Western Ridge Southern Tenements
Vertebrate Fauna Desktop Assessment

Biologic Environmental Survey

BHP Billiton Iron Ore Pty Ltd

November 2016

WESTERN RIDGE SOUTHERN TENEMENTS

VERTEBRATE FAUNA DESKTOP ASSESSMENT

DOCUMENT STATUS				
Revision No.	Author	Review / Approved for Issue	Approved for Issue to	
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Final	Shae Callan	Brad Durrant	Breanne Menezies	23/11/16

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1 EXECUTIVE SUMMARY

BHP Billiton Iron Ore Pty Ltd (BHP Billiton Iron Ore) commissioned Biologic Environmental Survey (Biologic) to undertake a vertebrate fauna desktop assessment covering the Western Ridge southern tenements E52/3360 and E52/3361 (referred to collectively as the Study Areas).

No relevant fauna surveys have taken place within the Study Areas, and 15 fauna surveys and reviews have been undertaken within 10 km of the Study Areas. Eight of these reports were considered most relevant for this review as the remaining seven reports only have a small section occurring within the 10 km buffer.

Four databases were searched to obtain information on species previously recorded (NatureMap and Threatened Fauna Database) or species of conservation significance likely to occur within the Study Areas (Protected Matters Database), and any Priority or Threatened Ecological Communities (PEC/TEC) in the area.

No Priority or Threatened Ecological Communities are known within or adjacent to the Study Areas. None of the ecological communities from the surrounding area of the Study Areas have conservation values related to terrestrial fauna.

Based on preliminary habitat assessments undertaken during a site visit, aerial imagery, Land System data and vegetation mapping, three major fauna habitats were identified within the Study Areas: Drainage area, Stony plain and Low hills.

The database searches and previous survey reports identified 33 species of conservation significance, of which it was determined that four species of conservation significance (Ghost Bat, Western Pebble-mound Mouse, Peregrine Falcon and Rainbow Bee-eater) are likely to occur in the Study Areas and four species may occur (Brush-tailed Mulgara, Fork-tailed Swift, Barn Swallow and Pilbara Flat-headed Blind Snake). No conservation significant fauna have been previously recorded from the Study Areas.

2 INTRODUCTION

BHP Billiton Iron Ore Pty Ltd (BHP Billiton Iron Ore) commissioned Biologic Environmental Survey (Biologic) to undertake a vertebrate fauna desktop assessment covering the Western Ridge southern tenements E52/3360 and E52/3361. These two tenements are hereafter referred to collectively as the Study Areas, or individually as the Western Study Area (E52/3360) and Eastern Study Area (E52/3361). The Study Areas occur in the eastern Pilbara region of Western Australia, approximately 7 km to 17 km south west of the town of Newman (Figure 2.1). The Study Areas collectively cover approximately 1745 ha (Figure 2.2) and are located south west of Orebodies 35, 29, 30 and Mt Whaleback.

The vertebrate fauna desktop assessment will be used to inform future vertebrate fauna baseline surveys and identify the potential occurrence of conservation significant species and communities and other associated values in the Study Areas.

This report provides:

a) a contemporary review and assessment of:

1. Vertebrate fauna within the Study Areas, based on consolidated data from all available surveys intercepting the Study Areas;
2. The international, regional, state/ local conservation values of fauna present, or likely to be present, in the Study Areas; and
3. A preliminary map of the main vertebrate fauna habitats present in the Study Areas.

b) an inventory of:

4. Species recorded from the Study Areas and those that are likely to occur in the area based on previous fauna surveys and databases;
5. Characteristics of mapped habitats; and
6. Locations of conservation significant fauna reported within the Study Areas.

400000 450000 500000 550000 600000 650000 700000 750000 800000 850000 900000 950000

7750000 7700000 7650000 7600000 7550000 7500000 7450000 7400000

Pindanland
McLarty
Nimingarra
PORT HEDLAND
Roebourne
Yarrie
Mackay
KARRATHA
MARBLE BAR
Chichester
Rudall
Hamersley
TOM PRICE
Marillana
Yandi (Marillana Creek)
Fortescue
Trainor
Mining Area C
Jinidi
Hope Downs
Mudlark
South Parmelia
South Flank
Ashburton
PARABURDOO
Cathedral Gorge
OB 24
OB 23
OB 31
OB 32
OB 18
OB 25
Western Ridge
Jimblebar (Wheelarra Hill)
Augustus

Legend

- Pilbara Towns
- Pilbara Rail
- Great Northern Hwy
- Study Area

IBRA subregion

- Ashburton
- Augustus
- Chichester
- Fortescue
- Hamersley
- Mackay
- McLarty
- Pindanland
- Roebourne
- Rudall
- Trainor

Mining & Exploration Locations

- Care & Maintenance
- Exploration
- Operations
- Operations (Third party)

biologic Environmental Survey

N

1:1,600,000

0 12.5 25 50 75 100 km

BHP Billiton Iron Ore - Western Ridge Project

Southern Tenements Fauna Desktop Assessment

Fig. 2.1: Location and IBRA sub-region

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Size A3. Created 25/09/2016

759000 760000 761000 762000 763000 764000 765000 766000 767000 768000 769000 770000 771000 772000 773000 774000 775000 776000 777000 778000 779000 780000 781000 782000

7416000 7415000 7414000 7413000 7412000 7411000 7410000 7409000 7408000 7407000 7406000 7405000 7404000 7403000 7402000

Mt Whaleback

NEWMAN

OB 29/30

OB 35

Western Ridge

Legend

- Pilbara Towns
- Pilbara Rail
- Great Northern Hwy
- Study Area

Mining & Exploration Locations

- Operations

biologic Environmental Survey

N

1:60,000

0 0.5 1 2 3 4 km

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Southern Tenements Fauna Desktop Assessment

Fig. 2.2: Study Areas and nearby mining locations

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Size A3. Created 25/09/2016

3 ENVIRONMENT

3.1 Biogeography

As defined by the Interim Biogeographic Regionalisation of Australia (Thackway and Cresswell 1995), the Study Areas are located on the southern boundary of the Hamersley sub-region of the Pilbara bioregion. The Hamersley sub-region is characterised by mountainous areas of Proterozoic sedimentary ranges and plateaux, dissected by gorges. The vegetation of the sub-region is dominated by *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils on the ranges, while between them are swathes of Mulga (formerly *Acacia aneura*) woodland over bunch grasses on fine textured soils (Kendrick 2001). The Pilbara bioregion is characterised by vast coastal plains and inland mountain ranges with cliffs and deep gorges. Vegetation is predominantly mulga low woodlands or snappy gum over bunch and hummock grasses (Bastin 2008).

3.2 Climate

The Study Areas are located within the Hamersley sub-region of the Pilbara bioregion (following Thackway and Cresswell 1995) (Figure 3.1). The region features a semi-desert to tropical climate, with rainfall occurring sporadically within either summer or winter, but mostly during the former season. Summer rainfall is a result of either tropical storms in the north or tropical cyclones that impact upon the coast and move inland. The winter rainfall is generally lighter and is the result of cold fronts moving north easterly across the state (Leighton 2004). The average annual rainfall ranges from about 200 to 350 mm, but there are significant fluctuations between years (Department of Water 2012) with up to 1200 mm falling in some locations in some years (McKenzie *et al.* 2009).

Long-term climatic data is not available for the Study Areas; however, long term climatic data (BoM 2016) is available from the Bureau of Meteorology weather station at Newman Aero (Station 7176), 14 km south east of the Study Areas, which provides an indication of climatic conditions experienced at the Study Areas (Figure 3.1).

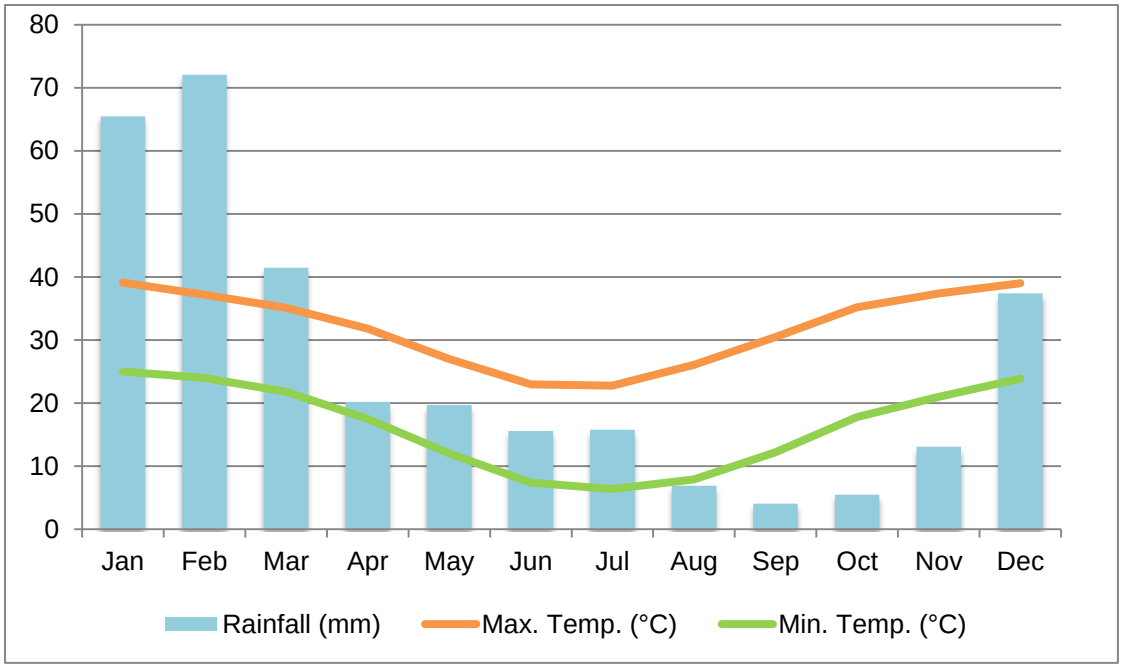

Figure 3.1: Long-term climatic averages of monthly rainfall and diurnal temperature range from Newman Aero (BoM 2016).

3.3 Topography and Drainage

The major hills and ranges of the local area occur immediately to the north of the Study Areas, dominated by Western Ridge (Figure 3.2). The Western Study Area is at the southern foot slope of the south western section of Western Ridge.

The average annual rainfall at Newman Aero is approximately 330 mm, but rainfall occurs mainly as intense tropical summer storms, and annual totals vary greatly. Watercourses flow only after prolonged heavy rain, as short-duration flooding with rapid peaks and slightly less rapid decline. Along major watercourses, including the Fortescue River (Figure 3.2), water can pond and may persist as pools for short periods following major flow events.

The Study Areas are located in the upper Fortescue River catchment, which flows in a west-north-westerly direction before discharging into the Indian Ocean. Several minor, unnamed tributaries of the Fortescue River run through the Study Areas, either in a southerly, or south easterly direction (Figure 3.2).

760000 761000 762000 763000 764000 765000 766000 767000 768000 769000 770000 771000 772000 773000 774000 775000 776000 777000 778000 779000

7412000 7411000 7410000 7409000 7408000 7407000 7406000 7405000 7404000 7403000 7402000 7401000

OB 29/30

OB 35

Western Ridge

To Fortescue River

To Fortescue River

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Legend

- Pilbara Rail
- Study Area
- Pilbara Water Courses

Mining & Exploration Locations

- Operations

Contour (mAHD)

546 550 560 570 580 590 600 610 620 630 640 650 660 670 680 690 700

biologic Environmental Survey

N

1:50,000

0 0.4 0.8 1.6 2.4 3.2 km

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Southern Tenements Fauna Desktop Assessment

Fig. 3.2: Local topography and drainage

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

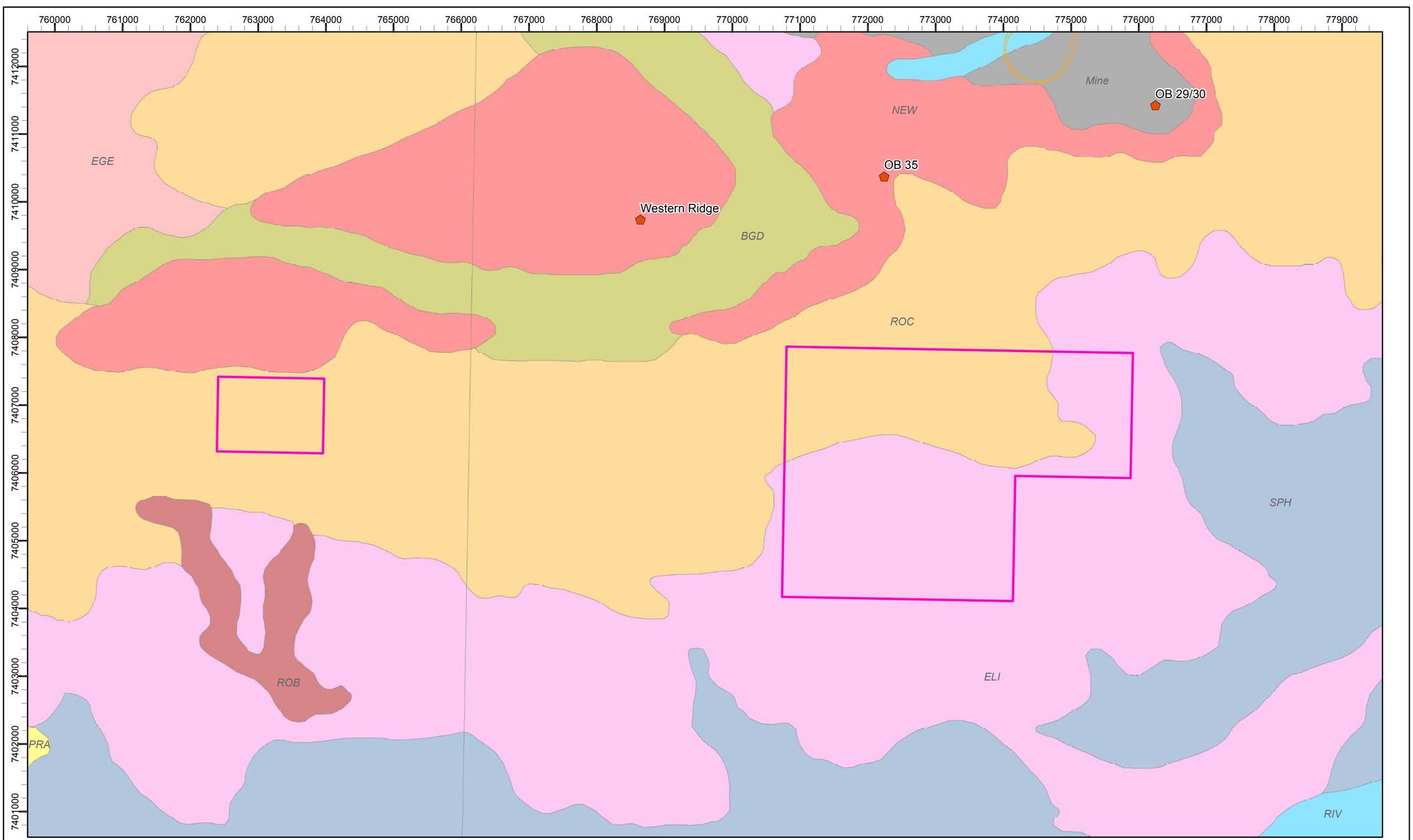
Size A3. Created 25/09/2016

3.4 Land Systems

The Land Systems of the Pilbara region are classified according to similarities in landform, soil, vegetation, geology and geomorphology, following van Vreeswyk *et al.* (2004). Figure 3.3 shows two Land Systems occurring within, and extending beyond, the Study Areas. Descriptions of each Land System occurring within the Study Areas are provided in Table 3.1, ranked in order of increasing spatial extent.

Table 3.1: Land Systems of the Study Areas

Land System (area within Study Areas)	Land Type	Description
Rocklea (793.9 ha)	Hills and ranges with spinifex grassland	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands
Elimunna (951.8 ha)	Stony plains with Acacia shrublands	Stony plains on basalt supporting sparse Acacia and Cassia shrublands and patchy tussock grasslands



Legend

- Pilbara Rail
- Study Area

LAND SYSTEMS

- Boolgeeda
- Disturbed Land
- Egerton
- Elimunna
- Newman
- Prairie
- River
- Robe
- Rocklea
- Spearhole

Mining & Exploration Locations

- Operations

biologic Environmental Survey

N

1:50,000

0 0.4 0.8 1.6 2.4 3.2 km

BHP Billiton Iron Ore - Western Ridge Project

Southern Tenements Fauna Desktop Assessment

Fig. 3.3: Land Systems of the Study Areas

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Size A3. Created 25/09/2016

3.5 Vegetation

The Study Areas are situated in the Hamersley Plateau, which forms part of the Fortescue Botanical District in the Eremaean Botanical Province of Western Australia (Beard 1975). Two vegetation types fall within the Study Areas; 18 (Low woodland; Mulga) and 82 (Hummock grasslands, low tree steppe; Snappy Gum over *Triodia wiseana*), and both vegetation types are known to have a large distribution, particularly within the Pilbara bioregion (Shepherd *et al*. 2001).

Onshore Environmental (2016) considered the Study Areas to comprise thirteen (13) vegetation associations (Table 3.2, Figure 3.4).

Table 3.2: Vegetation Associations of the Study Areas

Broad Floristic Formation	Vegetation Code	Vegetation Association	Vegetation Significance
Triodia Hummock Grassland	HC TsTwTbr AbAtenSegg ErcnPtoAsp	Hummock Grassland of *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835), *Triodia wiseana* and/or *Triodia brizoides* with Open Shrubland of *Acacia bivenosa*, *Acacia tenuissima* and *Senna glutinosa* subsp. *glutinosa* and Low Open Shrubland of *Eremophila canaliculata*, *Ptilotus obovatus* and *Acacia spondylophylla* on hill crests, steep scree slopes and BIF ridges	None
Triodia Closed Hummock Grassland	HC TbrTw Erfr AbAk	Closed Hummock Grassland of *Triodia brizoides* and *Triodia wiseana* with Shrubland of *Eremophila fraseri* and High Open Shrubland of *Acacia bivenosa* and *Acacia kempeana* on high dolerite hills	None
Acacia High Open Shrubland	HS AaAsyAte ErcuSolMag Arc	High Open Shrubland of *Acacia aptaneura* , *Acacia synchronicia* and *Acacia tetragonophylla* over Low Open Shrubland of *Eremophila cuneifolia*, *Solanum lasiophyllum* and *Maireana georgei* over Very Open Bunch Grassland of *Aristida contorta* on stony chert ironstone plains and rises	None
Triodia Hummock Grassland	FS TwTbr AbAi Seao	Hummock Grassland of *Triodia wiseana* ± *Triodia brizoides* with Open Shrubland of *Acacia bivenosa* and *Acacia inaequilatera* and Low Open Shrubland of *Senna artemisioides* subsp. *oligophylla* on dolerite footslopes and undulating low hills	None
Triodia Hummock Grassland	CP TragTw AbAkAsi EsEg	Hummock Grassland of *Triodia angusta* and *Triodia wiseana* with High Shrubland of *Acacia bivenosa*, *Acacia kempeana* and *Acacia sibirica* and Low Open Mallee of *Eucalyptus socialis* subsp. *eucentrica* or *Eucalyptus gamophylla* on calcrete, quartz and dolerite low hills, stony rises and stony plains	None

Broad Floristic Formation	Vegetation Code	Vegetation Association	Vegetation Significance
Acacia Low Open Woodland	SP Aa AteAsy CcArlaErmu	Low Open Woodland of *Acacia aptaneura* over High Open Shrubland of *Acacia tetragonophylla* and *Acacia synchronicia* over Very Open Tussock Grassland of **Cenchrus ciliaris*, *Aristida latifolia* and *Eriachne mucronata* on quartz plains	None
Triodia Open Hummock Grassland	SP Tp AaAp AsyAbAte	Open Hummock Grassland of *Triodia pungens* with Low Open Woodland of *Acacia aptaneura* and *Acacia paraneura* and Open Shrubland of *Acacia synchronicia*, *Acacia bivenosa* and *Acacia tetragonophylla* in red loamy sand on stony plains	None
Acacia Low Open Forest	FP AaAprAay ErffSeao Tp	Low Open Forest (to Low Open Woodland) of *Acacia aptaneura*, *Acacia pruinocarpa*, *Acacia ayersiana* and *Acacia catenulata* subsp. *occidentalis* over Shrubland of *Eremophila forrestii* subsp. *forrestii* and *Senna artemisioides* subsp. *oligophylla* and Open Hummock Grassland of *Triodia pungens* forming groves on hardpan plains	Representative of 'Valley Floor Mulga' within the Hamersley subregion which was considered to be an 'ecosystem at risk' by the then Department of Conservation and Land Management (now DPaW) (Kendrick 2001). This ecosystem is represented by vegetation associations occurring on valley floors or broad plains, which have a reasonably dense Mulga overstorey (i.e. at least 10-30 percent cover).
Astrebla Closed Tussock Grassland	GP AspeAselArla ErlcAte Aa	Closed Tussock Grassland of *Astrebla pectinata*, *Astrebla elymoides* and *Aristida latifolia* with Open Shrubland of *Eremophila lachnocalyx* and *Acacia tetragonophylla* and Scattered Low Trees of *Acacia aptaneura* on cracking gilgai clays	Closely affiliated with West Angelas Cracking-Clays PEC (Priority 1) - Open tussock grasslands of *Astrebla pectinata*, *Astrebla elymoides*, *Aristida latifolia*, in combination with *Astrebla squarrosa* and low scattered shrubs of *Sida fibulifera*, on basalt derived cracking-clay loam depressions and flowlines.
Aristida Tussock Grassland	GP ArlaAranErx AaAteAsy SifSeaoSeh	Tussock Grassland of *Aristida latifolia*, *Aristida* cf. *nitidula* and *Eragrostis xerophila* with High Open Shrubland of *Acacia aptaneura*, *Acacia tetragonophylla* and *Acacia synchronicia* and Low Open Shrubland of *Sida fibulifera*, *Senna artemisioides* subsp. *oligophylla* and *Senna hamersleyensis* on gilgai drainage flats and minor drainage lines	None
Triodia Hummock Grassland	MI Tp AbAten	Hummock Grassland of *Triodia pungens* with Open Scrub of *Acacia bivenosa* and *Acacia tenuissima* on minor drainage lines	None

Broad Floristic Formation	Vegetation Code	Vegetation Association	Vegetation Significance
Corymbia Low Woodland	ME ChExAa PelApypAma ErtThtCc	Low Woodland of *Corymbia hamersleyana*, *Eucalyptus xerothermica* and *Acacia aptaneura* over High Open Shrubland of *Petalostylis labicheoides*, *Acacia pyrifolia* subsp. *pyrifolia* and *Acacia maitlandii* over Open Tussock Grassland of *Eriachne tenuiculmis*, *Themeda triandra* and **Cenchrus ciliaris* along medium drainage lines	Representative of 'Valley Floor Mulga' within the Hamersley subregion which was considered to be an 'ecosystem at risk' by the then Department of Conservation and Land Management (now DPaW) (Kendrick 2001).
Acacia Low Open Forest	ME AaAprEx ErffSieErll ThtAriCc	Low Open Forest (to Low Woodland) of *Acacia aptaneura*, *Acacia pruinocarpa* and *Eucalyptus xerothermica* over Shrubland of *Eremophila forrestii* subsp. *forrestii*, *Sida ectogama* and *Eremophila latrobei* subsp. *latrobei* over Open Tussock Grassland of *Themeda triandra*, *Aristida inaequiglumis* and **Cenchrus ciliaris* on stony floodplains and unincised drainage zones	Representative of 'Valley Floor Mulga' within the Hamersley subregion which was considered to be an 'ecosystem at risk' by the then Department of Conservation and Land Management (now DPaW) (Kendrick 2001).

769000 770000 771000 772000 773000 774000 775000 776000

7408000 7407000 7406000 7405000 7404000

Western Study Area

1:20,000

Eastern Study Area

Legend

- Study Area

BROAD_FF, VEG_CODE

- Acacia High Open Shrubland, HS AaAsyAte ErcuSolMag
- Acacia Low Open Forest, FP AaAprAay ErffSeao Tp
- Acacia Low Open Forest, ME AaAprEx ErffSieErll ThtAriCc
- Acacia Low Open Woodland, SP Aa AteAsy
- Aristida Tussock Grassland, GP ArlaAranErx AaAteAsy SifSeaoSeh
- Astrebla Closed Tussock Grassland, GP AspeAselArla ErlcAte
- Corymbia Low Woodland, ME ChExAa PelApypAma ErtThtCc
- Triodia Closed Hummock Grassland, HC TbrTw Erfr AbAk
- Triodia Hummock Grassland, CP TragTw AbAkAsi EsEg
- Triodia Hummock Grassland, FS TwTbr AbAi Seao
- Triodia Hummock Grassland, MI Tp AbAten
- Triodia Open Hummock Grassland & Acacia Low Open Forest, SP Tp AaAp AsyAbAte & FP AaAprAay ErffSeao Tp
- Triodia Open Hummock Grassland, SP Tp AaAp

biologic Environmental Survey

N

1:20,000

0 0.15 0.3 0.6 0.9 1.2 km

BHP Billiton Iron Ore - Western Ridge Project

Southern Tenements Fauna Desktop Assessment

Fig. 3.4: Vegetation of the Study Areas

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Size A3. Created 25/09/2016

4 METHODOLOGY

4.1 Compliance

This literature and database review was carried out in a manner consistent with the Western Australian (WA) Environmental Protection Authority (EPA), WA Department of Parks and Wildlife (DPaW) and BHPBIO's requirements for the environmental surveying and reporting of fauna, including the following documents:

- EPA Position Statement No. 3, Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA, 2002, or its revision);
- EPA Guidance No. 56, Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA, 2004, or its revision);
- Technical Guide - Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (WA Department of Parks and Wildlife (previously Environment and Conservation) [DPaW]/EPA, 2010);
- BHPBIO (2016) Guidance for Vertebrate Fauna Surveys in the Pilbara (SPR-IEN-EMS-012); and
- BHPBIO (2014) Biological Survey Spatial Data and Digital Photography Requirements.

4.2 Review of previous studies

A review of all publicly available literature relevant to the Study Areas and surrounding areas (within a 10 km radius), and additional reports commissioned and held by BHPBIO, was undertaken in September 2016 (Figure 4.1). Of these, eight reports were identified as most relevant to the Study Areas.

These reports were (in chronological order):

- Baseline Biological, Soil Surveys and Mapping for ML244SA West of the Fortescue River (Biota 2001);
- Myopic Flora and Fauna Assessment (GHD 2008);
- Rail RGP5 Fauna Survey Newman to Jimblebar Junction (Ecologia 2008);
- Mt Whaleback TSF Flora, Vegetation and Fauna Assessment (Astron 2010);
- Eastern Ridge (OB23/24/25) Fauna Assessment (ENV 2011);
- Orebody 35 Vertebrate Fauna Study (Biologic 2011);
- Flora & Vegetation and Vertebrate Fauna Review - Mt Whaleback AML 7/244 (Biologic 2013); and
- Western Ridge Biological Survey (Onshore 2014).

760000 765000 770000 775000 780000 785000 790000 795000

7420000 7415000 7410000 7405000

Cathedral Gorge

OB 32

OB 24

OB 23

OB 25

Mt Whaleback

NEWMAN

OB 29/30

OB 35

Western Ridge

Fortescue River

Sources: Esri, HERE, DeLorme, Intern
Japan, METI, Esri China (Hong Kong),

Legend

- Pilbara Towns
- Pilbara Rail
- Great Northern Hwy
- Study Area

Mining & Exploration Locations

- Care & Maintenance
- Exploration
- Operations

Study Area (Citation)

- ML244SA West of the Fortescue River (Biota 2001)
- Eastern Ridge (OB23/24/25) (ENV 2011)
- Mt Whaleback AML 7/244 (Onshore 2013)
- Mt Whaleback TSF (Astron 2010)
- Myopic Flora and Fauna (GHD 2008)
- Orebody 35 Vertebrate Fauna Study (Biologic 2011)
- RGP5 Newman to Jimblebar Junction (Ecologia 2008)
- Western Ridge (Onshore 2014)

biologic Environmental Survey

N

1:90,000

0 0.75 1.5 3 4.5 6 km

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Southern Tenements Fauna Desktop Assessment

Fig. 4.1: Previous fauna surveys within 10 km of the Study Areas

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Size A3. Created 25/09/2016

4.3 Review of online databases

Four databases were searched to obtain information on species previously recorded (NatureMap and Threatened Fauna Database) or species of conservation significance likely to occur within the Study Areas (Protected Matters Database), and any Priority or Threatened Ecological Communities (PEC/TEC) in the area (Table 4.1):

- DPaW's NatureMap database – to determine threatened fauna recorded from the Study Areas.
- DPaW's Threatened Fauna Database – to determine the most up to date threatened fauna recorded from the Study Areas.
- DPaW's Priority and Threatened Ecological Communities Database – to determine the most up to date Priority and Threatened Ecological Communities recorded from the Study Areas.
- Department of Environment (DoE) Protected Matters Database – to determine matters of national environmental significance likely to occur within the Study Areas based on bioclimatic modelling.

Table 4.1: Databases used for the review.

Provider	Database	Parameters
Department of Parks and Wildlife	NatureMap. Accessed 7 September 2016	Circle of radius 40 km centred on the coordinates 23°25'16.54"S, 119°36'35.76"E to identify species recorded within and in the vicinity of the Study Areas.
Department of Parks and Wildlife	Threatened Fauna Database. Received 12 September 2016	Circle of radius 40 km centred on the coordinates 23°25'16.54"S, 119°36'35.76"E
Department of Parks and Wildlife	Priority and Threatened Ecological Communities Database. Received 12 September 2016	Circle of radius 40 km centred on the coordinates 23°25'16.54"S, 119°36'35.76"E
Department of Environment and Energy	Protected Matters Database Search Tool. Accessed 7 September 2016	Circle of radius 40 km centred on the coordinates 23°25'16.54"S, 119°36'35.76"E to identify species recorded within and in the vicinity of the Study Areas.

4.4 Assessment of Fauna habitats

Preliminary fauna habitat assessments were conducted at eight sites within the Study Areas during a reconnaissance site visit on 14 October 2016. Sites were chosen to reflect the major habitat types present, as observed from accessible vantage points visited in the Study Areas.

The habitat mapping in the Study Areas was undertaken based on the site visits, vegetation mapping (Onshore 2016), aerial imagery and Land System information. Habitats were assessed for their suitability for conservation significant fauna that are known to occur in the region. Conservation significant fauna species recorded from the databases and previous reports were assessed for their likelihood to occur within each of the habitats described and mapped throughout the Study Areas using the decision matrix shown below in Table 4.2.

Table 4.2: Species likelihood decision matrix

Habitat categories: **Range categories:**	**Core (breeding) habitat known to occur**	**Foraging habitat known to occur**	**Dispersal habitat known to occur**	**Some potential for habitat/ dispersal w/in Study Area**	**No known habitat occurs**
Species recorded < 5 km	Almost certain to likely to occur	Almost certain to likely to occur	Likely to occur	May possibly occur	Could occur rarely/ occasionally to unlikely
Species recorded 5 - 10 km	Likely to occur	Likely to occur	Likely to occur	May possibly occur	Could occur rarely/ occasionally to unlikely
Species recorded 10 - 40 km	Likely to occur	May possibly occur	May possibly occur	Could occur rarely/ occasionally	Could occur rarely/ occasionally to unlikely
Species recorded > 40 km	May possibly occur	May possibly occur	Could occur rarely/ occasionally	Could occur rarely/ occasionally	Could occur rarely/ occasionally to unlikely
Species not usually recorded in region or very rarely recorded	Could occur rarely/ occasionally to unlikely	Could occur rarely/ occasionally to unlikely	Unlikely to occur	Unlikely to occur	Unlikely to highly unlikely to occur

This decision matrix is only intended to be an indicative guide, and was applied with the following considerations:

- The range categories are subject to interpretation based on the known range of each species and its natural dispersal capabilities (for example, >50km range may be a significant distance for a fossorial skink, but not a migratory bird);
- Both the range categories and the habitat categories can vary markedly for different types of fauna such as birds, reptiles, mammals, and amphibians, and fauna with different ecological niches within each of these groups;
- The degree of habitat specificity for each species is a major determining factor for each of the habitat categories, and this in turn is dependent on the current state of ecological knowledge of the species. For example, core habitat for Ghost Bat is only

certain caves within mountainous terrains, whereas core habitat for the Pilbara Flat-headed Blindsnake can be most habitat types in the Pilbara. This may also differ between different populations of the same species in different bioregions, such as Northern Quoll, which has a broader core habitat in the Northern Pilbara (comprising gorges/ gullies, drainage lines, and hills/ ridges) than in the Hamersley Ranges (core habitat is primarily gorges/ gullies);

- The amount and location of previous sampling is a major factor influencing the applicability of the range categories, as well as the amount of effort that has been expended in (and the accessibility of) the area in question for sampling;
- The current state of taxonomy is another major factor for species which are poorly known taxonomically and thus difficult to identify accurately, as well as for any recent changes of classification and/or conservation category. For example, it was previously thought that the Pilbara contained populations of both the Crest-tailed Mulgara *Dasycercus cristicauda* and the Brush-tailed Mulgara *D. blythei*, but recent genetic sampling showed that only the Brush-tailed Mulgara occurs in the region. Such taxonomic changes can affect the reliability of previous records within fauna databases, the conservation status of the newly defined species/ populations, and also the assumptions regarding species ranges and habitat preferences; and
- The language used in each of the habitat and range categories may be useful for some taxa and not for others (for example, 'occasional' occurrences may be useful for describing birds or fauna which can traverse large distances, but in the case of fauna with more limited dispersal capabilities such as reptiles, there is no basis for 'occasional' occurrences, and rare occurrences (particularly in unexpected areas) may be more likely to represent range extensions.

4.5 Assessment of Conservation Significance

Within Western Australia, all native fauna is protected under the *Wildlife Conservation Act 1950* (WC Act) and any action that has the potential to impact on native fauna needs to be approved by relevant State and/ or Federal departments as dictated by the State *Environmental Protection Act 1986* and the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Some species of fauna that are determined to be at risk of extinction or decline are afforded extra protection under these Acts. For the purposes of this report, these species are called conservation significant species. A summary of applicable legislation and status codes is provided in Table 3.2. Additional information on Status Codes is provided in Appendix A.

A number of migratory bird species are prioritised for conservation under the *EPBC Act* or international agreements. In addition the International Union for the Conservation of Nature (IUCN) compiles a 'Red List' upon which species at risk of extinction are listed.

For some species there is insufficient information to determine their status. These species are generally considered by the EPA/ DPaW as 'conservation significance' for all development related approvals and are listed on a 'Priority List' that is regularly reviewed and maintained by the DPaW.

An ecological community that is presumed to be totally destroyed or at risk of being totally destroyed may also be listed by the WA Minister for Environment, and referred to the Commonwealth Government for listing under the EPBC Act. These 'Threatened Ecological Communities' (TECs) are defined as naturally occurring biological assemblages found to fit into one of the four categories shown in Table 4.3. Possible threatened ecological communities that do not meet these survey criteria are added to DPaW's 'Priority Ecological Communities' (PECs) lists under Priorities 1, 2 and 3.

Table 4.3: Conservation significance assessment guidelines.

Agreement, Act or List	Status Codes
INTERNATIONAL	**IUCN**
The IUCN *Red List* lists species at risk under nine categories (listed under 'Status Codes').	• Extinct (EX) • Extinct in the Wild (EW) • Critically Endangered (CE) • Endangered (EN) • Vulnerable (VU) • Near Threatened (NT) • Least Concern (LC) • Data Deficient (DD) • Not Evaluated (NE)
Migratory taxa listed under the following international conventions are generally listed as Migratory or Marine under the federal *Environment Protection and Biodiversity Conservation Act 1999* (see below): • Japan-Australia Migratory Bird Agreement (JAMBA); • China-Australia Migratory Bird Agreement (CAMBA); • Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA); and, • Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).	Generally listed as Migratory or Marine under the federal *Environment Protection and Biodiversity Conservation Act 1999*

Agreement, Act or List	Status Codes
FEDERAL	**EPBC Act**
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) DoE lists threatened fauna, which are determined by the Threatened Species Scientific Committee (TSSC) according to criteria set out in the Act. The Act lists fauna that are considered to be of conservation significance under one of eight categories (listed under 'Status Codes'). Threatened Ecological Communities (TECs) are those that are at risk of extinction.	• Extinct (EX) • Extinct in the Wild (EW) • Critically Endangered (CE) • Endangered (EN) • Vulnerable (VU) • Conservation Dependent (CD) • Migratory (MG) • Marine (MA) • Critically Endangered • Endangered • Vulnerable
STATE	**WC Act**
Wildlife Conservation Act 1950 (WC Act) At a state level, native fauna are protected under the *Wildlife Conservation Act 1950*. Species in need of conservation are given a ranking ranging from Critically Endangered to Vulnerable.	• Schedule 1 (S1) • Schedule 2 (S2) • Schedule 3 (S3) • Schedule 4 (S4) • Schedule 5 (S5) • Schedule 6 (S6) • Schedule 7 (S7)
DPaW Priority list (DPaW) DPaW produces a list of Priority species and ecological communities (*e.g.* Priority Ecological Communities (PECs) or Threatened Ecological Communities (TECs)) that have not been assigned statutory protection under the *Wildlife Conservation Act 1950*. This system gives a ranking from Priority 1 to Priority 4.	• DPaW Priority 1 (P1) • DPaW Priority 2 (P2) • DPaW Priority 3 (P3) • DPaW Priority 4 (P4)

4.6 Taxonomy and Nomenclature

The latest checklist of mammals, reptiles and amphibians published by the WA Museum (Western Australian Museum 2015) were used as a guide to the current taxonomy and nomenclature of these groups. This updated list in turn is formulated using up-to-date taxonomical literature. For birds, the current checklist of Australian birds, maintained by Birds Australia, was used. The bird list is based on the most recent review of the systematics and taxonomy of Australian birds by (Christidis and Boles 2008).

4.7 Limitations

No previous fauna surveys have been conducted within the two Study Area boundaries, and the preliminary habitat assessments conducted by Biologic (October 2016) are the only on-site assessments conducted within the Study Areas. As such, this assessment is based upon the site visit, the results of adjacent surveys, database searches and analysis of background information such as vegetation mapping, land systems, topography, drainage, and aerial photography.

5 RESULTS

5.1 Survey Effort

No relevant fauna surveys have taken place within the Study Areas, and 15 fauna surveys and reviews have been undertaken within 10 km of the Study Areas. Eight of these surveys and reviews were considered most relevant for this review as the remaining seven reports only have a small section occurring within the 10 km buffer (Table 5.1, Figure 4.1).

Table 5.1: Fauna reports reviewed for this assessment

Survey Title	Reference	Survey Type
Baseline Biological, Soil Surveys and Mapping for ML244SA West of the Fortescue River	Biota 2001	Desktop review
Myopic Flora and Fauna Assessment	GHD 2008	Level 1 survey
Rail RGP5 Fauna Survey Newman to Jimblebar Junction	Ecologia 2008	Level 1 survey
Mt Whaleback TSF Flora, Vegetation and Fauna Assessment	Astron 2010	Level 1 survey
Eastern Ridge (OB23/24/25) Fauna Assessment	ENV 2011	Level 1 survey
Orebody 35 Vertebrate Fauna Study	Biologic 2011	Level 2 survey (2 seasons)
Flora & Vegetation and Vertebrate Fauna Review - Mt Whaleback AML 7/244	Biologic 2013	Desktop review
Western Ridge Biological Survey	Onshore 2014	Level 1 survey

5.2 Literature Review

The eight surveys and reviews considered for this desktop assessment recorded six mammal, two reptile and nine bird species of conservation significance, as outlined below. Conservation category codes below are as abbreviated in Table 4.2.

Mammals

- Brush-tailed Mulgara *Dasycercus blythi* – DPaW P4;
- Northern Quoll *Dasyurus hallucatus* – EPBC Act EN, WC Act S2, IUCN EN;
- Ghost Bat *Macroderma gigas* – EPBC Act VU, WC Act S3, IUCN VU;
- Western Pebble-mound Mouse *Pseudomys chapmani* – DPaW P4;
- Pilbara Leaf-nosed Bat *Rhinonicteris aurantia* – EPBC Act VU, WC Act S3; and
- Long-tailed Dunnart *Sminthopsis longicaudata* – DPaW P4.

Reptiles

- Pilbara Olive Python *Liasis olivaceus barroni* – EPBC Act VU, WC Act S3; and
- Pilbara Flat-headed Blind Snake *Anilios ganei* – DPaW P1.

Birds (Threatened)

- Curlew Sandpiper *Calidris ferruginea* – EPBC Act CE & MG, WC Act S3 & S5, IUCN NT; and
- Peregrine Falcon *Falco peregrinus* – WC Act S7.

Birds (Migratory)

- Great Egret *Ardea modesta* – EPBC Act MG, WC Act S5;
- Rainbow Bee-eater *Merops ornatus* – EPBC Act MG, WC Act S5;
- Wood Sandpiper *Tringa glareola* – EPBC Act MG, WC Act S5;
- Common Sandpiper *Tringa hypoleucos* – EPBC Act MG, WC Act S5;
- Common Greenshank *Tringa nebularia* – EPBC Act MG, WC Act S5;
- Little Greenshank *Tringa stagnatilis* – EPBC Act MG, WC Act S5; and
- Common Redshank *Tringa totanus* – EPBC Act MG, WC Act S5.

5.3 Database Searches

The searches of DPaW's NatureMap database, the EPBC Protected Matters database, and DPaW's Threatened Species database reported a total of 33 species of conservation significance, including six mammals, 28 birds and two reptiles, as outlined in the sections below.

Figures 5.1 and 5.2 show the locations of conservation significant vertebrate fauna records from BHP Billiton Iron Ore databases and DPaW's Threatened Species database within the local area surrounding the Study Areas. Reports from DPaW's NatureMap database and the EPBC Protected Matters database can be found in Appendices B and C.

760000 765000 770000 775000 780000 785000 790000

7420000 7415000 7410000 7405000

NEWMAN
Newman
Fortescue Golf Club
Newman Dr
Newman Airport
Fortescue River

Legend

- Pilbara Towns
- Pilbara Rail
- Great Northern Hwy
- Study Area

BHPBIO Fauna Databases

- Curlew Sandpiper
- Peregrine Falcon
- Ghost Bat
- Pilbara Leaf-nosed Bat
- Brush-tailed Mulgara
- Long-tailed Dunnart
- Northern Quoll
- Western Pebble-mound Mouse
- Pilbara Flat-headed Blind-snake
- Pilbara Olive Python

DPaW Threatened Fauna DB

- Curlew Sandpiper
- Peregrine Falcon
- Ghost Bat
- Pilbara Flat-headed Blind Snake
- Pilbara Olive Python
- Long-tailed Dunnart
- Western Pebble-Mound Mouse

biologic Environmental Survey

N 1:90,000

0 0.75 1.5 3 4.5 6 km

BHP Billiton Iron Ore - Western Ridge Project

Southern Tenements Fauna Desktop Assessment

Fig. 5.1: Conservation Significant Fauna within 10 km of the Study Areas (part 1)

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Size A3. Created 25/09/2016

760000 765000 770000 775000 780000 785000 790000

7415000

7410000

7405000

NEWMAN

Newman

Fortescue Golf Club

Newman Airport

Fortescue River

Legend

- Pilbara Towns
- Pilbara Rail
- Great Northern Hwy
- Study Area

BHPBIO Fauna Databases

- Common Greenshank
- Common Redshank
- Common Sandpiper
- Eastern Great Egret
- Glossy Ibis
- Rainbow Bee-eater
- Wood Sandpiper

DPaW Threatened Fauna DB

- Common Greenshank
- Common Sandpiper
- Common Redshank
- Eastern Great Egret
- Glossy Ibis
- Long-toed Stint
- Oriental Plover
- Pectoral Sandpiper
- Rainbow Bee-eater
- Sharp-tailed Sandpiper

biologic Environmental Survey

N

1:80,000

0 0.5 1 2 3 4 km

BHP Billiton Iron Ore - Western Ridge Project

Southern Tenements Fauna Desktop Assessment

Fig. 5.2: Conservation Significant Fauna within 10 km of the Study Area (part 2)

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Size A3. Created 25/09/2016

5.3.1 DPaW Nature Map

The NatureMap search (based on co-ordinates described in Table 4.1), reported a total of 42 mammal species (including eight naturalised species), 205 bird species, 102 reptile species and seven amphibian species, totalling 356 vertebrate species (Appendix B). No fauna records occurred within the Study Areas. NatureMap identified seven threatened and 12 migratory species comprising:

Mammals

- Ghost Bat *Macroderma gigas* – EPBC Act VU, WC Act S3, IUCN VU;
- Pilbara Leaf-nosed Bat *Rhinonicteris aurantia* – EPBC Act VU, WC Act S3; and
- Long-tailed Dunnart *Sminthopsis longicaudata* – DPaW P4.

Reptiles

- Pilbara Olive Python *Liasis olivaceus barroni* – EPBC Act VU, WC Act S3; and
- Pilbara Flat-headed Blind Snake *Anilios ganei* – DPaW P1.

Birds (Threatened)

- Peregrine Falcon *Falco peregrinus* – WC Act S7; and
- Curlew Sandpiper *Calidris ferruginea* – EPBC Act CE & MG, WC Act S3 & S5, IUCN NT.

Birds (Migratory)

- Great Egret *Ardea modesta* – EPBC Act MG, WC Act S5;
- Cattle Egret *Ardea ibis* – EPBC Act MG, WC Act S5;
- Sharp-tailed Sandpiper *Calidris acuminata* – EPBC Act MG, WC Act S5;
- Pectoral Sandpiper *Calidris melanotos* – EPBC Act MG, WC Act S5;
- Red-necked Stint *Calidris ruficollis* – EPBC Act MG, WC Act S5, IUCN NT;
- Long-toed Stint *Calidris subminuta* – EPBC Act MG, WC Act S5;
- Rainbow Bee-eater *Merops ornatus* – EPBC Act MG, WC Act S5;
- Glossy Ibis *Plegadis falcinellus* – EPBC Act MG, WC Act S5;
- Wood Sandpiper *Tringa glareola* – EPBC Act MG, WC Act S5;
- Common Sandpiper *Tringa hypoleucos* – EPBC Act MG, WC Act S5;
- Common Greenshank *Tringa nebularia* – EPBC Act MG, WC Act S5; and
- Common Redshank *Tringa totanus* – EPBC Act MG, WC Act S5.

5.3.2 EPBC Protected Matters Report

An EPBC search was undertaken based on co-ordinates described in Table 4.1, to determine records of species that are likely, or may occur within and in the vicinity of the Study Areas (Appendix C).

The following two threatened and one migratory species were identified as known to occur within the 40 km search area:

Mammals

- Pilbara Leaf-nosed Bat *Rhinonicteris aurantia* – EPBC Act VU, WC Act S3.

Reptiles

- Pilbara Olive Python *Liasis olivaceus barroni* – EPBC Act VU, WC Act S3.

Birds (Migratory)

- Great Egret *Ardea modesta* – EPBC Act MG, WC Act S5.

The following four threatened and one migratory species were identified as likely to occur within the 40 km search area:

Mammals

- Greater Bilby *Macrotis lagotis* – EPBC Act VU, WC Act S3, IUCN VU;
- Northern Quoll *Dasyurus hallucatus* – EPBC Act EN, WC Act S2, IUCN EN; and
- Ghost Bat *Macroderma gigas* – EPBC Act VU, WC Act S3, IUCN VU.

Birds (Threatened)

- Night Parrot *Pezoporus occidentalis* – EPBC Act EN, WC Act S1, IUCN EN.

Birds (Migratory)

- Fork-tailed Swift *Apus pacificus* – EPBC Act MG, WC Act S5.

The following two threatened and six migratory species may possibly occur within the 40 km search area:

Birds (Threatened)

- Princess Parrot *Polytelis alexandrae* – EPBC Act VU, WC Act P4, IUCN NT; and
- Australian Painted Snipe *Rostratula australis* – EPBC Act EN, WC Act S2, IUCN EN.

Birds (Migratory)

- Cattle Egret *Ardea ibis* – EPBC Act MG, WC Act S5;
- Oriental Plover *Charadrius veredus* – EPBC Act MG, WC Act S5;

- Barn Swallow *Hirundo rustica* – EPBC Act MG, WC Act S5;
- Rainbow Bee-eater *Merops ornatus* – EPBC Act MG, WC Act S5;
- Grey Wagtail *Motacilla cinerea* – EPBC Act MG, WC Act S5; and
- Yellow Wagtail *Motacilla flava* – EPBC Act MG, WC Act S5.

5.3.3 DPaW Threatened Fauna Database search

The DPaW Threatened Fauna Database Search (based on co-ordinates described in Table 4.1) reported four mammal species, two reptile species and 16 bird species. No fauna records were within the Study Areas (Figure 4.1).

Mammals

- Ghost Bat *Macroderma gigas* – EPBC Act VU, WC Act S3, IUCN VU;
- Long-tailed Dunnart *Sminthopsis longicaudata* – DPaW P4;
- Pilbara Leaf-nosed Bat *Rhinonicteris aurantia* – EPBC Act VU, WC Act S3; and
- Western Pebble-mound Mouse *Pseudomys chapmani* – DPaW P4.

Reptiles

- Pilbara Olive Python *Liasis olivaceus barroni* – EPBC Act VU, WC Act S3; and
- Pilbara Flat-headed Blind Snake *Anilios ganei* – DPaW P1.

Birds (Threatened)

- Curlew Sandpiper *Calidris ferruginea* – EPBC Act CE & MG, WC Act S3 & S5, IUCN NT; and
- Peregrine Falcon *Falco peregrinus* – WC Act S7.

Birds (Migratory)

- Great Egret *Ardea modesta* – EPBC Act MG, WC Act S5;
- Cattle Egret *Ardea ibis* – EPBC Act MG, WC Act S5;
- Sharp-tailed Sandpiper *Calidris acuminata* – EPBC Act MG, WC Act S5; and
- Pectoral Sandpiper *Calidris melanotos* – EPBC Act MG, WC Act S5;
- Red-necked Stint *Calidris ruficollis* – EPBC Act MG, WC Act S5, IUCN NT;
- Long-toed Stint *Calidris subminuta* – EPBC Act MG, WC Act S5;
- Glossy Ibis *Plegadis falcinellus* – EPBC Act MG, WC Act S5;
- Oriental Plover *Charadrius veredus* – EPBC Act MG, WC Act S5;
- Rainbow Bee-eater *Merops ornatus* – EPBC Act MG, WC Act S5;
- Wood Sandpiper *Tringa glareola* – EPBC Act MG, WC Act S5;
- Common Sandpiper *Tringa hypoleucos* – EPBC Act MG, WC Act S5;

- Common Greenshank *Tringa nebularia* – EPBC Act MG, WC Act S5;
- Little Greenshank *Tringa stagnatilis* – EPBC Act MG, WC Act S5; and
- Common Redshank *Tringa totanus* – EPBC Act MG, WC Act S5.

5.3.4 Priority and Threatened Ecological Communities

No relevant Priority or Threatened Ecological Communities are known within or adjacent to the Study Areas. The nearest community relevant to vertebrate fauna is the West Angelas Cracking Clay Communities (PEC), approximately 60-70 km north west of the Study Areas.

5.4 Fauna Habitats

Preliminary fauna habitat assessments were conducted at six sites within the Study Areas during a reconnaissance site visit on 14 October 2016. Table 5.2 provides overall details of major fauna habitat types and Table 5.3 provides summary details of the habitats assessed at each site. Sites were chosen to reflect the major habitat types present, as observed from accessible vantage points visited in the Study Areas.

The habitat assessment identified three fauna habitat types throughout the Study Areas that broadly reflect major differences in landform features, drainage features and vegetation features relevant to vertebrate fauna. The habitat mapping (Figure 5.3) shows the locations of habitat assessment sites and the indicative extent of the three major habitat types throughout the Study Areas.

Table 5.2: Major fauna habitat descriptions.

Habitat	Related Land System Description	Landforms and Descriptions
Stony plain	Highly dissected hardpan plains supporting mulga shrublands and hard spinifex hummock grasslands (Egerton Land System). Stony hardpan plains and stony rises with groved mulga shrublands (Jamindi Land System).	Comprised of hardpan plains, dissected slopes, calcreted drainage margins and drainage floors and channels. Red loamy sands and loams from shallow to deep. Mainly sparse to very sparse Mulga (formerly *Acacia aneura)* and other *Acacia* spp) with some hard spinifex (*Triodia wiseana*) grasslands.
Drainage area	Narrow, active flood plains flanking major rivers and creeks with moderately dense tall shrublands (River Land System).	Flood plains immediately adjacent to major channels with sandy margins, channels and banks and stony plains. Dark red or dark reddish brown alluvial soils, including stony, seasonal cracking clay soils. Variable tall shrublands, open and moderately dense stands of *Acacia victoriae* and other *Acacia* spp., with variable understoreys, including *Triodia*. *Eucalyptus coolabah* and *E. camaldulensis* on the banks.
Low hills	Rugged mountain ranges, hills, ridges and plateaux with skeletal soils and tall shrublands; hard spinifex grasslands (Augustus Land System). Undulating stony uplands, low hills and ridges and stony lower plains with Mulga shrublands (Collier Land System).	Ranges, hills, ridges and rocky uplands: gently rounded summits, near vertical escarpments, calcrete mesas and low plateaux. Shallow reddish brown loams with rock outcrops and boulders. Tall open Mulga (formerly *Acacia aneura)* and other *Acacia* spp. with variable low shrubs.

Table 5.3: Fauna habitat descriptions from on-site assessment.

Site (study Area) Photo	Habitat type, Description	UTM GDA94 z50	Landform	Leaf litter (LL %); Twig litter (TL%); Log cover (LC%); Bare ground (BG%)	Soil characteristics	Disturbance, Fire history
1 (Western Study Area)	**Low Hills**					
	Stony low basalt hills in the north. Spinifex. Possible breakaways in the south	762700 E; 7407323 N	Hillslope	LL= None; TL= None; LC= None; BG= 11 to 30	Orange loam with volcanic pebbles	Negligible, Old fire (6+ yrs)
2 (Western Study Area)	**Mulga**					
	Mulga on very low undulations.	762759 E; 7407018 N	Drainage Depression	LL= None; TL= <2; LC= None; BG= 31 to 70	Brown clay loam with pebbles	Negligible, Old fire (6+ yrs)

Site (study Area) Photo	Habitat type, Description	UTM GDA94 z50	Landform	Leaf litter (LL %); Twig litter (TL%); Log cover (LC%); Bare ground (BG%)	Soil characteristics	Disturbance, Fire history
3 (Eastern Study Area)	**Stony Plain**					
	Sandy /clay plain, sparse shrubland	771160 E; 7404955 N	Plain	LL+ None; TL= <2; LC= <2; BG= 31 to 70	Red silty loam	Cattle grazing, no fire evident
4 (Eastern Study Area)	**Drainage Area**					
	Broad drainage area, sparse Eucalyptus, shrubs and buffel grass. Occasional tree hollows.	772707 E; 7405658 N	Drainage Depression	LL= 2 to 10; TL= <2; LC= <2; BG= 11 to 30	Red sandy loam	Cattle grazing, Old fire (6+ yrs)

Site (study Area) Photo	Habitat type, Description	UTM GDA94 z50	Landform	Leaf litter (LL %); Twig litter (TL%); Log cover (LC%); Bare ground (BG%)	Soil characteristics	Disturbance, Fire history
5 (Eastern Study Area)	**Low hills**					
	Small hills and low slopes, Spinifex grassland	773392 E; 7406510 N	Hillslope	LL= <2; TL= None; LC= None; BG= 11 to 30	Red clay loam with boulders	Negligible, Old fire (6+ yrs)
6 (Eastern Study Area)	**Sand plain**					
	Localised areas of sand, not extensive, adjacent to drainage. Spinifex.	773722 E; 7407223 N	Plain	LL= <2; TL= <2; LC= None; BG= 2 to 10	Red sand	Cattle grazing, no fire evident

769000 770000 771000 772000 773000 774000 775000 776000

7408000 7407000 7406000 7405000 7404000

Western Study Area

Eastern Study Area

1

2

3

4

5

6

1:20,000

Legend

- Study Area
- **Fauna habitat type**
  - Drainage area
  - Low hills
  - Stony plain
- **On-site habitat**
  - Drainage Area
  - Hillcrest/ Slope
  - Low Hills
  - Mulga
  - Sand Plain
  - Stony Plain

N

1:20,000

0 0.15 0.3 0.6 0.9 1.2 km

biologic Environmental Survey

BHP Billiton Iron Ore - Western Ridge Project

Southern Tenements Fauna Desktop Assessment

Fig. 5.3: Indicative vertebrate fauna habitats

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Size A3. Created 25/09/2016

5.5 Assessment of the Likelihood of Conservation Significant Fauna Occurring

Table 5.4 outlines all conservation significant fauna species recorded within the database and literature searches and their likelihood of occurring (as per Table 4.2) within the Study Areas based on the habitats present.

Further details regarding each of the taxa with some potential to occur are presented in the sections below.

5.5.1 Mammals

Ghost Bat (*Macroderma gigas*)

The Ghost Bat is listed as Vulnerable under the EPBC Act and by the IUCN, and as Schedule 3 under the WC Act. The Ghost Bat formerly occurred over a wide area of central, northern and southern Australia but has declined significantly in the southern parts of its range in the last 200 years. They now occur in only a few highly disjunct sites across northern Australia and is confined to the Kimberly and Pilbara in Western Australia. The distribution of Ghost Bats is influenced by the availability of suitable caves and abandoned mine shafts for roost sites. In the Pilbara, they roost in deep, complex caves beneath bluffs of low rounded hills composed of Marra Mamba or Banded Iron Formation, granite rock piles and abandoned mines (Armstrong and Anstee 2000). They roost either individually or in colonies up to 1500 (Churchill 2008) and move between a number of caves, both seasonally and as dictated by weather changes (Richards 2008).

The Ghost Bat has been recorded to the north, with a potential maternity roost occurring within 2 km of the Western Study Area. The habitats of the Study Areas are unlikely to provide suitable roosts for this species; however, either of the Study Areas may be used for foraging. This species is regarded as almost certainly occurring, particularly within the Western Study Area.

Western Pebble-mound Mouse (*Pseudomys chapmani*)

The Western Pebble-mound Mouse is currently listed as Priority 4 by the DPaW. This species has experienced a significant decline in their range through the Gascoyne and Murchison, and is now considered endemic to the Pilbara (Van Dyck and Strahan 2008). This species almost exclusively occurs on the gentler slopes of rocky ranges where the ground is covered with a stony mantle and vegetated by hard spinifex, often with a sparse overstorey of eucalypts and scattered shrubs (Van Dyck and Strahan 2008).

Table 5.4 Conservation significant fauna likelihood assessment

Species	*EPBC Act*	*WC Act*	IUCN	Recorded in Study Area	Literature Review	NatureMap	DPAW Threatened Species Database	Protected Matters Database	Core Habitat	Potential habitat within Study Area	Records nearby	Likelihood of Occurrence
Mammals												
Brush-tailed Mulgara		P4	LC		X				Sand plains	Small, localised sands	14-20km NE (OB24/ Eastern Ridge)	Could occur rarely
Ghost Bat		S3	VU		X	X	X	Likely to occur	Gorge/ gully, Hill crest/hill slope (caves)	Drainage area (foraging habitat)	<1km north, potential maternity roost	Almost certain (Western Study Area)
Long-tailed Dunnart		P4	LC		X	X	X		Gorge/gully, Hill crest/hill slope, Low hills	Low hills	7km Whaleback *	Unlikely
Northern Quoll	EN	S2	EN		X			Likely to occur	Gorge/gully, Hill crest/hill slope, Low hills	None	6km Whaleback *	Unlikely
Pilbara Leaf-nosed Bat	VU	S3	LC		X	X	X	Known to occur	Gorge/gully, Hill crest/hill slope, Low hills (caves)	None	15km NE (OB24/ Eastern Ridge) SM2 recordings	Unlikely
Western Pebble-mound Mouse		P4	LC		X		X		Hill crest/hill slope	Low hills (marginal habitat)	<1km north	Likely
Greater Bilby	VU	S3	VU					Likely to occur	Sand plains	None	None	Highly unlikely
Birds												
Australian Painted Snipe	EN	S2	EN					May occur	Major drainage (waterbodies)	None	None	Highly unlikely
Barn Swallow	MG	S5	LC					May occur	Migratory terrestrial	All habitats	20km NE (Ophthalmia Dam)	May possibly occur
Cattle Egret	MG	S5	LC			X		May occur	Migratory wetlands (Major drainage: waterbodies)	None	20km NE (Ophthalmia Dam)	Unlikely
Common Greenshank	MG	S5	LC		X	X	X		Migratory wetlands (Major drainage: waterbodies)	None	3km N (OB35 tailings dam), 20km NE (Ophthalmia Dam)	Unlikely
Common Redshank	MG	S5	LC		X	X	X		Migratory wetlands (Major drainage: waterbodies)	None	3km N (OB35 tailings dam), 20km NE (Ophthalmia Dam)	Unlikely
Common Sandpiper	MG	S5	LC		X	X	X		Migratory wetlands (Major drainage: waterbodies)	None	3km N (OB35 tailings dam), 20km NE (Ophthalmia Dam)	Unlikely
Curlew Sandpiper	CE	S3	NT		X	X	X		Migratory wetlands (Major drainage: waterbodies)	None	20km NE (Ophthalmia Dam)	Unlikely
Fork-tailed Swift	MG	S5	LC					Likely to occur	Migratory terrestrial	All habitats	None	Could occur occasionally
Glossy Ibis	MG	S5	LC			X	X		Migratory wetlands (Major drainage: waterbodies)	None	20km NE (Ophthalmia Dam)	Unlikely
Eastern Great Egret	MG	S5	LC			X	X	Known to occur	Migratory wetlands (Major drainage: waterbodies)	None	3km N (OB35 tailings dam), 20km NE (Ophthalmia Dam)	Unlikely
Grey Wagtail	MG	S5	LC					May occur	Migratory terrestrial	None	None	Highly unlikely
Little Greenshank	MG	S5	LC		X		X		Migratory wetlands (Major drainage: waterbodies)	None	None	Highly unlikely
Long-toed Stint	MG	S5	LC			X	X		Migratory wetlands (Major drainage: waterbodies)	None	20km NE (Ophthalmia Dam)	Unlikely
Night Parrot	EN	S1	EN					Likely to occur	Sandy/stony plains	None	None	Highly unlikely
Oriental Plover	MG	S5	LC				X	May occur	Migratory wetlands (Major drainage: waterbodies)	None	5km E (Fortescue River)	Could occur occasionally

Species	*EPBC Act*	*WC Act*	IUCN	Recorded in Study Area	Literature Review	NatureMap	DPAW Threatened Species Database	Protected Matters Database	Core Habitat	Potential habitat within Study Area	Records nearby	Likelihood of Occurrence
Pectoral Sandpiper	MG	S5	LC			X	X		Migratory wetlands (Major drainage: waterbodies)	None	20km NE (Ophthalmia Dam)	Unlikely
Peregrine Falcon		S7	LC		X	X	X		Gorge/gully, Hill crest/hill slope, Low hills	All habitats (foraging)	<2km north	Likely
Princess Parrot	VU	P4	NT					May occur	Sand plains	None	None	Highly unlikely
Rainbow Bee-eater	MG	S5	LC		X	X	X	May occur	Sandy/stony plains, Drainage area	All habitats (foraging)	<1km north	Almost certain
Red-necked Stint	MG	S5	NT			X	X		Migratory wetlands (Major drainage: waterbodies)	None	20km NE (Ophthalmia Dam)	Unlikely
Sharp-tailed Sandpiper	MG	S5	LC			X	X		Migratory wetlands (Major drainage: waterbodies)	None	20km NE (Ophthalmia Dam)	Unlikely
White-bellied Sea Eagle	MG		LC			X			Migratory wetlands (Major drainage: waterbodies)	None	None	Highly unlikely
Wood Sandpiper	MG	S5	LC		X	X	X		Migratory wetlands (Major drainage: waterbodies)	None	3km N (OB35 tailings dam), 20km NE (Ophthalmia Dam)	Unlikely
Yellow Wagtail	MG	S5	LC					May occur	Migratory terrestrial	None	None	Highly unlikely
Reptiles												
Pilbara Flat-headed Blind Snake		P1			X	X	X		Vegetated habitats	All habitats (some potential)	<2km N Western Ridge	May possibly occur
Pilbara Olive Python	VU	S3		X	X	X	X	Known to occur	Major drainage (waterbodies)	None	< 5km OB35, Western Ridge	Unlikely

Note: Asterisk * indicates old fauna records likely to represent vagrant animals rather than a resident population – a less reliable indicator of potential occurrence.

The Western Pebble-mound Mouse has been recorded extensively north within 10 km of the Study Areas. While the Study Areas are within the historical range of this species, it is now on the edge of its current known range. The Study Areas contain areas of Low hills that are regarded as a potentiallymarginal habitat for this species, although the areas where it was recorded more extensively to the north of the Study Areas are in far more suitable habitat. For this reason, this species is regarded as likely (but not almost certain) to occur.

Brush-tailed Mulgara (*Dasycercus blythi*)

Brush-tailed Mulgara is listed as Priority 4 by the DPaW. This species is closely associated with *Triodia* Sand plain and swales between low dunes from south-western Queensland across the Simpson, Tanami, and Great Sandy Deserts of southern and central Northern Territory and central Western Australia, including parts of the Pilbara (DSEWPaC 2011b; Pavey *et al.* 2012).

This species has been recorded approximately 11 km to the north east of the Study Areas. The Study Areas appear to contain small areas of Sand plain habitat suitable for this species adjacent to the Drainage areas, and is within the current known distribution; as such it is considered that it could occur rarely in the Study Areas.

5.5.2 Birds

Rainbow Bee-eater (*Merops ornatus*)

The Rainbow Bee-eater is listed as Migratory under the EPBC Act and Schedule 5 under the WC Act. This species has broad habitat preferences and lives almost anywhere suitable for hawking insects. The demographics of the species are complex, with populations in WA being resident, breeding visitors, post-nuptial nomads, passage migrants and winter visitors (Johnstone and Storr 1998). Many individuals move northwards to overwinter in Indonesia.

The Rainbow Bee-eater has been recorded extensively to the north within 10 km of the Study Areas. The Study Areas contain areas of potential foraging and nesting habitat within the Drainage areas, therefore this species is considered almost certain to occur.

Peregrine Falcon (*Falco peregrinus*)

The Peregrine Falcon is listed under the WC Act as Schedule 7 “other specially protected fauna” and is considered rare over much of its range (Johnstone and Storr 1998). In arid areas it is most often encountered along cliffs above rivers, ranges and wooded watercourses where it hunts birds (Johnstone and Storr 1998). It typically nests on rocky ledges occurring on tall, vertical cliff faces between 25 m and 50 m high (Olsen & Olsen 1989). It also appears to prefer nesting on large ledges a reasonable distance (average of

13 m) from the top of the cliff (Olsen & Olsen 1989), possibly to avoid ground dwelling predators.

The Peregrine Falcon has been recorded to the north of the Study Areas, within 10 km. All of the habitats within the Study Areas are regarded as potential foraging habitats for this wide-ranging species; as such, this species is considered likely to occur in the Study Areas.

Barn Swallow (*Hirundo rustica*)

The Barn Swallow is a globally widespread species which includes a number of populations that are migratory over long distances, therefore it is listed as Migratory under the EPBC Act and Schedule 5 under the WC Act. It builds cup nests in shallow caves and overhangs, and also makes use of human structures. Given the widespread nature of this species and its generalist habitat requirements, this species may possibly occur within the Study Areas.

Fork-tailed Swift (*Apus pacificus*)

This species is listed as Migratory under the EPBC Act and Schedule 5 under the WC Act, as it breeds in north-east and east Asia, wintering in Australia and southern New Guinea (Johnstone & Storr 1998). This species is entirely aerial within the Pilbara and does not utilise the terrestrial surface.

This species could occasionally utilise the skies above the Study Areas during the summer months, being attracted to thunderstorms and cyclonic systems (Johnstone & Storr 1998); however, due to the lack of records nearby and the sporadic nature of its occurrence (as a visitor or temporary resident), this species is not considered likely to occur.

5.5.3 Reptiles

Pilbara Flat-headed Blind Snake

The Pilbara Flat-headed Blind Snake is endemic to the Pilbara region and is listed as a Priority 1 species by the DPaW. Given its cryptic fossorial habit, this species is rarely encountered during surveys. Little is known of the species' ecology but most blind snakes are considered insectivorous, feeding on termites and their eggs, and the larvae and pupae of ants (Wilson & Swan 2010). This species is known to be associated with moist soils and leaf litter within gorges and gullies (Wilson & Swan 2010), and potentially within a range of other rocky habitats.

This species has been recorded from within 3 km to the north of the Study Areas, in considerably more mountainous habitat than present within the Study Areas. Based on its known habitat characteristics and distribution, the Pilbara Flat-headed Blind Snake may possibly occur within any of the more well vegetated areas within the Study Areas, although the more exposed Low hills and Stony plains would be regarded as less likely habitats.

6 CONCLUSION

No relevant fauna surveys have taken place within the Study Areas, and 15 fauna surveys and reviews have been undertaken within 10 km of the Study Areas. Eight of these reports were considered most relevant for this review as the remaining seven reports only have a small section occurring within the 10 km buffer.

Four databases were searched to obtain information on species previously recorded (NatureMap and Threatened Fauna Database) or species of conservation significance likely to occur within the Study Areas (Protected Matters Database), and any PECs or TECs in the area.

No Priority or Threatened Ecological Communities are known within or adjacent to the Study Areas. None of the ecological communities surrounding the Study Areas have conservation values related to terrestrial fauna.

Based on habitat assessments undertaken during a site visit in October 2016, aerial imagery, Land System data and vegetation mapping, three major fauna habitats were identified within the Study Areas: Drainage area, Stony plain and Low hills.

The database searches reported a total of 33 species of conservation significance, of which it was determined that four species of conservation significance (Ghost Bat, Western Pebble-mound Mouse, Peregrine Falcon and Rainbow Bee-eater) are considered ‘almost certain’ or ‘likely’ to occur in the Study Areas and four species ‘may’ or ‘could occasionally’ occur (Brush-tailed Mulgara, Fork-tailed Swift, Barn Swallow and Pilbara Flat-headed Blind Snake). No conservation significant fauna have been previously recorded from the Study Areas.

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Appendix A: Conservation Status Codes

International Union for Conservation of Nature

Category	Definition
Extinct (EX)	A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Extinct in the Wild (EW)	A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Critically Endangered (CE)	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.
Near Threatened (NT)	A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future
Data Deficient (DD)	A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

Environment Protection and Biodiversity Conservation Act 1999

Category	Definition
Extinct (EX)	Taxa not definitely located in the wild during the past 50 years.
Extinct in the Wild (EW)	Taxa known to survive only in captivity.
Critically Endangered (CE)	Taxa facing an extremely high risk of extinction in the wild in the immediate future.
Endangered (EN)	Taxa facing a very high risk of extinction in the wild in the near future.
Vulnerable (VU)	Taxa facing a high risk of extinction in the wild in the medium-term future.
Migratory (MG)	Consists of species listed under the following International Conventions: Japan-Australia Migratory Bird Agreement (JAMBA) China-Australia Migratory Bird Agreement (CAMBA) Convention on the Conservation of Migratory Species of Wild animals (Bonn Convention)

Wildlife Conservation Act 1950

Category	Definition
Schedule 1 (S1)	Critically Endangered
Schedule 2 (S2)	Endangered
Schedule 3 (S3)	Vulnerable
Schedule 4 (S4)	Presumed Extinct
Schedule 5 (S5)	Migratory
Schedule 6 (S6)	Conservation Dependent
Schedule 7 (S7)	Other Specially Protected Fauna

Department of Environment and Conservation Priority codes

Category	Definition
Priority 1 (P1)	Taxa with few, poorly known populations on threatened lands.
Priority 2 (P2)	Taxa with few, poorly known populations on conservation lands; or taxa with several, poorly known populations not on conservation lands.
Priority 3 (P3)	Taxa with several, poorly known populations, some on conservation lands.
Priority 4 (P4)	Taxa in need of monitoring. Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change.

Appendix B: NatureMap Database Search Results

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Brad Durrant on 29/09/2016

Kingdom Animalia
Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 119° 36' 36" E,23° 25' 17" S
Buffer 40km

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
2.	44634	*Anilios ganei*		P1	
3.	25558	*Ardea ibis (Cattle Egret)*		IA	
4.	41324	*Ardea modesta (Eastern Great Egret)*		IA	
5.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
6.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
7.	24786	*Calidris melanotos (Pectoral Sandpiper)*		IA	
8.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
9.	24789	*Calidris subminuta (Long-toed Stint)*		IA	
10.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
11.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*		IA	
12.	25150	*Lerista macropisthopus subsp. remota (Unpatterned Robust Slider (central interior WA), skink)*		P2	
13.	25238	*Liasis olivaceus subsp. barroni (Pilbara Olive Python)*		T	
14.	24180	*Macroderma gigas (Ghost Bat)*		P4	
15.	24598	*Merops ornatus (Rainbow Bee-eater)*		IA	
16.	24142	*Petrogale lateralis subsp. lateralis (Black-flanked Rock-wallaby, Black-footed Rock-wallaby)*		T	
17.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
18.	24233	*Pseudomys chapmani (Western Pebble-mound Mouse, Ngadji)*		P4	
19.	43368	*Rhinonicteris aurantia (Orange Leafnosed-bat)*		T	
20.	24115	*Sminthopsis longicaudata (Long-tailed Dunnart)*		P4	
21.	24806	*Tringa glareola (Wood Sandpiper)*		IA	
22.	24808	*Tringa nebularia (Common Greenshank)*		IA	
23.	24810	*Tringa totanus (Common Redshank)*		IA	

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

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Appendix C: Protected Matters Database Search Results

Australian Government

Department of the Environment

EPBC Act Protected Matters Report

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

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

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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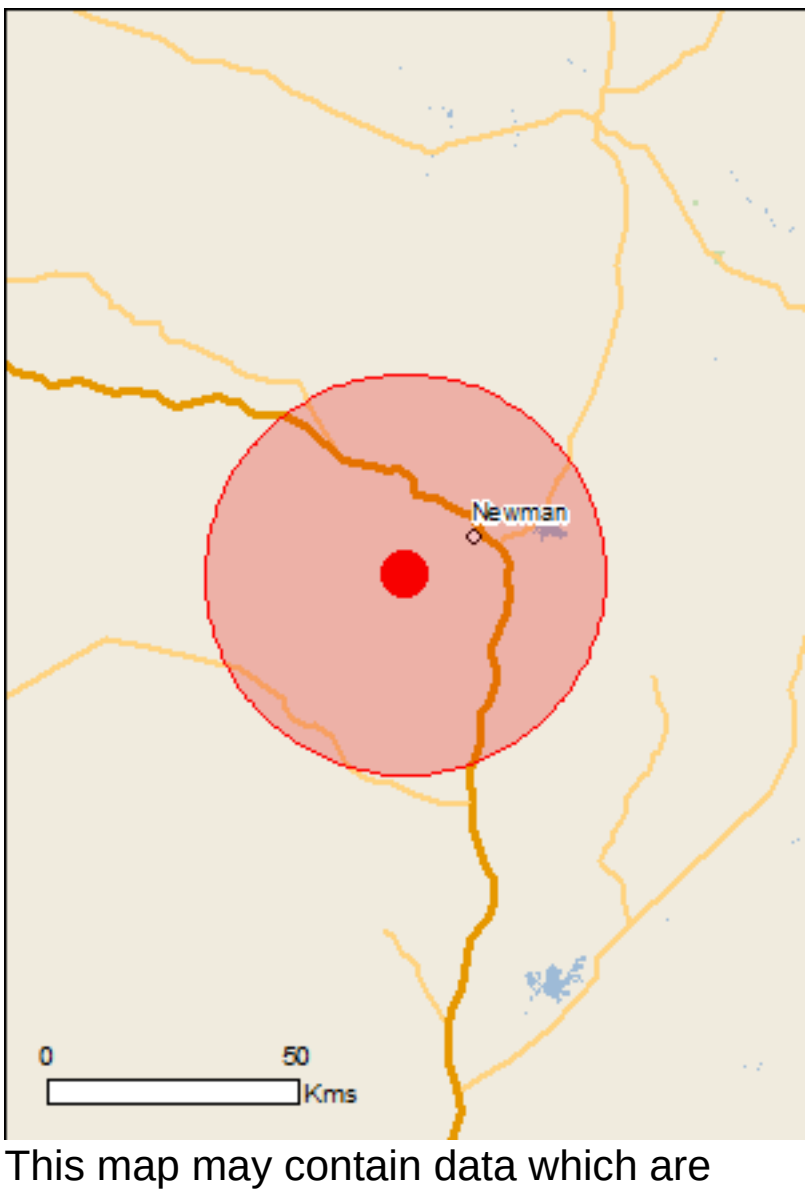

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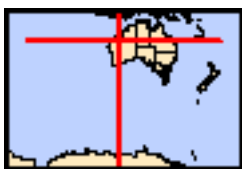

Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	10
Listed Migratory Species:	5

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

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

Commonwealth Land:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	9
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	10
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat likely to occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus hallucatus Northern Quoll, Digul [331]	Endangered	Species or species habitat likely to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat may occur within area
Rhinonicteris aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
Plants		
Lepidium catapycnon Hamersley Lepidium, Hamersley Catapycnon [9397]	Vulnerable	Species or species habitat known to occur within area
Pityrodia augustensis Mt Augustus Foxglove [4962]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		

Name	Threatened	Type of Presence
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -
Defence - NEWMAN TRAINING DEPOT

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur

Name	Status	Type of Presence within area

Caveat

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-23.42111 119.61

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Parks and Wildlife Commission NT, Northern Territory Government
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

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

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

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