerial species, which forages high above the tree canopy and rarely lower, so is less affected by localized ground disturbance. It usually occurs in flocks of up to 2000 and is often seen accompanying Tree Martins and Masked Woodswallows (Johnstone and Storr 1998).	As this species forages high (above the canopy) it is reasonably independent of the habitats within the study area. This species will only be found flying over the study area on an infrequent basis particularly in November for the Pilbara (Johnstone and Storr 1998). There have been numerous recent records of this species from the vicinity of the study area (DEC 2011a).	Likely
Grey Falcon (*Falco hypoleucos*)	P4	The Grey Falcon is distributed across the northern half of the state and rarely extends further south than the Gascoyne and Warburton areas	The Sandplain and Riverine habitats of the study area provide suitable habitat for the Grey Falcon. The Grey Falcon has been previously recorded	Likely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
		(Johnstone and Storr 1998). This species is considered scarce to rare and is usually found singularly or sometimes in pairs. It occurs in a range of habitats from lightly wooded coastal areas to riverine plains. Grey Falcons do not build their own nests when breeding, and therefore are less prone to site fidelity than other raptor species, although they may remain faithful to a home range for several years (Johnstone and Storr 1998). They are a difficult species to study, having a strongly transient nature.	at Yule River, Mundabullangana in 2000 approximately 30 km west of the study area (DEC 2011b).	
Peregrine Falcon (*Falco peregrinus*)	S4	The Peregrine Falcon is uncommon but wide-ranging across Australia. They occur mainly along coastal cliffs, rivers and ranges as well as wooded watercourses and lakes. The Peregrine Falcon nests primarily on cliffs, granite outcrops and quarries, and feed mostly on birds (Johnstone and Storr 1998).	The rock faces located in the granite quarry may provide suitable nest sites for this species, although none were observed during the current survey. Prey items are abundant and this species may forage across the Riverine and Sandplain habitats. There are numerous previous records of this species from the vicinity of the study area (DEC 2011a,b).	Likely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
Pacific Golden Plover (*Pluvialis fulva*)	Mi,S3	The Pacific Golden Plover is a common summer migrant that has a widespread distribution along the West Australian coast. It inhabits salt or brackish marshes and near coastal salt lakes (Johnstone and Storr 1998). This Migratory bird breeds in Siberia and Alaska and migrates to Australian waters in August to April (Pizzey and Knight 2007). This species requires marine waters for habitat such as beaches, mudflats and among rocky areas; sometimes inland (Simpson and Day 2004).	The Beach/Dunal and Tidal Flats habitat provides suitable habitat for this species. The Pacific Golden Plover has been recently recorded in the vicinity of the study area on numerous occasions (DEC 2011a).	Likely
Sharp-tailed Sandpiper *(Calidris acuminata*)	Mi,S3	The Sharp-tailed Sandpiper is a summer non-breeding migratory shorebird that occurs along most of the coast of Western Australia except for the south coast, and in well-watered parts of the interior and casually in the arid east south of Lake Gregory (Johnstone and Storr 1998). It inhabits both coastal and inland areas but prefers non-tidal fresh or brackish wetlands (Geering *et al.* 2007).	The Riverine habitat and Billabong (Coolarin Pool) provides the fresh water wetland habitat which is preferred by this species. There have been numerous recent records of the Sharp-tailed Sandpiper from the vicinity of the study area (DEC 2011a).	Likely
Sanderling (*Calidris alba*)	Mi,S3	The Sanderling is a small compact shorebird and is often found in small to large flocks, mostly on open beaches exposed to surf. This species has also been recorded within inter-tidal mudflats. This	The Beach/Dunal and Tidal Flats habitat provides suitable habitat for this species. There have been numerous recent records of the Sanderling from the vicinity of the study area (DEC 2011a).	Likely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
		species distinctly dashes between waves when feeding and is known at high tide to roost among beach debris (Geering *et al.* 2007).		
Long-toed Stint (*Calidris subminuta*)	Mi,S3	The Long-toed Stint is an uncommon non-breeding summer migratory shorebird that occurs along the majority of the coast of Western Australia (Pizzey and Knight 2007). It inhabits the weedy margins of shallow wetlands - coastal and inland, sewerage ponds and tidal mudflats (Pizzey and Knight 2007).	The Beach/Dunal and Tidal Flats habitat provides suitable habitat for this species. The most recent record for Long-toed Stint in the vicinity of the study area is from more than 30 years ago (DEC 2011a).	Possible
Pin-tailed Snipe (*Gallinago stenura)*	Mi,S3	The Pin-tailed Snipe is an uncommon migratory shorebird in Australia. This species is usually found in freshwater wetlands such as swamps, soaks, river pools, floodwaters and sewerage ponds (Geering *et al.* 2007).	The Riverine habitat and Billabong (Coolarin Pool) provides the fresh water wetland habitat which is preferred by this species. The most recent record for Pin-tailed Snipe in the vicinity of the study area is from more than 30 years ago (DEC 2011a).	Possible
Oriental Pratincole (*Glareola maldivarum*)	Mi,S3	The Oriental Pratincole occurs in the Kimberley and along the northern coast of Western Australia, and is a summer migrant. It occurs around tidal flats and floodwaters where it feeds aerially on flying insects and roosts on bare ground (Johnstone and Storr 1998).	The Tidal Flats of the study area provides suitable habitat for this species. There have been numerous recent records of the Oriental Pratincole in the vicinity of the study area (DEC 2011a).	Likely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
Asian Dowitcher (*Limnodromus semipalmatus*)	Mi,S3	The Asian Dowitcher is a relatively uncommon migratory shorebird in Western Australia. This species usually occurs solitarily or in very small flocks usually on intertidal mudflats. The Asian Dowitcher is a large shorebird with long legs and long straight slightly dropped bill (Geering *et al.* 2007).	The Tidal Flats habitat provides suitable habitat for this species. There have been numerous recent records of the Asian Dowitcher from the vicinity of the study area (DEC 2011a).	Likely
Broad-billed Sandpiper (*Limicola falcinellus*)	Mi,S3	The Broad-billed Sandpiper is a scarce summer migrant to coastal areas through out Western Australia and occasionally inland areas (Pizzey and Knight 2007). It inhabits estuarine flats, coastal salt lakes and drying fresh water lakes (Johnstone and Storr 1998).	The Riverine habitat particularly at the mouth of the River and the Billabong (Coolarin Pool) provides the estuarine/fresh water wetland habitat which is preferred by this species. There have been numerous recent records of the Broad-billed Sandpiper from the vicinity of the study area (DEC 2011a).	Likely
Black-tailed Godwit (*Limosa limosa*)	Mi,S3	The Black-tailed Godwit is an uncommon summer non-breeding migratory shorebird that occurs along most of the coast of Western Australia (Geering *et al.* 2007). It inhabits fresh and brackish wetlands as well as inter-tidal mudflats (Geering *et al.* 2007). This Migratory bird breeds of the coast of Mongolia and Siberia. It migrates to Australian waters in September to May (Pizzey and Knight 2007).	The Tidal Flats habitat provides suitable habitat for this species. The Black-tailed Godwit has been previously recorded in the vicinity of the study area (DEC 2011a).	Likely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
Ruff (*Philomachus pugnax*)	Mi,S3	The Ruff is a rare but regular visitor to Australia, particularly on muddy margins of freshwater and brackish swamps, lakes and salt-works (Geering *et al.* 2007).	The Beach/Dunal and Tidal Flats habitat provides suitable habitat for this species. The Ruff has been previously recorded in the vicinity of the study area (DEC 2011a).	Likely
Australian Painted Snipe (*Rostratula australis*)	VU, EN (IUCN Redlist),S1	The Australian Painted Snipe has a patchy distribution across Western Australia, inhabiting inland and coastal shallow freshwater wetlands, including dams. Its low population numbers are threatened by wetland drainage and the diversion of water from rivers (Johnstone and Storr 1998).	The Riverine habitat and the Billabong (Coolarin Pool) provide the fresh water wetland habitat which is preferred by this species. However there is a lack of previous records of the Australian Painted Snipe from the vicinity of the study area.	Unlikely
Common Tern (*Sterna hirundo*)	Mi,S3	The Common Tern is a non-breeding migratory Tern that occurs regularly in northern Western Australia. It primarily inhabits beaches, reefs, estuaries, sandflats, sewerage ponds and freshwater wetlands (Pizzey and Knight 2007).	The Beach/Dunal, Riverine and Billabong (Coolarin Pool) provide suitable habitat for this species. The Fairy Tern has been previously recorded in the vicinity of the study area (DEC 2011a).	Likely
White-winged Black Tern *(Chlidonias leucoptera*)	Mi,S3	The White-winged Black Tern is a non-breeding migratory Tern that occurs regularly in northern Western Australia and rarely in the southern half of Western Australia (Barrett *et al.* 2003). It inhabits coastal marine habitats (such as estuaries, lagoons and harbours) and near-coastal freshwater wetlands (such as river pools, billabongs and inundated floodplains [Morcombe 2000]).	The Beach/Dunal, Riverine and Billabong (Coolarin Pool) provide suitable habitat for this species. The most recent record of the White-winged Black Tern in the vicinity of the study area is from more than 25 years ago (DEC 2011a).	Possible

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
Barn Swallow (*Hirundo rustica*)	Mi,S3	The Barn Swallow is a migratory species that breeds in north-east Asia, and is a rare visitor to northern coastal northern Western Australia from September to early April (Johnstone and Storr 2004). They occur in ones or twos or in small flocks up to 15 (or occasionally large flocks in the 100's) and sometimes attached to flocks of Welcome Swallows (Johnstone and Storr 2004). They forage mainly near towns and wetlands such as sewage and salt work ponds, river pools, swamps, tidal creeks and reservoirs (Johnstone and Storr 2004). They forage aerially on insects and nest in caves, cliffs, under bridges and in buildings (Morcombe 2000).	The Tidal Flats, Riverine and Billabong (Coolarin Pool) provide suitable habitat for this species. There have been numerous recent records of the Barn Swallow in the vicinity of the study area (DEC 2011a).	Likely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
MAMMALS				
Brush-tailed Mulgara (*Dasycercus blythi*)	P4	Brush-tailed Mulgara was previously considered to be the same species as the Crest-tailed Mulgara (*Dasycercus cristicauda*), but a recent taxonomic review identified it as a separate species. The Brush-tailed Mulgara is listed as Priority 4 by the DEC, however as the EPBC Act currently does not recognize this revised taxonomy, this species is also protected under the EPBC Act. This species is found in central Western Australia in sandy regions, living in burrows (van Dyck and Strahan 2008).	The sandy substrate and spinifex of the Sandplain habitat type provide ideal habitat for this species. The Brush-tailed Mulgara has been recently recorded from the vicinity of the study area in 2008 and 2009 (DEC 2011a,b).	Likely
Crest-tailed Mulgara (*Dasycercus cristicauda)*	VU,S1	The Crest-tailed Mulgara (*Dasycercus cristicauda*) is a small carnivorous marsupial, now possibly extinct in Western Australia, where the most recent confirmed records are more than 50 years old, but it may persist in other parts of central Australia. Its is uncertain because it is often confused with the closely-related Brush-tailed Mulgara. Its habitat is grassland (especially Spinifex), and it persists in parts of north-western South Australia and south-eastern Northern Territory. It is threatened by loss of habitat and competition from introduced grazers (Menkhorst and Knight 2004).	Although suitable habitat exists in the study area, this species is thought to be extinct in Western Australia.	Highly Unlikely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
Greater Bilby (*Macrotis lagotis*)	VU, VU (IUCN Redlist),S1	The Greater Bilby is confined to arid and semi arid parts of northern Australia and in Western Australia it is limited to the Great Sandy Desert, Gibson Desert and Pilbara (van Dyck and Strahan 2008, DSEWPaC 2011c). It is now locally extinct from the southern half of Western Australia (DSEWPaC 2011c). The Greater Bilby occurs in tall shrublands and open woodlands in semi-arid regions, and hummock grasslands in arid Australia (DSEWPaC 2011c). The presence of the Greater Bilby is characterised by its feeding habits, evident from the numerous scattered excavations up to 10 cm deep it leaves behind, from which soil has been scattered on all sides.	The spinifex and sandy substrate of the Sandplain habitat provides suitable habitat for this species. However the most recent record for the Greater Bilby is from more that 40 years ago (DEC 2011b) and the current distribution does not include the Port Hedland region (van Dyck and Strahan 2008).	Unlikely
Ghost Bat (*Macroderma gigas*)	P4, VU (IUCN Redlist)	The Ghost Bat occurs in a wide variety of habitats, and requires an undisturbed cave, deep fissure or disused mine shaft in which to roost. It is patchily distributed across Australia, and is sensitive to disturbance. Colonies range in size from 400-1000 individuals (van Dyck and Strahan 2008). The Ghost Bat inhabits areas of open woodland (Churchill 2008).	The Riverine and Sanplain habitats provide suitable foraging habitat for this species, however the study area does not have any deep caves/mineshafts that would provide suitable roost sites. In 2009 there were a total of 59 records of the Ghost Bat for Pippingarra which is approximately 5 km to the east of the study area (DEC 2011b).	Likely (foraging only)
Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*)	VU,S1	The Pilbara Leaf-nosed Bat requires deep caves or disused mine shafts in which to roost (van Dyck and Strahan 2008), at least in the dry season. These bats have been recorded in isolated populations in the Pilbara, and are present only where suitable roosting niches are available. They are generally sparsely distributed. The Pilbara Leaf-nosed Bat inhabits areas of open woodland (Churchill 2008).	The Riverine and Sanplain habitats provide suitable foraging habitat for this species, however the study area does not have any deep caves/mineshafts that would provide suitable roost sites. In 2009 there were a total of four records of the Pilbara Leaf-nosed Bat for Pippingarra which is approximately 5 km to the east of the study area (DEC 2011b).	Likely (foraging only)

TABLE KEY:	
En	Listed as Endangered under the EBPC Act 1999.
Vu	Listed as Vulnerable under the EBPC Act 1999.
Mi	Listed as Migratory under the EBPC Act 1999.
S	Scheduled under the WC Act 1950. Schedule 1, 2 and 3 fauna are also protected by the EBPC Act 1999.
P	Listed as Priority by the DEC.
EN	Endangered under the IUCN Redlist
VU	Vulnerable under the IUCN Redlist
NT	Near Threatened under the IUCN Redlist
LC	Least Concern under the IUCN Redlist
Likely	Suitable habitat is present in the study area and the study area is in the species' known distribution.
Possible	Limited or no suitable habitat is present in study area but is nearby. The species has good dispersal abilities and is known from the general area.
Unlikely	No suitable habitat is present in study area but is nearby, the species has poor dispersal abilities, but is known from the general area; or suitable habitat is present, however the study area is outside of the species' known distribution.
Highly Unlikely	The species has poor dispersal abilities, no suitable habitat is present, and the species is uncommon; or the species is thought to be locally extinct.

4 DISCUSSION

4.1 FAUNA HABITATS

All of the habitats recorded in the study area are located along the coastal region of the Pilbara and are typically disturbed throughout the region by cattle grazing, fire, and more locally by mining activities and associated infrastructure. Each of these habitats hosts subtly different fauna assemblages.

Habitats considered to be of High habitat value constitute approximately 10.9% of the study area. The majority of the study area (67.9%) was composed of the Moderate value Sandplain habitat.

The area of Beach/Dunal habitat constitutes 0.7% of the study area. The Beach/Dunal habitat provides important foraging and roosting locations for Migratory listed birds, especially over the summer months when the majority of waders visit Australia's shores. During the survey the Eastern Osprey was recorded in this habitat and a total of 23 conservation significant fauna species (largely migratory species) are considered likely to occur in this habitat type. The Beach/Dunal habitat is classified as having High habitat value.

The area of Tidal Flats habitat in the study area is approximately 4.6% of the study area. The Tidal Flats habitat provides important foraging and roosting locations for Migratory listed birds, especially during the summer months when the majority of waders visit Australia's shores. During the current survey 10 Migratory listed bird species were recorded in this habitat. The Tidal Flats habitat is classified as having High habitat value.

The area of Mangrove habitat constitutes 4% of the study area. The Mangrove habitat provides refuge and roost sites and in less dense areas foraging opportunities for shorebirds including those classified as Migratory under the EPBC Act. The Mangrove habitat supports a unique faunal assemblage and fauna species that are habitat specialists such as the Little Northern Freetail-bat (Listed as Priority 4 by DEC), Mangrove Golden Whistler and Mangrove Grey Fantail. During the survey the Migratory listed White-bellied Sea-eagle was recorded in this habitat and a further six conservation significant fauna species are considered likely to occur in this habitat type. The Mangrove habitat is classified as having High habitat value. This is reflected in the *Principles of Guidance for the Protection of Tropical Arid Zone Mangroves along the Pilbara Coast* (EPA 2001), where the EPA consider the mangroves of the Port Hedland area to be of high conservation value and stipulates the need for minimal disturbance.

The Riverine habitat of the study area is approximately 1.6% of the study area. As the Riverine habitat is situated close to the coast many marine bird species such as terns and waders are expected to occur in this habitat. The Riverine habitat provides a large variety of microhabitats and is an important source of surface water (drinking sources for microbats, granivorous parrots, finches, as well as honeyeaters and macropods) and

functions as a dispersal corridor for wildlife. During the survey the Migratory listed Eastern Great Egret, Caspian Tern and Rainbow Bee-eater were recorded in this habitat and a further 24 conservation significant fauna species are considered likely to occur in this habitat. The Riverine habitat is classified as having High habitat value.

The Sandplain habitat of the study area constitutes 67.9% of the study area. The Sandplain habitat provides a moderate variety of microhabitats and is the dominant habitat type of the study area. During the survey the Woma (Schedule 4), Australian Bustard (Priority 4) , Bush Stone-curlew (Priority 4) and Rainbow Bee-eater (Migratory) were recorded and a further 10 conservation significant fauna species are considered likely to occur in this habitat. The Sandplain habitat is classified as having Moderate habitat value.

The five minor habitats Billabong, Low Hill, Granite Tor, Quartz Hill and Rockpile cover 71.4 ha of the study area. Although these habitats are small and isolated they contain microhabitats not provided in the broad habitat types, such as shallow freshwater pools and rocky habitat. The Low Hill habitat is suitable for the Western Pebble-mouse. However, the Quartz Hill is unlikely to provide suitable habitat for any conservation significant fauna. The Quarry, Granite Tor and Rockpile habitats provide suitable habitat for Northern Quolls as the boulders provide den sites for this species. Northern Quolls have been recorded in these habitats during previous surveys (Biologic 2010 and ecologia 2008b).

4.2 FAUNA ASSEMBLAGES

The composition and current status of the vertebrate fauna of the Pilbara is relatively well known as a result of a number of recent systematic fauna surveys (Gibson and McKenzie 2009, McKenzie and Bullen 2009, Burbidge *et al.* 2010) and numerous unpublished surveys.

Almost all of the species recorded in the 2011 survey are typical of the Port Hedland region and have been previously recorded in the vicinity of the study area. Of the 110 vertebrate species recorded in 2011, three species (Green Tree Frog, Mosaic Desert Skink and Banded Lapwing) are new records for the study area.

The Green Tree Frog traditionally occurs in the Kimberley region of Western Australia; however, numerous individuals were recorded within the Wedgefield Industrial Area during the survey. The Green Tree Frog is frequently found in human dwellings (Cogger 2000). These individuals may have been transported to the Port Hedland area in freight from the Kimberley, and it appears to only occur in urban areas.

The Mosaic Desert Skink was recently split from another *Eremiascincus* species. This species has a range from approximately Karratha to Broome (Wilson and Swan 2010) and records exist for the Port Hedland area (Mecke *et al.* 2009). It is likely to have been recorded in previous surveys under a different name.

The Banded Lapwing is a widespread species which is common in the mid to southwest of Western Australia and has a sparser distribution in the north to north east areas of the Pilbara (DEC 2011a). This record is not unexpected as it occurs within the Banded Lapwings known distribution (Barrett *et al.* 2003).

4.3 CONSERVATION SIGNIFICANT FAUNA

A total of 38 species of conservation significance have been recorded during the current and previous surveys (Appendix E). This list comprises eight species which are considered to be rare or threatened; Northern Quoll, Woma, Australian Bustard, Bush Stone-curlew, Eastern Curlew, Star Finch, Little Northern Freetail-bat and Western Pebble-mouse; and 29 species listed as Migratory under the EPBC Act and/or WC Act.

Migratory Species as listed by the EPBC Act

Twenty-nine avian species listed as Migratory under the EPBC Act and classified as Schedule 3 under the WC Act, have been recorded within the study area (Table 7). These species are subject to international bilateral agreements to conserve migratory birds and conserve the habitats they utilise along the East Asian-Australia Flyway. These bilateral agreements include the Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA), Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) and Bonn Convention. These agreements require all countries to protect migratory birds by limiting the circumstances under which migratory birds are taken or traded; protecting and conserving important habitats; exchanging information; and building cooperative relationships.

Northern Quoll

The Northern Quoll is listed as Endangered under the EPBC Act and is also classified as Schedule 1 under the WC Act. This carnivorous marsupial occurs mainly in areas of open eucalypt woodland within 200 km of the coast and is known to favour rocky areas, taking refuge in rock crevices, gullies and drainage lines (van Dyck and Strahan 2008). It is known to den in rock crevices and rock piles (van Dyck and Strahan 2008). In northern Australia the Northern Quolls former range has retracted considerably due to threats from Cane Toads, degradation and fragmentation of habitat, inappropriate fire regimes, weeds and predation by feral animals (DSEWPaC 2011c). The Northern Quoll has been recently recorded throughout the study area (DEC 2011ab, Biologic 2010 and ecologia 2008b, 2009). A total of 227 Northern Quoll were captured in the vicinity of Pippingarra over the past three years (DEC 2011b) indicating that this is one of the strongholds for this species in the Pilbara. The Riverine and Sandplain habitats and the boulders of the rocky habitat features such as the Granite Outcrop, Rockpile and Quarry provide suitable habitat for this species.

Woma

The Pilbara population of the Woma is classified as Schedule 4 under the WC Act. This species inhabits spinifex within woodlands, heaths and shrublands and occurs in arid areas across Australia (Wilson and Swan 2010), where it shelters in hollow logs, animal burrows or thick vegetation (Cogger 2000). The Woma is listed due to habitat loss from land clearing and possibly predation from introduced animals (Wilson and Swan 2010). This species was recorded during the 2011 survey and the Outer Harbour Development survey (ENV.Australia 2009) in similar locations within the Sandplain habitat.

Little Northern Freetail-bat

The Little Northern Freetail-bat is listed as Priority 1 by the DEC. This species inhabits mangrove communities, roosting in crevices and sprouts of the dead upper branches of the mangrove *Avicennia marina* (van Dyck and Strahan 2008). The Little Northern Freetail-bat has been recently recorded in the study area (DEC 2011a,b, ENV.Australia 2009, Biota 2006). The Mangroves and the surrounding Tidal Flats provide suitable habitat for this species.

Australian Bustard

The Australian Bustard is listed as Priority 4 under the DEC Priority Listing and is listed due to habitat loss from land clearing (Johnstone and Storr 1998). The most severe decline in this species has been experienced in the southern extent of its distribution, with northern populations remaining large and stable (Garnett *et al.* 2010). This species has been commonly recorded in the study area during numerous surveys (DEC 2011a,b, Biologic 2010, ENV.Australia 2009, Biota 2006 and Mattiske 1994).The Australia Bustard was recorded within the Sandplain habitat in the study area during the current survey.

Bush Stone-curlew

The Bush Stone-curlew is classified as Priority 4 under the DEC Priority Listing and is widespread across the Pilbara and Northern Australia (Barrett *et al*. 2003). The Bush Stone-curlew is listed due to predation by introduced predators (Johnstone and Storr 1998). The most severe decline in this species has been experienced in the southern extent of its distribution, with northern populations remaining large and stable (Garnett *et al.* 2010). A roadkilled Bush Stone-curlew was recorded in the Sandplain habitat during the current survey and has also been recorded within and in the vicinity of the study area previously (DEC 2011b and Biologic 2010).

Eastern Curlew

The Eastern Curlew is classified as Priority 4 under the DEC Priority Listing and is also listed as Migratory under the EPBC Act 1999. This shorebird is a large non-breeding migratory species, found commonly along the north coast of Western Australia (Geering *et al*. 2007). The Eastern Curlew has been recorded in the study area by four previous

surveys and is listed in the area by DEC databases (DEC 2011a and b, Biota 2009, Biota 2008b, ENV.Australia 2009 and Mattiske 1994). The Beach/Dunal and Tidal Flats habitats provide suitable habitat for this species, as it feeds on burrowing crabs or shrimps in the exposed intertidal zones (Geering *et al*. 2007).

Star Finch

The Western Star Finch (subspecies) is confined to the Pilbara region of Western Australia (Pizzey and Knight 2007) and typically inhabits areas of permanent water. This small finch drinks daily and generally breeds near water. The Star Finch was recorded in the Nelson Point Wetlands survey (Bennelongia 2011). The Riverine, Sandplains particularly those around the Riverine habitat and the Billabong (Coolarin Pool) provide suitable habitat for this species.

Western Pebble-mouse

The Western Pebble-mouse is classified as Priority 4 under the DEC Priority Listing. Abandoned mounds to the east of its current range indicate a decline in distribution (Menkhorst and Knight 2004). Abandoned mounds in disturbed areas suggest that the species is under threat by grazing and mining activities. This species is a ground dwelling mammal that has a poor ability to disperse compared to species that are highly mobile. Therefore, individual populations of this species are under greater risk of impact from any proposed development. However, the Western Pebble-mouse is currently found broadly across the Pilbara. Active pebble-mounds were recorded during the Mooka Siding survey (Biologic 2010) which was located both inside and outside of the study area (Figure 5). Numerous recent records exist for the Western Pebble-mouse in the vicinity of the study area (DEC 2011a,b). The Low Hills situated to the south of the study area provide small pockets of suitable habitat for this species.

5 SUMMARY

The study area consists of five major fauna habitat types: Beach/Dunal, Tidal Flats, Mangroves, Riverine and Sandplain. Additional minor habitats were located throughout the study area: Billabong, Low Hill, Granite Tor, Quartz Hill, Rockpile and Quarry. The Beach/Dunal, Tidal Flats, Mangroves and Riverine habitats were all given High habitat value and Sandplain habitat was deemed as having Moderate habitat value.

Habitats considered to be of High habitat value constitute approximately 10.87% of the study area. The majority of the study area (67.9%) was composed of the Moderate value Sandplain habitat.

During the 2011 survey 108 vertebrate species, including two amphibian, 20 reptile, 79 bird, and seven mammal species were opportunistically recorded.

Using the combined results of the fauna database review and the 2011 survey, a total of 316 vertebrate species have been recorded within the vicinity of the study area. This includes 11 amphibian, 74 reptile, 189 bird and 42 mammal species. The study area and vicinity are particularly rich in avifaunal species, dominated by the large number of waterbirds many of which are migratory shorebirds (29 species) or coastal seabirds (10 species).

A total of 61 conservation significant species were considered to potentially occur in the study area from the desktop assessment. Of these, 38 species were recorded in the study area by either the current 2011 survey or other previous surveys. These 38 species include two reptiles, 33 birds and three mammal species. Of these, eight species (Northern Quoll, Woma, Australian Bustard, Bush Stone-curlew, Eastern Curlew, Star Finch, Little Northern Freetail-bat and Western Pebble-mouse) are considered rare or threatened, while the remaining 29 are listed as Migratory under the EPBC Act.

Of the remaining 24 potentially occurring conservation significant species, 17 species were assessed as ‘Likely’ to occur, four species were considered as ‘Possible’ to occur, two species was considered ‘Unlikely’ to occur and one species was considered ‘Highly Unlikely’ to occur.

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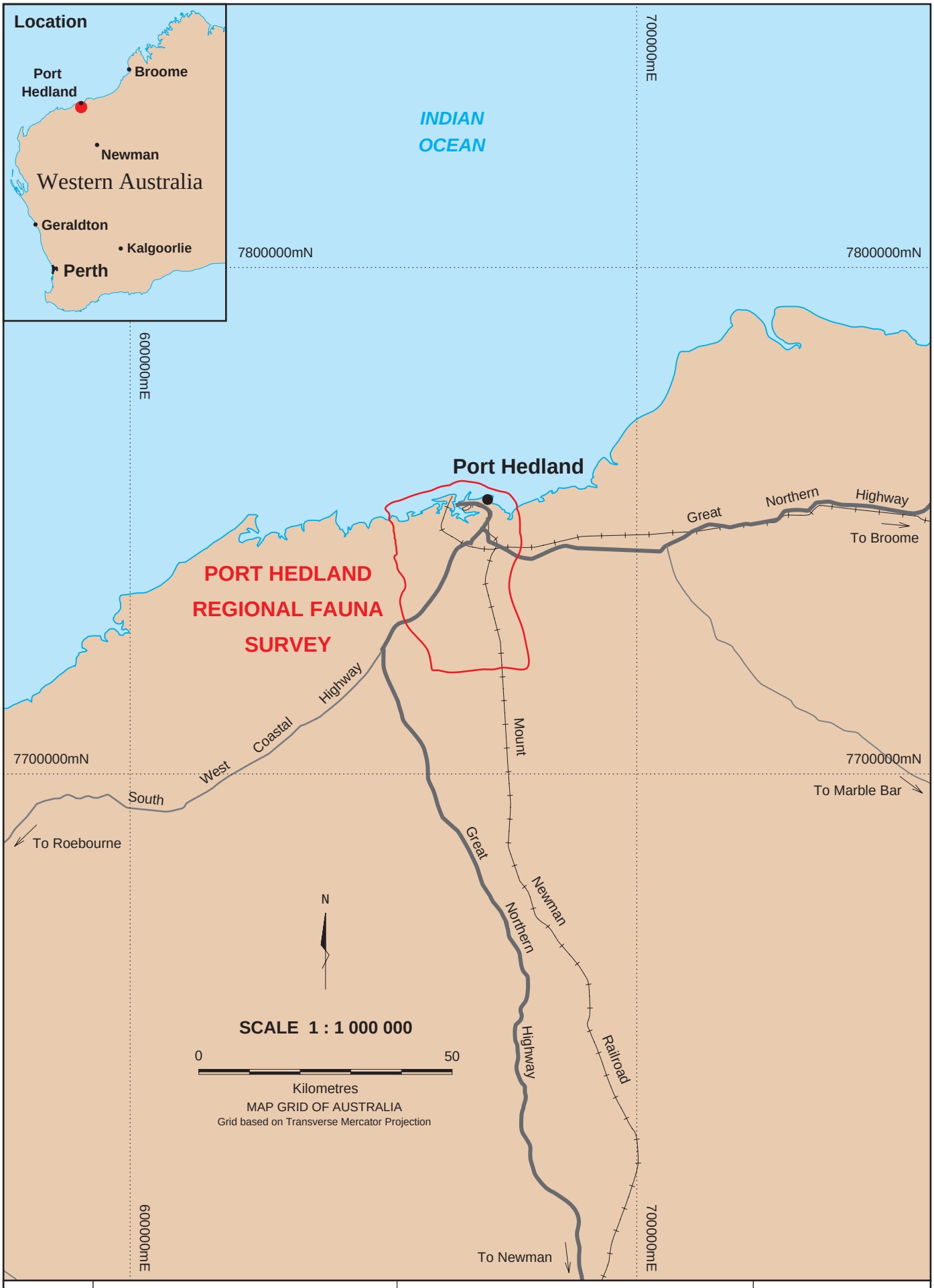
FIGURES



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	Project: PORT HEDLAND REGIONAL FAUNA SURVEY		Scale: 1:1 Million
			Author: J.T. / S.C.
			Figure No. 1
		J100490 A4	Plan No. PH-001

A3

HABITAT ASSESSMENT, TARGETED SEARCHES, ANABAT AND MOTION SENSITIVE CAMERA LOCATIONS

Client: **BHP BILLITON IRON ORE**	Date: 18 November 2011
Project: **PORT HEDLAND REGIONAL FAUNA SURVEY**	Scale: 1:75 000
	Job Number: J100490
	Figure No. **3a**
Author: J.Trainer — Drawn: S.Coleman	Plan No. **PH-014**

Legend

- Fauna Habitat Assessment Location
- Anabat Location
- Motion Sensitive Camera Location
- Mulgara Transect
- Northern Quoll and *Gehyra* Targeted Species

HA14
HA13
HA3
HA4
ANA13
HA11
HA12
HA2
ANA15
HA6
HA7
Transect 11
Transect 10
Transect 7
HA9

7755000mN
7750000mN
7745000mN
7740000mN

650000mE
655000mE
660000mE
665000mE
670000mE
675000mE

N

SCALE 1 : 75 000

0 5

Kilometres

MAP GRID OF AUSTRALIA
Grid based on Transverse Mercator Projection
GDA 1994 MGA Zone 50

Location

a
b

7740000mN
7735000mN
7730000mN
7725000mN
7720000mN
655000mE
660000mE
665000mE
670000mE
675000mE
680000mE

Location

a

b

Transect 1

Transect 5

Transect 7

HA9

Transect 9

N

SCALE 1 : 75 000

0 5

Kilometres

MAP GRID OF AUSTRALIA
Grid based on Transverse Mercator Projection
GDA 1994 MGA Zone 50

HA19 (Quartz Outcrop)

HA18 (Quartz Outcrop)

Transect 6

HA18 (Coolarin Pool)

MOT 2

ANA16

HA17 (Rockpile)

HA15

Northern Quoll and *Gehyra* Targeted Species

HA1

ANA19

MOT 1

MOT 3

ANA17

HA8

HA10

HA5

Northern Quoll and *Gehyra* Targeted Species

HA16 (Low Hill)

Transect 2

HA16 (Low Hill)

Northern Quoll and *Gehyra* Targeted Species

HA16 (Low Hill)

Transect 8

Transect 4

Transect 3

HA19 (Quartz Outcrop)

Northern Quoll and *Gehyra* Targeted Species

Legend

- Fauna Habitat Assessment Location
- Anabat Location
- Motion Sensitive Camera Location
- Mulgara Transect
- Northern Quoll and *Gehyra* Targeted Species

env Australia

HABITAT ASSESSMENT, MULGARA TRANSECT, ANABAT AND MOTION SENSITIVE CAMERA LOCATIONS (Sheet 1 of 2)

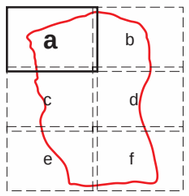
A3

Client: **BHP BILLITON IRON ORE**	Date: 18 November 2011
Project: **PORT HEDLAND REGIONAL FAUNA SURVEY**	Scale: 1:75 000
	Job Number: J100490
	Figure No. **3b**
Author: J.Trainer — Drawn: S.Coleman	Plan No. **PH-015**

Fauna Habitat

B/D	Beach / Dunal	LH	Low Hill
TF	Tidal Flats	GT	Granite Tor
M	Mangroves	Q	Quartz Outcrop
R	Riverine	RP	Rockpile
SP	Sandplain	D/I	Disturbed / Infrastructure
B	Billabong		

Location



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7745000mN

N

SCALE 1 : 50 000

0 2.5

Kilometres

MAP GRID OF AUSTRALIA
Grid based on Transverse Mercator Projection
GDA 1994 MGA Zone 50

FAUNA HABITAT
(Sheet 1 of 6)

A3

Client: BHP BILLITON PTY LTD		Date: 24 October 2011
Project: PORT HEDLAND REGIONAL FAUNA SURVEY		Scale: 1:50 000
		Figure No. 4a
Author: J.Trainer	Drawn: S.Coleman	Plan No. PH-008

Fauna Habitat

B/D	Beach / Dunal	LH	Low Hill
TF	Tidal Flats	GT	Granite Tor
M	Mangroves	Q	Quartz Outcrop
R	Riverine	RP	Rockpile
SP	Sandplain	D/I	Disturbed / Infrastructure
B	Billabong		

N

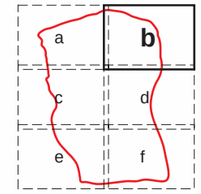
SCALE 1 : 50 000

0 2.5

Kilometres

MAP GRID OF AUSTRALIA
Grid based on Transverse Mercator Projection
GDA 1994 MGA Zone 50

Location



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B/D D/I TF M SP R

FAUNA HABITAT
(Sheet 2 of 6)

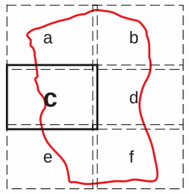
A3

Client: BHP BILLITON PTY LTD		Date: 24 October 2011
Project: PORT HEDLAND REGIONAL FAUNA SURVEY		Scale: 1:50 000
		Figure No. 4b
Author: J.Trainer	Drawn: S.Coleman	Plan No. PH-009

Fauna Habitat

B/D	Beach / Dunal	LH	Low Hill
TF	Tidal Flats	GT	Granite Tor
M	Mangroves	Q	Quartz Outcrop
R	Riverine	RP	Rockpile
SP	Sandplain	D/I	Disturbed / Infrastructure
B	Billabong		

Location



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SCALE 1 : 50 000

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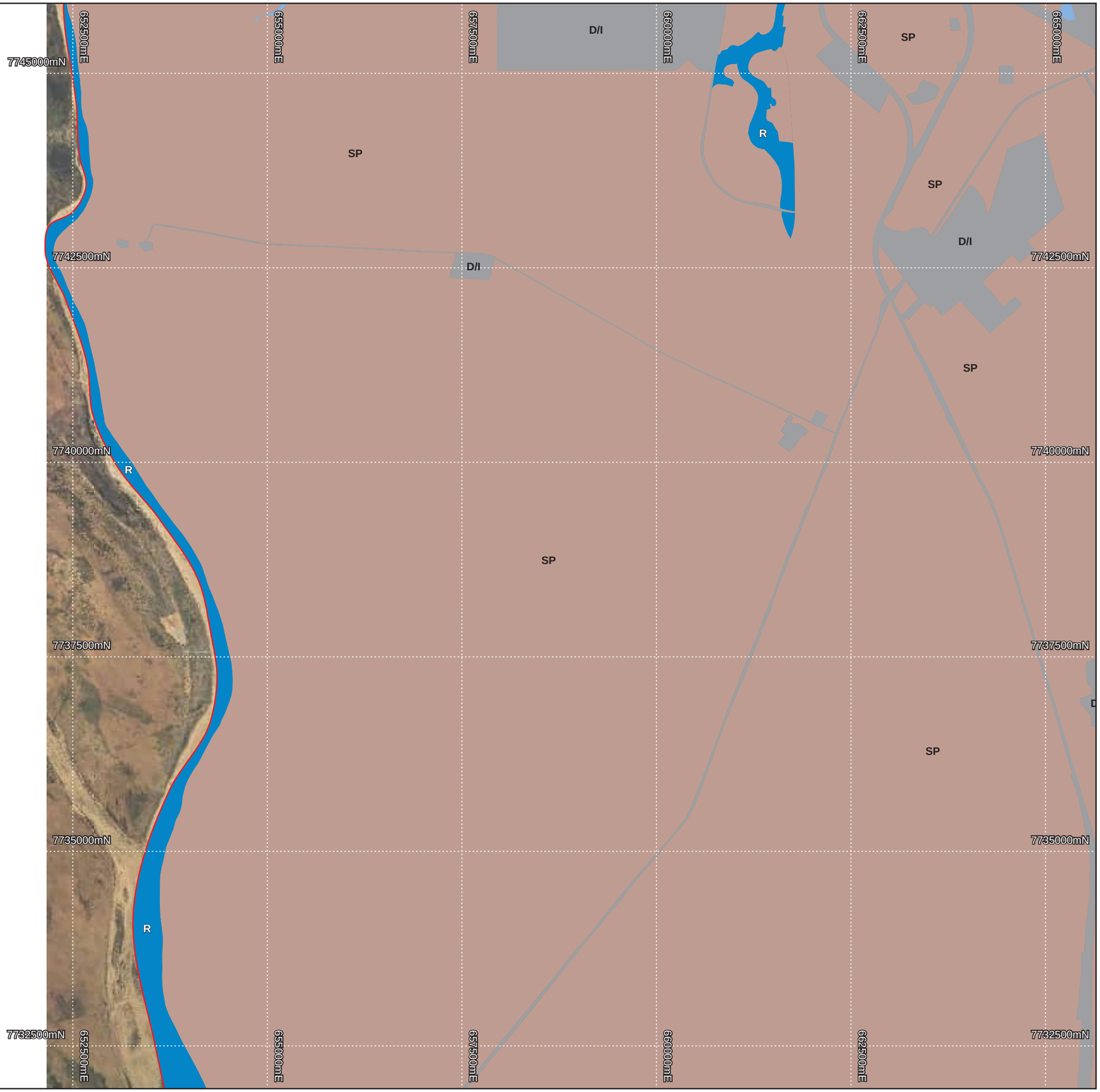
Kilometres

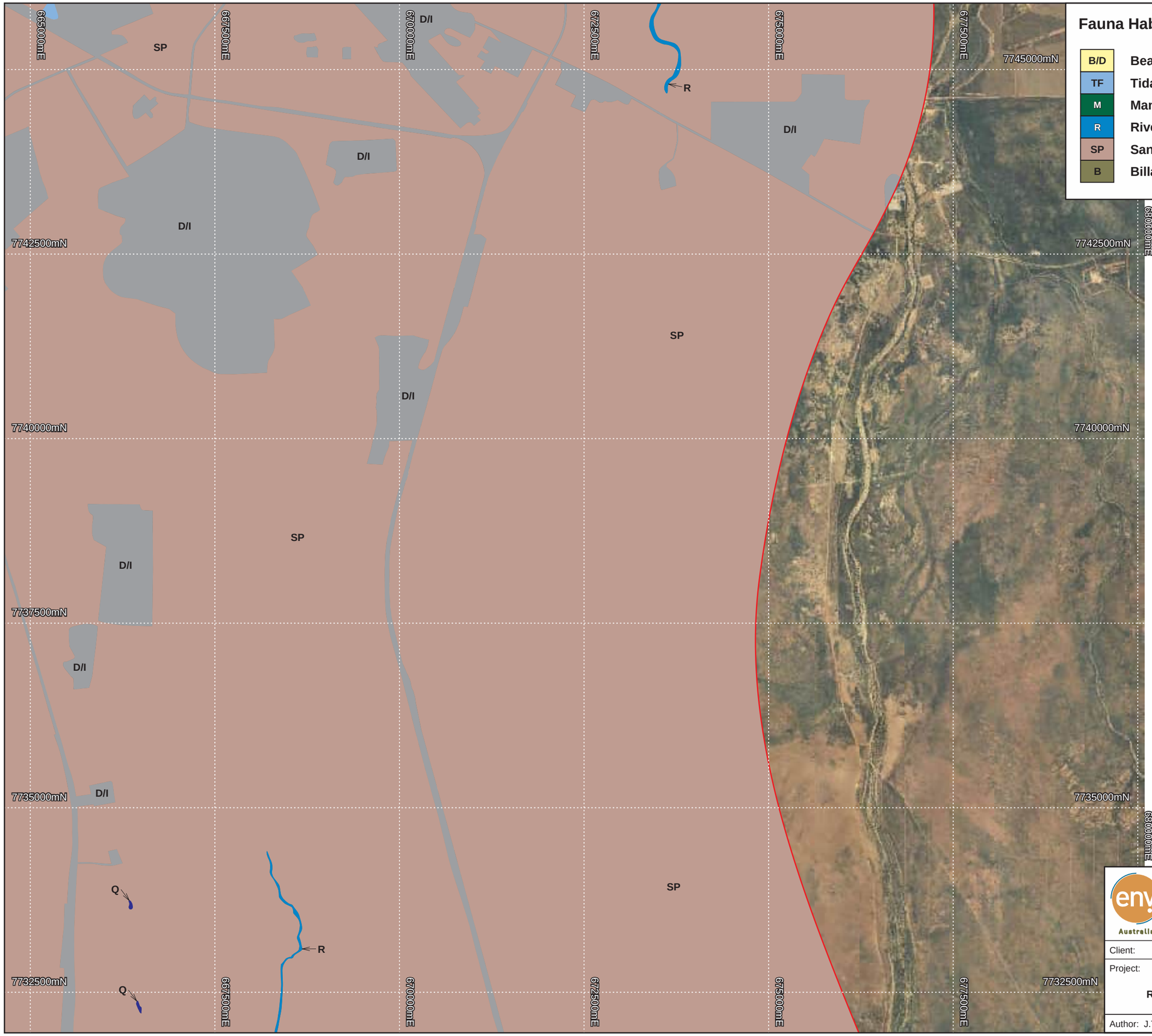
MAP GRID OF AUSTRALIA
Grid based on Transverse Mercator Projection
GDA 1994 MGA Zone 50



FAUNA HABITAT
(Sheet 3 of 6)

A3

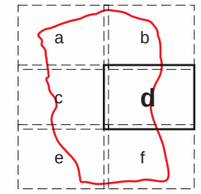
Client: BHP BILLITON PTY LTD		Date: 24 October 2011
Project: PORT HEDLAND REGIONAL FAUNA SURVEY		Scale: 1:50 000
		Figure No. 4c
Author: J.Trainer	Drawn: S.Coleman	Plan No. PH-010



Fauna Habitat

B/D	Beach / Dunal	LH	Low Hill
TF	Tidal Flats	GT	Granite Tor
M	Mangroves	Q	Quartz Outcrop
R	Riverine	RP	Rockpile
SP	Sandplain	D/I	Disturbed / Infrastructure
B	Billabong		

Location



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SCALE 1 : 50 000

0 2.5

Kilometres

MAP GRID OF AUSTRALIA
Grid based on Transverse Mercator Projection
GDA 1994 MGA Zone 50

FAUNA HABITAT (Sheet 4 of 6)

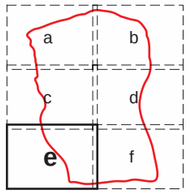
A3

Client: **BHP BILLITON PTY LTD**		Date: 24 October 2011
Project: **PORT HEDLAND REGIONAL FAUNA SURVEY**		Scale: 1:50 000
		Figure No. **4d**
Author: J.Trainer	Drawn: S.Coleman	Plan No. **PH-011**

Fauna Habitat

B/D	Beach / Dunal	LH	Low Hill
TF	Tidal Flats	GT	Granite Tor
M	Mangroves	Q	Quartz Outcrop
R	Riverine	RP	Rockpile
SP	Sandplain	D/I	Disturbed / Infrastructure
B	Billabong		

Location



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660000mE
662500mE
665000mE
647500mE
650000mE

R
SP
D/I
LH
LH
LH
D/I
LH
R
SP

N

SCALE 1 : 50 000

0 2.5 Kilometres

MAP GRID OF AUSTRALIA
Grid based on Transverse Mercator Projection
GDA 1994 MGA Zone 50

FAUNA HABITAT
(Sheet 5 of 6)

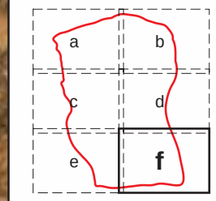
A3

Client: BHP BILLITON PTY LTD		Date: 24 October 2011
Project: PORT HEDLAND REGIONAL FAUNA SURVEY		Scale: 1:50 000
		Figure No. 4e
Author: J.Trainer	Drawn: S.Coleman	Plan No. PH-012

Fauna Habitat

B/D	Beach / Dunal	LH	Low Hill
TF	Tidal Flats	GT	Granite Tor
M	Mangroves	Q	Quartz Outcrop
R	Riverine	RP	Rockpile
SP	Sandplain	D/I	Disturbed / Infrastructure
B	Billabong		

Location



SCALE 1 : 50 000

0 2.5 Kilometres

MAP GRID OF AUSTRALIA
Grid based on Transverse Mercatof Projection
GDA 1994 MGA Zone 50

FAUNA HABITAT (Sheet 6 of 6)

A3

Client: BHP BILLITON PTY LTD		Date: 24 October 2011
Project: PORT HEDLAND REGIONAL FAUNA SURVEY		Scale: 1:50 000
		Figure No. 4f
Author: J.Trainer	Drawn: S.Coleman	Plan No. PH-013

LOCATION OF THREATENED FAUNA (Sheet 1 of 2)

A3

Client: **BHP BILLITON IRON ORE**	Date: 25 October 2011
Project: **PORT HEDLAND REGIONAL FAUNA SURVEY**	Scale: 1:75 000
	Job Number: J100490
	Figure No. **5a**
Author: J.Trainer / Drawn: S.Coleman	Plan No. **PH-016**

Legend

- Conservation Significant Species - ENV 2011
- Conservation Significant Species - ENV 2008
- Conservation Significant Species - Biologic 2010
- Little North-western Freetail Bat *(Mormopterus loriae cobourgensis)*

Little North-western Freetail Bat
(Mormopterus loriae cobourgensis)

650000mE 655000mE 660000mE 665000mE 670000mE 675000mE

7755000mN 7750000mN 7745000mN 7740000mN

N

SCALE 1 : 75 000

0 5

Kilometres

MAP GRID OF AUSTRALIA
Grid based on Transverse Mercator Projection
GDA 1994 MGA Zone 50

Location

a

b

7740000mN
655000mE
660000mE
665000mE
670000mE
675000mE
7740000mN
7735000mN
7735000mN
680000mE
7730000mN
7730000mN
7725000mN
7720000mN
660000mE
665000mE
7720000mN
680000mE

N

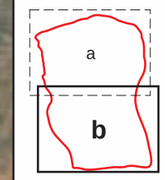
SCALE 1 : 75 000

0 5

Kilometres

MAP GRID OF AUSTRALIA
Grid based on Transverse Mercator Projection
GDA 1994 MGA Zone 50

Location



Woma *(Aspidites ramsayi)*

Woma *(Aspidites ramsayi)*

Bush-stone Curlew *(Burhinus grallarius)*

Northern Quoll Scat *(Dasyurus hallucatus)*

Australian Bustard *(Ardeotis australis)*

Northern Quoll Scat *(Dasyurus hallucatus)*

Northern Quoll *(Dasyurus hallucatus)*

Northern Quoll Scat *(Dasyurus hallucatus)*

Bush Stone-Curlew *(Burhinus grallarius)*

Bush Stone-Curlew *(Burhinus grallarius)*

Australian Bustard *(Ardeotis australis)*

Western Pebble-mound Mouse *(Pseudomys chapmani)*

Bush Stone-Curlew *(Burhinus grallarius)*

Australian Bustard *(Ardeotis australis)*

Bush Stone-Curlew *(Burhinus grallarius)*

Australian Bustard *(Ardeotis australis)*

Western Pebble-mound Mouse *(Pseudomys chapmani)*

Bush Stone-Curlew *(Burhinus grallarius)*

Northern Quoll *(Dasyurus hallucatus)*

Bush Stone-Curlew *(Burhinus grallarius)*

Legend

- Conservation Significant Species - ENV 2011
- Conservation Significant Species - ENV 2008
- Conservation Significant Species - Biologic 2010

- Australian Bustard *(Ardeotis australis)*
- Bush Stone-Curlew *(Burhinus grallarius)*
- Little North-western Freetail Bat *(Mormopterus loriae cobourgensis)*
- Northern Quoll Scat *(Dasyurus hallucatus)*
- Western Pebble-mound Mouse *(Pseudomys chapmani)*
- Woma *(Aspidites ramsayi)*

env Australia

LOCATION OF THREATENED FAUNA (Sheet 1 of 2)

A3

Client: **BHP BILLITON IRON ORE**		Date: 25 October 2011
Project: **PORT HEDLAND REGIONAL FAUNA SURVEY**		Scale: 1:75 000
		Job Number: J100490
		Figure No. **5b**
Author: J.Trainer	Drawn: S.Coleman	Plan No. **PH-017**

LOCATION OF MIGRATORY FAUNA (Sheet 1 of 2)

A3

Client: **BHP BILLITON IRON ORE**	Date: 26 October 2011
Project: **PORT HEDLAND REGIONAL FAUNA SURVEY**	Scale: 1:75 000
	Job Number: J100490
	Figure No. **6a**
Author: J.Trainer / Drawn: S.Coleman	Plan No. **PH-038**

Legend

- Migratory Fauna Species - ENV 2011
- Migratory Fauna Species - ENV 2008
- Migratory Fauna Species - Biologic 2010

Cattle Egret *(Ardea ibis)*
Eastern Reef Egret *(Egretta sacra)*
Grey-tailed Tatler *(Tringa brevipes)*
White-bellied sea-eagle *(Haliaeetus leucogaster)*

Eastern Osprey *(Pandion haliaetus)*

Bar-tailed Godwit *(Limosa lapponica)*
Grey Plover *(Pluvialis squatarola)*
Red-necked Stint *(Calidris ruficollis)*
Ruddy Turnstone *(Arenaria interpres)*
Whimbrel *(Numenius phaeopus)*

White-bellied sea-eagle *(Haliaeetus leucogaster)*

Rainbow Bee-eater *(Merops ornatus)*

Rainbow Bee-eater *(Merops ornatus)*

650000mE 655000mE 660000mE 665000mE 670000mE 675000mE

7755000mN 7750000mN 7745000mN 7740000mN

N

SCALE 1 : 75 000

0 5

Kilometres

MAP GRID OF AUSTRALIA
Grid based on Transverse Mercator Projection
GDA 1994 MGA Zone 50

Location

a

b

7740000mN
7735000mN
7730000mN
7725000mN
7720000mN
655000mE
660000mE
665000mE
670000mE
675000mE
680000mE

Rainbow Bee-eater *(Merops ornatus)*

N

SCALE 1 : 75 000

0 5

Kilometres

MAP GRID OF AUSTRALIA
Grid based on Transverse Mercator Projection
GDA 1994 MGA Zone 50

Location

a

b

Rainbow Bee-eater *(Merops ornatus)*

Caspian Tern *(Sterna caspia)*
Eastern Great Egret *(Ardea modesta)*

Oriental Plover *(Charadrius veredus)*

Rainbow Bee-eater *(Merops ornatus)*

Rainbow Bee-eater *(Merops ornatus)*

Legend

- Conservation Significant Species - ENV 2011
- Conservation Significant Species - ENV 2008
- Conservation Significant Species - Biologic 2010

env Australia

LOCATION OF MIGRATORY FAUNA (Sheet 1 of 2)

A3

Client: **BHP BILLITON IRON ORE**	Date: 26 October 2011
Project: **PORT HEDLAND REGIONAL FAUNA SURVEY**	Scale: 1:75 000
	Job Number: J100490
	Figure No. **6b**
Author: J.Trainer / Drawn: S.Coleman	Plan No. **PH-039**

APPENDIX A

DEFINITIONS OF CONSERVATION CODES FOR FAUNA OF CONSERVATION SIGNIFICANCE

PORT HEDLAND REGIONAL FAUNA ASSESSMENT

APPENDIX A

DEFINITIONS OF CONSERVATION CODES FOR FAUNA OF CONSERVATION SIGNIFICANCE

A1: *Environment Protection and Biodiversity Conservation Act 1999* (*Cth*): Threatened Species and Threatened Ecological Communities Codes

The *EPBC Act* prescribes seven matters of national environmental significance:-

- World Heritage properties;
- National Heritage places;
- Wetlands of international importance;
- Threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas; and
- Nuclear actions (including uranium mining).

Species in the categories ExW, CE, E, V and M (see below), and Threatened Ecological Communities in the CE and E categories are protected as matters of national environmental significance under the *EPBC Act*.

Category	Code	Category
Extinct	**Ex**	Taxa for which there is no reasonable doubt that the last member of the species has died.
Extinct in the Wild	**ExW**	Taxa known to survive only in cultivation, in captivity or as a naturalised population well outside its past range; or not recorded in its known and/or expected habitat at appropriate seasons anywhere in its past range despite exhaustive surveys over a timeframe appropriate to its life cycle and form.
Critically Endangered	**CE**	Taxa facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	**E**	Taxa not critically endangered and facing a very high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Vulnerable	**V**	Taxa not critically endangered or endangered and facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria**.**
Conservation Dependent	**CD**	Taxa which are the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within five years.

Category	Code	Category
Migratory	**Mi**	Taxa that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations, that are included in an international agreement approved by the Minister for the Environment, Heritage and the Arts and that have been placed on the national List of Migratory Species under the provisions of the EPBC Act. At present there are four such agreements: • the Bonn Convention • the China-Australia Migratory Bird Agreement (CAMBA) • the Japan-Australia Migratory Bird Agreement (JAMBA) • the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)
Marine	**Ma**	Taxa protected in a Commonwealth Marine Protected Area by virtue of section 248 of the *EPBC Act*. These taxa include certain seals, crocodiles, turtles and birds, as well as various marine fish. Commonwealth marine areas are matters of national environmental significance under the *EPBC Act*. An action will require approval if the: • action is taken in a Commonwealth marine area and the action has, will have, or is likely to have a significant impact on the environment, or • action is taken outside a Commonwealth marine area and the action has, will have, or is likely to have a significant impact on the environment in a Commonwealth marine area[1] The Commonwealth marine area is any part of the sea, including the waters, seabed, and airspace, within Australia's exclusive economic zone and/or over the continental shelf of Australia, that is not State or Northern Territory waters. The Commonwealth marine area stretches from 3 to 200 nautical miles (approximately 5-370 km) from the coast. Marine protected areas are marine areas which are recognised to have high conservation value.

A2: Western Australian Threatened Fauna Categories

Wildlife Conservation Act 1950 (WA)

Category	Code	Description
Schedule 1	S1	Rare or likely to become extinct.
Schedule 2	S2	Presumed extinct.
Schedule 3	S3	Birds subject to an agreement between the governments of Australia and Japan, the People's Republic of China & the Republic of Korea relating to the protection of migratory birds and birds in danger of extinction.
Schedule 4	S4	Other specially protected fauna.

A3: Department of Environment and Conservation Fauna Priority Codes

Category	Code	Description
Priority 1	P1	Taxa with few, poorly known populations on threatened lands.
Priority 2	P2	Taxa with few, poorly known populations on conservation lands.
Priority 3	P3	Taxa with several, poorly known populations, some on conservation lands.
Priority 4	P4	Taxa in need of monitoring: not currently threatened or in need of special protection, but could become so. Usually represented on conservation lands.
Priority 5	P5	Taxa in need of monitoring: not considered threatened, but the subject of a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

A4: IUCN Redlist Conservation Fauna Codes

Category	Code	Description
Extinct	EX	Taxa for which there is no reasonable doubt that the last individual has died.
Extinct in the Wild	EW	Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range and it has not been recorded in known or expected habitat despite exhaustive survey over a time frame appropriate to its life cycle and form.
Critically Endangered	CR	Taxa facing an extremely high risk of extinction in the wild.
Endangered	EN	Taxa facing a very high risk of extinction in the wild.
Vulnerable	VU	Taxa facing high risk of extinction in the wild

Category	Code	Description
Near Threatened	NT	Taxa which has been evaluated but does not qualify for CR, EN, or VU now but is close to qualifying or likely to qualify in the near future.
Least Concern	LC	Taxa which has been evaluated but does not qualify for CR, EN, VU, or NT but is likely to qualify for NT in the near future.
Data Deficient	DD	Taxa for which there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status.

APPENDIX B
FAUNA SPECIES RECORDED IN THE REGION

Appendix B1: Recorded Vertebrate Fauna - Amphibians

Key: EPBC = Environment Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DEC = Department of Conservation Priority Code, IUCN= International Union for Conservation of Nature Code, A = Listed in Naturema (DEC 2011a), B= EPBC protected matters search tool (DSEWPaC 2011b) C = Listed by Birds Australia (Birdata 2011), D= DEC Protected Matters Search (DSEWPaC 2011c), E= Bird Survey of Nelson Point Wetlands in April 2011 (Bennelongia 2001, F= Mo Siding Level 1 Targeted Fauna (Biologic 2010), G= Port Hedland Nelson Point Dredging Approvals Flora and Fauna Review of DMMA H (Biota 2009), H= Flora and Fauna Assessment of DMMA A (Biota 2008b), I= RGP5 Bing to Walla Siding and Repeater Fauna Assessment (ecologia 2008a), J= RGP5 Quarry 1 Fauna Survey (ecologia 2008b), K= Goldsworthy Rail Duplication fauna Assessment (ENV 2008), L= RGP5 Northern Quoll Wider Survey Area (ecologia 2009), M= Outer Harbour Development Faur Assessment (ENV 2009), N= Port Hedland Solar Saltfield Expansion Fauna Survey (Biota 2006), O= Fauna Habitats and Fauna Assemblage of the Proposed FMG Stage A Rail Corridor (Biota 2004), P= Boodarie Flora and Fauna (Mattiske 1994), Q= Curre

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Hylidae (Tree Dwelling Frogs)																						
Giant Frog	*Cyclorana australis*				LC	x												x	x			
Main's Frog	*Cyclorana maini*				LC	x												x				
Green Tree Frog	*Litoria caerulea*				LC																	x
Roth's tree Frog	*Litoria rothii*				LC													x				
Desert Tree Frog	*Litoria rubella*				LC	x								x				x				x
Limnodynastidae																						
Northern Burrowing Frog	*Neobatrachus aquilonius*				LC	x																
Shoemaker Frog	*Neobatrachus sutor*				LC	x																
Desert Spadefoot	*Notaden nichollsi*				LC	x												x	x			
Spencer's Burrowing Frog	*Platyplectrum spenceri*				LC	x												x	x			
Myobatrachidae (Ground Frogs)																						
Russell's Toadlet	*Uperoleia russelli*				LC													x				
Glandular toadlet	*Uperoleia glandulosa*				LC	x																

(x) denotes recorded during the survey

Appendix B2: Recorded Vertebrate Fauna - Reptiles

Key: EPBC = Environment Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DEC = Department of Conservation Priority Code, IUCN= International Union for Conservation of Nature Code, A = Listed in Naturemap (DEC 2011a), B= EPBC protected matters search tool (DSEWPaC 2011b) C = Listed by Birds Australia (Birdata 2011), D= DEC Protected Matters Search (DSEWPaC 2011c), E= Bird Survey of Nelson Point Wetlands in April 2011 (Bennelongia 2001, F= Moo Siding Level 1 Targeted Fauna (Biologic 2010), G= Port Hedland Nelson Point Dredging Approvals Flora and Fauna Review of DMMA H (Biota 2009), H= Flora and Fauna Assessment of DMMA A (Biota 2008b), I= RGP5 Bing to Walla Siding and Repeater Fauna Assessment (ecologia 2008a), J= RGP5 Quarry 1 Fauna Survey (ecologia 2008b), K= Goldsworthy Rail Duplication fauna Assessment (ENV 2008), L= RGP5 Northern Quoll Wider Survey Area (ecologia 2009), M= Outer Harbour Development Faun Assessment (ENV 2009), N= Port Hedland Solar Saltfield Expansion Fauna Survey (Biota 2006), O= Fauna Habitats and Fauna Assemblage of the Proposed FMG Stage A Rail Corridor (Biota 2004), P= Boodarie Flora and Fauna (Mattiske 1994), Q= Curre

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Agamidae (Dragons)																						
Long-nosed Water Dragon	*Amphibolurus longirostris*				LC	x					x		x	x	x	x		x	x	x	x	x
Ring-tailed Dragon	*Ctenophorus caudicinctus*				LC	x					x			x	x			x				x
Central Military Dragon	*Ctenophorus isolepis isolepis*				LC	x					x			x	x	x		x	x	x	x	x
Central Netted Dragon	*Ctenophorus nuchalis*				LC	x					x			x				x	x		x	x
Western Netted Dragon	*Ctenophorus reticulatus*				LC	x																
Canegrass Dragon	*Diporiphora winneckei*				LC	x												x				
Bearded Dragon	*Pogona minor*				LC						x							x				
Diplodactyllidae (Geckoes)																						
Fat-tailed Gecko	*Diplodactylus conspicillatus*				LC	x					x							x	x	x	x	
Pale-snouted Gecko	*Lucasium stenodactylum*				LC	x												x	x	x	x	
Beaked Gecko	*Rhynchoedura ornata*				LC														x		x	
Northern Spiny-tailed Gecko	*Strophurus cillaris aberrans*				LC	x												x	x			
Jewelled Gecko	*Strophurus elderi*				LC	x													x			
	Strophurus jeanae				LC	x													x			
Carphodactylidae (Geckoes)																						
Smooth Knob-tailed Gecko	*Nephrurus levis pilbarensis*				LC	x												x	x			
Gekkonidae (Geckoes)																						
	Gehyra nana				LC																x	
	Gehyra pilbara				LC	x													x			
Spotted Dtella	*Gehyra punctata*				LC	x					x			x	x			x				x
	Gehyra purpurascens				LC														x			
Tree Dtella	*Gehyra variegata*				LC	x												x	x	x	x	x
Asian House Gecko	**Hemidactylus frenatus*				LC	x																
Bynoe's Gecko	*Heteronotia binoei*				LC													x	x		x	x

ASSESSMENT
APPENDIX B
FAUNA SPECIES RECORDED IN THE REGION

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Pygopodidae (Legless Lizards)																						
Unbanded Delma	*Delma butleri*				LC													x			x	
Neck-barred Delma	*Delma haroldi*				LC	x													x			x
Peace Delma	*Delma pax*				LC	x													x	x	x	
Excitable Delma	*Delma tincta*				LC	x												x	x			
Burtons snake-lizard	*Lialis burtonis*				LC	x														x		
Hooded Scaly-foot	*Pygopus nigriceps*				LC	x														x	x	
Scincidae (Skinks)																						
White-lipped Rainbow Skink	*Carlia munda*				LC	x																x
Desert Rainbow Skink	*Carlia triacantha*				LC													x	x		x	
Buchanan's snake-eyed Skink	*Cryptoblepharus buchananii*				LC	x																
	Ctenotus duricola				LC	x					x							x				
	Ctenotus grandis titan				LC	x												x	x		x	
	Ctenotus hanloni				LC	x																
	Ctenotus helenae				LC	x												x		x		
Leopard Ctenotus	*Ctenotus pantherinus ocellifer*				LC	x					x			x	x	x		x	x	x	x	x
	Ctenotus piankai				LC	x												x	x		x	
	Ctenotus rufescens				LC	x												x	x			
Rock Ctenotus	*Ctenotus saxatilis*				LC	x					x			x	x			x	x	x	x	x
	Ctenotus serventyi				LC	x												x	x			
Pygmy Spiny-tailed Skink	*Egernia depressa*				LC						x							x				x
Narrow-banded Sand Swimmer	*Eremiascincus fasciolatus*				LC	x												x	x			
Mosaic Desert Skink	*Eremiascincus musivus*				LC																	x
	Lerista bipes				LC	x												x	x	x	x	x
	Lerista clara				LC	x																
	Lerista muelleri				LC													x	x			
Common Dwarf Skink	*Menetia greyii*				LC	x												x	x		x	
	Morethia ruficauda				LC	x					x			x				x	x	x	x	x
	Notoscincus ornatus				LC																x	
Desert Bluetongue	*Tiliqua multifasciata*				LC	x										x		x	x		x	
Varanidae (Monitors)																						
Ridge-tailed Monitor	*Varanus acanthurus*				LC	x												x	x	x	x	x
Short-tailed Monitor	*Varanus brevicauda*				LC	x												x	x	x		
Pilbara Goanna	*Varanus bushi*				LC													x				
Desert Pygmy Monitor	*Varanus eremius*				LC	x					x				x			x	x	x		
Perentie	*Varanus giganteus*				LC									x				x				
Sand Monitor	*Varanus gouldii*				LC	x									x	x		x	x	x	x	

ASSESSMENT
APPENDIX B
FAUNA SPECIES RECORDED IN THE REGION

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Typhlopidae (Blind Snakes)																						
	Ramphotyphlops ammodytes				LC	x												x	x	x		
Flowerpot Snake	**Ramphotyphlops braminus*				LC	x																
Beaked Blind Snake	*Ramphotyphlops grypus*				LC	x												x				
Pilbara Blind Snake	*Ramphotyphlops pilbarensis*				LC	x													x			
Boidae (Pythons)																						
Pygmy Python	*Antaresia perthensis*				LC	x																
Stimson's Python	*Antaresia stimsoni stimsoni*				LC	x								x	x							
Black-headed Python	*Aspidites melanocephalus*				LC	x												x				x
Woma	*Aspidites ramsayi*		S4		EN	x												x				x
Elapidae (Front-fanged Snakes)																						
Desert Death Adder	*Acanthophis pyrrhus*				LC	x																
Pilbara Death Adder	*Acanthophis wellsi*				LC													x				
Shovel-nosed Snake	*Brachyurophis approximans*				LC													x				
Yellow-faced Whip-Snake	*Demansia psammophis*				LC	x												x	x			
Rufous Whip-Snake	*Demansia rufescens*				LC	x												x				
Moon Snake	*Furina ornata*				LC	x																x
Mulga Snake	*Pseudechis australis*				LC	x												x	x	x		
Ringed Snake	*Pseudonaja modesta*				LC	x												x				
Gwardar	*Pseudonaja mengdeni*				LC	x										x		x				x
Desert Banded Snake	*Simoselaps anomalus*				LC	x												x	x	x		
Spotted Snake	*Suta punctata*				LC	x														x		

(x) denotes recorded during the survey

Appendix B3: Recorded Vertebrate Fauna - Birds

Key: EPBC = Environment Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DEC = Department of Conservation Priority Code, IUCN= International Union for Conservation of Nature Code, A = Listed in Naturemap (D 2011a), B= EPBC protected matters search tool (DSEWPaC 2011b) C = Listed by Birds Australia (Birdata 2011), D= DEC Protected Matters Search (DSEWPaC 2011c), E= Bird Survey of Nelson Point Wetlands in April 2011 (Bennelongia 2001, F= Mooka Sidin Level 1 Targeted Fauna (Biologic 2010), G= Port Hedland Nelson Point Dredging Approvals Flora and Fauna Review of DMMA H (Biota 2009), H= Flora and Fauna Assessment of DMMA A (Biota 2008b), I= RGP5 Bing to Walla Siding and Repeater 1 Fauna Assessment (ecologia 2008a), J= RGP5 Quarry 1 Fauna Survey (ecologia 2008b), K= Goldsworthy Rail Duplication fauna Assessment (ENV 2008), L= RGP5 Northern Quoll Wider Survey Area (ecologia 2009), M= Outer Harbour Development Fauna Assessm (ENV 2009), N= Port Hedland Solar Saltfield Expansion Fauna Survey (Biota 2006), O= Fauna Habitats and Fauna Assemblage of the Proposed FMG Stage A Rail Corridor (Biota 2004), P= Boodarie Flora and Fauna (Mattiske 1994), Q= Current Survey.

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Casuariidae (Cassowaries and Emus)																						
Emu	*Dromaius novaehollandiae*				LC	x												x	x	x	x	
Phasianidae (Pheasants and Quails)																						
Brown Quail	*Coturnix ypsilophora*				LC	x		x										x				
Anatidae (Ducks, Geese and Swans)																						
Grey Teal	*Anas gracilis*				LC	x		x		x				x				x				x
Pacific Black Duck	*Anas superciliosa*				LC	x		x		x				x	x			x				
Hardhead	*Aythya australis*				LC	x				x								x				
Black Swan	*Cygnus atratus*				LC	x		x		x												
Plumed Whistling-duck	*Dendrocygna eytoni*				LC	x				x								x				x
Pink-eared Duck	*Malacorhynchus membranaceus*				LC	x		x										x				
Australian Shelduck	*Tadorna tadornoides*				LC	x																
Podicipedidae (Grebes)																						
Hoary-headed Grebe	*Poliocephalus poliocephalus*				LC	x		x														
Australian Grebe	*Tachybaptus novaehollandiae*				LC	x		x		x								x				x
Columbidae (Pigeons and Doves)																						
Domestic Pigeon	**Columba livia*				LC	x																x
Diamond Dove	*Geopelia cuneata*				LC	x		x			x			x				x	x	x		
Bar-shouldered Dove	*Geopelia humeralis*				LC	x																
Peaceful Dove	*Geopelia striata placida*				LC	x		x		x				x		x		x	x			x
Spinifex Pigeon	*Geophaps plumifera*				LC	x					x	x	x	x				x				
Crested Pigeon	*Ocyphaps lophotes*				LC	x		x		x	x	x	x	x		x		x	x	x	x	x
Common Bronzewing	*Phaps chalcoptera*				LC	x															x	x
Flock Bronzewing	*Phaps histrionica*			P4	LC				x													

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APPENDIX B
FAUNA SPECIES RECORDED IN THE REGION

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Podargidae (Frogmouths)																						
Tawny Frogmouth	*Podargus strigoides*				LC	x												x				
Caprimulgidae (Nightjars)																						
Spotted Nightjar	*Eurostopodus argus*				LC	x								x				x		x	x	
Apodidae (Swifts)																						
Fork-tailed Swift	*Apus pacificus*	Mi	S3		LC		x															
Fregatidae (FrigateBirds)																						
Lesser Frigate Bird	*Fregata ariel*	Mi	S3		LC													x				
Anhingidae (Darters)																						
Darter	*Anhinga melanogaster*				LC	x												x			x	
Phalacrocoracidae (Cormorants and Darters)																						
Little Pied Cormorant	*Microcarbo melanoleucos*				LC	x				x				x				x				
Little Black Cormorant	*Phalacrocorax sulcirostris*				LC	x		x														
Pied Cormorant	*Phalacrocorax varius*				LC	x				x								x			x	x
Pelecanidae (Pelicans)																						
Australian Pelican	*Pelecanus conspicillatus*				LC	x				x								x				x
Ciconiidae (Storks)																						
Black-necked Stork	*Ephippiorhynchus asiaticus*				LC	x		x														x
Ardeidae (Herons and Bitterns)																						
Cattle Egret	*Ardea ibis*	Mi	S3		LC		x															x
Eastern Great Egret	*Ardea modesta*	Mi	S3		LC	x	x											x				x
White-faced Heron	*Ardea novaehollandiae*				LC	x								x	x			x			x	
White-necked Heron	*Ardea pacifica*				LC	x																x
Striated Heron	*Butorides striatus*				LC	x												x				x
Little Egret	*Egretta garzetta*				LC	x		x		x			x					x				
Intermediate Egret	*Egretta intermedia*				LC	x																
Eastern Reef Egret	*Egretta sacra*	Mi	S3		LC	x												x				x
Nankeen Night Heron	*Nycticorax caledonicus*				LC	x				x											x	

ASSESSMENT
APPENDIX B
FAUNA SPECIES RECORDED IN THE REGION

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Threskiornithidae (Ibises and Spoonbills)																						
Royal Spoonbill	*Platalea regia*				LC	x																
Australian White ibis	*Threskiornis molucca*				LC	x				x		x						x			x	
Straw-necked Ibis	*Threskiornis spinicollis*				LC	x		x														x
Accipitridae (Kites, Hawks and Eagles)																						
Collared Sparrowhawk	*Accipiter cirrocephalus*				LC	x																
Brown Goshawk	*Accipiter fasciatus*				LC	x																
Wedge-tailed Eagle	*Aquila audax*				LC						x			x				x		x		
Swamp Harrier	*Circus approximans*				LC	x							x									x
Spotted Harrier	*Circus assimilis*				LC	x								x				x		x	x	x
Black-shouldered Kite	*Elanus axillaris*				LC			x										x			x	
Letter-winged Kite	*Elanus scriptus*				LC																x	
White-bellied Sea-eagle	*Haliaeetus leucogaster*	Mi	S3		LC	x	x											x			x	x
Brahminy Kite	*Haliastur indus*				LC	x		x		x		x				x		x	x		x	x
Whistling Kite	*Haliastur sphenurus*				LC	x		x		x				x	x	x		x		x		x
Little Eagle	*Hieraaetus morphnoides*				LC	x								x				x				x
Black Kite	*Milvus migrans*				LC	x					x							x			x	x
Eastern Osprey	*Pandion haliaetus*	Mi	S3		LC	x		x		x						x		x	x		x	x
Falconidae (Falcons)																						
Nankeen Kestrel	*Falco cenchroides*				LC	x		x		x	x			x		x		x	x	x	x	x
Brown Falcon	*Falco berigora*				LC	x					x			x		x		x		x	x	x
Grey Falcon	*Falco hypoleucos*			P4	NT				x													
Australian Hobby	*Falco longipennis*				LC	x		x										x			x	x
Peregrine Falcon	*Falco peregrinus*		S4		LC	x			x													
Rallidae (Waterhens)																						
Buff-banded Rail	*Gallirallus philippensis*				LC	x		x		x												
Eurasian Coot	*Fulica atra*				LC	x		x		x												
Purple Swamphen	*Porphyrio porphyrio*				LC					x												
Otidae (Bustards)																						
Australian Bustard	*Ardeotis australis*			P4	NT	x			x		x							x	x	x	x	x

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APPENDIX B
FAUNA SPECIES RECORDED IN THE REGION

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Burhinidae (Stone-curlews)																						
Bush Stone-curlew	*Burhinus grallarius*			P4	NT				x		x											x
Haematopodidae (Oystercatches)																						
Sooty Oystercatcher	*Haematopus fuliginosus*				LC	x												x				x
Australian Pied Oystercatcher	*Haematopus longirostris*				LC	x												x				
Recurvirostridae (Stilts)																						
Banded Stilt	*Cladorhynchus leucocephalus*				LC	x																x
Black-winged Stilt	*Himantopus himantopus*				LC	x		x		x					x							x
Red-necked Avocet	*Recurvirostra novaehollandiae*				LC	x		x														
Charadriidae (Plovers, Lapwings and Dotterels)																						
Greater Sand Plover	*Charadrius leschenaultii*	Mi	S3		LC	x	x											x				
Lesser Sand Plover	*Charadrius mongolus*	Mi	S3		LC	x	x											x			x	
Red-capped Plover	*Charadrius ruficapillus*				LC	x		x										x	x			x
Oriental Plover	*Charadrius veredus*	Mi	S3		LC		x				x			x				x	x		x	
Red-kneed Dotterel	*Elseyornis cinctus*				LC	x																x
Black-fronted Dotterel	*Elseyornis melanops*				LC	x		x		x								x				x
Pacific Golden Plover	*Pluvialis fulva*	Mi	S3		LC	x	x															
Grey Plover	*Pluvialis squatarola*	Mi	S3		LC	x	x											x				x
Banded Lapwing	*Vanellus tricolor*				LC																	x
Masked Lapwing	*Vanellus miles*				LC	x																
Scolopacidae (Sandpipers and Snipes)																						
Common Sandpiper	*Actitis hypoleucos*	Mi	S3		LC	x	x	x										x			x	
Ruddy Turnstone	*Arenaria interpres*	Mi	S3		LC	x	x											x				x
Sharp-tailed Sandpiper	*Calidris acuminata*	Mi	S3		LC	x	x	x														
Sanderling	*Calidris alba*	Mi	S3		LC	x	x															
Red Knot	*Calidris canutus*	Mi	S3		LC	x	x											x				
Curlew Sandpiper	*Calidris ferruginea*	Mi	S3		LC	x	x											x				
Red-necked Stint	*Calidris ruficollis*	Mi	S3		LC	x	x	x										x				x
Long-toed Stint	*Calidris subminuta*	Mi	S3		LC	x																
Great Knot	*Calidris tenuirostris*	Mi	S3		VU	x	x											x			x	

ASSESSMENT
APPENDIX B
FAUNA SPECIES RECORDED IN THE REGION

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Pin-tailed Snipe	*Gallinago stenura*	Mi	S3		LC	x																
Broad-billed Sandpiper	*Limicola falcinellus*	Mi	S3		LC	x	x															
Asian Dowitcher	*Limnodromus semipalmatus*	Mi	S3		NT	x																
Bar-tailed Godwit	*Limosa lapponica*	Mi	S3		LC	x	x											x				x
Black-tailed Godwit	*Limosa limosa*	Mi	S3		NT	x	x															
Eastern Curlew	*Numenius madagascariensis*	Mi	S3	P4	VU	x	x		x			x	x					x			x	
Little Curlew	*Numenius minutus*	Mi	S3		LC	x	x			x												
Whimbrel	*Numenius phaeopus*	Mi	S3		LC	x	x			x		x	x					x			x	x
Ruff	*Philomachus pugnax*	Mi	S3		LC	x																
Australian Painted Snipe	*Rostratula australis*	VU	S1		EN		x															
Grey-tailed tattler	*Tringa brevipes*	Mi	S3		LC	x	x			x								x				x
Wood Sandpiper	*Tringa glareola*	Mi	S3		LC	x	x	x		x												
Common Greenshank	*Tringa nebularia*	Mi	S3		LC	x	x											x			x	
Marsh Sandpiper	*Tringa stagnatilis*	Mi	S3		LC	x	x											x				
Terek Sandpiper	*Xenus cinereus*	Mi	S3		LC	x	x											x			x	
Glareolidae (Pratincoles)																						
Oriental Pratincole	*Glareola maldivarum*	Mi	S3		LC	x	x	x										x	x	x	x	
Turnicidae (Button-quails)																						
Little Button-quail	*Turnix velox*				LC	x								x				x	x	x	x	
Laridae (Gulls and Terns)																						
Silver Gull	*Larus novaehollandiae*				LC	x		x		x						x		x			x	x
Pacific Gull	*Larus pacificus*				LC	x																
Little Tern	*Sterna albifrons*	Mi	S3		LC	x						x						x				
Lesser Crested Tern	*Sterna bengalensis*	Mi	S3		LC	x												x				
Crested Tern	*Sterna bergii*				LC	x												x				
Caspian Tern	*Sterna caspia*	Mi	S3		LC	x		x		x								x				x
Common Tern	*Sterna hirundo*	Mi	S3		LC	x																
Whiskered Tern	*Sterna hybrida*				LC	x		x		x								x				
Fairy Tern	*Sterna nereis*				VU	x												x				
Gull-billed Tern	*Sterna nilotica affinis*				LC	x		x										x			x	x
White-winged Black Tern	*Chlidonias leucoptera*	Mi	S3		LC	x		x														
Cacatuidae (Cockatoos)																						

ASSESSMENT
APPENDIX B
FAUNA SPECIES RECORDED IN THE REGION

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Galah	*Cacatua roseicapilla*				LC	x		x			x			x		x		x			x	x
Little Corella	*Cacatua sanguinea*				LC	x					x			x		x		x				x
Psittacidae (Lorikeets and Parrots)																						
Australian Ringneck	*Barnardius zonarius*				LC	x														x	x	x
Budgerigar	*Melopsittacus undulatus*				LC	x		x						x				x		x	x	x
Cockatiel	*Nymphicus hollandicus*				LC	x				x				x				x		x	x	x
Red-capped Parrot	*Platycercus spurius*				LC	x																
Cuculidae (Cuckoos)																						
Horsfield's Bronze-Cuckoo	*Chrysococcyx basalis*				LC			x			x							x			x	x
Black-eared Cuckoo	*Chalcites osculans*																		x			
Shining Bronze-Cuckoo	*Chalcites lucidus*											x										
Pallid Cuckoo	*Cuculus pallidus*				LC			x										x		x		
Pheasant Coucal	*Centropus phasianus*				LC													x				
Strigidae (Hawk-owls)																						
Southern Boobook Owl	*Ninox novaeseelandiae*				LC	x															x	
Tytonidae (Barn Owls)																						
Eastern Barn Owl	*Tyto alba*				LC	x												x				
Halcyonidae (Kingfishers)																						
Blue-winged Kookaburra	*Dacelo leachii*				LC	x		x						x		x						x
Collared Kingfisher	*Todiramphus chloris*				LC	x												x			x	
Red-backed Kingfisher	*Todiramphus pyrrhopygia*				LC	x		x			x							x		x	x	x
Sacred Kingfisher	*Todiramphus sanctus*				LC	x		x		x				x		x		x			x	x
Meropidae (Bee-eaters)																						
Rainbow Bee-eater	*Merops ornatus*	Mi	S3		LC	x	x	x			x	x		x		x		x	x	x	x	x
Climacteridae																						
Black-tailed Treecreeper	*Climacteris melanura*				LC	x																

ASSESSMENT
APPENDIX B
FAUNA SPECIES RECORDED IN THE REGION

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Ptilonorhynchidae (Bowerbirds)																						
Western Bowerbird	*Chlamydera guttata*				LC	x								x								
Maluridae (Fairy-wrens)																						
Variegated Fairy-wren	*Malurus lamberti*				LC	x		x			x							x	x		x	x
White-winged Fairy-wren	*Malurus leucopterus*				LC	x				x	x	x	x	x	x	x		x	x	x	x	x
Acanthizidae (Scrubwrens, Gerygones and Thornbills)																						
Dusky Gerygone	*Gerygone tenebrosa*				LC	x		x		x								x			x	
Weebill	*Smicrornis brevirostris*				LC	x						x										
Pardalotidae (Pardalotes)																						
Red-browed Pardalote	*Pardalotus rubricatus*				LC	x		x										x	x		x	x
Striated Pardalote	*Pardalotus striatus*				LC	x		x														
Meliphagidae (Honeyeaters)																						
Pied Honeyeater	*Certhionyx variegatus*				LC	x																
Black Honeyeater	*Certhionyx niger*				LC									x				x				
Orange Chat	*Epthianura aurifrons*																		x			
Crimson Chat	*Epthianura tricolor*				LC	x																
Grey-headed Honeyeater	*Lichenostomus keartlandi*				LC	x																
White-plumed Honeyeater	*Lichenostomus penicillatus*				LC	x		x		x	x	x		x		x		x	x		x	x
Singing Honeyeater	*Lichenostomus virescens*				LC	x		x		x	x	x	x	x		x		x	x	x	x	x
Brown Honeyeater	*Lichmera indistincta*				LC	x		x				x		x		x		x		x	x	x
Yellow-throated Miner	*Manorina flavigula*				LC	x		x			x					x		x		x	x	x
Pomatostomidae (Australian Babblers)																						
Grey-crowned Babbler	*Pomatostomus temporalis*				LC	x																
Campephagidae (Cuckoo-shrikes)																						
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*				LC	x		x		x	x	x		x		x		x	x	x	x	x
White-winged Triller	*Lalage sueurii*				LC	x		x								x		x	x	x		x

ASSESSMENT
APPENDIX B
FAUNA SPECIES RECORDED IN THE REGION

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Pachycephalidae (Whistlers)																						
Grey Shrike-thrush	*Colluricincla harmonica*				LC	x																x
Crested Bellbird	*Oreoica gutturalis*				LC										x							
White-breasted Whistler	*Pachycephala lanioides*				LC	x		x				x	x					x			x	x
Mangrove Golden Whistler	*Pachycephala melanura*				LC	x												x			x	
Rufous Whistler	*Pachycephala rufiventris*				LC						x								x		x	
Artamidae (Woodswallows)																						
Black-faced Woodswallow	*Artamus cinereus*				LC	x		x			x			x	x	x		x	x	x	x	x
White-breasted Woodswallow	*Artamus leucorynchus*				LC	x		x		x		x	x					x	x		x	x
Masked Woodswallow	*Artamus personatus*				LC	x				x												
White-browed Woodswallow	*Artamus superciliosus*				LC													x				
Pied Butcherbird	*Cracticus nigrogularis*				LC	x		x							x					x	x	x
Dicruridae (Flycatchers)																						
Magpie-Lark	*Grallina cyanoleuca*				LC	x		x		x	x	x		x		x		x	x	x	x	x
Grey Fantail	*Rhipidura fuliginosa*				LC			x														
Willie Wagtail	*Rhipidura leucophrys*				LC	x		x			x	x	x	x	x	x		x			x	x
Mangrove Grey Fantail	*Rhipidura phasiana*				LC	x												x			x	
Corvidae (Ravens and Crows)																						
Little Crow	*Corvus bennetti*				LC	x														x	x	
Torresian Crow	*Corvus orru*				LC	x		x			x	x		x		x		x	x			x
Western Crow	*Corvus orru cecilae*				LC	x																
Petroicidae (Australian Robins)																						
Mangrove Robin	*Eopsaltria pulverulenta*				LC	x		x										x			x	

ASSESSMENT
APPENDIX B
FAUNA SPECIES RECORDED IN THE REGION

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Alauidae (Songlarks)																						
Singing Bushlark	*Mirafra javanica*				LC	x		x			x			x		x		x	x		x	
Acrocephalidae																						
Australian Reed-warbler	*Acrocephalus stentoreus*				LC	x																
Megaluridae																						
Brown Songlark	*Cincloramphus cruralis*				LC	x												x			x	x
Rufous Songlark	*Cincloramphus mathewsi*				LC	x												x	x			x
Spinifex Bird	*Eremiornis carteri*				LC						x			x				x				x
Timaliidae (White-eyes)																						
Yellow White-eye	*Zosterops luteus*				LC	x		x		x								x	x		x	x
Hirundinidae (Swallows)																						
White-backed Swallow	*Cheramoeca leucosterna*				LC																x	x
Fairy Martin	*Hirundo ariel*				LC	x		x			x			x	x			x			x	x
Welcome Swallow	*Hirundo neoxena*				LC	x				x											x	
Barn Swallow	*Hirundo rustica*	Mi	S3		LC	x	x	x														
Tree Martin	*Petrochelidon nigricans*				LC	x		x		x				x		x		x			x	x
Estrildidae																						
Painted Finch	*Emblema pictum*				LC	x								x				x				
Star Finch (Western)	*Neochmia ruficauda subclarescens*			P4	NT	x		x		x												
Zebra Finch	*Taeniopygia guttata*				LC	x		x		x	x	x	x	x		x		x	x	x	x	x
Passeridae																						
Eurasian Tree Sparrow	**Passer montanus*				LC	x																
Motacillidae (Pipits and True Wagtails)																						
Australasian Pipit	*Anthus novaeseelandiae*				LC	x		x		x	x	x	x	x		x		x	x	x	x	
Eastern Yellow Wagtail	*Motacilla tschutschensis*					x																

(x) denotes recorded during the survey

Appendix B4: Recorded Vertebrate Fauna - Mammals

Key: EPBC = Environment Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DEC = Department of Conservation Priority Code, IUCN= International Union for Conservation of Nature Code, A = Listed Naturemap (DEC 2011a), B= EPBC protected matters search tool (DSEWPaC 2011b) C = Listed by Birds Australia (Birdata 2011), D= DEC Protected Matters Search (DSEWPaC 2011c), E= Bird Survey of Nelson Point Wetlands in April 2011 (Bennelongia 2001, F= Mooka Siding Level 1 Targeted Fauna (Biologic 2010), G= Port Hedland Nelson Point Dredging Approvals Flora and Fauna Review of DMMA H (Biota 2009), H= Flora and Fauna Assessment of DMMA A (Biota 2008b) RGP5 Bing to Walla Siding and Repeater 1 Fauna Assessment (ecologia 2008a), J= RGP5 Quarry 1 Fauna Survey (ecologia 2008b), K= Goldsworthy Rail Duplication fauna Assessment (ENV 2008), L= RGP5 Northern Quoll Wider Survey Area (ecologia 2009), M= Outer Harbour Development Fauna Assessment (ENV 2009), N= Port Hedland Solar Saltfield Expansion Fauna Survey (Biota 2006), O= Fauna Habitats and Fauna Assemblage of the Proposed FMG Stage A Rail Corridor

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Tachyglossidae (Echidnas)																						
Echidna	*Tachyglossus aculeatus*				LC	x																
Dasyuridae (Carnivorous Marsupials)																						
Kultarr	*Antechinomys laniger*				LC	x																
Brush-tailed Mulgara	*Dasycercus blythi*			P4	LC	x			x													
Crest-tailed Mulgara	*Dasycercus cristicauda*	VU	S1		LC	x	x		x													
Northern Quoll	*Dasyurus hallucatus*	EN	S1		EN	x	x		x		x				x		x					
Little Red Kaluta	*Dasykaluta rosamondae*				LC	x					x							x	x	x	x	
Pilbara Ningaui	*Ningaui timealeyi*				LC	x																
Long-tailed Planigale	*Planigale ingrami*				LC	x																
Stripe-faced Dunnart	*Sminthopsis macroura*				LC																x	
Lesser Hairy-footed Dunnart	*Sminthopsis youngsoni*				LC	x												x	x	x		
Peramelidae (Bilbys)																						
Greater Bilby	*Macrotis lagotis*	VU	S1		VU	x			x													
Macropodidae (Kangaroos)																						
Euro	*Macropus robustus*				LC	x					x		x			x		x	x		x	
Red Kangaroo	*Macropus rufus*				LC	x															x	

ASSESSMENT
APPENDIX B
FAUNA SPECIES RECORDED IN THE REGION

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Pteropodidae (Flying Fox)																						
Little Red Flying Fox	*Pteropus scapulatus*				LC													x				
Emballonuridae (Sheathtail-bats)																						
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*				LC						x							x				x
Common Sheathtail-bat	*Taphozous georgianus*				LC						x							x				x
Megasermatidae (False Vampire Bats)																						
Ghost Bat	*Macroderma gigas*			P4	VU				x													
Hipposideridae (Leafnosed-bats)																						
Pilbara Leaf-nosed Bat	*Rhinonicteris aurantia*	VU	S1		LC		x		x													
Vespertilionidae (Ordinary Bats)																						
Gould's Wattled Bat	*Chalinolobus gouldii*				LC						x							x				x
Arnhem Long-eared Bat	*Nyctophilus arnhemensis*				LC	x												x				
Lesser Long-eared Bat	*Nyctophilus geoffroyi*				LC	x												x				
Little Broad-nosed Bat	*Scotorepens greyii*				LC						x							x				x
Finlayson's Cave Bat	*Vespadelus finlaysoni*				LC	x					x							x	x			x
Molossidae (Freetail-bats)																						
Northern Freetail-bat	*Chaerephon jobensis*				LC	x												x				
Beccari's Freetail-bat	*Mormopterus beccarii*				LC													x				
Little Northern Freetail-bat	*Mormopterus loriae cobourgensis*			P1		x			x									x	x			
Muridae (Rodents)																						
House Mouse	**Mus musculus*					x												x	x	x	x	
Spinifex-hopping Mouse	*Notomys alexis*				LC	x												x	x			
Western Pebble-mouse	*Pseudomys chapmani*			P4	LC				x		x											
Delicate Mouse	*Pseudomys delicatulus*																		x	x		
Desert Mouse	*Pseudomys desertor*																		x			
Sandy Inland Mouse	*Pseudomys hermannsburgensis*				LC	x												x		x	x	
Western Chestnut Mouse	*Pseudomys nanus*				LC	x												x				
Common Rock-rat	*Zyzomys argurus*				LC						x							x				

ASSESSMENT
APPENDIX B
FAUNA SPECIES RECORDED IN THE REGION

COMMON NAME	SCIENTIFIC NAME	Conservation Codes				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		EPBC	WC	DEC	IUCN																	
Leporidae																						
European Rabbit	**Oryctolagus cuniculus*				LC													x				
Canidae																						
Dingo	*Canis lupus dingo*				LC	x					x			x							x	
Wild Dog	**Canis lupus familiaris*				LC	x						x						x	x		x	x
Fox	**Vulpes vulpes*				LC	x	x						x			x		x	x			
Felidae (Cats)																						
Feral Cat	**Felis catus*				LC	x	x				x	x				x		x			x	x
Equidae (Horses)																						
Horse	**Equus caballus*				LC													x			x	
Camelidae																						
Camel	**Camelus dromedarius*				LC						x											
Suidae																						
Pig	**Sus scrofa*				LC		x															
Bovidae																						
European Cattle	**Bos taurus*				LC						x		x	x		x		x			x	
Sheep	**Ovis aries*				LC																x	

(x) denotes recorded during the survey

(*) denotes introduced species.

(#) denotes species name that is no longer current.

APPENDIX C
FAUNA HABITAT DATA SHEETS

PORT HEDLAND REGIONAL FAUNA ASSESSMENT

APPENDIX C

FAUNA HABITAT DATA SHEETS

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA1
Easting	654509	**Northing**	7730086	**Date**	12/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	312-313
Broad Habitat	Riverine	**% of area**	-		
Landscape Position	N-S				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	0	Mallee	0
Shrubs >2m	20	Shrubs <2m	20
Hummock grasses	0	Herbs	0
Tussock grasses	10		

Soil type & colour	Cream riversand		
Rock type	N/A		
Rock size	N/A		
Rocky outcrops	Nil		
Leaf litter (% cover)	5		
Twig litter (% cover)	-	Average size	-
Fallen logs (abundance)	-	Average size	-
Hollow-bearing trees (abundance)	-	Average size	-
Dead stags (abundance)	-	Average dimension	-

Water bodies (present/absent) Describe

300 x 100 m stretch of fresh water.

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Absent

Disturbances (present/absent) Describe

4WD tracks, bridge and rubbish

Ecological processes important to habitat (present/absent) Describe

Important area for waterbirds particularly Egrets and Herons.

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA2
Easting	657741	**Northing**	7748938	**Date**	13/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	321-324
Broad Habitat	Mangroves	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	80	Mallee	0
Shrubs >2m	0	Shrubs <2m	0
Hummock grasses	0	Herbs	0
Tussock grasses	0		

Soil type & colour	Brown mud		
Rock type	0		
Rock size	0		
Rocky outcrops	0		
Leaf litter (% cover)	0		
Twig litter (% cover)	0	Average size	-
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Tidal sea water.

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Potential roost site for Migratory waders and shorebirds.

Disturbances (present/absent) Describe

4WD tracks and abandoned car.

Ecological processes important to habitat (present/absent) Describe

Potential foraging and roosting site for Migratory waders and shorebirds. Important site for Mangrove specialists.

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA3
Easting	659647	**Northing**	7753882	**Date**	13/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	330-331
Broad Habitat	Beach/Dunal	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	0	Mallee	0
Shrubs >2m	0	Shrubs <2m	0
Hummock grasses	0	Herbs	0
Tussock grasses	40		

Soil type & colour	White sand		
Rock type	Sandstone		
Rock size	Large sections of reef at low ride		
Rocky outcrops	-		
Leaf litter (% cover)	0		
Twig litter (% cover)	0	Average size	-
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Ocean.

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Potential roost site for Migratory waders and shorebirds.

Disturbances (present/absent) Describe

Boat ramp, 4WD, fishing and rubbish

Ecological processes important to habitat (present/absent) Describe

Foraging site for waders such as Plovers and Oystercatchers.

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA4
Easting	660568	**Northing**	7733782	**Date**	14/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	332-333
Broad Habitat	Mangroves	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	90	Mallee	0
Shrubs >2m	0	Shrubs <2m	0
Hummock grasses	0	Herbs	0
Tussock grasses	0		

Soil type & colour	Brown mud		
Rock type	-		
Rock size	-		
Rocky outcrops	-		
Leaf litter (% cover)	-		
Twig litter (% cover)	-	Average size	-
Fallen logs (abundance)	-	Average size	-
Hollow-bearing trees (abundance)	Few	Average size	10 cm
Dead stags (abundance)	-	Average dimension	-

Water bodies (present/absent) Describe

Tidal sea water.

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Good roost site for mangrove bat species as plenty of tree hollows in mature mangrove trees.

Potential roost site for Migratory waders and shorebirds.

Disturbances (present/absent) Describe

4WD and rubbish

Ecological processes important to habitat (present/absent) Describe

Important for bats and birds that specialize in this habitat.

Potential foraging and roosting site for Migratory waders and shorebirds.

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA5
Easting	658086	**Northing**	7725599	**Date**	14/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	335-336
Broad Habitat	Riverine	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	10
Trees <10m	30	Mallee	0
Shrubs >2m	10	Shrubs <2m	0
Hummock grasses	-	Herbs	0
Tussock grasses	10		

Soil type & colour	Cream riverstone		
Rock type			
Rock size			
Rocky outcrops			
Leaf litter (% cover)	0		
Twig litter (% cover)	5	Average size	Small
Fallen logs (abundance)	Low	Average size	Small
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

500m stretch of water.

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Zebra finch nests in trees.

Disturbances (present/absent) Describe

4WD tracks and cattle.

Ecological processes important to habitat (present/absent) Describe Important water source for all fauna particularly water fowl.

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA6
Easting	657567	**Northing**	7748702	**Date**	16/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	345-346
Broad Habitat	Tidal Flats	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	0	Mallee	0
Shrubs >2m	0	Shrubs <2m	0
Hummock grasses	0	Herbs	1%
Tussock grasses	0		

Soil type & colour	Mud		
Rock type	-		
Rock size	-		
Rocky outcrops	-		
Leaf litter (% cover)	0		
Twig litter (% cover)	0	Average size	-
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Tidal sea water.

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Potential roost site for Migratory waders and shorebirds.

Disturbances (present/absent) Describe

4WD tracks.

Ecological processes important to habitat (present/absent) Describe

Potential foraging and roosting site for Migratory waders and shorebirds.

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA7
Easting	654693	**Northing**	7747642	**Date**	16/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	349-350
Broad Habitat	Tidal Flats	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	0	Mallee	0
Shrubs >2m	0	Shrubs <2m	10%
Hummock grasses	0	Herbs	25%
Tussock grasses	0		

Soil type & colour	Mud		
Rock type	0		
Rock size	0		
Rocky outcrops	0		
Leaf litter (% cover)	0		
Twig litter (% cover)	0	Average size	-
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Tidal sea water

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Potential roost site for Migratory waders and shorebirds.

Disturbances (present/absent) Describe

4WD tracks.

Ecological processes important to habitat (present/absent) Describe

Potential foraging and roosting site for Migratory waders and shorebirds.

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA8
Easting	676827	**Northing**	7728551	**Date**	18/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	401-402
Broad Habitat	Riverine	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	10
Trees <10m	10	Mallee	0
Shrubs >2m	5	Shrubs <2m	10
Hummock grasses	20	Herbs	0
Tussock grasses	0		

Soil type & colour	Red river sand		
Rock type	0		
Rock size	0		
Rocky outcrops	0		
Leaf litter (% cover)	0		
Twig litter (% cover)	5-10	Average size	-
Fallen logs (abundance)	Low	Average size	Small
Hollow-bearing trees (abundance)	Medium	Average size	Medium
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Riverbed during peak flow periods after significant rain events.

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Absent

Disturbances (present/absent) Describe

Absent

Ecological processes important to habitat (present/absent) Describe

Provides wide range of fauna habitats.

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA9
Easting	673743	**Northing**	7739163	**Date**	18/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	404-405
Broad Habitat	Sand plain	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	1%	Mallee	0
Shrubs >2m	0	Shrubs <2m	40%
Hummock grasses	40%	Herbs	0
Tussock grasses	0		

Soil type & colour	Red sand		
Rock type	0		
Rock size	0		
Rocky outcrops	0		
Leaf litter (% cover)	+		
Twig litter (% cover)	+	Average size	-
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Absent

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Absent

Disturbances (present/absent) Describe

4WD tracks

Ecological processes important to habitat (present/absent) Describe

Absent

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA10
Easting	670229	**Northing**	7727597	**Date**	18/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	406-407
Broad Habitat	Sand plain	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	2%	Mallee	0
Shrubs >2m	0	Shrubs <2m	10%
Hummock grasses	40%	Herbs	0
Tussock grasses	0		

Soil type & colour	Red sand		
Rock type	0		
Rock size	0		
Rocky outcrops	0		
Leaf litter (% cover)	0		
Twig litter (% cover)	1	Average size	small
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Absent

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Absent

Disturbances (present/absent) Describe

Fire and 4WD tracks

Ecological processes important to habitat (present/absent) Describe Absent

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA11
Easting	673945	**Northing**	7751791	**Date**	19/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	412-413
Broad Habitat	Tidal Flats	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	0	Mallee	0
Shrubs >2m	0	Shrubs <2m	0
Hummock grasses	0	Herbs	0
Tussock grasses	0		

Soil type & colour	Mud - brown		
Rock type	Limestone		
Rock size	Flat large areas		
Rocky outcrops	0		
Leaf litter (% cover)	0		
Twig litter (% cover)	0	Average size	-
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Tidal sea water

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Potential roost site for Migratory waders and shorebirds.

Disturbances (present/absent) Describe

Humans / boats

Ecological processes important to habitat (present/absent) Describe

Foraging and roosting site for Migratory waders and shorebirds.

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA12
Easting	674003	**Northing**	7751411	**Date**	19/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	418-419
Broad Habitat	Mangroves	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	40%	Mallee	0
Shrubs >2m	0	Shrubs <2m	0
Hummock grasses	0	Herbs	0
Tussock grasses	0		

Soil type & colour	Brown mud		
Rock type	0		
Rock size	0		
Rocky outcrops	0		
Leaf litter (% cover)	0		
Twig litter (% cover)	0	Average size	-
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Tidal sea water

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Potential roost site for Migratory waders and shorebirds.

Disturbances (present/absent) Describe

Human traffic and rubbish

Ecological processes important to habitat (present/absent) Describe

Potential foraging and roosting site for Migratory waders and shorebirds. Important site for Mangrove specialists.

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA13
Easting	669978	**Northing**	7754453	**Date**	19/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	420-421
Broad Habitat	Beach/Dunal	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	0	Mallee	0
Shrubs >2m	0	Shrubs <2m	0
Hummock grasses	0	Herbs	0
Tussock grasses	0		

Soil type & colour	White sand		
Rock type	Limestone		
Rock size	Tidal reef platforms		
Rocky outcrops	0		
Leaf litter (% cover)	0		
Twig litter (% cover)	0	Average size	-
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Tidal sea water

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Potential roost site for Migratory waders and shorebirds.

Disturbances (present/absent) Describe

Rubbish

Ecological processes important to habitat (present/absent) Describe

Potential foraging and roosting site for Migratory waders and shorebirds.

Terrestrial Fauna Habitat Assessment Proforma

Pilbara

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA14
Easting	661632	**Northing**	7754586	**Date**	18/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	408-409
Broad Habitat	Beach/Dunal	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	0	Mallee	0
Shrubs >2m	0	Shrubs <2m	0
Hummock grasses	0	Herbs	0
Tussock grasses	0		

Soil type & colour	Sand		
Rock type	Limestone		
Rock size	Tidal reef platform		
Rocky outcrops	0		
Leaf litter (% cover)	0		
Twig litter (% cover)	0	Average size	-
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Ocean / tidal

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Potential roost site for Migratory waders and shorebirds.

Disturbances (present/absent) Describe

Fishing, rubbish

Ecological processes important to habitat (present/absent) Describe

Potential foraging and roosting site for Migratory waders and shorebirds.

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA15
Easting	660851	**Northing**	7731542	**Date**	16/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	426-427
Broad Habitat	Sand plain	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	0	Mallee	0
Shrubs >2m	0	Shrubs <2m	20
Hummock grasses	70	Herbs	0
Tussock grasses	0		

Soil type & colour	Red sand		
Rock type	0		
Rock size	0		
Rocky outcrops	0		
Leaf litter (% cover)	5		
Twig litter (% cover)	5	Average size	small
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Absent

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Absent

Disturbances (present/absent) Describe

4WD and rubbish (corrugated iron)

Ecological processes important to habitat (present/absent) Describe

Absent

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**		**Site #**	HA16
Easting1	659956	**Northing1**	7724408		
Easting2	663683	**Northing2**	7723955		
Easting3	676066	**Northing3**	7722938		
Date	15/07/2011				
Site Dimensions	-	**Search time**	-		
Photo #	340-341; 343-344				
Broad Habitat	Low Hill	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	0	Mallee	0
Shrubs >2m	0	Shrubs <2m	0
Hummock grasses	0	Herbs	0
Tussock grasses	20		

Soil type & colour	Red		
Rock type	Ironstone		
Rock size	Small		
Rocky outcrops	0		
Leaf litter (% cover)	0		
Twig litter (% cover)	1	Average size	Small
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Absent

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Absent

Disturbances (present/absent) Describe

Tracks

Ecological processes important to habitat (present/absent) Describe

Suitable for Pebble-Mound Mouse. No pebblemounds found.

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**		**Site #**	HA17
Easting	668762	**Northing**	7731587	**Date**	16/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	369-370
Broad Habitat	Rock pile - Granite	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	0	Mallee	0
Shrubs >2m	0	Shrubs <2m	0
Hummock grasses	0	Herbs	0
Tussock grasses	0		

Soil type & colour	-		
Rock type	Granite		
Rock size	Large boulders		
Rocky outcrops	100%		
Leaf litter (% cover)	0		
Twig litter (% cover)	0	Average size	-
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Absent

Caves (present/absent) Describe

Crevices but no caves

Nests or Roosts (present/absent) Describe

Absent

Disturbances (present/absent) Describe

Absent

Ecological processes important to habitat (present/absent) Describe

Good habitat for rock dwelling species.

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**		**Site #**	HA18
Easting	669174	**Northing**	7731594	**Date**	16/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	367-368
Broad Habitat	Coolarin pool	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	30%	Mallee	0
Shrubs >2m	5%	Shrubs <2m	0
Hummock grasses	10%	Herbs	10%
Tussock grasses	0		

Soil type & colour	-		
Rock type	Granite		
Rock size	Slabs		
Rocky outcrops	0		
Leaf litter (% cover)	0		
Twig litter (% cover)	0	Average size	-
Fallen logs (abundance)	Few	Average size	Small
Hollow-bearing trees (abundance)	Few	Average size	Small
Dead stags (abundance)	nil	Average dimension	-

Water bodies (present/absent) Describe

Billabong.

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Absent

Disturbances (present/absent) Describe

Absent

Ecological processes important to habitat (present/absent) Describe

Significant foraging and roost site for waterbirds and birds of prey

Terrestrial Fauna Habitat Assessment Proforma

Project Name	Port Hedland Fauna	**Observer**	JT	**Site #**	HA19
Easting	672680	**Northing**	7721814	**Date**	17/07/2011
Site Dimensions	-	**Search time**	-	**Photo #**	371-372
Broad Habitat	Quartz Hill	**% of area**	-		
Landscape Position	-				
Broad Floristic Formation					

Vegetation (% cover)

Trees >30m	0	Trees 10-30m	0
Trees <10m	0	Mallee	0
Shrubs >2m	0	Shrubs <2m	0
Hummock grasses	0	Herbs	0
Tussock grasses	0		

Soil type & colour	0		
Rock type	Quartz		
Rock size	Large		
Rocky outcrops	0		
Leaf litter (% cover)	0		
Twig litter (% cover)	0	Average size	-
Fallen logs (abundance)	0	Average size	-
Hollow-bearing trees (abundance)	0	Average size	-
Dead stags (abundance)	0	Average dimension	-

Water bodies (present/absent) Describe

Absent

Caves (present/absent) Describe

Absent

Nests or Roosts (present/absent) Describe

Absent

Disturbances (present/absent) Describe

Absent

Ecological processes important to habitat (present/absent) Describe

Good habitat for rock dwelling species.

APPENDIX D
ANABAT, MOTION SENSITIVE CAMERA AND MULGARA TRANSECT LOCATIONS

APPENDIX D

ANABAT, MOTION SENSITIVE CAMERA AND MULGARA TRANSECT LOCATIONS

D1: AnaBat Locations for Port Hedland Regional Survey

Date	Code	Easting	Northing	Habitat	Species of Bat Recorded
13/07/2011	AnaBat 1	660510	7753840	Mangroves	*Chalinolobus gouldii*
15/7/2011	AnaBat 2	657761	7748938	Mangroves	*Chalinolobus gouldii*
16/7/2011	AnaBat 3	669174	7731594	Coolarin Pool	*Chalinolobus gouldii, Saccolaimus flaviventris, Scotorepens greyii*
17/7/2011	AnaBat 4	672023	7729062	Quarry	*Chalinolobus gouldii, Scotorepens greyii, Taphozous georgianus, Vespadelus finlaysoni*
19/7/2011	AnaBat 5	654504	7730005	Turner River	*Chalinolobus gouldii, Scotorepens greyii*

[#]Australian Geocentric 1994 (GDA94) Zone 50K

D2- Location of Motion Sensitive Camera

Date	Code	Easting	Northing	Habitat
13/07/2011 until 14/07/2011 and 17/07/2011	MOT 1	654716	7729993	Riverine
15/7/2011	MOT 2	668761	7731587	Rockpile
16/7/2011	MOT 3	672023	7729062	Quarry

[#]Australian Geocentric 1994 (GDA94) Zone 50K

D3- Location of Mulgara Transect Start Points

Code	Easting	Northing	Length of Transect
1a	655360	7736888	1423.6 m
2a	658707	7724593	2663.2 m
3a	664954	7721725	2316 m
4a	673179	7722559	2644.7 m
5a	665098	7736949	1219 m
6a	665497	7732240	2310.8 m
7a	670105	7739483	1482.8 m
8a	675810	7722738	1735.2 m
9a	675797	7737510	1180.6 m
10a	661483	7747701	800.3 m
11a	659124	7747711	1030.2 m

[#]Australian Geocentric 1994 (GDA94) Zone 50K

APPENDIX E
LOCATIONS OF RECORDED CONSERVATION SIGNIFICANT FAUNA

APPENDIX E

LOCATION OF RECORDED CONSERVATION SIGNIFICANT FAUNA

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Aspidites ramsayi	Woma	WC- S4	Current Survey (ENV 2011)	11-20 July 2011	662938	7732087	

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Aspidites ramsayi	Woma	WC- S4	Quantum Outer Harbor Development (ENV 2008)	5- 16 May 2008	664207	7734443	
Ardea ibis	Cattle Egret	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	662586	7753059	

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Ardea modesta	Eastern Great Egret	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	654495	7730008	
Egretta sacra	Eastern Reef Egret	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	662586	7753059	

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Haliaeetus leucogaster	White-bellied Sea-eagle	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	657741	7748937	
Haliaeetus leucogaster	White-bellied Sea-eagle	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	662586	7753059	

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Pandion haliaetus	Eastern Osprey	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	667098	7753456	
Ardeotis australis	Australian Bustard	DEC-Priority 4	Current Survey (ENV 2011)	11-20 July 2011	659315	7724501	

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Ardeotis australis	Australian Bustard	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673845	7722643	None Available
Ardeotis australis	Australian Bustard	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673912	7721866	None Available
Ardeotis australis	Australian Bustard	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	674135	7720714	None Available
Ardeotis australis	Australian Bustard	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	674138	7720711	None Available
Ardeotis australis	Australian Bustard	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	672354	7730924	None Available

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Ardeotis australis	Australian Bustard	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	672050	7730678	None Available
Ardeotis australis	Australian Bustard	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673875	7721521	None Available
Ardeotis australis	Australian Bustard	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	674111	7720968	None Available

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Burhinus grallarius	Bush Stone-Curlew	DEC-Priority 4	Current Survey (ENV 2011)	11-20 July 2011	676316	7734399	
Burhinus grallarius	Bush Stone-Curlew	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673512	7720235	None Available
Burhinus grallarius	Bush Stone-Curlew	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673332	7721486	None Available
Burhinus grallarius	Bush Stone-Curlew	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic	20 – 26 July and 1 - 5 November 2010	673385	7720306	None Available

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
			2010)				
Burhinus grallarius	Bush Stone-Curlew	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673701	7720102	None Available
Burhinus grallarius	Bush Stone-Curlew	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673868	7721794	None Available
Burhinus grallarius	Bush Stone-Curlew	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673881	7720280	None Available
Burhinus grallarius	Bush Stone-Curlew	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673909	7721989	None Available

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Burhinus grallarius	Bush Stone-Curlew	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	674087	7721839	None Available
Burhinus grallarius	Bush Stone-Curlew	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673826	7720867	None Available
Burhinus grallarius	Bush Stone-Curlew	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673373	7728384	None Available
Burhinus grallarius	Bush Stone-Curlew	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	672899	7729139	None Available

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Pluvialis squatarola	Grey Plover	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	673945	7751791	
Charadrius veredus	Oriental Plover	EPBC-Mi and WC - S3	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673801	7726792	None Available

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Arenaria interpres	Ruddy Turnstone	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	673945	7751791	
Calidris ruficollis	Red-necked Stint	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	673945	7751791	

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Limosa lapponica	Bar-tailed Godwit	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	673945	7751791	
Tringa brevipes	Grey-tailed Tattler	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	662586	7753059	

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Numenius phaeopus	Whimbrel	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	673945	7751791	
Sterna caspia	Caspian Tern	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	654495	7730008	

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Merops ornatus	Rainbow Bee-eater	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	658075	7743873	
Merops ornatus	Rainbow Bee-eater	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	655230	7738721	

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Merops ornatus	Rainbow Bee-eater	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	657879	7725666	
Merops ornatus	Rainbow Bee-eater	EPBC-Mi and WC - S3	Current Survey (ENV 2011)	11-20 July 2011	666100	7732371	

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
Merops ornatus	Rainbow Bee-eater	EPBC-Mi and WC - S3	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673188	7720323	None Available
Dasyurus hallucatus	Northern Quoll	EPBC-EN, WC- S1	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	672094	7729131	None Available
Dasyurus hallucatus	Northern Quoll	EPBC-EN, WC- S1	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673512	7720235	None Available
Mormopterus loriae cobourgensis	Little Western Freetailed Bat	DEC-Priority 1	Quantum Outer Harbor Development (ENV 2008)	12 October – 9 November 2007 and 5- 16 May 2008	662594	7753080	None Available
Mormopterus loriae cobourgensis	Little Western Freetailed Bat	DEC-Priority 1	Quantum Outer Harbor Development (ENV 2008)	12 October – 9 November 2007 and 5- 16 May 2008	671008	7717595	None Available
Pseudomys chapmani	Western Pebble-mound Mouse	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic	20 – 26 July and 1 - 5 November 2010	674986	7720499	None Available

Species Name	Common Name	Listing	Survey	Date	#Eastings	#Northings	Species/Habitat Photos
			2010)				
Pseudomys chapmani	Western Pebble-mound Mouse	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	675021	7720469	None Available
Pseudomys chapmani	Western Pebble-mound Mouse	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	674903	7720600	None Available
Pseudomys chapmani	Western Pebble-mound Mouse	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	674912	7720576	None Available
Pseudomys chapmani	Western Pebble-mound Mouse	DEC-Priority 4	Mooka Siding, Level 1/ Targeted Fauna Survey (Biologic 2010)	20 – 26 July and 1 - 5 November 2010	673044	7722426	None Available

[#]Australian Geocentric 1994 (GDA94) Zone 50K