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Transmission Line Survey: Desktop Assessment of Altered Alignment

Alinta Energy

science+design

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Rev No.	Author	Approved for Issue	Date
Draft_rev0	LA	BT	14/11/2012
Final_R0	LA	BT	07/12/2012
Final_R1	BT	NR	14/01/2013

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Acronyms and Abbreviations

ARRP Act (1976)	Western Australian *Agriculture and Related Resource Protection Act (1976)*
BoM	Bureau of Meteorology
CALM	Department of Conservation and Land Management (now DEC)
DEC	Western Australian Department of Environment and Conservation
DSEWPaC	Commonwealth Department of Sustainability, Environment, Water, Populations and Communities
Ecoscape	Ecoscape (Australia) Pty Ltd
EPA	Western Australian Environmental Protection Authority
EP Act (1986)	Western Australian *Environmental Protection Act (1986)*
EPBC Act (1999)	Commonwealth *Environment Protection and Biodiversity Conservation Act (1999)*
ESA	Environmentally Sensitive Area
GDE	Groundwater Dependent Ecosystem
GWA	Government of Western Australia
OEPA	Office of the Environmental Protection Authority
PEC	Priority Ecological Community
PF	Priority Flora, also known as Priority Listed Flora
P1, P2, P3, P4, P5	Priority Flora rankings (see **Table 14**); also codes for degree of control required for Declared Plants
TEC	Threatened Ecological Community
TF	Threatened Flora (formerly termed Declared Rare Flora, DRF)
WAH	Western Australian Herbarium
WAHERB	Western Australian Herbarium specimen
WC Act (1950)	Western Australian Wildlife Conservation Act (1950)

Executive Summary

Alinta Energy is planning to construct a transmission line from near Newman, in the Pilbara bioregion of Western Australia, to Roy Hill, approximately 65 km south of Nullagine. The length of the alignment is approximately 123 km.

In August 2012 Ecoscape conducted a Level 2 Flora and Vegetation and Level 1 Fauna assessment of part of the alignment, from Jimblebar Junction to the Noreena Roy Hill Road. The findings of that survey are presented in the separate report, *Newman-Roy Hill Transmission Line Survey* (Ecoscape 2012).

Alinta Energy has since altered part of the proposed alignment and requires a Flora, Vegetation and Fauna assessment of this section (from approximately the Ethel Creek Jigalong Road to near Newman, known as the Study Area) to support environmental approvals. The Study Area is a nominal 200 m width, however Alinta Energy does not require clearing of the entire width.

Due to urgency and timing, this assessment was conducted as a desktop assessment to identify potential significant biological impacts in the Study Area.

The significant flora and vegetation findings of this assessment are:

1. Only one conservation significant flora species, *Brachyscome* sp. Wanna Munna Flats (S. van Leeuwen 4662) (P1), is likely to occur in the Study Area, however if it does occur within the Study Area and is impacted by clearing, its population as a whole is unlikely to be impacted.
2. No vegetation that is considered to represent a TEC or PEC is likely to occur within the Study Area.
3. There is little intersection between the Study Area and riparian vegetation.
4. Mulga vegetation has been considered as significant. However the EPA report and recommendations for the nearby Jimblebar Iron Ore Mine (EPA 2010) considers that Mulga vegetation is well represented locally and regionally.
5. Using land system identification as a method to assess regional significance of vegetation, only one land system (Elimmuna) is considered to be poorly represented. However the impact on this land system is anticipated to be at most 0.008% of its total Pilbara bioregion extent.
6. Using pre-European vegetation as a method to assess regional significance of vegetation, only one vegetation association is represented by less than 500,000 ha (vegetation association 216). The Study Area represents 0.002% of the current extent.

A fauna reconnaissance survey was conducted during August 4-9, 2012. This survey recorded presence of conservation significant species Mulgara (*Dasycercus cristicauda*, EPBC VU, or *D. blythi*, DEC P4), Australian Bustard (*Ardeotis australis*, DEC P4), Bush Stone-curlew (*Burhinus grallarius*, DEC P4), and Rainbow Bee-eater (*Merops ornatus*, EPBC Migratory) either within the Study Area or in

contiguous similar habitats. Evidence of Western Pebble-mound Mouse (*Pseudomys chapmani*, DEC P4) was also observed, but may not be recent. Based on the survey and other data, current presence of some conservation significant species (including Northern Quoll, Pilbara Leaf-nosed Bat and Pilbara Olive Python) is considered to be highly unlikely.

A DEC database search identified 17 conservation significant fauna species (Threatened, Priority or other specially protected) as known to occur in the East Pilbara. No spatial data or precise buffer distance from the Study Area was provided, but relevant records can mostly be located in NatureMap. An additional 11 species were identified through a Protected Matters Search Tool. The majority (five species) of these additional 11 species are migratory birds. A review of NatureMap and recent literature (previous survey reports) identified another 17 species as having been recorded in the vicinity of the Study Area. Discussion is provided on the likely occurrence of these species within the Study Area.

Should Alinta clear up to 5% of the Study Area in order to allow for investigation and construction activities, Ecoscape considers there will be no significant impacts on conservation significant flora or vegetation. Minor adjustments to the transmission line corridor will not cause a significant change to the potential conservation significant flora, vegetation, fauna or land systems found within any potential area of impact.

1.0 Introduction

1.1 Project Overview

Alinta Energy is planning to construct a transmission line from near Newman, in the Pilbara bioregion of Western Australia, to Roy Hill, approximately 65 km south of Nullagine; approximately 123 km in total.

The northern section was subject to a desktop and field assessment in August 2012. This assessment has been commissioned to cover the area of the alignment that was not surveyed in August (Newman Power Station to Jimblebar Junction) and the area of the alignment that has moved since the August survey (Jimblebar Junction to Ethel Creek-Jigalong Road). Changes in the alignment have been made as a result of ongoing discussions with underlying tenure holders in the area.

Due to project timeframes and the time of year, only a desktop assessment has been undertaken.

This report presents the desktop assessment of the biological environment for areas that were not subject to field surveys in August, and a risk assessment of the potential for conservation significant flora, ecological communities and fauna to occur within or be associated with the Study Area.

1.1.1 PREVIOUS SURVEY

In August 2012, Ecoscape undertook a Level 2 flora and vegetation assessment and Level 1 fauna assessment of 81 km of the alignment, between (approximately) the Jimblebar Junction at the southern end and the Noreena Roy Hill Road at the northern end. This assessment included both desktop and field surveys.

The results of a desktop assessment of the entire alignment and field survey of the partial alignment are included in the report *Newman-Roy Hill Transmission Line Survey* (Ecoscape 2012).

1.2 Study Area

The Study Area is located in the Pilbara bioregion of Western Australia.

The Newman Power Station is the southern terminus of the proposed transmission line. The Study Area comprises of a 63 km, 200 m wide corridor between the Newman Power Station and Ethel Creek-Jigalong Road, totalling 1,260 ha. The Study Area generally follows the Newman-Marble Bar Road and Great Northern Highway.

The Study Area and a comparison of the area that was subject of the August 2012 desktop and field survey (Ecoscape 2012), is shown in **Figure 1.** Although not generally discussed separately, the Study Area consists of two discrete sections:

- from Jimblebar Junction north to Ethel Creek-Jigalong Road; located to within 1 km of the area covered by the desktop and field assessment in August 2012 (Ecoscape 2012) (Section A)
- from Newman Power Station to Jimblebar Junction (Section B).

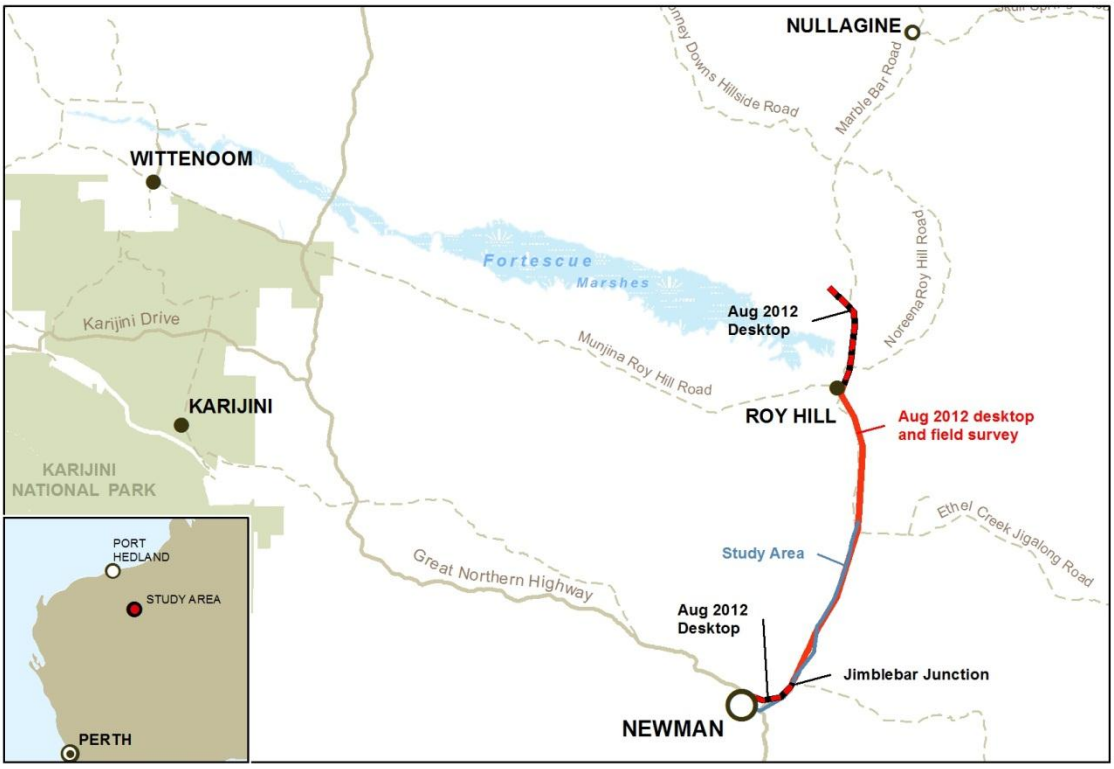

Figure 1: Study Area location and comparison with Ecoscape (2012) Study Area

1.3 Project Objectives

The project includes a desktop and risk assessment that, as much as possible (without a field assessment), is compliant with:

- *Guidance for the Assessment of Environmental Factors (in accordance with the Environmental Protection Act 1986) No. 51 - Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (known as *Guidance Statement No. 51*) (Environmental Protection Authority, EPA 2004)
- *Terrestrial Biological Surveys as an Element of Biodiversity Protection Position Statement No.* 3 (EPA 2002).

Objectives of the terrestrial vertebrate fauna assessment were to:

- develop an inventory of terrestrial vertebrate fauna species identified from the Study Area or likely to occur, and characterise the fauna habitats present

- assess the potential impacts of disturbance within the Study Area on vertebrate fauna and their habitats.

1.4 Previous Biological Surveys

Reports reviewed for information relevant to the Study Area include:

- EPA (2005) *Pilbara Iron Ore & Infrastructure Project: East-West Railway and Mine Sites (Stage B) - Fortescue Metals Group. Report and recommendations of the Environmental Protection Authority*
- ENVIRON Australia Pty Ltd (2009) *Roy Hill 1 Iron Ore Mining Project: Stage 2 Environmental Referral*
- EPA (2009a) *Roy Hill 1 Iron Ore Mining Project Stage 1 - Roy Hill Iron Ore Pty Ltd. Report and Recommendations of the Environmental Protection Authority. Report 1342*
- EPA (2009b) *Roy Hill 1 Iron Ore Mining Project Stage 2 - Roy Hill Iron Ore Pty Ltd. Report and Recommendations of the Environmental Protection Authority. Report 1345*
- Everard and Bamford (2009) *Fauna Assessment of the BC Iron Nullagine Iron Ore Project*
- Outback Ecology Services (2009) *Jimblebar Iron Ore Project - Terrestrial Vertebrate Fauna Assessment*
- McKenzie et al (2009) *A Biodiversity Survey of the Pilbara Region of Western Australia, 2002 - 2007*
- Bamford Consulting Ecologists & Ecoscape (2012) *Fauna Assessment - Nyidinghu Iron Ore Project*
- Everard *et al*. (2012) *Vertebrate Fauna Assessment of the Iron Valley Project Area*
- Ninox (2009) *A Fauna Survey of the Proposed Hope Downs 4 Mining Area, near Newman, Western Australia*
- Davis et al. (2005) *Fauna survey of proposed Iron Ore Mine, Cloud Break*
- Phoenix *(2011a; 2011b) Level 1 fauna habitat assessment and targeted mulgara survey for the FerrAus Pilbara Project; and Consolidated report on vertebrate fauna surveys conducted for the FerrAus Pilbara Project*
- Ecologia (2006) *Roy Hill Iron Ore Project Terrestrial Vertebrate Fauna Assessment*
- Everard and Bamford (2009) *Fauna Assessment of the BC Iron Nullagine Iron Ore Project*
- Ecoscape (2011) *Cookes Creek Terrestrial and Subterranean Fauna Survey*
- Ecoscape (2012) *Newman-Roy Hill Transmission Line Survey*
- How and Dell (2004) *Reptile assemblage of the Abydos Plain, north-eastern Pilbara, Western Australia*
- How and Cooper (2002) *Terrestrial small mammals of the Abydos Plain in the north-eastern Pilbara, Western Australia.*

2.0 Existing Environment

2.1 Physical Environment

2.1.1 CLIMATE

The Pilbara region experiences an arid climate, which is influenced by two air masses, the Indian tropical maritime air moving in from the west or north-west, and the tropical continental air from the inland. During the warmer part of the year, there is a hot low-pressure system over the region resulting in clear skies and very high temperatures from November to February with average maximum temperatures generally between 35°C and 40°C. During the winter months the average maximum temperature generally falls to between 22°C and 30°C, the range of which is generally greater in inland areas away from the moderating effects of onshore winds common in coastal areas (Australian Government 2009).

The Pilbara lies south of the area normally penetrated by the northwest monsoon in the summer months, and is only occasionally influenced by weather systems of the westerly circulation in the winter months. Rainfall is therefore low and variable. The majority of rainfall occurs between December and March, as the result of moist tropical storms and cyclones originating in the north, with a pronounced dry period between August and November (Australian Government 2009).

Figure 2 outlines monthly rainfall and temperature averages for the Newman Airport Bureau of Meteorology (BoM) station, located approximately 9km from the southern end of the Study Area (BoM 2012).

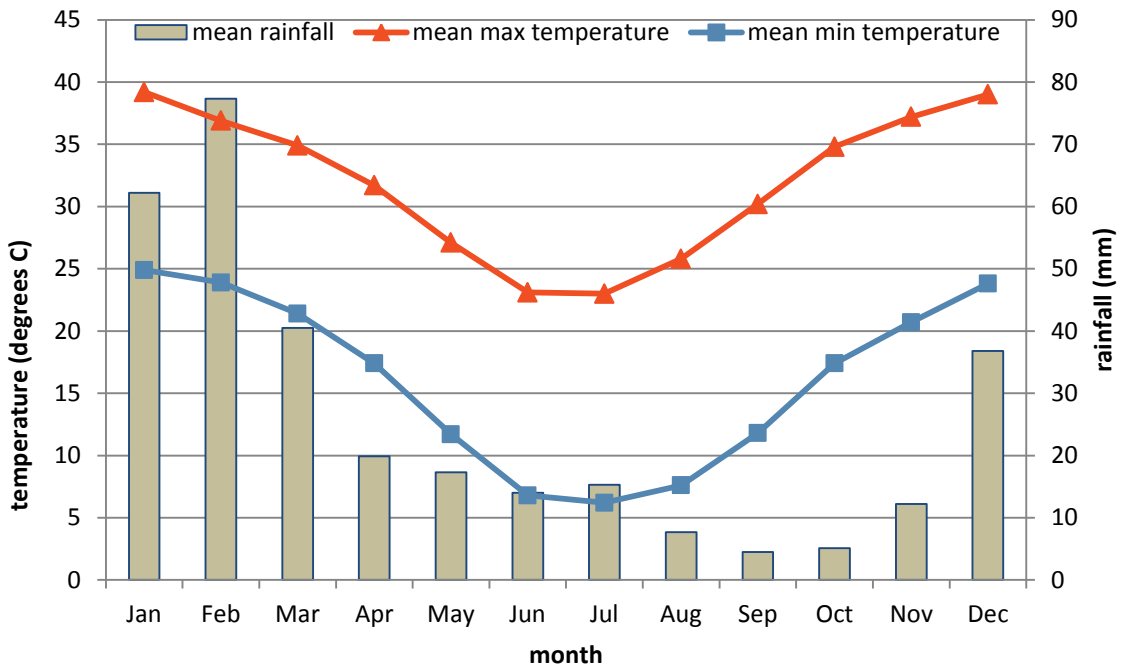

Figure 2: Monthly rainfall and temperature averages for Newman Airport BoM station (BoM 2012)

2.1.2 GEOLOGY

Table 1 shows the geological units that occur in the Study Area. These are mapped over three 1:250000 map sheets; Roy Hill (Thorne & Tyler 1997), Balfour Downs (Bunting & Van de Graaff 1987) and Newman (Tyler *et al.* 1990). Descriptions of units vary slightly between these sheets, with the most specific description retained in **Table 1**.

Table 1: Geological units (Study Area)

Unit	Description
Czk	Calcrete - sheet carbonate usually formed in major drainage lines
Czr	Laterite, includes surficial hematite-goethite deposits on banded iron-formation; forms Hamersley Surface
Fd	Metadolerite sills intruded into Fortescue Group; medium- to coarse-grained, massive grey-green rock, usually foliated
Fj	JEERINAH FORMATION: interbedded mudstone, siltstone and chert with minorfelsic tuff, dolomite and sandstone
Hb	BROCKMAN IRON FORMATION: banded iron-formation, chert and minor shale (2490+-20 Ma, U-Pb)
Hm	MARRA MAMBA IRON FORMATION: chert, ferruginous chert and banded iron-formation with minor shale
Ho	BOOLGEEDA IRON FORMATION: fine-grained, finely laminated, dark grey-brown to black, flaggy iron-formation; minor chert, jaspilite and shale
Hw	WOONGARRA VOLCANICS: quartz - or feldspar-phyric rhyolite and rhyodacite as sills or flows; tuff and minor jaspilitic banded iron-formation (2470 +- 30 Ma, U-Pb; 2370 Ma, Rb-Sr)
Qa	Alluvium - unconsolidated silt, sand and gravel
Qc	Colluvium - unconsolidated quartz and rock fragments in soil
Qs	Eolian sand - in sheets and longitudinal (seif) dunes
Qw	Alluvium and colluvium - red-brown sandy and clayey soil

2.1.3 LAND SYSTEMS

As part of the rangeland resource surveys, the then Department of Agriculture comprehensively described and mapped the biophysical resources of the Pilbara, together with an evaluation of the condition of the soils and vegetation (from a an agricultural perspective) throughout (Van Vreeswyk *et al.* 2004). As part of this process an inventory of land types, land systems and land units with particular use capabilities, habitats or conservation values were established to assist in land use planning. According to this mapping, the following land systems (grouped according to land type on the basis of a combination of landform, soil, vegetation, and drainage characteristics) occur within the Study Area (**Table 2**, **Map 1**). Approximately 10 km of the Study Area is included in the Gascoyne bioregion, however no equivalent publication detailing land systems is available for inclusion in this report.

Table 2: Descriptions of land types and systems occurring in the Study Area (Van Vreeswyk *et al.* 2004)

Unit	Description	Geomorphology
Land type 1		
McKay Land System (MCK)	Hills, ridges, plateaux remnants and breakaways of meta sedimentary and sedimentary rocks supporting hard spinifex grasslands	Erosional (hills, ridges, plateaux remnants, breakaways, stony plains and interfluves)
Land type 2		
Newman Land System (NEW)	Rugged ironstone ridges, plateaux and mountains; hard spinifex pastures in good to excellent condition; no erosion.	Erosional (BIF, outcrop and stony mantle)
Rocklea Land System (ROC)	Rugged basalt hills and dissected plateaux; poorly accessible, not degraded or eroded.	Erosional (steep stony slopes, small channels and stony interfluves, minor gilgai plains)
Land type 16		
Elimunna Land System (ELI)	Stony plains on basalt supporting sparse acacia and cassia shrublands and patchy tussock grasslands.	Mainly depositional (level to gently undulating, some low hills, some gilgai)
Land type 4		
Boolgeeda Land System (BGD)	Stony lower slopes and plains below hill systems; not degraded or eroded.	Depositional (colluvial/alluvial lower slopes, stony, derived from Newman LS)
Land type 28		
Divide Land System (DIV)	Sandplains and occasional dunes supporting shrubby hard spinifex grasslands.	Depositional (aeolian sand, sandy loam)
Land type 31		
Fan Land System (FAN)	Hardpan plains and gilgai plains supporting groved mulga shrublands and minor tussock grasslands.	Depositional (alluvial/colluvial, sandy, near-level)
Land type 42		
River Land System (RIV)	Flood plains and terraces flanking major rivers and creeks; little pasture degradation or erosion.	Floodplains and terraces (sand, cobbles)

The extent of each land system within the Study Area is shown in **Table 3**. Extent data is not available for the Gascoyne bioregion.

Table 3: Extent of land systems within the Study Area and regional representation

Land System	IBRA Bioregion	Extent within Study Area (ha)	Proportion of Study Area (%)	Pilbara extent (ha)	Representation (%) within the Study Area
Boolgeeda	PIL	10	0.8	774,800	<0.001%
Divide	PIL	400	32	529,300	0.075%
Elimunna	PIL	101	8	617,000	0.016%
	GAS	197	16	-	-
Fan	PIL	151	12	148,200	0.1%
McKay	PIL	18	1.1	420,200	0.004%
	GAS	13	1	-	-
Newman	PIL	60	4.8	1,458,000	0.004%
	GAS	20	1.3	-	-
River	PIL	260	21	408,800	0.064%
Rocklea	PIL	30	2.4	91,700	0.033%

2.1.4 DRAINAGE

A major drainage line, the Fortescue River, runs approximately parallel to the Study Area through its central portion. A tributary of the Fortescue River, known as Kalgan Creek, crosses the Study Area approximately 25 km north of Newman. **Map 1** shows the drainage lines associated with the Study Area.

2.2 Biological Environment

2.2.1 BIOGEOGRAPHIC REGION

The Study Area is located within the Pilbara and Gascoyne biogeographic regions as defined in the Interim Biogeographical Regionalisation for Australia (IBRA) (DSEWPaC 2011). Biogeographic regions are delineated on the basis of similar climate, geology, landforms, vegetation and fauna. The Pilbara biogeographic region includes four subregions; the Hamersley, Fortescue Plains, Chichester and Roebourne subregions (Thackway & Cresswell 1995). The Gascoyne biographic region includes three subregions; Ashburton, Augustus and Carnegie. The Study Area falls mostly within the Fortescue Plain subregion described in the 2002 Biodiversity Audit of Western Australia's 53 Biogeographical Subregions (McKenzie *et al.* 2003) as:

> *Alluvial plains and river frontage. Extensive salt marsh, mulga-bunch grass, and short grass communities on alluvial plains in the east. Deeply incised gorge systems in the western (lower) part of the drainage. River gum woodlands fringe the drainage lines. Northern limit of Mulga (Acacia aneura). An extensive calcrete aquifer (originating within a palaeo-drainage valley) feeds numerous permanent springs in the central Fortescue, supporting large permanent wetlands with extensive stands of river gum and cadjeput Melaleuca woodlands. Climatic conditions are semi desert tropical, with*

average rainfall of 300 mm, falling mainly in summer cyclonic events. Drainage occurs to the north-west.

A small proportion of the Study Area's southern end falls in the Hamersley and Augustus biographic subregions described by McKenzie et al. (2003) as:

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

Augustus: *Rugged low Proterozoic sedimentary and granite ranges divided by broad flat valleys. Also includes the Narryera Complex and Bryah Basin of the Proterozoic Capricorn Orogen (on northern margin of the Yilgarn Craton), as well as the Archaean Marymia and Sylvania Inliers. Although the Gascoyne River System provides the main drainage of this subregion, it is also the headwaters of the Ashburton and Fortescue Rivers. There are extensive areas of alluvial valley-fill deposits. Mulga woodland with Triodia occur on shallow stony loams on rises, while the shallow earthy loams over hardpan on the plains are covered by Mulga parkland. A desert climate with bimodal rainfall.*

2.2.2 ENVIRONMENTALLY SENSITIVE AREAS

Section 51B of the *Environmental Protection (EP) Act* (Government of Western Australia (GWA) 1986) allows the Minister to declare Environmentally Sensitive Areas (ESAs). ESAs are protected under the *Environmental Protection (Clearing of Native Vegetation) Regulations* (GWA 2004). Exemptions under the regulations, which allow clearing of native vegetation without a clearing permit issued by either the DEC or Department of Minerals and Petroleum, do not apply within ESAs.

Map 3 shows an ESA associated with the *'Ethel Gorge aquifer stygobiont community'* Threatened Ecological Community (TEC) intersecting with the Study Area.

2.2.3 FLORA

2.2.3.1 Conservation Significant Flora Species

For the purposes of this report, *conservation significant flora* species are those that are listed by the Department of Environment and Conservation (DEC) as Threatened Flora (TF) and Priority Flora (PF). Flora species are classified as TF or listed as PF where populations are geographically restricted or threatened by local processes.

TF species (previously known in Western Australian as Declared Rare Flora (DRF)) are listed by the DEC and are protected under the Western Australian *Wildlife Conservation Act* (*WC Act*) (1950). Rare flora species, as they are termed in the *WC Act*, are gazetted under Sub-section 2 of Section 23F, thereby making it an offence to remove or damage rare flora without Ministerial approval.

Some TF species have additional legislative protection by being listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* (Commonwealth of Australia 1999).

Definitions of the Commonwealth (DSEWPaC) categories are provided in **Table 12** in **Appendix One**.

There are six categories covering State-listed TF and PF species (DEC 2011), which are outlined in **Table 13** in **Appendix One**. PF for Western Australia are regularly reviewed by the DEC whenever new information becomes available, with species status altered or removed from the list when data indicates that they no longer meet the requirements outlined in **Table 13**.

DEC Database Search

A DEC Threatened Flora database search was conducted of the August 2012 Study Area and 20 km buffer (DEC reference 10-0712FL). This search identified data from validated populations of TF and some PF from the Threatened Flora Database (DEFL) and specimens in the Western Australian Herbarium (WAHERB). The results of this search are included in Ecoscape (2012). The results applicable to the Study Area are included in **Map 3** that shows the locations of conservation significant records from this search closest to the Study Area. The closest conservation significant species records to the Study Area (centre line) are shown in **Table 4**.

Table 4: Nearby conservation significant flora

Species	Conservation Code	Distance from Study Area
Brachyscome sp. Wanna Munna Flats (S. van Leeuwen 4662)	P1	2.5 km
Crotalaria smithiana	P3	4 km
Gymnanthera cunninghamii	P3	0.4 km
Lepidium catapycnon	T	5.5 km

The DEC Threatened Flora database search does not identify other *significant flora* species, described in *Guidance Statement No. 51* (EPA2004) as including:

- keystone or relictual species
- those having anomalous features
- range extremities, range extensions or population outliers
- restricted subtaxa and hybrids or local endemics
- poorly reserved species.

Commonwealth Protected Matters Search

A review of the DSEWPaC online databases (Protected Matters Search Tool and Species Profile and Threats Database(2012)) was also conducted to identify any additional threatened flora with Commonwealth protection near the Study Area. The results of the Protected Matters Search are reproduced in **Appendix Three**.

The only Commonwealth-listed TF species considered likely to occur within the Study Area was *Pityrodia augustensis* (Mt Augustus Foxglove).

NatureMap Search

A NatureMap (DEC 2007-) search was conducted of the approximate Study Area and 5 km buffer (**Appendix Four**). This search identified 305 flora species that have been recorded within the search area and buffer. The conservation significant flora identified from this search were:

- *Brachyscome* sp. Wanna Munna Flats (S. van Leeuwen 4662) (P1)
- *Crotalaria smithiana* (P3)
- *Gymnanthera cunninghamii* (P3)
- *Ipomoea racemigera* (P1).

Widening the search area to a 20 km buffer identified the following additional conservation significant species:

- *Amaranthus centralis* (P3)
- *Eremophila pilosa* (P1)
- *Eremophila rigida* (P3)
- *Eucalyptus rowleyi* (P3)
- *Ipomoea racemigera* (P1)
- *Lepidium catapycnon* (T).

The results of the 20 km buffer conservation significant flora search using NatureMap (DEC 2007-) is included in **Appendix Four**.

Ecoscape Field Survey

Conservation significant flora species identified during the August Ecoscape (2012) survey of the original alignment, which is proximate to the Study Area are:

- *Rhagodi*a sp. Hamersley (M. Trudgen 17794) (P3)
- *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (P3)
- *Eremophila youngii* subsp. *lepidota* (P4)
- *Goodenia nuda* (P4).

2.2.3.2 Introduced Species

Declared Plants are listed under the *Agriculture and Related Resources Protection (ARRP) Act 1976* (Department of Agriculture and Food Western Australia 1976) and require a degree of control, depending on their rating in the district they are encountered (GWA 2009).

Declaration of plants as *P1* prohibits movement of plants or seeds, including prohibiting the movement of contaminated machinery and produce. *P2 Declared Plants* require eradication of the infestation until no plants remain, *P3 Declared Plants* require control preventing spread of seed or plant pars within and from the property, including destroying plants and preventing seed set, and *P4 Declared Plants* are required to be controlled to prevent the spread of the infestation, including destroying plants and preventing seed set.

Introduced species (weeds) are commonly recorded, particularly in disturbed areas including those targeted for grazing by introduced species, including cattle. Plants are regarded as introduced if they are listed as such on FloraBase (Western Australian Herbarium (WAH) 1998).

Introduced species identified from the NatureMap (DEC 2007-) search as occurring within 5 km of the Study Area were:

- **Alternanthera pungens* (Khaki Weed)
- **Cenchrus ciliaris* (Buffel Grass)
- **Cenchrus setiger* (Birdwood Grass)
- **Echinochloa colona* (Awnless Barnyard Grass)
- **Setaria verticillata* (Whorled Pigeon Grass)
- **Tribulus terrestris* (Caltrop).

Introduced species recorded during the 2012 field survey (Ecoscape 2012) from near the Study Area were:

- **Aerva javanica* (Kapok weed)
- **Cenchrus ciliaris* (Buffel Grass)
- **Portulaca oleracea* (Purslane)
- **Tribulus ?terrestris* (Caltrop).

None of the listed or recorded species are recognised under the *ARRP Act* 1976 as Declared Plants in the Shire of East Pilbara (GWA 2009), nor as WONS (Weeds Australia 2012).

2.2.4 VEGETATION

2.2.4.1 Vegetation Association Mapping

During the 1970s, John Beard and associates conducted a systematic survey of native vegetation, describing the vegetation systems in Western Australia at a scale of 1:250 000 in the south-west and

at a scale of 1:1 000 000 in less developed areas. The vegetation survey of Western Australia maps and explanatory memoirs (1974-1981) are credited to J.S. Beard (or Beard with various co-authors).

Beard's vegetation maps attempted to depict the native vegetation as it was presumed to be at the time of settlement, and is known as the pre-European vegetation type and extent. It has since been developed in digital form by Shepherd *et al*. (2002). The extent of the pre-European vegetation associations within the Study Area are displayed in **Map 2**.

The extents of the pre-European vegetation associations intersected by the Study Area in the Pilbara bioregion (GWA 2011) are listed in **Table 5**. The Pilbara bioregion occupies 17,821,309.90 ha.

Table 5: Pre-European vegetation associations (Pilbara bioregion)

Vegetation Association	Pilbara Bioregion			Extent within the Study Area	
	Pre-European Extent (ha)	Current Extent (ha)	% Remaining	Extent (ha)	Proportion (%)
18 - Low woodland; mulga (*Acacia aneura*)	676,557	672,424	99.4	84	7
29 - Sparse low woodland; mulga, discontinuous in scattered groups	1,133,220	1,132,939	99.9	394	31
82 - Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*	2,563,583	2,550,899	99.5	168	13
111 - Hummock grasslands, shrub steppe; *Eucalyptus gamophylla* over hard spinifex	550,287	550,232	99.9	410	33
216 – Low woodland; mulga (with spinifex) on rises	26,670	26,373	98.9	10	0.8

The extents of the pre-European vegetation associations intersected by the Study Area in the Gascoyne bioregion (GWA 2011) are listed in **Table 6**. The Gascoyne bioregion occupies 18,075,219.48 ha.

Table 6: Pre-European vegetation associations (Gascoyne bioregion)

Vegetation Association	Gascoyne Bioregion			Extent within the Study Area	
	Pre-European Extent (ha)	Current Extent (ha)	% Remaining	Extent (ha)	Proportion (%)
29 - Sparse low woodland; mulga, discontinuous in scattered groups	780,622	780,429	99.9	203	16
82 - Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*	2,563,583	2,550,899	99.5	0.5	0.04

2.2.4.2 Threatened and Priority Ecological Communities

Threatened Ecological Communities (TECs) are categorised at both State level (DEC 2010) and Commonwealth level (Commonwealth of Australia 1999), while Priority Ecological Communities (PECs) are classed at State level (DEC 2010). The status of the State and Commonwealth ratings are summarised in **Table 14** and **Table 15** in **Appendix One**.

According to the TECs listed on the DEC database endorsed by the Minister for the Environment (DEC 2012b), there are two State-listed TECs within the Pilbara bioregion:

- the *vulnerable 'Themeda* grasslands on cracking clays (Hamersley Station, Pilbara)'. This TEC is described as grassland plains dominated by the perennial *Themeda* (kangaroo grass) and many annual herbs and grasses.
- the *endangered '*Ethel Gorge aquifer stygobiont community'.

There are no Commonwealth-listed TECs within the Pilbara bioregion (DSEWPaC 2009).

There are 30 PECs listed as occurring in the Pilbara bioregion (DEC 2012c).

DEC Ecological Communities Database Search

The DEC Ecological Communities database search for the original (Ecoscape 2012) alignment (search reference 20-0712EC) identified the *endangered* TEC 'Ethel Gorge', described as 'Ethel Gorge aquifer stygobiont community' TEC as occurring within approximately 5km of the Study Area.

The DEC Ecological Communities database search does not identify other *significant vegetation* described in *Guidance Statement No. 51* (EPA 2004), including scare vegetation types, communities including unusual species or a novel combination of species, vegetation acting as a refuge or key habitat for threatened species, vegetation representative of a range of a unit, or vegetation having a restricted distribution.

Map 3 displays the location of the TEC identified from the DEC database search.

2.2.4.3 Protected Matters Search

A search conducted using the DSEWPaC (2012) online databases (Protected Matters Search Tool and Species Profile and Threats Database, **Appendix Three**) identified no other flora or vegetation-related protected matters from the Study Area.

2.2.4.4 Groundwater Dependent Ecosystems

GDEs have been defined as ecosystems that are dependent on groundwater for their survival at some stage or stages of their lifecycle, however groundwater use cannot be equated with groundwater dependence (Eamus 2009b).

Within the Pilbara bioregion, vegetation containing *Eucalyptus camaldulensis* and *E. victrix* are considered to be indicative of GDE presence.

2.2.5 FAUNA

2.2.5.1 Conservation Significant Fauna

The conservation status of fauna species is assessed under both the *EPBC Act* (Commonwealth of Australia 1999) and the *WC Act* (1950). The significance levels for fauna used in the *EPBC Act* (1999) are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN) and reviewed by Mace and Stuart (1994). *EPBC Act* (1999) categories are listed in **Table 12**, **Appendix One**.

The *WC Act* (1950) uses a set of Schedules but also classifies species using some of the IUCN categories. DEC Schedules, which provide special protection to listed fauna under the *WC Act* (1950) and definitions are shown in **Table 13**, **Appendix One**. Under a memorandum of understanding between DEC and DSEWPaC, taxa listed as threatened by DEC are automatically listed under the *EPBC Act* (1999), but there are delays in this process.

In Western Australia, the DEC has produced a supplementary list of Priority Fauna, listed using priority codes, which are species that are not considered *Threatened* under the *WC Act* (1950) but for which the DEC considers there is cause for concern. Some Priority species are also assigned to the IUCN Conservation Dependent category. It is important to recognise that such Priority Lists have no statutory standing, but are used to assist the DEC when considering which fauna are most in need of more surveys or other investigations, in order to establish their status in the wild.

The Priority Fauna List for Western Australia includes taxa organised by priority codes that either:

- have recently been removed from the schedule of threatened fauna
- have a restricted range, are uncommon or are declining in range and/or abundance, but which do not meet the criteria for inclusion on the schedule of threatened fauna
- have been nominated for consideration for the schedule of threatened fauna and for which there is insufficient information for the advisory committee to make an assessment of their status
- are worthy of inclusion on such a list, as determined by the DEC.

The Priority Fauna List for Western Australia is reviewed by the DEC whenever new information on relevant taxa becomes available. Taxa are removed from the list by the DEC as they cease to meet the requirements identified above. In addition to these conservation levels, species that have been introduced are indicated.

Vertebrate taxonomy in this report follows the WAM checklists last updated Feb 2011, except for birds where the classification and sequence follows Christidis and Boles (2008), and recently published taxonomic revisions if they allow confident re-identification (eg Doughty *et al.* 2012).

DEC Database Search

A DEC database search was conducted which identified 17 conservation significant fauna species (Threatened, Priority or other specially protected) as known to occur in the East Pilbara (**Table 7**). No spatial data or precise buffer distance from the Study Area was provided, but relevant records can mostly be located in NatureMap (DEC 2012a).

Table 7: DEC Threatened and Priority Fauna search results

Species Name	Common Name	EPBC Act Status	WC Act Status	DEC Status	No. of records
Pezoporus occidentalis	Night Parrot	EN	S1	EN	1
Dasyurus hallucatus	Northern Quoll	EN	S1	EN	2
Liasis olivaceus barroni	Pilbara Olive Python	VU	S1	VU	3
Petrogale lateralis lateralis	Black-flanked Rock-wallaby	VU	S1	VU	4
Falco peregrinus	Peregrine Falcon		S4		9
Ramphotyphlops ganei	Pilbara Blindsnake			P1	12
Ctenotus uber johnstonei	Balgo Spotted Ctenotus			P2	3
Lerista macropisthopus remota	Robust Lerista			P2	4
Ardeotis australis	Australian Bustard			P4	68
Burhinus grallarius	Bush Stone-curlew			P4	7
Dasycercus blythi	Brush-tailed Mulgara			P4	2
Falco hypoleucos	Grey Falcon			P4	3
Leggadina lakedownensis	Short-tailed Mouse			P4	9
Macroderma gigas	Ghost Bat			P4	3
Oreoica gutturalis gutturalis	Crested Bellbird (southern)			P4	2
Pseudomys chapmani	Western Pebble-mound Mouse			P4	49
Sminthopsis longicaudata	Long-tailed Dunnart			P4	2

2.2.5.2 EPBC Protected Matters Search

Results of the Protected Matters Search Tool identified the following Threatened and Migratory fauna species as potentially occurring within 10 km of the Study Area (**Table 8**). This list is the same as that for the previous study (Ecoscape 2012) with one exception: *Dasycercus cristicauda* (Crest-tailed Mulgara) is not predicted to occur in the Study Area, as the assumed distribution of this species does not extend to the south eastern Pilbara.

Table 8: Protected Matters Search Results (fauna)

Scientific Name	Common Name	EPBC Act Status	Type of Presence
THREATENED SPECIES			
Birds			
Pezoporus occidentalis	Night Parrot	Endangered	Species or habitat likely to occur
Polytelis alexandrae	Princess Parrot	Vulnerable	Species or habitat may occur
Mammals			
Dasyurus hallucatus	Northern Quoll	Endangered	Species or habitat likely to occur
Macrotis lagotis	Greater Bilby	Vulnerable	Species or habitat known to occur
Rhinoncteris aurantia (Pilbara form)	Pilbara Leaf-nosed Bat	Vulnerable	Species or habitat likely to occur
Reptiles			
Liasis olivaceus barroni	Pilbara Olive Python	Vulnerable	Species or habitat may occur
MIGRATORY SPECIES			
Migratory Marine Birds			
Apus pacificus	Fork-tailed Swift		Species or habitat may occur
Ardea modesta [=alba]	Eastern Great Egret		Species or habitat may occur
Ardea ibis	Cattle Egret		Species or habitat may occur
Migratory Terrestrial Species			
Merops ornatus	Rainbow Bee-eater		Species or habitat may occur
Pezoporus occidentalis	Night Parrot	Endangered	Species or habitat likely to occur
Migratory Wetland Species			
Ardea modesta [=alba]	Eastern Great Egret		Species or habitat may occur
Ardea ibis	Cattle Egret		Species or habitat may occur
Charadrius veredus	Oriental Plover		Species or habitat may occur
LISTED MARINE SPECIES			
Birds			
Apus pacificus	Fork-tailed Swift		Species or habitat may occur
Ardea modesta [=alba]	Great Egret		Species or habitat may occur
Ardea ibis	Cattle Egret		Species or habitat may occur
Charadrius veredus	Oriental Plover		Species or habitat may occur
Merops ornatus	Rainbow Bee-eater		Species or habitat may occur

2.2.5.3 NatureMap and other resources

Searches of DEC's online *NatureMap* database (DEC 2012a) identified fauna species that have been recorded within 40 km of the Study Area (**Appendix Four, Table 17**). This list was compared with reports on previous fauna surveys in the eastern Pilbara, including actual records and desktop assessments of the fauna considered likely or potentially to occur. This approach is used because sampling in parts of the Study Area is quite sparse and many species are represented by few records, but there is evidence for only weak geographic variation in vertebrate fauna composition across the Pilbara (Burbidge et al. 2010; Doughty et al. 2011; Gibson & McKenzie 2009).

In addition to those listed in **Table 7** and **Map 3**, the following conservation significant fauna species (**Table 9**) are considered to potentially occur in the broad vicinity of the Study Area.

Table 9: Threatened and Priority fauna species potentially occurring in Study Area but not recorded by DEC or predicted by PMST

Species Name	Common Name	EPBC Act Status	WC Act Status	DEC Status
Notoryctes caurinus	Northern Marsupial Mole	EN	S1	EN
Dasycercus cristicauda	Crest-tailed Mulgara	VU	S1	VU
Planigale spp. 1 & 2	Planigales			
Lagorchestes conspicillatus leichardti	Spectacled Hare-wallaby (mainland)			P3
Ctenotus nigrilineatus	Pinstriped Finesnout Ctenotus			P1
Liopholis kintorei (or *Egernia kintorei*)	Great Desert Skink	VU	S1	VU
Haliaeetus leucogaster	White-bellied Sea-eagle	M	S3	
Scolopacidae (9 spp)	Migratory waders	M	S3	
Hydroprogne caspia (or *Sterna caspia*)	Caspian Tern	M	S3	
Neochmia ruficauda subclarescens	Western Star Finch			P4

3.0 Methods

3.1 Flora and Vegetation

Ecoscape has undertaken the following to order to identify flora and vegetation of significance that may occur within the Study Area:

1. A literature review of flora and vegetation reports from nearby.
2. A conservation significant flora risk assessment to identify the likelihood of species occurring within the Study Area.
3. An assessment of vegetation significance based on representativeness of land systems.
4. An assessment of vegetation significance based on representativeness of pre-European vegetation associations.
5. Consideration of the presence of Groundwater Dependent Ecosystems (GDEs)
6. Other reasons flora and vegetation may be considered significant.

Flora, unless it is listed as a TF, and vegetation, unless it represents a TEC, does not have any legislative protection.

3.1.1 LITERATURE REVIEW

Available reports and documents from Ecoscape's electronic and hardcopy library (including survey reports from nearby) and on-line searches were reviewed to identify flora and, in particular, vegetation that may be considered of significance that is known or is likely to occur in the Study Area.

The reports and documents included in the review, and significant findings from these, are listed in **Table 18**.

3.1.2 CONSERVATION SIGNIFICANT FLORA RISK ASSESSMENT

In order to determine the likelihood of conservation significant species occurring within the Study Area, a risk assessment of taxa identified during the desktop assessment (**Table 16**) was undertaken.

Although the altered alignment was not the subject of a field assessment (for this project), the altered alignment (except the far south-western tip) largely follows the roads traversed during the August 2012 Ecoscape survey. During this survey no unusual or unexpected (based on surveyor's experience) vegetation was observed. The likelihood of a species occurring in the Study Area is based on attributes listed on FloraBase (WAH 1998-; WAH & DEC 2012) and tailored to local populations, and results of the Ecoscape (2012) survey. These attributes were:

- broad soil type usually associated with the species
- broad landform usually associated with the species
- usual vegetation (characteristic species) with which the species is usually associated (including assessment of habitat specific information e.g. Mulga on valleys is considered different to

Mulga on hillslopes, riparian vegetation on clay floodplains is considered different to the same species occurring on sandy alluvial soils)

- species having previously been recorded from within approximately 50 km of the Study Area (considered as 'nearby').

The likelihood rating is assigned using the following categories:

- Does occur (i.e. has previously been recorded within the Study Area); denoted as 'Recorded'
- Almost certain: it is expected to occur within the Study Area; broadly, all of the required attributes are present in the Study Area
- Possible: it may occur within the Study Area; two or three of the required attributes (including records from nearby) are present in the Study Area
- Unlikely: it could occur but is not expected; one- three of the required attributes are present in the Study Area but it is not known from nearby (in the case of three attributes, it is not known from within 100 km)
- Almost none: no attributes other than having been recorded nearby or one or two attributes but not known from within 100 km
- None (Rare): the species characteristics include none of the required attributes of soil, landform, associated vegetation and having previously been recorded nearby, and as such it almost certainly does not occur within the Study Area.

3.1.3 VEGETATION SIGNIFICANCE BASED ON LAND SYSTEMS

Land systems, which are derived from a combination topography, soils and vegetation (Van Vreeswyk *et al.* 2004) provide a method of assessing regional significance. Vegetation associated with poorly represented land systems or where a significant proportion of the land system will be impacted can be considered to have regional significance.

Representation of land systems was assessed to determine regional significance.

3.1.4 VEGETATION SIGNIFICANCE BASED ON PRE-EUROPEAN VEGETATION ASSOCIATIONS

Pre-European vegetation mapping (Shepherd *et al.* 2002) also provides a regional perspective, and can provide an indication of regional significance.

Representation of pre-European vegetation associations was assessed to determine regional significance.

3.1.5 GROUNDWATER DEPENDENT VEGETATION

Both *Eucalyptus camaldulensis* subsp*. refulgens* and *E. victrix* are considered to be potentially at least partly dependent on groundwater (Eamus et al. 2006; 2009a; Froend 2009; Maunsell Australia Pty Ltd 2006; Resource and Environmental Management Pty Ltd 2007). Presence of either of these species, but particularly *Eucalyptus camaldulensis* subsp. *refulgens* (Eamus *et al.* 2006), in vegetation is considered to potentially indicate a GDE.

Eucalyptus camaldulensis subsp*. refulgens* and *E. victrix* are characteristic of riparian (drainage line, creekline) vegetation. *Eucalyptus camaldulensis* subsp*. refulgens* was not recorded in areas close to the Study Area during the Ecoscape (2012) survey of the original alignment, however it cannot be discounted from occurring within the Study Area.

Eucalyptus victrix is known to occur along Kalgan Creek, and will also occur in the Study Area where it intersects with Kalgan Creek.

Vegetation was assessed as to its likelihood of being considered a GDE.

3.1.6 OTHER REASONS FLORA AND VEGETATION MAY BE SIGNIFICANT

Reasons why flora (species, subspecies, varieties, hybrids and ecotypes) may be significant, other than as TF or PF, are listed in *Guidance Statement No. 51* (EPA 2004). Those listed are:

- a keystone role in a particular habitat for threatened species, or supporting large populations representing a significant proportion of the local regional population of a species
- relic status
- anomalous features that indicate a potential new discovery
- being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
- the presence of restricted subspecies, varieties, or naturally occurring hybrids
- local endemism/restricted distribution
- being poorly reserved.

Reasons that vegetation may be significant, in addition to its listing as a TEC or PEC or because the extent is below a minimum threshold, are listed in *Guidance Statement No. 51* (EPA 2004). These reasons, which may apply at a number of scales but are not defined in detail, include:

- scarcity
- unusual species
- novel combinations of species
- role as a refuge
- role as a key habitat for threatened species or large populations representing a significant proportion of the local to regional total population of a species
- being representative of the range of a unit (particularly a good local and/or regional example of a unit in 'prime' habitat, at the extremes of range, recently discovered range extension or isolated outliers of the main range)
- restricted distribution.

Vegetation displaying any of the above attributes can be considered to be 'locally significant', and are detailed in the assessment.

'Ecosystems at Risk' were identified by regional ecologists and others as part of the then Department of Conservation and Land Management's (CALM, now DEC) *Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002* (CALM 2002).

'Ecosystems at Risk' vegetation identified from the Fortescue Plains (PIL2) and Hamersley (PIL3) subregions of the Pilbara bioregion that may occur in or near the Study Area include:

- Grove-intergrove mulga communities at Southern end of Northern apron of Hamersley Range, threatened by grazing, feral animals and altered fire regimes
- 'Grove/inter-grove mulga, eastern Hamersley Range' ecosystem, threatened by grazing, weeds and hydrological change
- 'Valley floor mulga' ecosystem, threatened by grazing, weeds, fire and hydrological change
- 'Lower-slope mulga' ecosystem, threatened by fire
- 'Hill-top floras, Hamersley Range' ecosystem, threatened by fire
- 'All major ephemeral water courses' ecosystem, threatened by grazing and weeds.

There are no 'Ecosystems at Risk' in the Augustus (GAS3) subregion of the Gascoyne bioregion that are likely to occur in or near the Study Area (CALM 2002).

Vegetation in the Study Area was assessed to determine if it represents any of the above ecosystems.

3.2 Fauna and Habitat

3.2.1 TARGET FAUNA SPECIES

The database searches undertaken as part of the desktop study indicate the potential presence of 10 conservation significant fauna species (*EPBC* and *WC Act* Endangered or Vulnerable) in the Study Area:

- Night Parrot
- Princess Parrot
- Northern Quoll
- Greater Bilby
- Black-flanked Rock-wallaby
- Pilbara Leaf-nosed Bat
- Pilbara Olive Python
- Northern Marsupial Mole
- Crest-tailed Mulgara
- Great Desert Skink

In addition fifteen DEC Priority species, 16 EPBC Migratory species, one Specially Protected (*WC Act* Schedule 4), and two undescribed Planigales considered as of at least local conservation significance (**Table 7** - **Table 9**) were identified through NatureMap and previous survey reports. An objective of

this report is to assess the likelihood of these species or their habitats currently occurring in the Study Area, and to what extent they may be impacted by the proposed clearing activity.

3.2.2 HABITAT ASSESSMENT

Components of 'habitat type' that affect whether a particular vertebrate species is likely to be present at a site include (among others) topography, rock type, soil type, vegetation structure, presence/absence of particular plant taxa or size/age classes, and waterbodies. Information on these features of habitats within and adjacent to the Study Area is here based on description and mapping of Land Systems (**Table 2**, **Map 1**). Assessment of vegetation type and condition, level of disturbance, and other specific features based on surveys of adjacent and overlapping areas (**Section 1.4**) and overhead imagery, are also considered.

3.2.3 INTERPRETATION OF SPECIES LISTS

Species lists generated from the desktop review are generous as they include records drawn from a large region and possibly from environments not represented in the Study Area. Some species have been excluded because no suitable habitat exists within the Study Area. The remaining species returned by the desktop review process are expected in the Study Area whether or not they have been positively recorded, as suitable habitat exists.

Interpretation of species lists generated through the desktop review included assigning an expected status within the project area to species of conservation significance. This is particularly important for birds that may naturally be migratory or nomadic, and for some mammals that can also be mobile or irruptive. The status categories used are:

- Resident: species with a population permanently present in the project area;
- Regular migrant or visitor: species that occur within the project area regularly in at least moderate numbers, such as part of annual cycle;
- Irregular Visitor: species that occur within the project area irregularly such as nomadic and irruptive species. The length of time between visitations could be decades but when the species is present, it uses the project area in at least moderate numbers and for some time;
- Vagrant: species that occur within the project area unpredictably, in small numbers and/or for very brief periods. Therefore, the project area is unlikely to be of important for the species; and
- Locally extinct: species that has not been recently recorded in the local area and therefore is almost certainly no longer present in the project area.

4.0 Results

4.1 Flora and Vegetation

The results of the desktop investigation aspects listed in Section 3.1 are detailed below.

4.1.1 LITERATURE REVIEW

The documents listed in **Table 18** provided general information on flora and vegetation attributes that have been considered of significance. The common themes are that the following broad vegetation types are considered of significance:

- riparian (creekline) vegetation, that may considered to represent groundwater dependent ecosystems
- vegetation providing habitat for conservation significant flora
- Mulga dominated vegetation, particularly sheet flow dependent formations.

No vegetation considered similar to any known TECs or PECs was reported from any nearby areas. Whilst the southern portion of the Study Area corresponds with an *endangered* TEC ('Ethel Gorge aquifer stygobiont community'), it is not a vegetation type, rather a community of stygofauna (animals) that inhabit groundwater aquifers.

Of significance, the EPA report and recommendations for the nearby Jimblebar Iron Ore Mine (EPA 2010) considers all vegetation occurring in the Jimblebar project area to be well represented locally and regionally, including Mulga vegetation. Broadly, based on the Ecoscape (2012) survey and vegetation descriptions in Outback Ecology Services (2009), the vegetation in the Jimblebar project area is considered similar to that occurring in the southern portion of the Study Area (Section B), and as such the same degree of representation can be applied to both areas.

Riparian Vegetation

Also of significance in the same report (EPA 2010), the creekline vegetation at Jimblebar is not considered to be groundwater dependent due to depth to the watertable.

However, riparian vegetation is frequently considered to be habitat for conservation significant flora species; 35 of the 96 conservation significant flora identified by the DEC database search or during the Ecoscape (2012) survey are known from soils or landforms associated with riparian areas (e.g. creeks, gorges, gullies, floodplains) or are known to occur with are riparian species (e.g. *Eucalyptus camaldulensis* or *E. victrix*).

Riparian vegetation does occur within the Study Area. The Study Area crosses Kalgan Creek and another unnamed drainage line and is, in places, in close proximity to the Fortescue River.

Without a field survey it is not possible to know if or where conservation significant flora actually occur within the Study Area.

Mulga Vegetation

Mulga vegetation does occur within the Study Area, as it occurs sporadically in the surveyed alignment north of Kalgan Creek (Ecoscape 2012).

The EPA report and recommendations for the nearby Jimblebar Iron Ore Mine (EPA 2010) considers the similar Mulga vegetation to be well represented both locally and regionally.

4.1.2 CONSERVATION SIGNIFICANT FLORA RISK ASSESSMENT

The conservation significant flora risk assessment is included in **Table 19**, **Appendix Six**.

The conservation significant flora considered most likely to occur within or near the Study Area (assessed as 'almost certain') are:

- *Brachyscome* sp. Wanna Munna Flats (S. van Leeuwen 4662) (P1)
- *Helichrysum oligochaetum* (P1)
- *Amaranthus centralis* (P3)
- *Eremophila rigida* (P3)
- *Gymnanthera cunninghamii* (P3)
- *Rhagodia* sp. Hamersley (M. Trudgen 17794) (P3); this species was recorded during the Ecoscape (2012) survey and Ecoscape is in agreement with the assessment that it is 'almost certain' to occur in the Study Area
- *Eremophila youngii* subsp. *lepidota* (P4); this species was recorded during the Ecoscape (2012) survey, however Ecoscape considers it unlikely that it will occur in the Study Area. The surrounding habitat was very specific (semi-saline soil with *Triodia longiceps*) and was not observed elsewhere along the road adjacent to the Study Area
- *Goodenia nuda* (P4); this species was most likely recorded during the Ecoscape (2012) survey (the finding is tentative due to the poor quality of the collected specimen). It occurs sporadically throughout the Pilbara and is likely to occur sporadically within the Study Area.

The next most likely conservation significant flora to occur within or near the Study Area (assessed as 'possible') are:

- *Lepidium catapycnon* (TF)
- *Aristida jerichoensis* var. s*ubspinulifera* (P1)
- *Brunonia* sp. Long hairs (D.E. Symon 2440) (P1)
- *Calotis squamigera* (P1)

- *Eremophila pilosa* (P1); this species was recorded during the Ecoscape (2012) survey, however Ecoscape considers it unlikely to occur within the Study Area as its occurrence was very localised
- *Eremophila* sp. Hamersley Range (K. Walker KW 136) PN (P1)
- *Stemodia* sp. Battle Hill (A.L. Payne 1006) (P1)
- *Isotropis parviflora* (P2)
- *Crotalaria smithiana* (P3)
- *Indigofera gilesii* subsp. *gilesii* (P3)
- *Iotasperma sessilifolium* (P3)
- *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (P3); only one patch of this species was recorded during the Ecoscape (2012) survey, and whilst it may occur in or near the Study Area, Ecoscape considers it unlikely to occur within impact areas
- *Eremophila magnifica* subsp. *magnifica* (P4).

Priority 3 and 4 taxa are rarely considered of concern to regulatory authorities as they are considered poorly known but not currently threatened (**Table 13**).

TF, P1 and P2 are considered to be threatened with P1 and P2 taxa poorly known but with none or few populations in lands reserved for conservation, **Table 13**. These categories of taxa are of most concern for conservation. Ministerial approval is required to remove TF taxa under the *WC Act* (1950). The DEC apply a 50 m clearing buffer around any TF individuals to prevent damage or accidental destruction. Of late, the DEC has been applying a 20 m clearing buffer around P1 and P2 taxa.

It is worth noting that, although the above taxa were considered 'almost certain' and 'possible' to occur within or near the Study Area, there is no certainty that they do occur.

A discussion of each TF, P1 and P2 species considered most likely to occur within or near the Study Area is given below.

***Lepidium catapycnon* (TF)**

Lepidium catapycnon is a short-lived perennial herb that is listed as *Vulnerable* under the *EPBC Act* (1999) and as *Rare* (now known as Threatened Flora) under the Western Australian *WC Act* (1950). According to the document *Approved Conservation Advice for: Lepidium catapycnon (Hamersley Lepidium)* (DSEWPaC 2008), there were 23 known populations of this species in 2008. It grows in skeletal soils on hillsides, and is associated with *Eucalyptus leucophloia* and *Acacia* species. It is known to occur within 10 km of the Study Area.

As the Study Area is adjacent to two major roads in the area surrounding Newman, the Study Area is unlikely to be associated with hills and it is highly unlikely that this species will be encountered.

***Aristida jerichoensis* var. *subspinulifera* (P1)**

Aristida jerichoensis var. *subspinulifera* is a perennial tussock grass that occurs on clay plains (WAH 1998-). Review of the specimen data for this species (WAH & DEC 2012) indicates it is associated with other species that are strictly associated with heavy clay soils or clay creek banks. The closest record to the Study Area is over 20 km to the east. As there are no heavy clay plains within the Study Area, and little intersection with creek banks, it is highly unlikely that that species will be encountered.

***Brachyscome* sp. Wanna Munna Flats (S. van Leeuwen 4662) (P1)**

Brachyscome sp. Wanna Munna Flats is an annual herb also associated with clay soils, however review of location data on NatureMap (DEC 2007-) indicates that the species is more likely to be associated with valleys within hills, rather than broad-scale clay plains. The species it is associated with (WAH & DEC 2012) are common along the Study Area.

As this species is known from within 5 km of Newman (DEC 2007-) and the landform and associated vegetation are likely to occur within the Study Area, Ecoscape considers there is potential for this species to occur in the Study Area.

***Brunonia* sp. Long hairs (D.E. Symon 2440) (P1)**

Brunonia sp. Long hairs is an annual herb associated with drainage lines and flood plains (WAH & DEC 2012). All records of this species are from within the Hamersley and Opthalmia Ranges, west of the Study Area and at least 30 km distant (DEC 2007-). There is little information available on this species. The only specimen record that indicates associated vegetation includes *Eucalyptus xerothermica*, which was not recorded during the August 2012 survey of the nearby alignment. There are records of *Eucalyptus xerothermica* from the vicinity (DEC 2007-).

This species is currently known only from west of Newman, therefore west of the Study Area and from within the Hamersley and Opthalmia Ranges that the Study Area intersections only slightly. Ecoscape considers it unlikely that *Brunonia* sp. Long hairs occurs within the Study Area.

***Calotis squamigera* (P1)**

Calotis squamigera is an annual herb; both records on FloraBase (WAH & DEC 2012) indicate it has been recorded from Mulga vegetation on floodplains. The nearest record is more than 70 km from the Study Area (near Christmas Creek on the Fortescue Floodplain (DEC 2007-)), thus Ecoscape considers it unlikely that *Calotis squamigera* will actually occur within the Study Area.

***Eremophila pilosa* (P1)**

Eremophila pilosa was recorded during the Ecoscape (2012) survey, however Ecoscape considers it unlikely to occur within the Study Area as its occurrence was very localised.

***Eremophila* sp. Hamersley Range (K. Walker KW 136) (P1)**

Eremophila sp. Hamersley Range is an erect shrub that is known to occur on hilltops, cliffs and gorges (WAH & DEC 2012), none of which occur within the Study Area. Therefore Ecoscape considers it highly unlikely to occur within the Study Area.

***Helichrysum oligochaetum* (P1)**

Helichrysum oligochaetum is an annual herb that is associated with clay soil on alluvial plains (WAH 1998-). The nearest record to the Study Area is from the Fortescue River floodplain, although it is also known from the smaller drainage lines in the Hamersley Range, west of the Study Area (DEC 2007-).

As the nearest record from landforms similar to those that are likely to be encountered within the Study Area is more than 250 km distant (DEC 2007-), Ecoscape considers it highly unlikely to actually occur within the Study Area.

***Stemodia* sp. Battle Hill (A.L. Payne 1006) (P1)**

Stemodia sp. Battle Hill is a low shrub known from two FloraBase records from the Fortescue River floodplain (WAH & DEC 2012). As this landform does not correspond with the Study Area, Ecoscape considers it highly unlikely to actually occur within the Study Area.

***Isotropis parviflora* (P2)**

Isotropis parviflora is a shrub that has two records from lower slopes in the Hamersley Range (WAH & DEC 2012) but has a wide distribution across much of northern Australia (Atlas of Living Australia 2012). The Study Area only intersects with the associated landform in a very small extent, and as the nearest record is more than 30 km distant, Ecoscape considers it highly unlikely to actually occur within the Study Area.

4.1.2.1 Conservation Significant Flora Risk Assessment Summary

Following a broad conservation significant flora risk assessment followed by more detailed analysis of species considered most likely to occur within the Study Area, Ecoscape considers *Brachyscome* sp. Wanna Munna Flats (S. van Leeuwen 4662) (P1) to be the only species likely to actually occur within the Study Area.

Brachyscome sp. Wanna Munna Flats occurs within the Hamersley and Opthalmia Ranges. There are 12 NatureMap records of this species and it has a known distribution spanning approximately 380 km from west to east (DEC 2007-). Although there are no NatureMap records from within any DEC managed lands, the wide distribution suggests it is most likely sparsely distributed across its known range and thus is likely to occur within DEC managed lands.

As it is likely to be only sparsely distributed, the probability of actually disturbing any individuals of this species is low, and as this species has a wide distribution any impacts on the species as a whole are likely to be insignificant.

4.1.3 VEGETATION SIGNIFICANCE BASED ON LAND SYSTEMS

The Study Area intersects with eight land systems. Data on the extents and representation of these land systems within the Pilbara are available (Payne 2004) however comparative data is not available for the Gascoyne bioregion.

Table 3 shows that the proportion of all Pilbara land systems within the proposed alignment is less than 0.1% of each entire land system. Even if the entire alignment were cleared, impacts on any vegetation associated with the land system would be insignificant.

The least represented land system (Elimunna, occupying 0.3% of the Pilbara bioregion (Payne 2004)), occurs in both the Pilbara and Gascoyne bioregion. The data in **Table 3** indicates approximately 101 ha of this land system is within the Study Area, which is only 0.016% of the entire land system.

4.1.4 VEGETATION SIGNIFICANCE BASED ON PRE-EUROPEAN VEGETATION ASSOCIATIONS

The Study Area intersects with five pre-European vegetation associations in the Pilbara bioregion (**Table 5**), two of which it also intersects with in the Gascoyne bioregion (**Table 6**). Two of the vegetation associations occupy over one million hectares within the Pilbara bioregion (vegetation associations 29 and 82, both of which also occur in the Gascoyne bioregion), and two occupy over 500,000 ha (vegetation associations 18 and 111). The least represented vegetation association 216, occupying 26,670 ha within the Pilbara bioregion.

The Study Area intersects pre-European vegetation association 216 by 10 ha, the equivalent of 0.04% of the total current extent.

4.1.5 GROUNDWATER DEPENDENT VEGETATION

Of significance in the EPA Jimblebar report and recommendations (EPA 2010), the creekline vegetation at Jimblebar is not considered to be groundwater dependent due to depth to the watertable. Whilst no specific flora and vegetation survey report for Jimblebar has been sighted, the terrestrial fauna report (Outback Ecology Services 2009) lists riparian vegetation as including *Eucalyptus victrix*.

Riparian, potential groundwater dependent (GDE) vegetation dominated by one or both of *Eucalyptus camaldulensis* subsp. *refulgens* and/or *E. victrix* is known to occur along the Fortescue River and tributaries within and close to the Study Area (observed during the Ecoscape (2012) field survey, **Plate 1**).

Plate 1: Riparian vegetation (background, behind railway) at Jimblebar Junction

4.1.6 OTHER REASONS FLORA AND VEGETATION MAY BE SIGNIFICANT

Reasons why flora or vegetation may be listed as being significant in *Guidance Statement No. 51* (EPA 2004) can only be interpreted following field surveys (e.g. range extensions of species or vegetation). It is therefore not possible to clearly identify other reasons, as listed in *Guidance Statement No. 51*, that flora or vegetation may be significant at this stage.

However, it is Ecoscape's opinion that, unless flora is already listed as TF or PF, it is unlikely to be significant within the Study Area.

The nearby Ecoscape (2012) survey of the original alignment indicates that the vegetation of the Study Area is also unlikely to be significant. This view is reflected in the EPA (2010) report and recommendations for the nearby Jimblebar Iron Ore Mine in which all vegetation occurring in the Jimblebar project area is considered well represented locally and regionally.

'Ecosystems at Risk' listed in the *Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002* (CALM 2002) that may occur within the Study Area are 'grove- intergrove Mulga', 'valley floor Mulga' and, perhaps, 'all major ephemeral water courses' as part of the Study Area runs alongside the Fortescue River.

The EPA (2010) considers the Mulga vegetation of the nearby Jimblebar Iron Ore Mine to be well represented locally and regionally. There is no reason to consider that the Mulga occurring within the Study Area would be any more significant than that occurring nearby.

4.2 Fauna and Habitat

4.2.1 HABITAT TYPES

As in the survey report (Ecoscape 2012), the habitat types of the Study Area are represented by Land Systems as described and mapped by Van Vreeswyk *et al* (2004). Brief descriptions of land systems and their extents within the Study Area are provided in **Table 2** and **Table 3** (**Section 2.1.3**). Recognition of a smaller number of habitat types (e.g. by 'lumping' of land systems) would obscure differences relevant to the known requirements or associations of at least some of the conservation significant fauna species.

Approximately one third (32%) of the Study Area lies within the Divide Land System (aeolian sandplain with Spinifex and scattered shrubs), with 24% in Elimunna LS (stony plains and low hills with shrubland and tussock grass), 21% River LS (channels and terraces of sand and cobbles with riparian eucalypt woodland, flanked by sandy floodplains with open to sparse eucalypt woodland and shrubland over tussock grass), 12% Fan LS (hardpan clay and sandy loam with mulga groves and tussock grass), and 12% comprising relatively small, discontinuous areas of Newman, Rocklea, McKay and Boolgeeda LS (ironstone and basalt hills and slopes with Spinifex).

5.0 Discussion and Conclusion

5.1 Flora and Vegetation

Ecoscape has conducted a desktop assessment, followed by a risk assessment to determine the likelihood of significant flora and vegetation occurring within the Study Area.

The desktop assessment was conducted using a nominal 200 m wide corridor with the proposed Study Area as the centreline. The corridor width is nominal only and used as a guide to determine intersects. Ecoscape understands that up to 5% of the Study Area may be cleared by Alinta Energy in order to enable investigation and construction activities.

It is also possible that the proposed Study Area, as used in this report, may change however the results will still be applicable, even if the alignment alters by up to 1 km (although an additional pre-European vegetation association, 157, that was not included in this assessment may be impacted).

The desktop assessment and subsequent risk assessment has identified the following in terms of potential for significant flora and vegetation to be impacted by potential clearing within the Study Area.

1. The literature review identified that other Pilbara flora and vegetation reports have considered riparian vegetation, Mulga and vegetation providing habitat for TF and PF to be significant, all of which may occur within the Study Area.
2. The conservation significant flora risk assessment determined that eight species were considered 'almost certain' to occur within the Study Area and 13 species considered as 'possible' to occur within the Study Area. Of these, only TF, P1 and P2 species (total of 10) were considered as significant. A more detailed risk assessment was conducted of these, looking at detailed habitat and associated vegetation from known populations to potential to occur. Only one species, *Brachyscome* sp. Wanna Munna Flats (S. van Leeuwen 4662) (P1) remained following this process. This species has a wide distribution of approximately 380 km. Therefore, if the species occurs within the alignment and is impacted by clearing, it is unlikely to be a significant impact on the population as a whole.
3. No vegetation that is considered to represent a TEC or PEC is likely to occur within the Study Area, although it does correspond with the administrative buffers (ESA) of a subterranean TEC, 'Ethel Gorge aquifer stygobiont community'.
4. Riparian vegetation is considered significant as it may be groundwater dependent and habitat for conservation significant flora. The EPA (2010) considers the riparian vegetation at nearby Jimblebar to be not groundwater dependent due to depth to watertable. There is little intersection between the proposed Study Area and riparian vegetation (i.e. the alignment runs

parallel to the Fortescue River but not within it, and crosses only one significant creek, Kalgan Creek).

5. Mulga vegetation has been considered as significant in other surveys and in the *Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002* (CALM 2002), however the EPA report and recommendations for the nearby Jimblebar Iron Ore Mine (EPA 2010) considers that similar Mulga vegetation is well represented locally and regionally.
6. Using land system as a method to assess regional significance of vegetation, only one land system (Elimmuna) is considered to be poorly represented. The Study Area covers 0.016% of this land system's total Pilbara bioregion extent.
7. Using pre-European vegetation as a method to assess regional significance of vegetation, only one vegetation association is represented by less than 500,000 ha (vegetation association 216). The Study Area covers 0.04% of this pre-European vegetation association.

Ecoscape understands that up to 5% of the Study Area may be subject to vegetation clearing to enable Alinta Energy to undertake project and construction activities. Should clearing of this scale occur, Ecoscape does not anticipate any significant impacts on conservation significant flora and vegetation. Disturbance on the same scale along a slightly different route would be expected to have the same, negligible impact.

5.2 Fauna

5.2.1 INTERPRETATION OF SPECIES LISTS

Species lists generated from the desktop review are generous as they include records drawn from a large region and possibly from environments not represented in the Study Area. Therefore, some species that were returned by one or more of the data searches have been excluded because their ecology, combined with the habitats within the Study Area, make it highly unlikely that these species would be present.

Interpretation of species lists generated through the desktop review included assigning an expected status within the project area to species of conservation significance. This is particularly important for birds that may naturally be migratory or nomadic, and for some mammals that can also be mobile or irruptive. The status categories used are:

- Resident: species with a population permanently present in the project area;
- Regular migrant or visitor: species that occur within the project area regularly in at least moderate numbers, such as part of annual cycle;
- Irregular Visitor: species that occur within the project area irregularly such as nomadic and irruptive species. The length of time between visitations could be decades but when the species is present, it uses the project area in at least moderate numbers and for some time;

- Vagrant: species that occur within the project area unpredictably, in small numbers and/or for very brief periods. Therefore, the project area is unlikely to be of important for the species; and
- Locally extinct: species that has not been recently recorded in the local area and therefore is almost certainly no longer present in the project area.

Table 10 gives brief summaries of habitat requirements, inferred occupancy status and estimate of maximum likely impact of proposed clearing for species listed in **Table 7-Table 9**. Categories of impact used are *negligible* (no decline in local population likely) and *minor* (short-term local decline possible, no long-term effects on viability). The Table is based on more detailed species profiles provided in **Appendix Twelve**.

5.2.2 OCCURRENCE OF CONSERVATION SIGNIFICANT SPECIES IN RELATION TO LAND SYSTEMS

Table 11 is based on the attributes of species listed in the preceding section and those of the Land Systems intersecting the Study Area. The Table indicates known (+) or predicted potential occurrence (p) of species in each Land System.

Including records from the field survey, previous reports, NatureMap records and interpretation of habitat requirements, the vertebrate fauna considered to potentially occur within the Study Area includes six species of fish, 13 frogs, 53 mammals, 122 reptiles, and 191 birds (**Appendix Four**, **Table 17**). The fauna species actually recorded represent 17% of the mammals, 5% of the reptiles and 22% of the birds that could potentially occur.

Table 10: Summary of habitat, occupancy status and potential impact on conservation significant fauna of clearing up to 5% of the Study Area

Family	Species	Common Name	EPBC Act status	WC Act status	DEC status	DEC Threatened fauna database	EPBC Act PMST	Preferred habitat	Occupancy status	Potential Impacts
MAMMALS										
Thylacomyidae	*Macrotis lagotis*	Greater Bilby	VU	S 1	V U		K	Sandy desert, cracking clay and shrubland	Inferred to be locally extinct	None
Dasyuridae	*Dasycercus cristicauda*	Crest-tailed Mulgara	VU	S 1	VU		L	Sanplains and dunefileds	One or both species recorded	Minor impact to population
	Dasycercus blythi	Brush-tailed Mulgara			P 4	2		Sandplains and gibber plains		
	Dasyurus hallucatus	Northern Quoll	E N	S 1	EN	2	L	Gorges, riparian woodland, breakaways, boulder piles	Occasional visitor, potential; for future establishment	No impact to population, minor impact to habitat
	Sminthopsis longicaudata	Long-tailed Dunnart			P 4	2		Rocky scree and plateaux	Likely resident or irruptive visitor	Negligible
Notoryctidae	*Notoryctes caurinus*	Northern Marsupial Mole	E N	S 1	EN		-	Dunefields with shrubs and spinifex	Outside known or likely range	None
Macropodidae	*Lagorchestes conspicillatus leichardti*	Spectacled Hare-wallaby			P 3			Woodland, shrubland, sandplain with spinifex	Locally extinct except for known remnants (Jimblebar, Nullagine)	None
	Petrogale lateralis lateralis	Black-flanked Rock-wallaby	VU	S 1	VU	4	-	Cliffs and boulder piles	Locally extinct	None
Megadermatidae	*Macroderma gigas*	Ghost Bat			P 4	3		Humid caves, riparian woodland, shrubland and grassland	Likely resident or regular visitor	Minor impact to foraging habitat, potentially to day roosts
Hipposideridae	*Rhinonicteris aurantia*	Pilbara Leaf-nosed Bat	VU	S 1	VU		L	Deep humid caves and adits, riparian woodland, rocky hills, gorges	Possible occasional visitor, unlikely to be resident	Minor to negligible impact to foraging habitat only

Family	Species	Common Name	EPBC Act status	WC Act status	DEC status	DEC Threatened fauna database	EPBC Act PMST	Preferred habitat	Occupancy status	Potential Impacts
Muridae	*Leggadina lakedownensis*	Short-tailed Mouse			P 4	9		Grassland and savannah woodland	Likely resident or irruptive visitor	Negligible
	Pseudomys chapmani	Western Pebble-mound Mouse			P 4	49		Gravel slopes and hilltops with Spinifex and scattered shrubs	Likely resident	Negligible to minor impact possible
REPTILES										
Scincidae	*Ctenotus nigrilineatus*	Pinstriped Finesnout Ctenotus			P 1			Spiifex, rock outcrops	Possible resident (outside known range, likely absent)	Negligible to minor impact possible
	Ctenotus uber johnstonei (aff.)	Balgo Spotted Ctenotus			P 2	3		Chenopod and Acacia shrubland, rocky hills	Likely resident	Negligible to minor impact possible
	Lerista macropisthopus remota	Robust Slider			P 2	4		Acacia, mallee or Corymbia woodland with litter	Likely resident in southern part	Negligible to minor impact possible
Typhlopidae	*Ramphotyphlops ganei*	Pilbara Blindsnake			P 1	12		Gorges in rocky hills, floodplain, spinifex	Likely resident	Negligible to minor impact possible
Pythonidae	*Liasis olivaceus barroni*	Pilbara Olive Python	VU	S 1	VU	3	M	Rocky hills and gorges near waterholes	Possible resident (near edge of range, likely absent)	Negligible to minor impact possible
BIRDS										
Apodidae	*Apus pacificus*	Fork-tailed Swift	M	S 3			M	Aerial, all habitats	Likely regular visitor, non-breeding	None
Ardeidae	*Ardea modesta*	Eastern Great Egret	M	S 3			M	Permanent and temporary wetlands	Likely occasional visitor, non-breeding	Negligible to minor impact possible
	Ardea ibis	Cattle Egret	M	S 3			M	Permanent and temporary wetlands, pasture	Likely occasional visitor	Negligible to minor impact possible

Family	Species	Common Name	EPBC Act status	WC Act status	DEC status	DEC Threatened fauna database	EPBC Act PMST	Preferred habitat	Occupancy status	Potential Impacts
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-eagle	M	S 3			-	Large watercourses	Occasional visitor, non-breeding	Negligible to minor impact possible (riparian woodland)
Falconidae	*Falco hypoleucos*	Grey Falcon			P 4	3		Open woodland, shrublands and grasslands, nests in eucalypts near watercourses	Likely resident, possibly breeding	Negligible to minor impact possible (riparian woodland)
	Falco peregrinus	Peregrine Falcon		S 4	S	9		Rocky hills, open woodland, margins of grassland, nests on cliffs or large eucalypts	Likely resident, possibly breeding	Negligible to minor impact possible (riparian woodland)
Otididae	*Ardeotis australis*	Australian Bustard			P 4	68		Grassland, open woodland and shrubland	Resident	Negligible impact (minor if breeding)
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew			P 4	7		Open woodland with grass and fallen wood	Resident	Negligible impact (minor if breeding)
Charadriidae	*Charadrius veredus*	Oriental Plover	M	S 3			M	Short grassland, saltmarsh	Occasional visitor	Negligible
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	M	S 3			-	Permanent and temporary wetlands, saltmarsh	Occasional visitors	Negligible
	Tringa nebularia	Common Greenshank	M	S 3			-			
	Tringa stagnatilis	Marsh Sandpiper	M	S 3			-			
	Tringa glareola	Wood Sandpiper	M	S 3			-			
	Calidris ruficollis	Red-necked Stint	M	S 3			-			
	Calidris subminuta	Long-toed Stint	M	S 3			-			
	Calidris melanotos	Pectoral Sandpiper	M	S 3			-			
	Calidris acuminata	Sharp-tailed Sandpiper	M	S 3			-			

Family	Species	Common Name	EPBC Act status	WC Act status	DEC status	DEC Threatened fauna database	EPBC Act PMST	Preferred habitat	Occupancy status	Potential Impacts
	Calidris ferruginea	Curlew Sandpiper	M	S 3			-			
Psittacidae	*Polytelis alexandrae*	Princess Parrot	VU		P 4		M	Sandplains with open savannah woodland	Possible occasional visitor	None
	Pezoporus occidentalis	Night Parrot	E N	S 1	CR	1	L	Chenopod shrubland, Spinifex, proximity to water	Occasional visitor or sparse resident	Negligible
Meropidae	*Merops ornatus*	Rainbow Bee-eater	M	S 3			M	Open woodlands, sandy areas near watercourses	Likely resident	Negligible
Pachycephalidae	*Oreoica g. gutturalis*	Cr. Bellbird (southern)			P 4	2		Shrublands, low woodland, heath, grasslands	Absent (northern subspecies is likely resident)	None
Estrildidae	*Neochmia ruficauda subclarescens*	Star Finch (western)			P 4			Grassland near watercourses	Likely resident	Negligible

Table 11: Possible or confirmed occurrence of conservation significant fauna species in land systems intersected by the Study Area

Symbols: - unlikely to occur, p possibly (or probably) occurs, + recorded in August 2012 survey (Ecoscape 2012), * one of two species recorded based on distinctive burrows, but not distinguishable from each other.

Family	Species	Common Name	NEW LS	BGD LS	ROC LS	MCK LS	ELI LS	RIV LS	FAN LS	DIV LS
MAMMALS										
Thylacomyidae	*Macrotis lagotis*	Greater Bilby	-	-	-	-	p	-	p	p
Dasyuridae	*Dasycercus cristicauda*	Crest-tailed Mulgara	-	p	-	-	-	-	p	P*
	Dasycercus blythi	Brush-tailed Mulgara	-	p	-	-	-	-	p	P*
	Dasyurus hallucatus	Northern Quoll	p	-	p	p	-	p	-	-
	Sminthopsis longicaudata	Long-tailed Dunnart	p	p	p	p	-	-	-	-
Macropodidae	*Lagorchestes conspicillatus leichardti*	Spectacled Hare-wallaby	-	-	-	-	-	-	-	-
	Petrogale lateralis lateralis	Black-flanked Rock-wallaby	-	-	-	-	-	-	-	-
Megadermatidae	*Macroderma gigas*	Ghost Bat	p	p	p		-	p	-	-
Hipposideridae	*Rhinonicteris aurantia*	Pilbara Leaf-nosed Bat	-	-	-		-	-	-	-
Muridae	*Leggadina lakedownensis*	Short-tailed Mouse	-	-	-		p	p	p	p
	Pseudomys chapmani	Western Pebble-mound Mouse	p	p	p		-	-	-	-
REPTILES										
Scincidae	*Ctenotus nigrilineatus*	Pinstriped Finesnout Ctenotus	p	p	p		p	-	p	p
	Ctenotus uber johnstonei (aff.)	Balgo Spotted Ctenotus	p	p	p		p	-	p	-
	Lerista macropisthopus remota	Robust Slider	-	-	-		p	-	p	-
Typhlopidae	*Ramphotyphlops ganei*	Pilbara Blindsnake	p	-	p		-	p	-	p
Pythonidae	*Liasis olivaceus barroni*	Pilbara Olive Python	p	-	p		-	p	-	-
BIRDS										
Apodidae	*Apus pacificus*	Fork-tailed Swift	p	p	p	p	p	p	p	p
Ardeidae	*Ardea modesta*	Eastern Great Egret	-	-	-	-	-	p	-	-
	Ardea ibis	Cattle Egret	-	-	-	-	-	p	-	-
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-eagle	-	-	-	-	-	p	-	-
Falconidae	*Falco hypoleucos*	Grey Falcon	-	-	-	-	-	p	-	-
	Falco peregrinus	Peregrine Falcon	P	-	-	-	-	p	-	-
Otididae	*Ardeotis australis*	Australian Bustard	-	-	-	-	p	+	+	+
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew	-	-	-	-	p	p	p	-
Charadriidae	*Charadrius veredus*	Oriental Plover	-	-	-	-	-	-	-	p
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	-	-	-	-	-	p	-	-
	Tringa nebularia	Common Greenshank	-	-	-	-	-	p	-	-
	Tringa stagnatilis	Marsh Sandpiper	-	-	-	-	-	p	-	-
	Tringa glareola	Wood Sandpiper	-	-	-	-	-	p	-	-
	Calidris ruficollis	Red-necked Stint	-	-	-	-	-	p	-	-

Family	Species	Common Name	NEW LS	BGD LS	ROC LS	MCK LS	ELI LS	RIV LS	FAN LS	DIV LS
	Calidris subminuta	Long-toed Stint	-	-	-	-	-	p	-	-
	Calidris melanotos	Pectoral Sandpiper	-	-	-	-	-	p	-	-
	Calidris acuminata	Sharp-tailed Sandpiper	-	-	-	-	-	p	-	-
	Calidris ferruginea	Curlew Sandpiper	-	-	-	-	-	p	-	-
Psittacidae	*Polytelis alexandrae*	Princess Parrot	-	-	-	-	-	-	-	-
	Pezoporus occidentalis	Night Parrot	-	-	-	-	-	-	p	p
Meropidae	*Merops ornatus*	Rainbow Bee-eater	p	p	p	p	p	p	p	p
Pachycephalidae	*Oreoica g. gutturalis*	Cr. Bellbird (southern)	-	-	-	-	-	-	-	-
Estrildidae	*Neochmia ruficauda subclarescens*	Star Finch (western)	-	-	-	-	-	p	-	-

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Maps

786000

806000

7440000

7420000

Ethel Creek Jigalong Road

Marble Bar Road

Great Northern Highway

KALGAN CREEK

FORTESCUE RIVER

COONINER CREEK

NEWMAN

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GDA 1994 MGA Zone 50

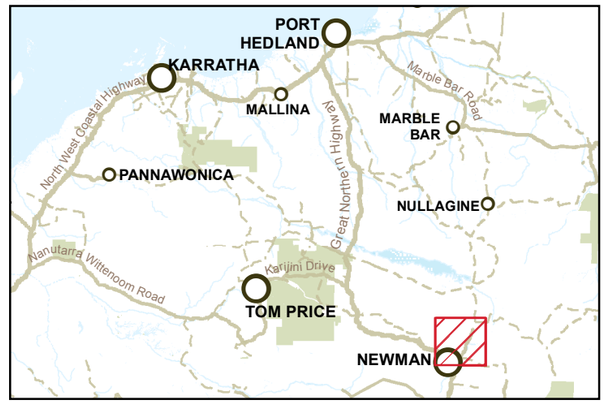
LEGEND

- Highway
- Road; sealed
- Road; unsealed
- Drainage lines
- Lakes
- Modified Southern Area (63.24 km)
- Original Study Area

Land Systems (DAFWA 2007)

- ADR - Adrian Land System
- BGD - Boolgeeda Land System
- DIV - Divide Land System
- ELI - Elimunna Land System
- FAN - Fan Land System
- FTC - Fortescue Land System
- JAM - Jamindie Land System
- MCK - McKay Land System
- NEW - Newman Land System
- PLA - Platform Land System
- RIV - River Land System
- ROB - Robe Land System
- ROC - Rocklea Land System
- SPH - Spearhole Land System
- SYL - Sylvania Land System
- WNM - Wannamunna Land System
- WSP - Washplain Land System

OVERVIEW



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NEWMAN TO ROY HILL BIOLOGICAL SURVEYS

CLIENT: ALINTA ENERGY

LAND SYSTEMS

MAP 1

SCALE 1:175,000 @ A3

0 5 10 Km

786000

806000

7440000

7420000

Fortescue Subregion

Hamersley Subregion

Augustus Subregion

Ethel Creek Jigalong Road

Marble Bar Road

Great Northern Highway

KALGAN CREEK

FORTESCUE RIVER

NEWMAN

29

111

82

18

157

166

216

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GDA 1994 MGA Zone 50

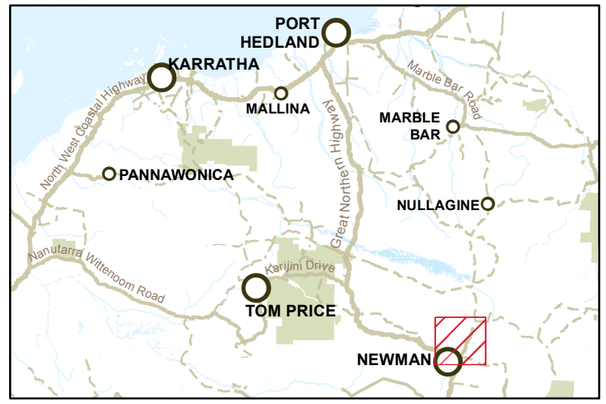
LEGEND

- Highway
- Road; sealed
- Road; unsealed
- Drainage lines
- Lakes
- Modified Southern Area (63.24 km)
- Original Study Area
- IBRA Subregions (DSEWPaC 2012)

Pre-European Vegetation (DAFWA 2006)

- 18 - Low woodland; mulga (*Acacia aneura*)
- 29 - Sparse low woodland; mulga, discontinuous in scattered groups
- 82 - Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*
- 111 - Hummock grasslands, shrub steppe; *Eucalyptus gamophylla* over hard spinifex
- 157 - Hummock grasslands, grass steppe; hard spinifex, *Triodia wiseana*
- 166 - Low woodland; mulga and *Acacia victoriae*
- 216 - Low woodland; mulga (with spinifex) on rises

OVERVIEW



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NEWMAN TO ROY HILL BIOLOGICAL SURVEYS

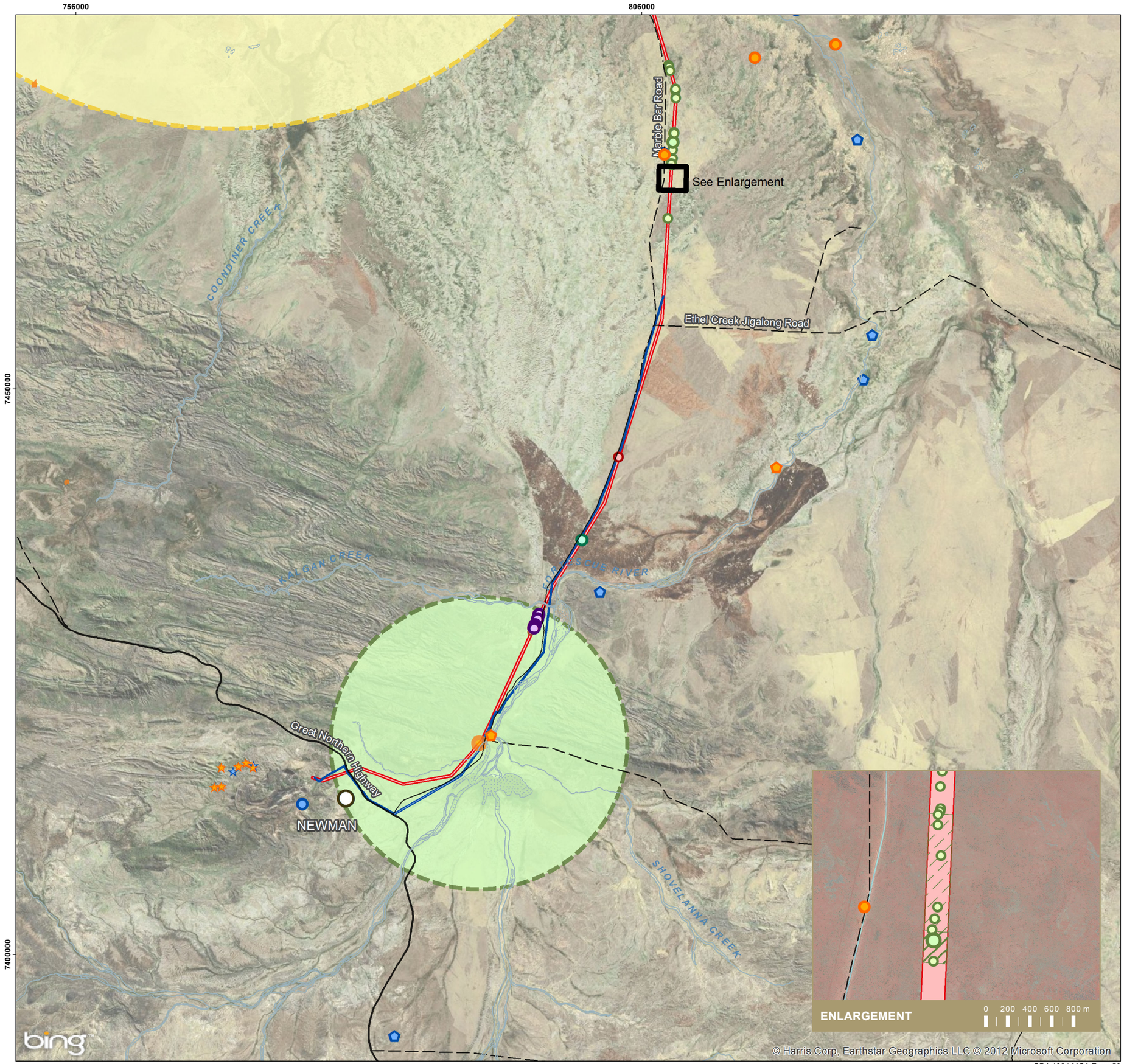
CLIENT: ALINTA ENERGY

IBRA SUBREGIONS AND VEGETATION ASSOCIATION MAPPING

MAP 2

SCALE 1:175,000 @ A3

0 5 10 Km



GDA 1994 MGA Zone 50

LEGEND

- Highway
- Road; sealed
- Road; unsealed
- Drainage lines
- Lakes
- Modified Southern Area (63.24 km)
- Original Study

DEC Threatened Flora Database

Conservation Code

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

WA Herbarium

Conservation Code

- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4

Conservation Significant Flora - Original Survey

Eremophila pilosa - P1

- less than 10 plants
- 10 to 50 plants
- greater than 50 plants
- Sparse - less than 0.5% cover
- Moderate - 0.5 to 1% cover

Eremophila youngii subsp. *lepidota* - P4

- less than 10 plants
- 10 to 50 plants

Goodenia nuda - P4

- less than 10 plants

Rhagodia sp. Hamersley - P3

- Single plant

Themeda sp. Hamersley Station - P3

- 10 to 50 plants

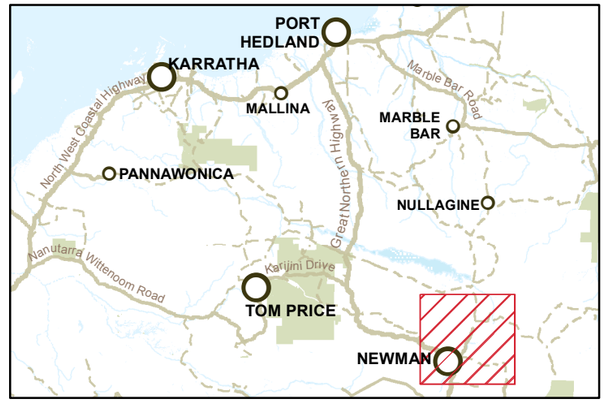
Environmentally Sensitive Areas (DEC 2010)

DEC Ecological Communities Database

Administrive Buffer

- TEC: Ethel Gorge Aquifer Stygobiont Community
- PEC: Fortescue Marsh (Marsh Land System)

OVERVIEW



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NEWMAN TO ROY HILL BIOLOGICAL SURVEYS

CLIENT: ALINTA ENERGY

SIGNIFICANT REGIONAL FLORA AND VEGETATION FEATURES

MAP 3

SCALE 1:330,000 @ A3

0 5 10 15 Km

Appendix One: Definitions and Criteria

Table 12: EPBC Act categories for flora and fauna (Commonwealth of Australia 1999)

EPBC Act Category	Definition
Extinct	A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
Extinct in the wild	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time: (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered	A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	A native species is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	A native species is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.
Conservation Dependent	A native species is eligible to be included in the conservation dependent category at a particular time if, at that time: (a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Table 13: DEC conservation codes for flora and fauna (DEC2011)

Conservation Codes for Western Australian Flora and Fauna
T: Schedule 1 under the *Wildlife Conservation Act 1950*
• **Threatened Fauna** (Fauna that is rare or is likely to become extinct) • **Threatened Flora** (Declared Rare Flora – Extant) Taxa* that have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.
X: Schedule 2 under the *Wildlife Conservation Act 1950*
• **Presumed Extinct Fauna** • **Presumed Extinct Flora** (Declared Rare Flora – Extinct) Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.
1A: Schedule 3 under the *Wildlife Conservation Act 1950*
• **Birds protected under an international agreement** Birds that are subject to an agreement between governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction.
S: Schedule 4 under the *Wildlife Conservation Act 1950*
• **Other specially protected fauna** Fauna that is in need of special protection, otherwise than for the reasons mentioned in the above schedules.
Threatened fauna and flora (Schedule 1) are further ranked by the Department according to their level of threat using IUCN Red List criteria. **CR:** Critically Endangered – considered to be facing an extremely high risk of extinction in the wild. **EN**: Endangered – considered to be facing a very high risk of extinction in the wild. **VU:** Vulnerable – considered to be facing a high risk of extinction in the wild.
Taxa that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are added to the Priority Flora and Priority Fauna Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna. Taxa that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4. These taxa require regular monitoring. Conservation Dependent species are placed in Priority 5.
1: Priority One: Poorly-known taxa
Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
2: Priority Two: Poorly-known taxa
Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
3: Priority Three: Poorly-known taxa
Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.

Conservation Codes for Western Australian Flora and Fauna
4: Priority Four: Rare, Near Threatened and other taxa in need of monitoring
(a) **Rare.** Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. (b) **Near Threatened**. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
5: Priority Five: Conservation Dependent taxa
Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxa becoming threatened within five years.

Table 14: DEC definitions and criteria for TECs and PECs (DEC 2010)

Criteria	Definition
Threatened Ecological Communities	
Presumed Totally Destroyed (PD)	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies (A or B): A. Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or B. All occurrences recorded within the last 50 years have since been destroyed
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C): A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii): i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years); ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated. B. Current distribution is limited, and one or more of the following apply (i, ii or iii): i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years); ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes; iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes. C. The ecological community exists only as highly modified occurrences that may be

Criteria	Definition
	capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C): A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii): i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years); ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated. B) Current distribution is limited, and one or more of the following apply (i, ii or iii): i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years); ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes; iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes. C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range. An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C): D) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated. E) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations. F) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.
Priority Ecological Communities	
Priority One	*Poorly known ecological communities* Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat

Criteria	Definition
	from known threatening processes across their range.
Priority Two	*Poorly known ecological communities* Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, state forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities, but do not meet adequacy of survey requirements, and / or are not well defined, and appear to be under threat from known threatening processes.
Priority Three	*Poorly known ecological communities* i. Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or; ii. Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; iii. Communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities, but do not meet adequacy of survey requirements and / or are not well defined, and known threatening processes exist that could affect them.
Priority Four	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. i. Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change These communities are usually represented on conservation lands. ii. Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. iii. Ecological communities that have been removed from the list of threatened communities during the past five years.
Priority Five	*Conservation Dependent Ecological Communities* Ecological Communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Table 15: *EPBC Act* categories for TECs (DSEWPaC 2009)

EPBC Act Category	Definition
Critically Endangered (CR)	An ecological community that is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered (EN)	An ecological community that is not critically endangered, and is facing a very high risk of extinction in the wild in the new future.
Vulnerable (VU)	An ecological community that is not critically endangered or endangered, and is facing a high risk of extinction in the medium-term future.

Appendix Two: Flora Database Search Results

Table 16: DEC database, NatureMap and DSEWPaC search results plus relevant Ecoscape (2012) results, Threatened and Priority flora for the original alignment

Species	Habit	Flowering	Landform\Soil	Vegetation Type
T				
Lepidium catapycnon	Open, woody perennial, herb or shrub, 0.2-0.3 m high, stems zigzag	Oct	Skeletal soils, hillsides	*Triodia wiseana* hummock grassland. With *Acacia bivenosa, A. inaequilatera, A. pruinocarpa, A. pyrifolia, Triodia* sp. Shovelanna Hill.
Pityrodia augustensis	Bushy shrub 1 m high. Purple/purple-red flowers	Aug-Sep	Slopes, drainage lines	*Acacia* or *Eremophila* shrubland, *Eucalyptus camaldulensis* woodland
Thryptomene wittweri	Spreading or rounded shrub, 0.5–1.5(–2.1) m high	Apr/Jul/ Aug	Skeletal red stony soils. Breakaways, stony creek beds	
P1				
Aristida jerichoensis var. *subspinulifera*	Compactly tufted perennial, grass-like or herb, 0.3-0.8 m high	-	Hardpan plains	Open *Acacia* woodland over *Triodia* and other grasses. *Acacia falcata, Triodia epactia, Eragrostis cumingii*
Bothriochloa decipens var. *cloncurrensis*	Rhizomatous, perennial, herb (fern), 0.1-0.2 m high	-	Moist, sheltered sites in gorges and on cliff walls	-
Brachyscome sp. Wanna Munna Flats (S. van Leeuwen 4662)	Herb, 15 cm high. Flowers blue	-	Flat. Red brown clay	-
Brunonia sp. Long hairs (D.E. Symon 2440)	Erect herb, to 0.07 m high, with long spreading hairs on the leaves; spike to 0.3 m high	-	Along creeklines	-
Calotis squamigera	Procumbent annual, herb, to 0.21 m high	Jul	Pebbly loam	-
Cochlospermum sp. Pilbara (D. Brassington, E. Agar & J. Macknay LCH 31756) PN	-	-	-	-
Eragrostis sp. Mt Robinson (S.van Leeuwen 4109)	Tussock-forming perennial, grass-like or herb, to 0.3 m high	Sep	Red-brown skeletal soils, ironstone. Steep slopes, summits	
Eremophila pilosa	Shrub, ca 0.8 m high. Fl purple	Sep	Shallow depression in sandplain with loamy soil	Soft spinifex hummock grassland of *Triodia pungens* with an overstorey of this mallee
Eremophila sp. Hamersley Range (K. Walker KW 136) PN	Shrub to 2 m tall, rounded crowded canopy, Flowers white-cream-yellow-pink-purple	-	Hill crest, cliff top , gorge top	-
Eremophila sp. Snowy Mountain (S. van. Leeuwen 3737)	-	-	-	-
Eremophila sp. West Angelas (S. van Leeuwen 4086)	-	-	-	-
Eremophila spongiocarpa	Compact, succulent-leaved shrub, to 1 m high	May/Sep	Weakly saline alluvial plain on margins of marsh	-
Eucalyptus lucens	Mallee, to 4.5 m high, bark smooth, white, sometimes slightly powdery; leaves glossy green	-	Ironstone rocky slopes and mountain tops, high in the landscape	-

Species	Habit	Flowering	Landform\Soil	Vegetation Type
Genus sp. Hamersley Range hilltops (S van Leeuwen 4345)	Rounded shrub, to 0.4 m high	Oct	Skeletal, brown gritty soil over ironstone. Hill summit	Growing in VOSM of *Eucalyptus leucophloia* and *E. gamophylla* over LSB of *Senna pruinosa, Acacia bivenosa, A. maitlandii* and *A. pyrifolia* over ODSD of *A. marramamba* over MDHG of *Triodia* sp.
Goodenia pallida	Erect herb, to 0.5 m high	Aug	Red soils	Annual grassland, *Acacia* scrub-steppe
Grevillea sp. Turee (J. Bull & G. Hopkinson ONS JJ 01.01) PN	Low, single stemmed tree to 2 m	-	Steep scree slope, hill crest of low foothill below main range	*Acacia aneura*open woodland
Gunniopsis sp. Fortescue (M.E. Trudgen 11019)	-	-	-	-
Helichrysum oligochaetum	Erect annual, herb, to ca 0.25 m high. Fl. yellow	Aug to Nov	Red clay. Alluvial plains	*Eucalyptus camaldulensis, Gossypium sp.* etc.
Hibiscus sp. Mt Brockman (E. Thoma ET 1354) PN	Leafless except at apices of stems. Flowers purple with dark violet centres	-	Gorge	-
Ipomoea racemigera	Creeping or climbing annual herb. White flowers.	?April		
Myriocephalus scalpellus	Semi-erect herb, 0.03-0.08 m high	-	Clay	-
Nicotiana heterantha	Decumbent, short-lived annual or perennial, herb, to 0.5 m high, forming low, spreading colonies Fl. white-cream	Mar to Jun or Sep	Black clay. Seasonally wet flats	-
Peplidium sp. Fortescue Marsh (S. van Leeuwen 4865)	Herb to 4 cm tall and 30 cm across, in full to late flower			Growing in Low Heath of *Haloscarcia spp. (H. indica, H. halocnemoides, H. auriculata)* and *Eremophila spongiocarpa*
Sida sp. Hamersley Range (K. Newbey 10692)	-	-	-	VOSM of *Eucalyptus gamophylla* and *E. xerothermica* with scattered emergent *E. leucophloia* over OLSB of *Acacia pyrifolia* (SVL 4375) and *Hakea lorea* over DHG of *Triodia* sp.
Stemodia sp. Battle Hill (A.L. Payne 1006)	Low shrub	-	Cracking clay. Floodplain	-
Tecticornia globulifera	Small spreading shrub to 0.3 m. Articles bright red	-	-	Samphire flats
Tecticornia sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)	A low spreading shrub, 25 cm high, 50 cm across with articles varying in colour from a dull green to a purple red	-	Near man made channel. Gently undulating floodway. Red clayey sand	-
Tetratheca fordiana	Dwarf shrub, 0.3–0.4 m high	-	Shale pocket amongst ironstone	-
Teucrium pilbaranum	Rounded shrub, to 0.4 m high	May/Sep	Clay. Crab hole plain in a river floodplain, margin of calcrete table	*Chrysopogon fallax* tussock grassland, Open woodland of *Eucalyptus victrix*, with a tussock grass understorey of *Eriachne benthamii*
Triodia triticoides	Tussock-forming perennial, grass-like or herb, 0.45-2 m high	Jan to Mar or Jun to Jul	Rocky sandstone & limestone hillslopes	-
Vittadinia sp. Coondewanna Flats (s. van Leeuwen 4684)	Tall daisy to 1 m , open canopy, in late flower and dehiscing fruit, cream/white flowers.	May/Sep	Clay loam soils	*Acacia* thicket over mixed grassland. Species dominating in area include: *Acacia aneura, Eucalyptus ?xerothermica, Themeda ?triandra*.

Species	Habit	Flowering	Landform\Soil	Vegetation Type
P2				
Adiantum capillus-veneris	Rhizomatous, perennial, herb (fern), 0.1-0.2 m high	-	Moist, sheltered sites in gorges and on cliff walls	-
Aristida lazaridis	Tufted perennial, grass-like or herb, 0.4-1.5 m high	Apr	Sand or loam	-
Calotis squamigera	Densely tufted perennial, grass-like or herb (sedge), 2 m high	Nov	Perennial pools	-
Cladium procerum	Densely tufted perennial, grass-like or herb (sedge), 2 m high	Nov?	Perennial pools	With *Cyperus* and *Typha* and Date Palms
Dicladanthera glabra	Spreading perennial, herb or shrub, to 0.6(-1) m high. Fl. white/white-blue	Apr or Aug-Oct	Alluvium , Along watercourses, near rock pools	-
Eragrostis sp. Mt Robinson (S.van Leeuwen 4109)	Low shrub 0.5 m tall with red or pinky flowers with long exerted stamens	May-Jul	Stony soil, slopes	-
Eremophila forrestii subsp. Pingandy (M.E. Trudgen 2662)	Subshrub to 50 cm tall, compact tight bush	-	Flat terrain, low in landscape, base of braod valley, stony gibber plain above shallow drainage line, red clay-loam	-
Gompholobium karijini	Rounded shrub ca 40 cm high, 60 cm diameter	-	Hilltop with shaley ironstone substrate, red-brown gravelly loam	*Eucalyptus leucophloia, Senna* spp., *Triodia* spp.
Hibiscus sp. Gurinbiddy Range (M.E. Trudgen MET 15708) PN	Spindly upright shrub to 3 m tall	-	Near summit of hill, high in landscape, skeletal red-brown stony soil over massive ironstone of the Brockman Iron Formation	Growing in Very Open Shrub Mallee of *Eucalyptus kingsmillii, E, leucophloia & E. gamophylla* over Open Shrub of *Acacia aneura, A. rhodophloia over* Open Low Scrub *of Scaevola acacioides, Eremophila latrobei* over Mid-Dense Hummock Grass of *Triodia wiseana*
Oxalis sp. Pilbara (M.E. Trudgen 12725)	Creeping annual herb <0.3 m high. Flowers yellow	-	Gully. Brown-red loam, cobbles and pebbles	
Paspalidium retiglume	Tufted annual, grass-like or herb, 0.1-0.5 m high	Apr	Clay	-
Pilbara trudgenii	Gnarled, aromatic shrub, to 1 m high	Sep	Skeletal, red stony soil over ironstone. Hill summits, steep slopes, screes, cliff faces	*Eucalyptus kingsmillii*
Scaevola sp. Hamersley Range basalts (S. van Leeuwen 3675)	hrub, to 1 m high	Jul to Aug	Skeletal, brown gritty soil over basalt. Summits of hills, steep hills	*Acacia hamersleyensis* with emergent *Brachychiton gregorii*
Sida sp. Hamersley Range (K. Newbey 10692)	50 m high x 50 m wide.	-	Sandy plain, Plain with thin sheet of sand (light orange / brown) over compacted hardpan and limestone rock, Claypan of fine cracking clays. Basalt hills in the immediate distance.	*Triodia epactia* hummock grassland over **Cenchrus ciliaris* very open tussock grassland, *Indigofera colutea / Vigna* sp Central / *Rhynchosia minima* low open shrubland. *Eucalyptus camaldulensis* and **Cenchrus ciliaris* association.
P3				
Acacia daweana	Spreading shrub, 0.3–1.5(–2) m high	Jul-Sep	Stony red loamy soils. Low rocky rises, along drainage lines	
Acacia effusa	Low, dense, spreading, somewhat viscid shrub, 0.3-1 m high, bark 'minni-ritchi'.	May to Aug	Stony red loam. Scree slopes of low ranges	Open Woodland of *Eucalyptus leucophloia*, over Open Low Shrub of *Acacia bivenosa, A. effusa* and Mid-dense Hummock Grass of *Triodia basedowii* and *Themeda triandra*
Acacia glaucocaesia	Dense, glabrous shrub or tree, 1.8-6 m high	Jul to Sep	Red loam, sandy loam, clay. Floodplains	Low shrubland

Species	Habit	Flowering	Landform\Soil	Vegetation Type
Acacia subtiliformis	Spindly, slender, erect shrub, to 3.5 m high	Jun	On rocky calcrete plateau	Tall open scrub to low shrubland over hummock grassland. *Eucalyptus leucophloia, Triodia aff. basedowii*
Amaranthus centralis	Single stemmed herb to 50 cm	-	River bank	With *Cenchrus ciliaris* under *Eucalyptus camaldulensis*
Ampelopteris prolifera	Rhizomatous, perennial, herb (fern), to 4 m high	-	Near water or in wet ground	-
Astrebla lappacea	Tufted perennial, grass-like or herb, 0.3-0.8 m high Fl. green/purple	Jun to Jul	Clay, loam	*Polymeria* sp. Hamersley (M.E. Trudgen 11353) herbland with *Astrebla pectinata, A. lappacea* open tussock grassland.
Atriplex flabelliformis	Monoecious, erect, rounded perennial, herb, to 0.35 m high	-	Clay loam, loam. Saline flats or marshes	Among succulents
Calotis latiuscula	Erect herb, to 0.5 m high	Jun-Oct	Sand, loam. Rocky hillsides, floodplains, rocky creeks or river beds	-
Crotalaria smithiana	Annual, herb, to 0.4 m high	Jun	Regeneration site on floodplain	-
Dampiera anonyma ms	Multistemmed perennial, herb, to 0.5(-1) m high	Jun-Sep	Skeletal red-brown to brown gravelly soil over banded ironstone, basalt, shale and jaspilite. Hill summits, upper slopes	-
Dampiera metallorum	Rounded, multistemmed perennial, herb, to 0.5 m high	Apr-Oct	Skeletal red-brown gravely soils over banded ironstone. Steep slopes and summits	-
Elatine macrocalyx	Prostrate, glabrous, mat-forming annual, herb, sepals 2-3mm long, fruit indehiscent	May to Oct	Shallow sands over clay. Margins of playa lakes and clay pans	-
Eragrostis crateriformis	Annual, grass-like or herb, 0.17–0.42 m high	Jan-Jul	Clayey loam or clay. Creek banks, depressions	-
Eragrostis surreyana	Tufted annual herb 5-8 (-13) cm high	May-Sep	Drainage line, red-brown clay	-
Eremophila forrestii subsp. *viridis*	Much-branched shrub, ca 1 m high	Aug	Sandplain	-
Eremophila magnifica subsp. *velutina*	Shrub, 0.5–1.5 m high	Aug-Sep	Skeletal soils over ironstone. Summits	-
Eremophila rigida	Annual, grass-like or herb, 0.17-0.42 m high	May or Jul	Clayey loam or clay. Creek banks, depressions	Grassland with *Chrysopogon fallax* and *Triodia epactia*
Eucalyptus rowleyi	Mallee to 5 m high, smooth pale bark shedding in ribbons and strips		Plains, floodplains	Pure stands or with *Eucalyptus gamophylla* or *E. victrix*, usually over *Triodia*
Euphorbia inappendiculata	Spreading, procumbent herb, to 0.4 m high	Aug	Clay soils. Among broken rocky screes	Hummock grassland of *Triodia epactia* over Very Open Grassland of *Cenchrus ciliaris*
Euphorbia stevenii	Somewhat succulent perennial, herb, 0.1-0.5 m high	-	Clay, sandy soils	Tussock Grassland of *Aristida* sp. over Closed Bunch Grassland of *Iseilema* sp. over Herbs of *Operculina aequisepala, Striga* sp., -*Rhynchosia* sp. & *Vigna* sp.
Fimbristylis sieberiana	Shortly rhizomatous, tufted perennial, grass-like or herb (sedge), 0.25–0.6 m high	May-Jun	Mud, skeletal soil pockets. Pool edges, sandstone cliffs	-
Geijera salicifolia	Tree, 1.5–6 m high	Sep	Skeletal soils, stony soils. Massive rock scree, gorges	-
Glycine falcata	Mat-forming perennial, herb, to 0.2 m high. Fl. blue, purple	May-Jul	Floodplains. Black clayey sand. Along drainage depressions in crabhole plains on river	
Goodenia lyrata	Prostrate herb, with lyrate leaves	Aug	Red sandy loam. Near claypan	*Acacia aneura* low open woodland over *Eremophila margarethae* low open shrubland

Species	Habit	Flowering	Landform\Soil	Vegetation Type
Goodenia sp. East Pilbara (A.A. Mitchell PRP 727)	Open, erect annual or biennial, herb, to 0.2 m high Fl. yellow	-	Red-brown clay soil, calcrete pebbles. Low undulating plain, swampy plains.	*Melaleuca eleuterostachya, Acacia bivenosa* over *Triodia wiseana, Triodia angusta. Associated Species: Ptilotus exaltatus var. exaltatus, Enneapogon polyphyllus, Acacia pruinocarpa, Digitaria brownii*
Gymnanthera cunninghamii	Erect shrub 1-2 m high	Jan-Dec	Sandy soils	-
Indigofera gilesii subsp. *gilesii*	Shrub, to 1.5 m high	May/Aug	Pebbly loam amongst boulders & outcrops, hills	-
Indigofera sp. Bungaroo Creek (S. van Leeuwen 4301)	Erect shrub to 2.3 m high, red-pink flowers	Jul-Oct	Creeks and gorges	-
Iotasperma sessilifolium	Erect herb. Fl. pink.	-	Cracking clay, black loam. Edges of waterholes, plains	-
Nicotiana umbratica	Erect, short-lived annual or perennial, herb, 0.3-0.7 m high	Apr to Jun	Shallow soils. Rocky outcrops	-
Oldenlandia sp. Hamersley Station (A.A. Mitchell PRP 1479)	Spreading annual, herb, 0.05–0.1 m high	Mar.	Cracking clay, basalt. Gently undulating plain with large surface rocks, flat crabholed plain	-
Olearia mucronata	Densely branched, unpleasantly aromatic shrub, 0.6–1 m high. Fl. white, yellow	Aug-Jan	Schistose hills, along drainage channels	-
Phyllanthus aridus	Erect, much-branched shrub, to 0.25 m high. Fl. cream, green	May–Jun	Sandstone, gravel, red sand	-
Polymeria distigma	Prostrate trailing herb. Fl. pink	Apr to Jul	Sandy soils	-
Ptilotus subspinescens	Compact shrub, to 0.8 m high. Fl. pink, bases of screes	Sep–Oct	Gentle rocky slopes, screes and the bases of screes	-
Rhagodia sp. Hamersley (M. Trudgen 17794)	Erect shrub	-	Floodplain / lower slopes	-
Rostellularia adscendens var.*latifolia*	Herb or shrub, 0.1–0.3 m high	Apr-May	Ironstone soils. Near creeks, rocky hills	-
Sida sp. Barlee Range (S van Leeuwen 1642)	Spreading shrub, to 0.5 m high	Aug	Skeletal red soils pockets. Steep slope	-
Solanum sp. Hamersley clay (D. Halford Q 9280) PN	Low shrub 10 cm high and up to 20 cm across, suckering, fruit green, globose	-	Flat to slightly undulating plain. Red-brown clay (cracking in places) with ironstone rocks and pebbles scattered on surface	Tussock grassland
Swainsona sp. Hamersley Station (A.A. Mitchell 196)	Prostrate annual, herb, to 0.1 m high	-	Flat crabholed plain.	Open *Eremophila maculata* shrubland over moderately dense herbs. Tussock grassland of *Astrebla pectinata*.
Tecticornia medusa	Erect shrub 0.5 m high. Articles bright green		1.8 km from the shoreline. Flat floodplain. Red clayey sand	-
Themeda sp. Hamersley Station (M.E. Trudgen 11431)	Tussocky perennial, grass-like or herb, 0.9-1.8 m high	Aug	Red clay. Clay pan, grass plain	*Polymeria* sp. Hamersley (M.E. Trudgen 11353) herbland with *Chrysopogon fallax*, *Astrebla pectinata*, *Aristida latifolia* very open tussock grassland
Triodia sp. Mt. Ella (ME Trudgen 12739)	Perennial, grass-like or herb, 0.4 m high	-	Light orange-brown, pebbly loam. Amongst rocks & outcrops, gully slopes	-
Triodia sp. Robe River (M.E. Trudgen et al. MET 12367)	Perennial hummock grass to 0.6 m high	-	Rocky hills and mesas	-

Species	Habit	Flowering	Landform\Soil	Vegetation Type
Whiteochloa capillipes	Annual or perennial, grass-like or herb, 0.4-1 m high	Feb to Jun	Red-brown	*Astrebla* tussock grassland
P4				
Acacia bromilowiana	Tree or shrub, to 12 m high	Jul-Aug	Red skeletal stony loam, orange-brown pebbly, gravel loam, laterite, banded ironstone, basalt. Rocky hills, breakaways, scree slopes, gorges, creek beds	-
Eremophila magnifica subsp. *magnifica*	Shrub, 0.5-1.5 m high	Aug-Nov	Skeletal soils over ironstone. Rocky screes	-
Eremophila youngii subsp. *lepidota*	Dense, spreading shrub, (0.2-)1-3 m high. Fl. purple-red-pink	Jan or Mar or Jun or Aug to Sep	Stony red sandy loam. Flats plains, floodplains, sometimes semi-saline, clay flats.	-
Goodenia nuda	Erect to ascending herb, to 0.5 m high Fl. yellow	Apr to Aug	Red--brown clay loam, ironstone.	*Acacia tumida* tall shrubland with mixed grass understorey including *Triodia epactia*.
Rhynchosia bungarensis	Compact, prostrate shrub, to 0.5 m high	-	Pebbly, coarse sand, banks of flow line	-

Appendix Three: EPBC Search Results

Australian Government

Department of Sustainability, Environment, Water, Population and Communities

EPBC Act Protected Matters Report

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

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

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

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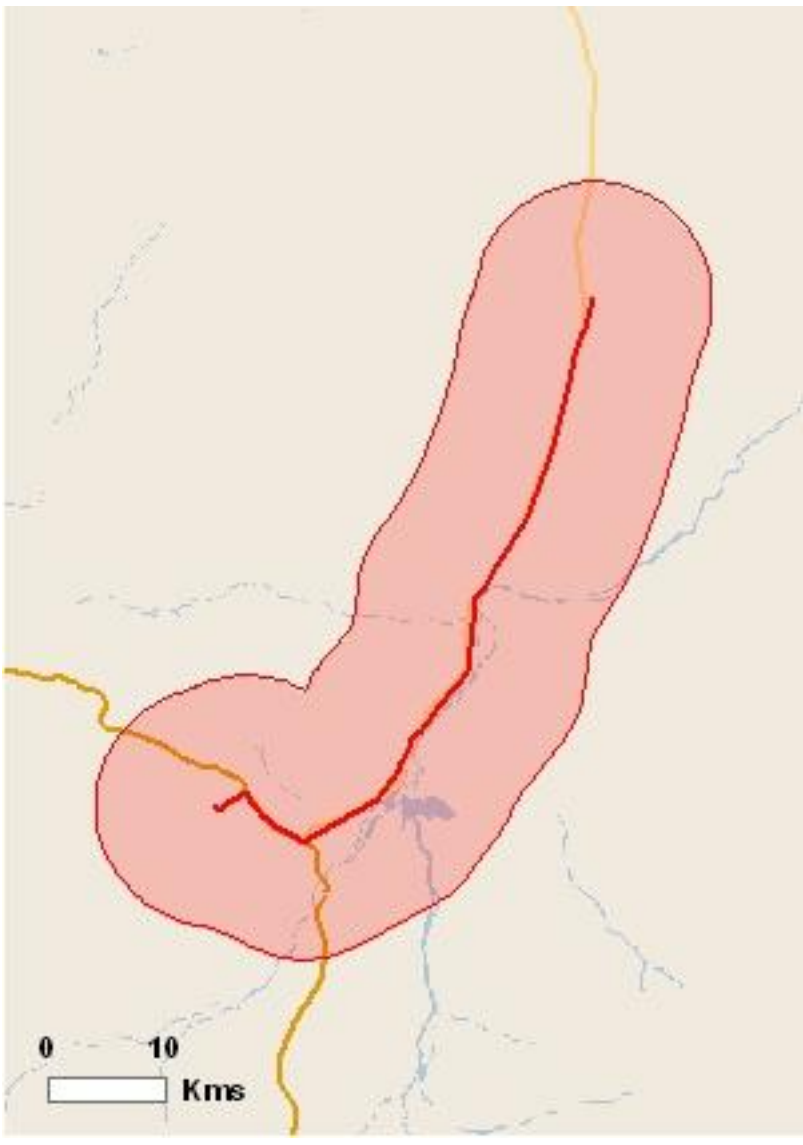

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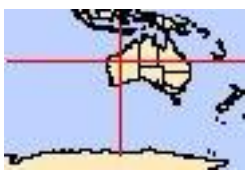

Summary

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 Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	7
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

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

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

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

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

Commonwealth Land:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	5
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

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

Place on the RNE:	1
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	4
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
Mammals		
Dasyurus hallucatus Northern Quoll [331]	Endangered	Species or species habitat may occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat may occur within area
Rhinonicteris aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat likely to occur within area
Plants		
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 may 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
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Pezoporus occidentalis		
Night Parrot [59350]	Endangered	Species or species habitat likely to occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may 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

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 may 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
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within

Name	Threatened	Type of Presence area

Extra Information

Places on the RNE	[Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Indigenous		
Ethel Gorge Rockshelter Area	WA	Registered

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
Mammals		
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris		
Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area

Coordinates

-23.345522 119.710282,-23.348249 119.714178,-23.34621 119.716466,-23.346206 119.716472,-23.343587 119.720504,-23.34358 119.720514,-23.341069 119.724942, -23.341067 119.724947,-23.339225 119.728492,-23.337538 119.731629,-23.337536 119.731633,-23.336147 119.734325,-23.336144 119.734331,-23.335576 119.735546, -23.335574 119.735546,-23.335456 119.735797,-23.335454 119.735803,-23.335453 119.735803,-23.335456 119.735805,-23.337591 119.736697,-23.339394 119.737728, -23.340567 119.738437,-23.341121 119.738787,-23.341777 119.739295,-23.342651 119.740049,-23.342653 119.74005,-23.34427 119.741411,-23.354552 119.750286,-23.356178 119.752163,-23.356204 119.752188,-23.362315 119.75733,-23.370559 119.774692, -23.370548 119.774698,-23.371158 119.775954,-23.372812 119.779364,-23.341672 119.835537,-23.316507 119.854582,-23.311622 119.855075,-23.306822 119.858269, -23.301924 119.860273,-23.298386 119.861673,-23.294014 119.86303,-23.289815 119.865773,-23.290431 119.868543,-23.280674 119.874074,-23.26839 119.884061, -23.252029 119.897311,-23.241815 119.905594,-23.186483 119.911577,-23.18648 119.911579,-23.185541 119.911682,-23.178062 119.91743,-23.160606 119.928967, -23.124935 119.950009,-23.076266 119.969287,-23.029486 119.982801,-23.000651 119.988897,-23.000632 119.988902,-22.981885 119.994682,-22.981877 119.994685, -22.978556 119.995851,-22.9554 120.002621

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 Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Acknowledgements

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

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

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

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

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Appendix Four: NatureMap Search Results

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 29/10/2012

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	4886	*Abutilon amplum*			
2.	19589	*Abutilon dioicum*			
3.	4891	*Abutilon fraseri (Lantern Bush)*			
4.	4895	*Abutilon lepidum*			
5.	3198	*Acacia acradenia*			
6.	11215	*Acacia adoxa var. adoxa*			
7.	3205	*Acacia adsurgens*			
8.	3214	*Acacia ancistrocarpa (Fitzroy Wattle)*			
9.	37260	*Acacia aptaneura*			
10.	3223	*Acacia arida*			
11.	3228	*Acacia atkinsiana*			
12.	3241	*Acacia bivenosa*			
13.	23524	*Acacia catenulata subsp. occidentalis*			
14.	3260	*Acacia citrinoviridis*			
15.	3270	*Acacia coriacea (Wirewood)*			
16.	13502	*Acacia coriacea subsp. pendens*			
17.	3300	*Acacia dictyophleba (Sandhill Wattle)*			
18.	16174	*Acacia elachantha*			
19.	3326	*Acacia eriopoda (Broome Pindan Wattle)*			
20.	3360	*Acacia hamersleyensis*			
21.	3370	*Acacia hilliana*			
22.	3377	*Acacia inaequilatera (Baderi)*			
23.	37240	*Acacia macraneura*			
24.	3434	*Acacia maitlandii (Maitland's Wattle)*			
25.	19305	*Acacia melleodora*			
26.	3447	*Acacia monticola (Gawar)*			
27.	3475	*Acacia pachyacra*			
28.	15724	*Acacia paraneura*			
29.	3500	*Acacia pruinocarpa (Gidgee)*			
30.	29016	*Acacia pyrifolia var. morrisonii*			
31.	29015	*Acacia pyrifolia var. pyrifolia*			
32.	13078	*Acacia sclerosperma subsp. sclerosperma*			
33.	29135	*Acacia sericophylla*			
34.	8949	*Acacia sibirica (Bastard Mulga)*			
35.	3553	*Acacia spondylophylla*			
36.	13070	*Acacia synchronicia*			
37.	3573	*Acacia tenuissima*			
38.	3577	*Acacia tetragonophylla (Kurara)*			
39.	3595	*Acacia victoriae (Bramble Wattle)*			
40.	3598	*Acacia wanyu*			
41.	2652	*Alternanthera nodiflora (Common Joyweed)*			
42.	2653	*Alternanthera pungens (Khaki Weed)*	Y		
43.	2666	*Amaranthus mitchellii (Boggabri Weed)*			
44.	20018	*Amaranthus undulatus*			
45.	11614	*Amyema gibberula var. gibberula*			
46.	2383	*Amyema preissii (Wireleaf Mistletoe)*			
47.	40910	*Androcalva luteiflora (Yellow-flowered Rulingia)*			
48.	2333	*Anthobolus leptomerioides*			
49.	207	*Aristida contorta (Bunched Kerosene Grass)*			
50.	215	*Aristida latifolia (Feathertop Wiregrass)*			
51.	2453	*Atriplex codonocarpa (Flat-topped Saltbush)*			
52.	2476	*Atriplex semilunaris (Annual Saltbush)*			
53.	6609	*Bonamia rosea (Felty Bellflower)*			
54.	241	*Brachyachne convergens (Spider Grass)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
55.	7878	*Brachyscome iberidifolia*			
56.	20427	*Brachyscome sp. Wanna Munna Flats (S. van Leeuwen 4662)*		P1	
57.	7413	*Brunonia australis (Native Cornflower)*			
58.	2866	*Calandrinia quadrivalvis*			
59.	2869	*Calandrinia schistorhiza*			
60.	7903	*Calotis hispidula (Bindy Eye)*			
61.	7905	*Calotis multicaulis (Many-stemmed Burr-daisy)*			
62.	5446	*Calytrix carinata*			
63.	2976	*Capparis lasiantha (Split Jack)*			
64.	258	*Cenchrus ciliaris (Buffel Grass)*	Y		
65.	29721	*Cenchrus setiger (Birdwood Grass)*	Y		
66.	32	*Cheilanthes brownii*			
67.	37	*Cheilanthes lasiophylla (Woolly Cloak Fern)*			
68.	12818	*Cheilanthes sieberi subsp. sieberi*			
69.	8462	*Cheilanthes tenuifolia (Rock Fern)*			
70.	270	*Chloris pumilio*			
71.	12614	*Chrysocephalum pterochaetum*			
72.	273	*Chrysopogon fallax (Golden Beard Grass)*			
73.	2985	*Cleome oxalidea*			
74.	13692	*Clerodendrum floribundum var. angustifolium*			
75.	2778	*Codonocarpus cotinifolius (Native Poplar)*			
76.	6612	*Convolvulus clementii*			
77.	13560	*Corchorus crozophorifolius*			
78.	17405	*Corchorus lasiocarpus*			
79.	16783	*Corymbia candida*			
80.	16780	*Corymbia candida subsp. dipsodes*			
81.	17093	*Corymbia hamersleyana*			
82.	17092	*Corymbia opaca*			
83.	14859	*Crotalaria smithiana*		P3	
84.	17117	*Cullen cinereum*			
85.	17119	*Cullen leucochaites*			
86.	17120	*Cullen pogonocarpum*			
87.	279	*Cymbopogon ambiguus (Scentgrass)*			
88.	282	*Cymbopogon procerus (Lemon Grass)*			
89.	6584	*Cynanchum floribundum (Dumara Bush)*			
90.	786	*Cyperus cunninghamii*			
91.	818	*Cyperus vaginatus (Stiffleaf Sedge)*			
92.	290	*Dactyloctenium radulans (Button Grass)*			
93.	7424	*Dampiera candicans*			
94.	303	*Dichanthium fecundum (Curly Bluegrass)*			
95.	7164	*Dicladanthera forrestii*			
96.	6754	*Dicrastylis cordifolia*			
97.	310	*Digitaria brownii (Cotton Panic Grass)*			
98.	12023	*Diplopeltis stuartii var. stuartii (Desert Pepperflower)*			
99.	4759	*Dodonaea coriacea*			
100.	4772	*Dodonaea pachyneura*			
101.	3103	*Drosera indica (Indian Sundew)*			
102.	11653	*Dysphania rhadinostachya subsp. inflata*			
103.	11890	*Dysphania rhadinostachya subsp. rhadinostachya*			
104.	32348	*Eccremidium arcuatum*			
105.	328	*Echinochloa colona (Awnless Barnyard Grass)*	Y		
106.	12064	*Enchylaena tomentosa var. tomentosa (Barrier Saltbush)*			
107.	357	*Enneapogon caerulescens (Limestone Grass)*			
108.	360	*Enneapogon lindleyanus (Wiry Nineawn)*			
109.	387	*Eragrostis lanipes (Creeping Wanderrie)*			
110.	388	*Eragrostis leptocarpa (Drooping Lovegrass)*			
111.	393	*Eragrostis setifolia (Neverfail Grass)*			
112.	398	*Eragrostis tenellula (Delicate Lovegrass)*			
113.	15167	*Eremophila canaliculata*			
114.	7189	*Eremophila clarkei (Turpentine Bush)*			
115.	7192	*Eremophila cuneifolia (Pinyuru)*			
116.	7205	*Eremophila exilifolia*			
117.	15052	*Eremophila forrestii subsp. forrestii*			
118.	16696	*Eremophila fraseri subsp. fraseri*			
119.	7228	*Eremophila lachnocalyx (Woolly-calyxed Eremophila)*			
120.	16940	*Eremophila lanceolata*			
121.	17576	*Eremophila latrobei subsp. latrobei*			
122.	7234	*Eremophila longifolia (Berrigan)*			
123.	7237	*Eremophila maculata (Native Fuchsia)*			
124.	16363	*Eremophila maculata subsp. brevifolia (Native Fuchsia)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
125.	7239	*Eremophila margarethae (Sandbank Poverty Bush)*			
126.	15058	*Eremophila platycalyx subsp. platycalyx*			
127.	16486	*Eriachne pulchella subsp. pulchella*			
128.	421	*Eriachne tenuiculmis*			
129.	4335	*Erodium cygnorum (Blue Heronsbill)*			
130.	5684	*Eucalyptus kingsmillii (Kingsmill's Mallee)*			
131.	18088	*Eucalyptus leucophloia subsp. leucophloia*			
132.	5703	*Eucalyptus lucasii (Barlee Box)*			
133.	5773	*Eucalyptus socialis (Red Mallee)*			
134.	14548	*Eucalyptus victrix*			
135.	15592	*Eucalyptus xerothermica*			
136.	11011	*Eulalia aurea*			
137.	4614	*Euphorbia alsiniflora (Namana)*			
138.	4617	*Euphorbia australis (Namana)*			
139.	4619	*Euphorbia biconvexa*			
140.	4620	*Euphorbia boophthona (Gascoyne Spurge)*			
141.	9048	*Euphorbia careyi*			
142.	12097	*Euphorbia tannensis subsp. eremophila (Desert Spurge)*			
143.	5212	*Frankenia setosa (Bristly Frankenia)*			
144.	41245	*Gompholobium oreophilum*			
145.	2676	*Gomphrena canescens (Batchelors Buttons)*			
146.	2680	*Gomphrena cunninghamii*			
147.	18367	*Gomphrena kanisii*			
148.	11131	*Gomphrena sordida*			
149.	6151	*Gonocarpus ephemerus*			
150.	7490	*Goodenia armitiana*			
151.	7521	*Goodenia lamprosperma*			
152.	12552	*Goodenia muelleriana*			
153.	12574	*Goodenia prostrata*			
154.	10982	*Goodenia stobbsiana*			
155.	7556	*Goodenia tenuiloba*			
156.	7558	*Goodenia triodiophila*			
157.	7560	*Goodenia vilmoriniae*			
158.	11559	*Gossypium sturtianum var. sturtianum*			
159.	15845	*Grevillea juncifolia subsp. juncifolia*			
160.	2096	*Grevillea stenobotrya*			
161.	2099	*Grevillea striata (Beefwood)*			
162.	12832	*Gymnanthera cunninghamii*		P3	
163.	19137	*Hakea lorea subsp. lorea*			
164.	2196	*Hakea preissii (Needle Tree)*			
165.	30258	*Halgania solanacea var. Mt Doreen (G.M. Chippendale 4206)*			
166.	6174	*Haloragis gossei*			
167.	23465	*Haloragis gossei var. gossei*			
168.	20669	*Haloragis maierae*			
169.	6706	*Heliotropium cunninghamii*			
170.	6712	*Heliotropium heteranthum*			
171.	17309	*Heliotropium pachyphyllum*			
172.	6718	*Heliotropium tenuifolium (Mamukata)*			
173.	4924	*Hibiscus burtonii*			
174.	4925	*Hibiscus coatesii*			
175.	5215	*Hybanthus aurantiacus*			
176.	3972	*Indigofera brevidens (Widji)*			
177.	3974	*Indigofera georgei (Bovine Indigo)*			
178.	3982	*Indigofera monophylla*			
179.	6624	*Ipomoea costata (Rock Morning Glory)*			
180.	6633	*Ipomoea muelleri (Poison Morning Glory)*			
181.	11312	*Ipomoea pes-caprae subsp. brasiliensis*			
182.	6639	*Ipomoea racemigera*		P1	
183.	458	*Iseilema dolichotrichum*			
184.	464	*Iseilema membranaceum (Small Flinders Grass)*			
185.	465	*Iseilema vaginiflorum (Red Flinders Grass)*			
186.	3994	*Isotropis forrestii*			
187.	3996	*Jacksonia aculeata*			
188.	4043	*Kennedia prorepens*			
189.	5846	*Lamarchea sulcata*			
190.	3025	*Lepidium echinatum*			
191.	3032	*Lepidium muelleri-ferdinandii*			
192.	3033	*Lepidium oxytrichum*			
193.	3039	*Lepidium platypetalum (Slender Peppercress)*			
194.	4061	*Lotus cruentus (Redflower Lotus)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
195.	2544	*Maireana georgei (Satiny Bluebush)*			
196.	2551	*Maireana melanocoma (Pussy Bluebush)*			
197.	2556	*Maireana planifolia (Low Bluebush)*			
198.	75	*Marsilea exarata*			
199.	76	*Marsilea hirsuta (Nardoo)*			
200.	5915	*Melaleuca glomerata*			
201.	7082	*Mimulus gracilis*			
202.	8109	*Minuria integerrima (Smooth Minuria)*			
203.	4105	*Mirbelia viminalis*			
204.	6519	*Mitrasacme connata*			
205.	3614	*Neptunia dimorphantha (Sensitive Plant)*			
206.	6791	*Newcastelia hexarrhena (Lambs' Tails)*			
207.	6979	*Nicotiana simulans*			
208.	7338	*Oldenlandia crouchiana*			
209.	515	*Paraneurachne muelleri (Northern Mulga Grass)*			
210.	519	*Paspalidium constrictum (Knottybutt Grass)*			
211.	546	*Perotis rara (Comet Grass)*			
212.	3675	*Petalostylis labicheoides (Slender Petalostylis)*			
213.	6491	*Plumbago zeylanica (Native Plumbago)*			
214.	18642	*Podolepis sp. Great Victoria Desert (A.S. George 8219)*			
215.	2903	*Polycarpaea longiflora*			
216.	2879	*Portulaca cyclophylla*			
217.	2886	*Portulaca pilosa (Djanggara)*			
218.	8192	*Pterocaulon sphacelatum (Apple Bush)*			
219.	2690	*Ptilotus aervoides*			
220.	2693	*Ptilotus aphyllus*			
221.	2696	*Ptilotus astrolasius*			
222.	2698	*Ptilotus auriculifolius*			
223.	2699	*Ptilotus axillaris (Mat Mulla Mulla)*			
224.	2704	*Ptilotus calostachyus (Weeping Mulla Mulla)*			
225.	2706	*Ptilotus carinatus*			
226.	2711	*Ptilotus clementii (Tassel Top)*			
227.	2727	*Ptilotus gaudichaudii*			
228.	2728	*Ptilotus gomphrenoides*			
229.	11708	*Ptilotus gomphrenoides var. conglomeratus*			
230.	11236	*Ptilotus gomphrenoides var. gomphrenoides*			
231.	2731	*Ptilotus helipteroides (Hairy Mulla Mulla)*			
232.	2734	*Ptilotus incanus*			
233.	2741	*Ptilotus macrocephalus (Featherheads)*			
234.	2746	*Ptilotus nobilis (Tall Mulla Mulla)*			
235.	41001	*Ptilotus nobilis subsp. nobilis (Yellow Tails)*			
236.	2747	*Ptilotus obovatus (Cotton Bush)*			
237.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
238.	2755	*Ptilotus rotundifolius (Royal Mulla Mulla)*			
239.	13308	*Rhodanthe charsleyae*			
240.	13301	*Rhodanthe floribunda*			
241.	13310	*Rhodanthe margarethae*			
242.	13307	*Rhodanthe pollackii*			
243.	13303	*Rhodanthe sterilescens*			
244.	13254	*Rhodanthe stricta*			
245.	5285	*Rotala diandra*			
246.	116	*Ruppia polycarpa*			
247.	8198	*Rutidosis helichrysoides (Grey Wrinklewort)*			
248.	2357	*Santalum lanceolatum (Northern Sandalwood)*			
249.	12578	*Scaevola acacioides*			
250.	7633	*Scaevola parvifolia (Camel Weed)*			
251.	13172	*Scaevola parvifolia subsp. pilbarae*			
252.	7644	*Scaevola spinescens (Currant Bush)*			
253.	963	*Schoenoplectus laevis*			
254.	2602	*Sclerolaena convexula*			
255.	2603	*Sclerolaena cornishiana (Cartwheel Burr)*			
256.	2604	*Sclerolaena costata*			
257.	2607	*Sclerolaena densiflora*			
258.	2609	*Sclerolaena diacantha (Grey Copperburr)*			
259.	2619	*Sclerolaena lanicuspis (Spinach Burr)*			
260.	17645	*Senna artemisioides*			
261.	12276	*Senna artemisioides subsp. filifolia*			
262.	12279	*Senna artemisioides subsp. helmsii*			
263.	12280	*Senna artemisioides subsp. oligophylla*			
264.	12307	*Senna glutinosa subsp. glutinosa*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
265.	12309	*Senna glutinosa subsp. pruinosa*			
266.	12308	*Senna glutinosa subsp. x luerssenii*			
267.	18451	*Senna hamersleyensis*			
268.	12312	*Senna notabilis*			
269.	606	*Setaria dielsii (Diels' Pigeon Grass)*			
270.	613	*Setaria verticillata (Whorled Pigeon Grass)*	Y		
271.	4976	*Sida echinocarpa*			
272.	4977	*Sida fibulifera (Silver Sida)*			
273.	31854	*Sida sp. Excedentifolia (J.L. Egan 1925)*			
274.	16617	*Sida sp. spiciform panicles (E. Leyland s.n. 14/8/90)*			
275.	6998	*Solanum cleistogamum*			
276.	7018	*Solanum lasiophyllum (Flannel Bush)*			
277.	7036	*Solanum sturtianum (Thargomindah Nightshade)*			
278.	629	*Sporobolus australasicus (Fairy Grass)*			
279.	4731	*Stackhousia intermedia*			
280.	8240	*Streptoglossa odora*			
281.	12492	*Striga squamigera*			
282.	4223	*Swainsona decurrens*			
283.	17789	*Tephrosia rosea var. glabrior*			
284.	40060	*Tephrosia sp. clay soils (S. van Leeuwen et al. PBS 0273)*			
285.	673	*Themeda triandra*			
286.	2826	*Trianthema glossostigma*			
287.	4377	*Tribulus hirsutus*			
288.	4383	*Tribulus terrestris (Caltrop)*	Y		
289.	6727	*Trichodesma zeylanicum (Camel Bush)*			
290.	11750	*Trichodesma zeylanicum var. zeylanicum*			
291.	679	*Triodia angusta*			
292.	680	*Triodia basedowii (Lobed Spinifex)*			
293.	681	*Triodia brizoides*			
294.	13131	*Triodia epactia*			
295.	690	*Triodia longiceps (Giant Grey Spinifex)*			
296.	696	*Triodia pungens (Soft Spinifex)*			
297.	20241	*Triodia sp. Shovelanna Hill (S. van Leeuwen 3835)*			
298.	704	*Triodia wiseana (Limestone Spinifex)*			
299.	4879	*Triumfetta leptacantha*			
300.	14942	*Triumfetta maconochieana*			
301.	717	*Urochloa piligera*			
302.	7660	*Velleia glabrata (Pee the Bed)*			
303.	31391	*Vigna sp. Hamersley Clay (A.A. Mitchell PRP 113)*			
304.	7393	*Wahlenbergia tumidifructa*			
305.	4392	*Zygophyllum iodocarpum*			

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.

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 29/10/2012

Kingdom Plantae
Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	34810	*Amaranthus centralis*		P3	
2.	20427	*Brachyscome sp. Wanna Munna Flats (S. van Leeuwen 4662)*		P1	
3.	14859	*Crotalaria smithiana*		P3	
4.	15028	*Eremophila pilosa*		P1	
5.	15031	*Eremophila rigida*		P3	
6.	20264	*Eucalyptus rowleyi*		P3	
7.	12832	*Gymnanthera cunninghamii*		P3	
8.	6639	*Ipomoea racemigera*		P1	
9.	3022	*Lepidium catapycnon (Hamersley Lepidium)*		T	

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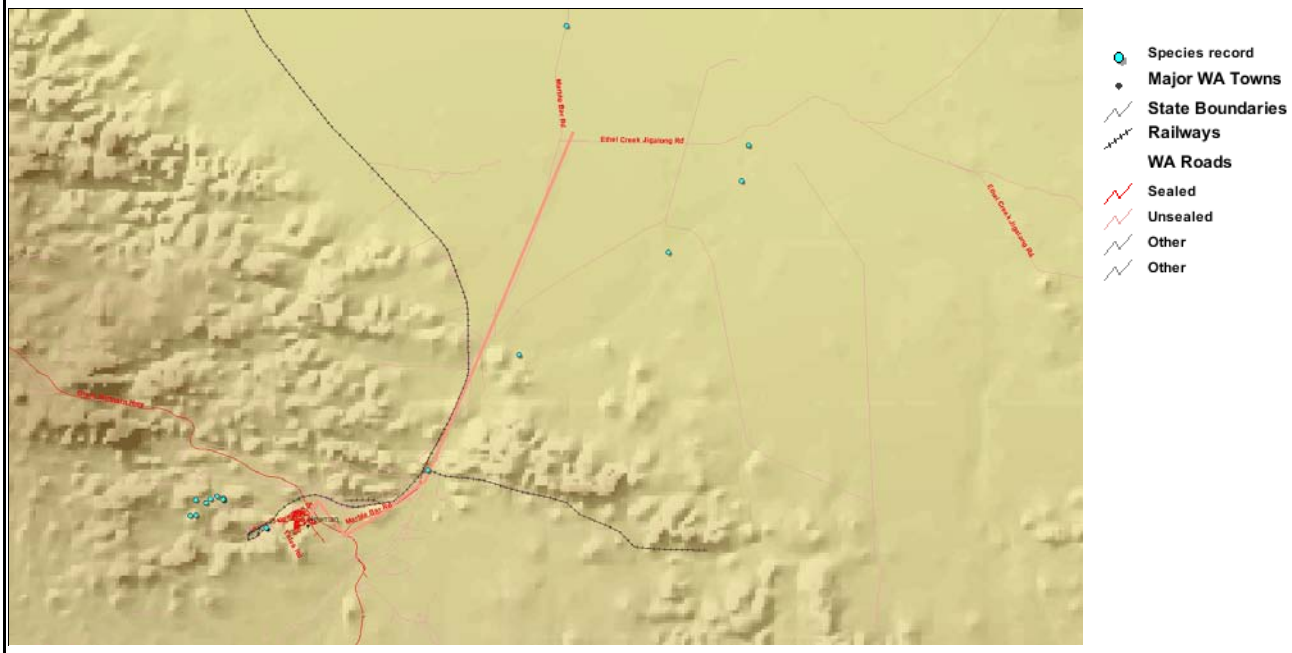
[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only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

NatureMap
Mapping Western Australia's biodiversity

Conservation Significant Flora 20 km Buffer

Printed by Guest user on 29/10/2012

Query details : Kingdom=Plantae; Conservation Status=Conservation Taxon (T, X, IA, S, P1-P5); Current Names Only=Yes; Core Datasets Only=Yes; Method='By Line';



Fauna occurrence prediction.

Table 17: Vertebrate taxa known or potentially present in the Study Area

Based on EPBC Act Protected Matters Search Tool, NatureMap reports, and previous survey reports for eastern Pilbara. Pink shading: conservation significant species. Light brown shading: species known or likely to be present based on site and nearby records and available habitat. Records denote presence (+), number (individuals sighted or trapped, number of sites, or number of traces depending on detection method for species), percentage occurrence at sampling sites, or codes (initials for rare, scarce, uncommon, moderately common, common, very common). Sources of survey data:

% PIL quadrats: Microbats – McKenzie & Bullen (2009); Small terrestrial mammals – Gibson & McKenzie (2009); Frogs and reptiles – Doughty *et al*. (2011); Birds – Burbidge *et al.* (2010) (based on occurrence at 297 quadrats, except bats based on occurrence in 24 survey areas). All species recorded in quadrats of Roy Hill – Newman (RHN) cell by Doughty *et al.* (2011) are listed, even if no other records available.

DEC Threatened fauna database: Number of records listed in DEC report on search area (buffer not specified by DEC).

Nyidinghu (FMG Marillana mine area): Bamford & Tomlinson (2012) – number trapped or recorded in timed survey, '+' other sighting, 'e' expected based on database search and other data

Iron Valley (IOH Marillana mine area): Everard *et al*. (2012)

Hope Downs 4 Mining Area: Ninox (2009)

Cloudbreak: Davis *et al*. (2005) – '+' recorded in survey, 'e' expected based on database search and other data, 'x' considered regionally extinct

BHP Jimblebar: Outback Ecology (2009) – number recorded in 2008 survey, '+' recorded by other surveys in Study Area, 'e' expected based on nearby surveys and NatureMap search (40 km buffer)

FerrAus (east of Jimblebar): Phoenix (2011a; 2011b)

Roy Hill: Ecologia (2006) [Phoenix 2011 survey records in NatureMap, including *Melithreptus brevirostris* which is a likely error for *M. gularis*, report not available]

BCI Nullagine: Everard & Bamford (2009) - '+' recorded in survey, 'e' expected based on database search and other data

Cookes Ck, Nullagine: Ecoscape (2011)

Abydos/Woodstock: How & Dell (2004), herpetofauna; How & Cooper (2002), small mammals – numbers trapped, '+' observational record

Notes: Extralimital species 'expected' but not recorded by previous surveys removed if inclusion not otherwise indicated.

Ctenophorus maculatus removed (one NatureMap record from Newman WGS84 50 785126 mE 7413049 mN on BHP Main Line, ID reported as 'certain'; this is nearly 500 km from the nearest other records of the species, and interpreted as either a misidentification or accidentally transported individual).

Ctenophorus scutulatus removed (NatureMap record from Mt Webber WGS84 50 740171 mE 7618625 mN, ID reported as 'certain'; the only other Pilbara records, in the Hamersley Ranges, are flagged on NatureMap as 'reported and under review').

Demansia shinei is not recorded on NatureMap or survey reports, but two atypical specimens are known from close to the east Pilbara (about 100 km SE of Newman in WGS84 51 ~255500 mE, 7356600 mN; and about 180 km NE of Roy Hill in 51 ~352300 mE, 7604300 mS) (Shea & Scanlon 2007)

Family	Species	Common Name	EPBC Act status	WC Act status	DEC status	DEC Threatened fauna database	EPBC Act PMST	% PIL quadrats	NMap Newman +40km	NMap eastern Fortescue	NMap Roy Hill +40 km	Nyidinghu	Iron Valley	Hope Downs	Cloudbreak	BHP Jimblebar	FerrAus	Roy Hill	BCI Nullagine	Cookes Ck Nullagine	Abydos/W'stock	August 2012
FISH																						
Clupeidae	*Nematolosa erebi*	Bony Bream																	e			
Plotosidae	*Neosilurus hyrtli*	Hyrtl's Tandan										+							e			
Atherinidae	*Craterocephalus cuneiceps*	Murchison River Hardyhead																	e			
Melanotaeniidae	*Melanotaenia australis*	Western Rainbowfish										+				e			+			
Terapontidae	*Amniataba percoides*	Barred Grunter																	e			
	Leiopotherapon unicolor	Spangled Perch										e				e			e			
AMPHIBIANS																						
Hylidae	*Cyclorana maini*	Sheep Frog						6.4	+	+	+	31		+	e	+	e	e	+		73	
	Cyclorana platycephala	Water-holding Frog						0.0		+	+	e		e	e	+	+	e	e	e		
	Litoria rubella	Little Red Tree Frog						2.0	+	+	+	1		e	+	5	+	+	e	e	48	
Myobatrachidae	*Pseudophryne douglasi*	Gorge Toadlet						0.0	+			e			e	e	e		e			
	Uperoleia glandulosa	Glandular Toadlet						1.0		+	+				e				+		3	
	Uperoleia russelli	Northwest Toadlet						-	+		+	e		e	e	1	+	e	e		124	
Limnodynastidae	*Neobatrachus aquilonius*	Northern Burrowing Frog						4.0											+			
	Neobatrachus "centralis"	Desert Trilling Frog						-						e		+	e	e				
	Neobatrachus kunapalari	Kunapalari Frog						-	+							e	e					
	Neobatrachus sutor	Shoemaker Ftrog						-						e			e				+	
	Notaden nichollsi	Desert Spadefoot						5.4			+			e	e	+	e	e	e		+	
	Platyplectrum ornatum	Ornate Burrowing Frog						-													+	
	Platyplectrum spenceri	Desert Burrowing Frog						1.0	+		+			e	e	+	+	e		e	103	
MAMMALS																						
Tachyglossidae	*Tachyglossus aculeatus*	Echidna							+	+	+	e	+	e	+	1	+	e	e	e	+	

Family	Species	Common Name	EPBC Act status	WC Act status	DEC status	DEC Threatened fauna database	EPBC Act PMST	% PIL quadrats	NMap Newman +40km	NMap eastern Fortescue	NMap Roy Hill +40 km	Nyidinghu	Iron Valley	Hope Downs	Cloudbreak	BHP Jimblebar	FerrAus	Roy Hill	BCI Nullagine	Cookes Ck Nullagine	Abydos/W'stock	August 2012
Thylacomyidae	*Macrotis lagotis*	Greater Bilby	VU	S 1	VU		K				+	e	e	e	+		e	e	e	e	+	
Dasyuridae	*Dasycercus cristicauda*	Crest-tailed Mulgara	VU	S 1	VU		L					e	?		e		1		e	e	+	?
	Dasycercus blythi	Brush-tailed Mulgara			P 4	2				+			+?				e			e	+	?
	Dasykaluta rosamondae	Kaluta						39	+	+	+	1	e	+	+	2	+	e	+		51	
	Dasyurus hallucatus	Northern Quoll	EN	S 1	EN	2	L				+	e	e	e	e			e	+		11	
	Ningaui ridei	Wongai Ningaui											e				+	e				
	Ningaui timealeyi	Pilbara Ningaui						59	+	+	+	1	e	+	+	+	e	e	e	+	36	
	Planigale sp. 1							50			?	e	e	?	?		?	+	?	+	0/1?	
	Planigale sp. 2							11			?	e	e	?	?		?	+	?	+	1/0?	
	Pseudantechinus roryi	Rory's Pseudantechinus						1.7	+			e	e	e			e				10	
	Pseudantechinus woolleyae	Woolley's Pseudantechinus						5.4	+		+	+	e	e	e		e	e	e	e	2	
	Sminthopsis "crassicaudata"	Fat-tailed Dunnart						-	+							2	+					
	Sminthopsis longicaudata	Long-tailed Dunnart			P 4	2		2.7	+	+			e	e	e		e		e		e	
	Sminthopsis macroura	Stripe-faced Dunnart						44	+	+	+	+	e	e	+	8	+	+	+	+	1	
	Sminthopsis ooldea	Ooldea Dunnart						1.7	+					+			+	e				
	Sminthopsis hirtipes	Hairy-footed Dunnart						0.0				6										
	Sminthopsis youngsoni	Lesser Hairy-footed Dunnart						11	+	+				e	e	1	+	e	e		1	
Notoryctidae	*Notoryctes caurinus*	Northern Marsupial Mole	EN	S 1			-															
Macropodidae	*Lagorchestes conspicillatus leichardti*	Spectacled Hare-wallaby			P 3							e			e	e	e		e		+	
	Macropus robustus	Euro, Biggada							+	+	+	+	+	+	+	7	+	+	+	+	+	
	Macropus rufus	Red Kangaroo, Marlu							+	+	+	+	+	+	+	16	+	+	+	e	+	c
	Petrogale l. lateralis	Black-footed Rock-wallaby	VU	S 1		4	-		+					e		e	e					

Family	Species	Common Name	EPBC Act status	WC Act status	DEC status	DEC Threatened fauna database	EPBC Act PMST	% PIL quadrats	NMap Newman +40km	NMap eastern Fortescue	NMap Roy Hill +40 km	Nyidinghu	Iron Valley	Hope Downs	Cloudbreak	BHP Jimblebar	FerrAus	Roy Hill	BCI Nullagine	Cookes Ck Nullagine	Abydos/W'stock	August 2012
	Petrogale rothschildi	Rothschild's Rock-wallaby							+	+	+	e	e	e	e	e	e	e	e		+	
Phalangeridae	*Trichosurus vulpecula*	Brush-tailed Possum									+				x							
Pteropodidae	*Pteropus alecto*	Black Flying-fox													e				e			
	Pteropus scapulatus	Little Red Flying-fox																	e			
Megadermatidae	*Macroderma gigas*	Ghost Bat			P 4	3		87	+	+	+	e	e	e	e	+	?	e	e	e	+	
Hipposideridae	*Rhinonicteris aurantia*	Pilbara Leaf-nosed Bat	VU	S 1	VU		L	71				e	e		e	+	e		e		+	
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat						100	+			+	+	+	+	+	+	e	e	+		
	Taphozous georgianus	Common Sheathtail-bat						88	+		+	+	+	+	+	+	+	e	e	e	+	
	Taphozous hilli	Hill's Sheathtail-bat						33	+			e	e	e	e		+	e	e			
Molossidae	*Chaerephon jobensis*	Northern Freetail-bat						100	+	+	+	+	+	+	+	e	+	+	+	+		
	Mormopterus beccarii	Beccari's Freetail-bat						100	+			e	e	e	e	+	+	e	e	+		
	Mormopterus "sp. 3"	Inland Freetail-bat						-							e				e			
	Mormopterus "planiceps"	Little Mastiff-bat						-						e				e				
	Tadarida australis	White-striped Freetail-bat						79		+	+	e	e	e	+		+	e	e	+	+	
Vespertilionidae	*Nyctophilus bifax daedalus*	Northwestern Long-eared Bat						29				e	e	e	e		e	+	e			
	Nyctophilus geoffroyi	Lesser Long-eared Bat						96	+	+	+	+	e	e	+	+	+	+	e			
	Nyctophilus "timoriensis"	Greater long-eared Bat						-							e							
	Chalinolobus gouldii	Gould's Wattled Bat						100	+	+	+	+	+	+	+	+	+	+	+	+	+	
	Chalinolobus morio	Chocolate Wattled Bat						4.2				e	e	+	e		e	e	e			
	Scotorepens balstoni	Inland Broad-nosed Bat						0.0						e	e		e	e	e			
	Scotorepens greyii	Little Broad-nosed Bat						100	+	+	+	+	+	+	+	+	+	+	e	+	+	
	Vespadelus finlaysoni	Finlayson's Cave Bat						100	+	+	+	+	+	+	+	+	+	+	+	+	+	
Muridae	*Leggadina*	Short-tailed Mouse			P 4	9		6.1		+	+	e	e	e	e				e		+	

Family	Species	Common Name	EPBC Act status	WC Act status	DEC status	DEC Threatened fauna database	EPBC Act PMST	% PIL quadrats	NMap Newman +40km	NMap eastern Fortescue	NMap Roy Hill +40 km	Nyidinghu	Iron Valley	Hope Downs	Cloudbreak	BHP Jimblebar	FerrAus	Roy Hill	BCI Nullagine	Cookes Ck Nullagine	Abydos/W'stock	August 2012
	lakedownensis																					
	Mus musculus	House Mouse			Int			26	+	+	+	e	e		+	1	+	+	+	e	118	
	Notomys alexis	Spinifex Hopping-mouse						3.0	+	+		e	e	e	e	+	2	e	e		e	
	Pseudomys chapmani	Western Pebble-mound Mouse			P 4	49		10	+	+	+	+	+	+	+	4	+	+	+	+	6	
	Pseudomys delicatulus	Delicate Mouse						6.4						+						+	4	
	Pseudomys desertor	Desert Mouse						27	+	+	+	+	e	+	+	+	+	+	+	+	+	
	Pseudomys hermannsburgensis	Sandy Inland Mouse						42	+	+	+	2	e	+	e	5	+	+	e	e	99	
	Zyzomys argurus	Common Rock-rat						4.7	+		+	+	e	+	+	3	+	e	+		67	
Leporidae	*Oryctolagus cuniculus*	Rabbit			Int		L		+			e	e		e	+	+	e	e			+
Camelidae	*Camelus dromedaries*	Camel			Int				+	+		e	e		+	+	+		e		+	
Bovidae	*Bos taurus*	European Cattle			Int				+	+	+	+	e			+	+	+			+	+
	Capra hircus	Goat			Int										e				e			
Equidae	*Equus asinus*	Donkey			Int				+	+	+	e	e		+	1	+	+	e		+	
	Equus caballus	Horse			Int					+	+	e	e		+	3	+	+	e			+
Canidae	*Canis lupus dingo*	Dingo			Int				+	+	+	+	+	+	+	8	?	+	e	+	+	+
	Vulpes vulpes	Fox			Int		M			+		e	e		e	e	+		e			
Felidae	*Felis catus*	Cat			Int		L		+	+	+	+	+		+	3	+	+	+	+	+	+
REPTILES																						
Cheluidae	*Chelodina steindachneri*	Flat-shelled Turtle						0.0	+		+	e	e	e	+	+	e	e	e		+	
Agamidae	*Amphibolurus gilberti*	Gilbert's Dragon						0.0											+			
	Amphibolurus longirostris	Long-nosed Dragon						12	+	+	+	+	+	+	+	+	+	+	+	+	12	
	Caimanops amphiboluroides	Mulga Dragon						2.0				e	e	+		e	+	+				
	Ctenophorus caudicinctus	Ringtailed Dragon						63	+	+	+	3+	+	+	+	1	+	+	+	+	27	

Family	Species	Common Name	EPBC Act status	WC Act status	DEC status	DEC Threatened fauna database	EPBC Act PMST	% PIL quadrats	NMap Newman +40km	NMap eastern Fortescue	NMap Roy Hill +40 km	Nyidinghu	Iron Valley	Hope Downs	Cloudbreak	BHP Jimblebar	FerrAus	Roy Hill	BCI Nullagine	Cookes Ck Nullagine	Abydos/W'stock	August 2012
	Ctenophorus isolepis	Military Dragon						24	+	+	+	77	e	+	e	+	+	e	e		47	+
	Ctenophorus nuchalis	Central Netted Dragon						13	+	+	+	9+	e	+	e	4	+	e	e	e	29	?
	Ctenophorus reticulatus	Western Netted Dragon						10	+	+	+	e	e	+	e	+	+	e	+		+	?
	Ctenophorus rubens	Red Dragon						0.0													+	
	Diporiphora valens	Pilbara Two-lined Dragon						4.4				e	e	e		e		e		+		
	Diporiphora "winneckei" (=D. paraconvergens)	Grey-striped Western Desert Dragon						-							e		+		e		3	
	Moloch horridus	Thorny Devil						0.7									+					
	Pogona minor	Western Bearded Dragon						20	+	+	+	2+	e	+	e	+	+	+	+	e	9	
	Tympanocryptis cephalus	Pebble Dragon						1.0	+	+		e	e	e	e		e	e	e			
	Tympanocryptis sp. nov.							5.1														
Gekkonidae	*Gehyra 'fenestra'*							9.8														
	Gehyra pilbara	Pilbara Dtella						3.7	+			e	e	e	e	e	e	e	+		67	
	Gehyra punctata	Spotted Dtella						26	+	+	+	e	+	+	e	2	+	+	e	+	58	
	Gehyra purpurascens	Purplish Dtella						29				4	+	e		+	+	e				
	Gehyra variegata	Common Dtella							+	+	+	13	+	+	+	13	+	+	+	+	23	
	Hemidactylus frenatus	Asian House Gecko			Int			-											e			
	Heteronotia binoei	Bynoe's Prickly Gecko						42	+	+	+	11	+	+	+	1	+	+	+	+	15	
	Heteronotia planiceps	North-west Prickly Gecko						-	+													
	Heteronotia spelea	Desert Cave Gecko						1.0	+	+	+	e	+	e	+	+	e	e	e	+	1	
Carphodactylidae	*Nephrurus levis*	Smooth Knob-tailed Gecko						6.1						e	e		+	e	e		20	
	Nephrurus laevissimus	Pale Knob-tailed Gecko						0.3									e	e				
	Nephrurus wheeleri cinctus	Banded Knob-tailed Gecko						4.3	+	+	+	e	+	+	e		+	+	e			
	Underwoodisaurus seorsus	Pilbara Barking Gecko						0.0					e					e				

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Diplodactylidae	*Crenadactylus "ocellatus"*	Clawless Gecko						1.3				e	e	e	e		e	e	e		+	
	Diplodactylus conspicillatus	Fat-tailed Gecko						30	+	+	+	96	+	e	+	1	+	e	e	e	27	
	Diplodactylus mitchelli	Pilbara Stone Gecko						2.4	+	+				e			e					
	Diplodactylus pulcher	Fine-faced Gecko						1.3		+		e	e	+	e		+	e	e			
	Diplodactylus savagei	Yellow-spotted Pilbara Gecko						11	+	+	+	e	e	+	e	e	e	e	+	+	+	
	Lucasium squarrosum	Spotted Ground Gecko						-			+			e							+	
	Lucasium stenodactylum	Sand-plain Gecko						1.0	+	+	+	17	+	+	e	3	+	+	+	+	24	
	Lucasium wombeyi	Pilbara Ground Gecko						17	+	+	+	+	+	e		+	e	+	+	+	+	
	Oedura marmorata	Marbled Velvet Gecko						1.0	+	+	+	e	+	e	e	e	+	e	e		+	
	Rhynchoedura ornata	Beaked Gecko						13	+	+	+	27	+	+	e	+	+	e	e	+	12	
	Strophurus assimilis (?)	Goldfields Spiny-tail Gecko						-									+					
	Strophurus ciliaris	Northern Spiny-tail gecko						1.7						e			+					
	Strophurus elderi	Jewelled Gecko						13	+	+	+	5	e	e	e	+	+	e	+	e	6	
	Strophurus jeanae	Southern Phasmid Gecko						1.0				1	e	e	e	e	+		e		1	
	Strophurus strophurus	Western Spiny-tail Gecko						0.7							e				e			
	Strophurus wellingtonae	Western Shield Spiny-tail Gecko						11	+	+	+	3	e	+	e	+	+	+	+			
	Strophurus wilsoni							0.3						e								
Pygopodidae	*Delma borea*							0.3						e	e				e			
	Delma butleri							0.3	+	+	+	e	e	e	e	e	e	e	+		+	
	Delma desmosa							0.7									+					
	Delma elegans							5.4	+	+	+	e	e	e	e	+	e	e	e		+	
	Delma haroldi							0.7	+	+		+	+	+	e	+	e	e	e			

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	Delma nasuta							5.7	+	+	+	e	e	+	e	+	+	+	+	e	e	
	Delma pax							8.1	+	+	+	+	e	+	e	2	+	+	+	+	5	
	Delma tincta							5.1		+	+	e	e	+	e	1	+	+	e		1	
	Lialis burtonis	Burton's Legless lizard						3.7	+	+	+	+	+	+	+	3	+	+	+	e	12	
	Pygopus nigriceps	Hooded Scaly-foot						0.7	+	+		+	e	+	e	+	+	+	e		+	
Scincidae	*Carlia munda*	Shaded-litter Rainbow Skink						25	+	+	+	1	e	+	+	+	+	+	+	+	9	
	Carlia triacantha	Rainbow Skink						6.1	+	+	+	e	e	+	e	+	+	e	e			
	Cryptoblepharus buchananii							0.7	+		+	e	e	+			e					
	Cryptoblepharus plagiocephalus							1.0		+			e	?	+	e	e	e	e		9	
	Cryptoblepharus ustulatus	Russet Snake-eyed Skink						0.0	+			e	+	+			e				+	
	Ctenotus ariadnae							1.3	+			16	e	e		e	+	e	e			
	Ctenotus atlas	Southern Mallee Ctenotus						-		+												
	Ctenotus brooksi							0.3									e					
	Ctenotus duricola	Pilbara Ctenotus						32	+	+	+	17	e	+	e	2	+	+	e	e	28	
	Ctenotus grandis titan	Titan Ctenotus						16	+		+	11	e	e	e	1	+	e	e	e	262	
	Ctenotus greeri							-		+							e					
	Ctenotus hanloni	Nimble Ctenotus						5.4		+	+	59	e	e	e		+	e	e			
	Ctenotus helenae (and aff.)	Clay-soil Ctenotus						39	+	+	+	e	e	+	e	4	+	e	e	e	50	
	Ctenotus leonhardii	Leonhard's Ctenotus						3.4	+	+	+	4	e	e	e	+	+	e	e			
	Ctenotus nasutus							1.0									e					
	Ctenotus nigrilineatus				P 1			0.0			+				e				e	e	2	
	Ctenotus pantherinus	Leopard Ctenotus						39	+	+	+	11	+	+	+	13	+	+	+		50	

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	Ctenotus piankai							-				e		e	e		e	e	+			
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus						0.7								e	+	e				
	Ctenotus robustus	Robust Ctenotus						2.6													+	
	Ctenotus rubicundus	Ruddy Ctenotus						11	+			e	e	e	+		e	+	e		+	
	Ctenotus rufescens	Rufous Finesnout Ctenotus						0.7											e			
	Ctenotus rutilans	Rusty-shouldered Ctenotus						1.7	+			8	e	+		+	e	+				
	Ctenotus saxatilis	Rock Ctenotus						59	+	+	+	37	+	+	+	7	+	+	+	+	91	
	Ctenotus schomburgkii	Barred Wedge-snout Ctenotus						1.3	+			e	e	+	e		+	e	e		+	
	Ctenotus serventyi							4.7				e	e	e	e	e	e	e	e		5	
	Ctenotus uber uber	Spotted Ctenotus						6.4	+	+	+	e	e	e		1	+	e				
	Ctenotus uber johnstonei (aff.)	Balgo Spotted Ctenotus			P 2	3		-	+						e		e		e			
	Cyclodomorphus melanops	Spinifex Slender Bluetongue						18	+	+	+	1	+	+	+	+	+	+	+	+	1	?
	Egernia cygnitos (desc 2011)	West Pilbara Spiny-tail Skink						5.7														
	Egernia depressa (s.l.)	Southern Pygmy Spiny-tailed Skink							+		+	e	e	e	e	+	e	e	e	e	1	
	Egernia formosa	Goldfields Crevice-skink						0.0	+		+	e	e	e	e		e	e	e		11	
	Egernia pilbarensis							0.7			+	e			e				e			
	Eremiascincus faciolatus	Narrow-banded Sandswimmer						0.0				e	e				e	e	e			
	Eremiascincus isolepis							3.0							e							
	Eremiascincus richardsonii	Broad-banded Sandswimmer						1.3	+	+	+	2	e	e	e	+	+	+	+		1	
	Lerista amicorum							7.4		+	+	7	e	?			+					

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	Lerista timida (=*'rhodonoides'*)									+		2	e	?			+					
	Lerista bipes (& aff.)	Northwestern Sandslider						21	+			29	e		e	+	+	e	e		51	
	Lerista clara							7.1													+	
	Lerista flammicauda(='*frost'i*)	Pilbara Flame-tailed Slider						5.1		+	+			e			e	+				
	Lerista ips							0.7									e					
	Lerista jacksoni							8.1				1	e	?						+	+	
	Lerista labialis							1.0		+	+	1	e	e	e		e	e				
	Lerista macropisthopus remota				P 2	4		-	+						e		e		e			
	Lerista muelleri	Wood-mulch Slider						18	+	+	+	4	e	+	+	1	e	+	+	e	11	
	Lerista neander	Newman Slider						1.7	+			e	e	e		1	+	e				
	Lerista verhmens							11												e		
	Lerista zietzi	Blue-tailed Skink						2.0	+			e	+	+	e	+	e	e				
	Liopholis inornata	Desert Skink						-									+					
	Liopholis kintorei	Great Desert Skink	VU	S 1			-	-									e					
	Liopholis striata	Night Skink						1.0						e	e		+				27	
	Menetia greyii	Common Dwarf Skink						38	+	+	+	8	e	+	+	2	+	+	e		5	
	Menetia surda	Western Dwarf Skink						22	+	+	+	e	e	+	e			e	e	e		
	Morethia ruficauda exquisita	Fire-tailed Skink						40	+	+	+	e	+	+	+	+	+	+	+	+	4	
	Notoscincus ornatus	Ornate Soil-crevice Skink						11			+	e	e	e	e		+	e	e	+	2	
	Proablepharus reginae	Western Soil-crevice Skink						5.7		+	+	e	e	e	e		e	e	e	e	4	
	Tiliqua multifasciata	Central Blue-tongue						8.8	+	+		e	+	+	+	2	+	e	+	e	22	
Varanidae	*Varanus acanthurus*	Ridge-tailed Monitor						30	+	+	+	1	e	+	+	7	+	+	+	e	23	
	Varanus brevicauda	Short-tailed Pygmy						19	+		+	e	e	e	+		+	e	e		17	

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		Monitor																				
	Varanus bushi	Pilbara Mulga Monitor						0.0				e	e	+			e					
	Varanus caudolineatus	Stripe-tailed Monitor						5.7	+	+	+	e	e	e	+	3	+	+	e			
	Varanus eremius	Pygmy Desert Monitor						9.8				6	e	e	e	e	+	e	e	e	4	+
	Varanus giganteus	Perentie						0.0		+	+	e	e	e	e	+	+	e	+	e	1+	+
	Varanus gilleni	Pygmy Mulga Monitor						0.0						e	e		+	e	e			
	Varanus gouldii	Sand Monitor						0.7	+	+	+	2+	e	e	e	1	+	e	e		7+	?
	Varanus panoptes	Yellow-spotted Monitor						0.3	+	+	+	1+	e	e	+	+	+	+	+		+	?
	Varanus pilbarensis	Pilbara Rock Monitor						1.3	+		+	+	e	e		e	e	e	e	e	2	
	Varanus tristis	Black-tailed Monitor						0.7	+	+	+	1+	e	+	+	2	+	+	+	+	3	
Typhlopidae	*Ramphotyphlops ammodytes*							21	+	+	+	e	e	e	+	e	e	+	e	e	5	
	Ramphotyphlops endoterus							-									e					
	Ramphotyphlops ganei				P 1	12		1.7	+	+	+	e	e	e	e	e	e	e	e		+	
	Ramphotyphlops grypus							17	+	+	+	e	e	e	+	+	+	+	+	e	2	
	Ramphotyphlops hamatus							3.0	+	+	+	e	e	+		1	+	+		+		
	Ramphotyphlops pilbarensis							1.7			+				e				e	e	2	
	Ramphotyphlops waitii							1.0		+		e	e	e			e	e				
Pythonidae	*Antaresia perthensis*	Pigmy Python						1.0	+	+	+	1	e	e	e	+	+	e	e	e	1	
	Antaresia stimsoni	Stimson's Python						0.0	+	+	+	+	e	e	e	+	e	e	e	e	4	
	Aspidites melanocephalus	Black-headed Python						0.3	+		+	+	+	+	+	+	e	e	e	e	1	
	Aspidites ramsayi	Woma		S 4				0.0										e	e			
	Liasis olivaceus barroni	Pilbara Olive Python	VU	S 1	VU	3	M	0.0	+		+	+	e	e	e	e	e	e	+		1	
Elapidae	*Acanthophis pyrrhus*	Desert Death Adder						0.0											e			

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	Acanthophis wellsi	Pilbara Death Adder						0.7	+	+	+	e	e	+	e		+	e	+	e	1+	
	Brachyurophis approximans	Pilbara Shovel-nosed Snake						2.0	+	+	+	+	e	e	e	+	e	+	e		1	
	Demansia psammophis	Yellow-faced Whipsnake						1.0	+	+	+	1	e	+	e	+	+	+	e	+	3	
	Demansia rufescens	Rufous Whipsnake						0.0	+			e	e	e		e	e	e	e			
	Demansia shinei	Shine's Whipsnake						-														
	Furina ornata	Moon Snake						0.3	+		+	e	e	e	e	e	+	+	+	e	1	
	Parasuta monachus	Monk Snake						0.0	+			2	e	+	e		e	e	e			
	Pseudechis australis	Mulga Snake						0.0	+	+	+	1	+	+	e	1	+	+	e	e	6+	
	Pseudonaja modesta	Ringed Brown Snake						1.3	+	+	+	e	e	e	e	+	+	e	e	e	1	
	Pseudonaja mengdeni	Gwardar						0.0	+	+	+	+	e	e	e	1	+	+	+	e	4	
	Simoselaps anomalus	Desert Banded Snake						1.3									e					
	Simoselaps bertholdi	Jan's Banded Snake						0.3									e					
	Suta fasciata	Rosen's Snake						0.0	+	+		e	+	e	e		e	e	e		+	
	Suta punctata	Spotted Snake						0.7	+	+	+		e	e	e	+	+	e	e	e	e	
	Vermicella snelli	Pilbara Bandy Bandy						0.3	+		+		e	+	e	e	e		e			
BIRDS																						
Casuariidae	*Dromaius novaehollandiae*	Emu						11	+	+	+	+	+	e	+	+	+	+	+	+	+	+
Phasianidae	*Coturnix pectoralis*	Stubble Quail						1.6	+		+	e		e	e	e	e		e			
	Coturnix ypsiliophora	Brown Quail						2.4	+		+	e	e	e	+	+	e	e	e	+		
Anseranatidae	*Anseranas semipalmata*	Magpie Goose						0.0	+							e	+					
Anatidae	*Dendrocygna eytoni*	Plumed Whistling Duck						0.3	+	+	+	e	e			e	e	e	e	e		
	Dendrocygna arcuata	Wandering Whistling Duck						0.0	+							e	e					
	Stictonetta naevosa	Freckled Duck						0.0	+							e	e					

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	Cygnus atratus	Black Swan						0.3	+			+		e	+	e	e	e	+		+	(+)
	Tadorna tadornoides	Australian Shelduck						0.0	+	+		+	e	e	+	+	e	e	e			
	Chenonetta jubata	Australian Wood Duck						0.0	+	+	+	e	e	e		+	e			e	+	
	Malacorhynchus membranaceus	Pink-eared Duck						0.0	+					e	+	+	e	e	e		+	
	Anas rhynchotis	Australian Shoveler						0.0	+							e	e					
	Anas gracilis	Grey Teal						0.3	+	+	+	+	e	e	+	e	+	e	e		+	
	Anas superciliosus	Pacific Black Duck						0.7	+	+	+	e	e	e	+	e	+	e	e	e	+	
	Aythya australis	Hardhead						0.0	+	+	+	e	e	e		e	e	+		e	+	
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe						0.0	+	+	+	e	e	e		e	e	e		e	+	(+)
	Poliocephalus poliocephalus	Hoary-headed Grebe						0.0	+		+	e	e	e		e	e			e		
	Podiceps cristatus	Great Crested Grebe						0.0	+							e	e					
Columbidae	*Phaps chalcoptera*	Common Bronzewing						4.7	+	+	+	e	+	+	+	+	+	+	+	e	+	
	Ocyphaps lophotes	Crested Pigeon						49	+	+	+	13	+	+	+	38	+	+	+	+	+	+
	Geophaps plumifera	Spinifex Pigeon						32	+	+	+	+	+	+	e	8	+	+	+	+	+	
	Geopelia cuneata	Diamond Dove						57	+	+	+	23	+	+	+	+	+	+	+	+	+	c
	Geopelia striata	Peaceful Dove						9.8	+	+	+	e	e	e	e	+	e	+	+	+	+	
	Geopelia humeralis	Bar-shouldered Dove						0.0	+	+	+						e					
Podargidae	*Podargus strigoides*	Tawny Frogmouth						3.0	+	+	+	e	e	e	+	+	+	+	e		+	
Eurostopodidae	*Eurostopodus argus*	Spotted Nightjar						7.1	+	+	+	+	+	+	+	+	+	+	+		+	
Aegothelidae	*Aegotheles cristatus*	Australian Owlet Nightjar						5.4	+	+	+	+	+	+	+	+	+	+	+	e	+	
Apodidae	*Apus pacificus*	Fork-tailed Swift	M	S 3			M	0.0				+	e	e	e	e	+	e	e			
Anhingidae	*Anhinga novaehollandiae*	Australian Darter						0.0				e	e	e		e	e	e				
Phalacrocoracidae	*Microcarbo*	Little Pied Cormorant						0.0				e	e	e		e	e	e				

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	melanoleucos																					
	Phalacrocorax carbo	Great Cormorant						0.0	+	+						e	e					(?)
	Phalacrocorax sulcirostris	Little Black Cormorant						0.0	+	+	+	e	e	e		+	+	+		e	+	(?)
	Phalacrocorax varius	Pied Cormorant						0.0	+							e	e					
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican						0.0	+	+	+	+				e	+			e	+	
Ciconiidae	*Ephippiorhynchus asiaticus*	Black-necked Stork						0.0	+	+	+	e	e			e		e		+	+	
Ardeidae	*Ardea pacifica*	White-necked Heron						0.3	+	+	+	e	+	+	+	+	e	+	e	e	+	
	Ardea modesta (=*alba*)	Great Egret	M	S 3			M	0.0				+	e	e		e	e	+	e		+	
	Ardea intermedia	Intermediate Egret						0.0	+							e	e					
	Ardea ibis	Cattle Egret	M	S 3			M	0.0	+	+		e				e	e	e	e			
	Egretta novaehollandiae	White-faced Heron						0.0	+			+	e	+	+	+	e	e	+	+	+	
	Egretta garzetta	Little Egret						0.0				e	e			e	e	e				
	Nycticorax caledonicus	Nankeen Night-heron						0.3	+	+		e	e	e		e	e	e		+	+	
Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis						0.0	+							e	e					
	Threskiornis molucca	Australian White Ibis						0.7	+					e			e					
	Threskiornis spinicollis	Straw-necked Ibis						0.0	+	+	+	+	e	e	+		e	e	e	e	+	(+)
	Platalea regia	Royal Spoonbill						0.0	+	+		e	e			e	e	+				
	Platalea flavipes	Yellow-billed Spoonbill						0.0	+	+		e	e	e		e	e		e			
Accipitridae	*Elanus axillaris*	Black-shouldered Kite						3.4				e	e	e	e	+	e	+	e		+	
	Lophoictinia isura	Square-tailed Kite						0.0				e	e		e	e	e	e	e			
	Hamirostra melanosternon	Black-breasted Buzzard						0.7	+	+	+	1	+	+	e	1	+	e	e			+
	Haliaeetus leucogaster	White-bellied Sea-eagle	M	S 3			-	0.7	+			e				e	e		e			
	Haliastur sphenurus	Whistling Kite						13	+	+	+	3	+	+	+	12	+	+	+	+	+	c
	Milvus migrans	Black Kite						0.7	+	+	+	3	e	e	+	2	+	e	e	e	+	

Family	Species	Common Name	EPBC Act status	WC Act status	DEC status	DEC Threatened fauna database	EPBC Act PMST	% PIL quadrats	NMap Newman +40km	NMap eastern Fortescue	NMap Roy Hill +40 km	Nyidinghu	Iron Valley	Hope Downs	Cloudbreak	BHP Jimblebar	FerrAus	Roy Hill	BCI Nullagine	Cookes Ck Nullagine	Abydos/W'stock	August 2012
	Accipiter fasciatus	Brown Goshawk						2.4	+	+	+	1	e	e	e	+	+	+	e		+	
	Accipiter cirrocephalus	Collared Sparrowhawk						1.6	+	+	+	2	e	e	+	e	+	+	e		+	
	Circus assimilis	Spotted Harrier						11	+	+	+	3	e	e	+	+	+	+	+		+	
	Circus approximans	Swamp Harrier						0.3	+				e	e	e	e	e		e			
	Aquila audax	Wedge-tailed Eagle						11	+	+	+	2	+	+	+	2	+	e	+	+	+	c
	Hieraeetus morphnoides	Little Eagle						3.0				+	+	+	+	1	+	+	+			+
Falconidae	*Falco cenchroides*	Australian Kestrel						26	+	+	+	1	+	+	+	1	+	+	+	+	+	c
	Falco berigora	Brown Falcon						28	+	+	+	+	+	+	+	16	+	+	+	+	+	+
	Falco longipennis	Australian Hobby						3.4	+	+	+	2	e	e	+	+	+	+	e		+	
	Falco hypoleucos	Grey Falcon			P 4	3		0.0		+	+	e	e	e	+		e	+	e			
	Falco peregrinus	Peregrine Falcon		S 4	S	9		0.3	+	+	+	+	e	+	+	e	+	+	e			
	Falco subniger	Black Falcon						0.0							e				e			
Rallidae	*Porphyrio porphyrio*	Purple Swamphen						0.0	+							+	e					
	Gallirallus philippensis	Buff-banded Rail						0.0	+	+	+	e	e			e	e	e				
	Porzana pusilla	Baillon's Crake						0.0	+							e	e					
	Porzana tabuensis	Spotless Crake						0.0	+			e		e		e	e					
	Tribonyx ventralis	Black-tailed Native Hen						0.0						e	+	+	e	e	e			
	Fulica atra	Eurasian Coot						0.0	+							e	e				+	
Otididae	*Ardeotis australis*	Australian Bustard			P 4	68		21	+	+	+	+	+	+	+	1	+	+	+	+	+	c
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew			P 4	7		2.4	+	+	+	e	e	e	e	1	+	+	+		+	+
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt						0.0	+		+	+	e	e		e	e		e	e	+	
	Recurvirostra novaehollandiae	Red-necked Avocet						0.0	+			+		e		e	e		e			
	Cladorhynchus leucocephalus	Banded Stilt						0.0	+							e	e		e			
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover						0.0				e		e		e	e		e			

Family	Species	Common Name	EPBC Act status	WC Act status	DEC status	DEC Threatened fauna database	EPBC Act PMST	% PIL quadrats	NMap Newman +40km	NMap eastern Fortescue	NMap Roy Hill +40 km	Nyidinghu	Iron Valley	Hope Downs	Cloudbreak	BHP Jimblebar	FerrAus	Roy Hill	BCI Nullagine	Cookes Ck Nullagine	Abydos/W'stock	August 2012
	Charadrius veredus	Oriental Plover	M	S 3			M	0.3				e					e		e			
	Charadrius australis	Inland Dotterel						0.0						e			e					
	Elseyornis melanops	Black-fronted Dotterel						1.3	+	+	+	+	e	e	+	+	e		+	+	+	
	Erythrogonys cinctus	Red-kneed Dotterel						0.0				e	e	e	+		e	+	e	+	+	
	Vanellus tricolor	Banded Lapwing						0.0						e			e				+	
Turnicidae	*Turnix velox*	Little Button-quail						25	+	+	+	47	+	+	+	+	6	+	e		+	c
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	M	S 3			-	0.0				e		e		e	e	e				
	Tringa nebularia	Common Greenshank	M	S 3			-	0.3	+			e		e		e	e				+	
	Tringa stagnatilis	Marsh Sandpiper	M	S 3			-	0.0	+			e				e	e					
	Tringa glareola	Wood Sandpiper	M	S 3			-	0.0	+							e	e	+			+	
	Calidris ruficollis	Red-necked Stint	M	S 3			-	0.0				e		e		e	e		e			
	Calidris subminuta	Long-toed Stint	M	S 3			-	0.0						e		e	e					
	Calidris melanotos	Pectoral Sandpiper	M	S 3			-	0.0	+					e								
	Calidris acuminata	Sharp-tailed Sandpiper	M	S 3			-	0.0	+					e		e	e					
	Calidris ferruginea	Curlew Sandpiper	M	S 3			-	0.0	+							e	e					
Glareolidae	*Glareola maldivarum*	Oriental Pratincole	M	S 3			-	0.0				e										
	Stiltia isabella	Australian Pratincole						0.7	+	+	+	e			e	e	e		e			
Laridae	*Gelochelidon nilotica*	Gull-billed Tern						0.7				+				e	e					
	Hydroprogne caspia (=Sterna caspia)	Caspian Tern	M	S 3			-	0.0								e	e					
	Chlidonias hybrida	Whiskered Tern						0.0				+		e		e	e					
	Chroicocephalus novaehollandiae	Silver Gull						0.0	+					e		e	e					
Cacatuidae	*Calyptorhynchus banksii*	Red-tailed Black Cockatoo						0.0												+		
	Eolophus roseicapillus	Galah						47	+	+	+	72	+	+	+	+	+	+	+	+	+	+

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	Cacatua sanguinea	Little Corella						16	+	+	+	17	+	+	+	42	+	+	+	+	+	+
	Nymphicus hollandicus	Cockatiel						27	+	+	+	259	+	+	+	+	+	+	+	+	+	c
Psittacidae	*Polytelis alexandrae*	Princess Parrot	VU		P4		M	0.0									e		e			
	Barnardius zonarius	Australian Ringneck						28	+	+	+	14	+	+	+	7	+	+	+	+	+	+
	Psephotus varius	Mulga Parrot						0.7				e		e		e	+	e				
	Melopsittacus undulatus	Budgerigar						53	+	+	+	1244	+	+	+	2	+	+	e	+	+	c
	Neopsephotus bourkii	Bourke's Parrot						1.3	+	+	+	e	e	e	+	+	+	e	e			
	Neophema elegans	Elegant Parrot						0.3				e		e					e			
	Pezoporus occidentalis	Night Parrot	EN	S1	CR	1	L	0.0				e	e	e	+		e	e	e			
Cuculidae	*Centropus phasianinus*	Pheasant Coucal						0.7		+	+			e	e	+	e	e	e	+	+	
	Chalcites osculans	Black-eared Cuckoo						2.7	+			e	e	e	e	+	+	+	+			
	Chalcites basalis	Horsfield's Bronze-Cuckoo						23	+		+	2	+	+	+	+	+	+	e	e	+	
	Cacomantis pallidus	Pallid Cuckoo						24	+	+	+	6	+	+	+	+	+	+	+	+	+	
	Cacomantis flabelliformis	Fan-tailed Cuckoo						0.0								e						
Strigidae	*Ninox connivens*	Barking Owl						1.7	+			e	e	+	e	e	e	e	e	e		
	Ninox novaeseelandiae	Southern Boobook						4.4	+	+	+	+	+	+	+	2	+	+	+	+	+	
Tytonidae	*Tyto javanica*	Eastern Barn Owl						1.0	+	+	+	+	e	e	+	1	+	+	e			
Halcyonidae	*Dacelo leachii*	Blue-winged Kookaburra						9.8	+	+	+	e	e	+	+	+	+	+	+	+	+	
	Todiramphus sanctus	Sacred Kingfisher						8.1	+	+	+	e	e	+	e	+	e	e	+	+	+	?
	Todiramphus pyrrhopygia	Red-backed Kingfisher						15	+	+	+	2	+	+	+	1	+	+	+		+	?
Meropidae	*Merops ornatus*	Rainbow Bee-eater	M	S3			M	35	+	+	+	14	+	+	+	12	3	+	+	+	+	(+)
Climacteridae	*Climacteris melanura*	Black-tailed Treecreeper						2.0	+	+		e		e	e	+	e	e	e	+		
Ptilonorhynchidae	*Ptilonorhynchus guttatus*	Western Bowerbird						10		+	+	+	e	+	e	+	+	e	e	e	+	
Maluridae	*Malurus splendens*	Splendid Fairy-wren						0.7	+			e		+		e	+					

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	Malurus leucopterus	White-winged Fairy-wren						28	+	+	+	19	+	+	+	2	+	+	e	e	+	+
	Malurus lamberti	Variegated Fairy-wren						43	+	+	+	22	+	+	+	2	+	+	+	+	+	+
	Stipiturus ruficeps	Rufous-crowned Emu-wren						7.7				e	+	+	+	+	+	e	e		+	
	Amytornis striatus whitei	Striated Grasswren						8.8	+	+	+	e	e	+	e	4	+	+	+	+	+	
Acanthizidae	*Calamanthus campestris*	Rufous Fieldwren						0.0						e			e					
	Pyrrholaemus brunneus	Redthroat						4.0	+	+	+	e	e	+	e	e	e	e	e			
	Smicrornis brevirostris	Weebill						25	+	+	+	17	+	+	+	2	+	+	+	+	+	+
	Gerygone (fusca) fusca	Western Gerygone						11		+	+	2	e	+	+	2	+	+	e	+	+	
	Gerygone (fusca) mungi	Desert Gerygone						-	+													
	Acanthiza robustirostris	Slaty-backed Thornbill						4.7	+	+	+	e	e	e	+	+	+	+	e			
	Acanthiza uropygialis	Chestnut-rumped Thornbill						13	+	+		6	e	+	+	+	+	+	e	e		
	Acanthiza apicalis	Broad-tailed (Inland) Thornbill						2.0	+	+	+	e	e	+		3	+	e				
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill						2.4	+	+	+	e	e	e		+	+	e		+		
	Aphelocephala leucopsis	Southern Whiteface						0.0	+					e	+	e	+	e	e			
	Aphelocephala nigricincta	Banded Whiteface						0.0		+				e			+					
Pardalotidae	*Pardalotus rubricatus*	Red-browed Pardalote						18	+	+	+	6	+	e	e	+	+	+	+	+	+	+
	Pardalotus striatus	Striated Pardalote						8.8	+	+	+	2	e	+	+	+	e	e	e	+	+	
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater						3.0	+	+	+	e	e	e	e	+	+	+	+		+	
	Lichenostomus virescens	Singing Honeyeater						78	+	+	+	50	+	+	+	10	+	+	+	+	+	+
	Lichenostomus keartlandi	Grey-headed Honeyeater						31	+	+	+	5	+	+	+	5	+	+	+	+	+	
	Lichenostomus plumulus	Grey-fronted Honeyeater						0.0						+	+	+	e	e	e	e	+	
	Lichenostomus	White-plumed						22	+	+	+	31	+	+	+	6	+	+	+	+		+

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	penicillatus	Honeyeater																				
	Purnella albifrons	White-fronted Honeyeater						0.3				e	e	e		+	e	e				
	Manorina flavigula	Yellow-throated Miner						52	+	+	+	+	+	+	+	25	+	+	+	+	+	+
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater						27	+	+	+	+	e	+	+	+	+	+	+	+		+
	Conopophila whitei	Grey Honeyeater						0.3	+	+		e	e	e	e	e	+	e	e	+		
	Sugomel niger	Black Honeyeater						4.4	+	+		3	+	e	e	+	+	+	+			
	Ephthianura tricolor	Crimson Chat						11	+	+	+	17	+	e	e	+	+	+	e		+	
	Ephthianura aurifrons	Orange Chat						0.7	+	+	+	e	e	e	+		e		e			
	Lichmera indistincta	Brown Honeyeater						34	+	+	+	5	+	+	+	+	+	+	+	+	+	
	Melithreptus gularis	Black-chinned Honeyeater						4.4	+			e	e	+	+	+	e		e	+		
	Melithreptus brevirostris	Brown-headed Honeyeater						0.0			+											
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler						22	+	+	+	17	e	+	+	4	+	+	+	+	+	
	Pomatostomus superciliosus	White-browed Babbler						2.4	+	+	+	e	e	+	+	+	+	+	e	+		
Eupetidae	*Cinclosoma castaneothorax*	Chestnut-breasted Quail-thrush						3.7		+	+	e	e	e	e	e	+	+	e	e		
	Psophodes occidentalis	Chiming Wedgebill						2.4	+	+		e	e	e	e	e	e	e	e			
Neosittidae	*Daphoenositta chruysoptera*	Varied Sittella						1.0		+	+	e	e	e	+		+	e	e			
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike						53	+	+	+	3	+	+	+	5	+	+	+	+	+	+
	Coracina maxima	Ground Cuckoo-shrike						2.4	+		+	e	e	+	+	+	+	+	e		+	
	Lalage sueurii	White-winged Triller						20	+	+	+	31	+	+	+	+	+	+	e		+	
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler						38	+	+	+	24	+	+	+	6	+	+	+	+	+	+
	Colluricincla harmonica	Grey Shrike-thrush						24	+	+	+	2	+	+	+	7	+	+	+	+	+	+

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	Oreoica gutturalis	Crested Bellbird						41	+	+	+	1	e	+	+	+	+	+	+	+		
	Oreoica g. gutturalis	Cr. Bellbird (southern)			P 4	2				+	+											
Artamidae	*Artamus leucorynchus*	White-breasted Woodswallow						0.0						e								
	Artamus personatus	Masked Woodswallow						19	+	+	+	80	+	+	e	3	+	+	e	+	+	
	Artamus superciliosus	White-browed Woodswallow						0.0	+			e				e	e	e				
	Artamus cinereus	Black-faced Woodswallow						64	+	+	+	96	+	+	+	7	+	+	+	+	+	
	Artamus cyanopterus	Dusky Woodswallow						0.0	+					e			e					
	Artamus minor	Little Woodswallow						6.7	+	+	+	e	+	+	e	+	+	+	e	e	+	c
	Cracticus torquatus	Grey Butcherbird						15	+	+	+	+	e	+	+	+	+	+	e		+	
	Cracticus nigrogularis	Pied Butcherbird						51	+	+	+	12	+	+	+	11	+	+	+	+	+	+
	Cracticus tibicen	Australian Magpie						14	+	+	+	+	+	+	+	13	+	+	+	+	+	
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail						4.7	+			e	+	+	+	e	e	+	e			
	Rhipidura leucophrys	Willie Wagtail						67	+	+	+	20	+	+	+	12	+	+	+	+	+	+
Corvidae	*Corvus coronoides*	Australian Raven						0.0		+	+					e	+					
	Corvus bennetti	Little Crow						11	+	+	+	1	e	+	+	+	e	+	+	+	+	+
	Corvus orru	Torresian Crow						45	+	+	+	7	+	+	+	8	+	+	+	+	+	+
Monarchidae	*Grallina cyanoleuca*	Magpie-Lark						25	+	+	+	14	+	+	+	4	+	+	+	+	+	+
Petroicidae	*Petroica goodenovii*	Red-capped Robin						5.1	+	+	+	1	e	+	+	3	+	+	e			
	Melanodryas cucullata	Hooded Robin						13		+	+	3	+	+	+	2	+	+	e	e		
Alaudidae	*Mirafra javanica horsfieldii*	Horsfield's (Singing) Bushlark						19	+	+	+	8	+	e	+	1	+	+	+		+	
Acrocephalidae	*Acrocephalus australis*	Australian Reed-warbler						0.3	+		+	e	e			+	e	e	+	e	+	
Megaluridae	*Megalurus gramineus*	Little Grassbird						0.0	+					e	e	e	e		e			
	Cincloramphus mathewsi	Rufous Songlark						7.4	+	+	+	e	+	e	e	+	+	+	e	e	+	

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	Cincloramphus cruralis	Brown Songlark						4.4	+	+	+	e	+	e	+	+	+	e	e	e	+	
	Eremiornis carteri	Spinifexbird						42	+	+	+	3	+	+	+	1	e	+	+	+	+	
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow						0.7	+			e		e		4	+	e	e			
	Hirundo neoxena	Welcome Swallow						1.0	+			e	e	e	e	e	e	e	e			
	Petrochelidon ariel	Fairy Martin						13	+			+	e	e	+	e	e	e	e		+	
	Petrochelidon nigricans	Tree Martin						8.8				2	e	+	e	e	+	+	+	+	+	
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird						13	+	+	+	1	e	e	+	+	+	+	e		+	
Estrildidae	*Taeniopygia guttata*	Zebra Finch						82	+	+	+	367	+	+	+	25	+	+	+	+	+	c
	Neochmia ruficauda subclarescens	Star Finch (western)			P 4			0.3	+			e	e	e	+	e	e	+	+	e		
	Emblema pictum	Painted Finch						51	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit						23	+	+	+	+	e	+	+	1	+	+	+		+	

Appendix Five: Literature Review

Table 18: Reports reviewed for vegetation significance and summary of findings relevant to the Study Area

Author/Year Reference	Report Title	Summary of report findings of relevance to the Study Area
Environmental Protection Authority (2012a)	*FerrAus Pilbara Project. Report and Recommendations of the Environmental Protection Authority. Report 1449*	The FerrAus project area is intersects the Study Area approximately 26 km north of Newman, and follows the Marble Bar Road to the north of this point. Broadly, the EPA considers impacts on vegetation consisting of the partly groundwater dependent *Eucalyptus camaldulensis* and *E. victrix* may be significant (but can be managed), although it appears likely that this refers to vegetation on the Fortescue River floodplain rather than an overall assessment of significance.
Environmental Protection Authority (2012b)	*Yandicoogina Iron Ore Project – expansion to include Junction south West and Oxbow Deposits. Report and Recommendations of the Environmental Protection Authority. Report 1448*	Riparian vegetation is considered significant.
Fortescue Metals Group (2012)	*IO Direct Shipping Ore Project: Referral and supporting information*	The IO area is approximately 65 km from the Study Area. Fortescue Metals Group considered impacts on Mulga communities, particularly sheet flow dependent vegetation.
Fortescue Metals Group (2011)	*Significant Flora, Vegetation, Fauna and Fauna Habitats of the Special Rail Licence*	This report summarized the findings of a number of biological surveys in the Pilbara, although at closest the relevant area is approximately 75 km to the west and north-west. Mulga vegetation types were considered to have high conservation significance.
G&G Environmental Pty Ltd (2011)	*Flora and vegetation surveys of the FerrAus Limited rail corridor options*	The report survey area crosses the Study Area. Vegetation on the Fan and Divide (and others) were considered to potentially have moderate conservation value. G&G interpreted Biota (2004b) as considering vegetation on sand dunes of the Hamersley Range and Fortescue Plain as being locally significant (although the Biota survey area was approximately 100 km from the Study Area).
Mattiske Consulting Pty Ltd (2011)	*Review of Flora and Vegetation Along Weeli Wolli, Mindy Mindy and Coondiner Creeklines*	Mainly and flora and vegetation monitoring report. No vegetation significance was discussed.
Biota Environmental Sciences (2010)	Vegetation and Flora Surveys of the Oxbow and Junction South West Deposits, near Yandicoogina	Vegetation providing habitat for TF and creekline vegetation was considered of high conservation significance and vegetation providing habitat for PF was considered of moderate conservation significance.
EPA (2010)	*Jimblebar Iron Ore Project, BHP Billiton Iron Ore Pty Ltd. Report and recommendations of the Environmental Protection Authority*	All vegetation occurring at Jimblebar was well represented in the local area and region (including Mulga). Groundwater was more than 50 m below the surface so creekline vegetation was not considered a GDE.

Author/Year Reference	Report Title	Summary of report findings of relevance to the Study Area
Strategen (2010)	*Hope Downs 4 Iron Ore Project. Public Environmental Review*	No vegetation was considered to be restricted to the locality (approximately 25 km from Newman). Vegetation associated with creeklines and Mulga/Spinifex was considered locally significant.
Ecologia Environment (2009)	Brockman Resources Limited Marillana (E47/1408) Vegetation and Flora Report Version 5	Vegetation of the Fortescue land system was considered to have conservation significance, however this land system does not occur within the Study Area.
Mattiske Consulting Pty Ltd (2009)	*Flora and Vegetation on the Creeklines (Coondiner, Kalgan, Mindy Mindy and Unnamed) Associated with Hope Downs 4*	Creekline vegetation (dominated by *Eucalyptus camaldulensis* and *E. victrix* or *E. victrix*) was considered to be dependent on seasonal surface water flows and groundwater.
Mattiske Consulting (2008a)	*Flora and Vegetation of the Hope Downs 4 Mine and Infrastructure Corridor*	Vegetation providing habitat for PF or species range extensions was considered to be locally significant. Creekline vegetation was considered significant due to it providing fauna habitat.
Mattiske Consulting (2008b)	*Flora and Vegetation on the Hope Downs 4 Mine and Village/Camp Area*	The Mattiske study area was approximately 65 km north-west of Newman. Mulga and Mulga-Spinifex communities, and creekline communities are considered to have conservation significance as they support populations of PF.
Biota Environmental Sciences	*Hope Downs rail corridor (Juna Downs section) vegetation and flora survey*	The Biota study area is approximately 100 km west of Newman. Vegetation providing habitat for PF and Mulga were considered of the highest conservation significance.
Environmental Protection Authority (2005)	*Pilbara Iron Ore & Infrastructure Project: East-West Railway and Mine Sites (Stage B). Report and Recommendations of the Environmental Protection Authority. Bulletin 1202*	80 broad vegetation types were identified, with vegetation of key interest being phreatophytic (*Eucalyptus camaldulensis*, *Melaleuca argentea* or *E. victrix* dominated).
Biota Environmental Sciences (2004a)	*Fortescue Metals Group Stage B Rail Corridor, Christmas Creek, Mt Lewin, Mt Nicholas and Mindy Mindy Mine Areas*	The survey area is approximately 40 km north of the Study Area. Biota considers their survey area to have high conservation value for overall flora and moderate to high conservation value for significant flora, and Mulga vegetation types to be of high or very high conservation significance.
Van Vreeswyk *et al.* (2004)	'*Vegetation*' in Technical Bulletin 92 - An inventory and condition survey of the Pilbara region, Western Australia	The only vegetation considered of significance is now listed as either TEC or PECs
van Leeuwen & Bromilow (2002)	*Botanical Survey of Hamersley Range Uplands*	Eighty Hamersley Range summits were included in the report, including one ('Eastern Ridge') north-north-east of Newman. The summits near Newman were considered to be included in a floristic group that was also east of Tom Price and represented by several summits in the south-western portion of Karijini National Park.
Trudgen & Casson (1998)	*Flora and Vegetation Surveys of Orebody A and Orebody B in the West Angelas Hill Area, an Area Surrounding Them, and of Rail Route Options*	A number of vegetation types identified from the study area were considered to have conservation significance, including: • some riparian vegetation • vegetation associated with seeps

Author/Year Reference	Report Title	Summary of report findings of relevance to the Study Area
	Considered to Link Them to the Existing Robe River Iron Associates Rail Line	• some grasslands on clay soils (including vegetation that is now considered a TEC and PEC) • some Mulga vegetation types.

Appendix Six: Conservation Significant Flora Risk Assessment

Table 19: Conservation Significant Flora Risk Assessment

Species	Cons Code	Soil	Landform	Vegetation	Soil Type Present	Landform Present	Associated Vegetation Present	Known from Nearby	Likelihood of Occurring in the Study Area
Lepidium catapycnon	T	Skeletal soils	Hillsides	*Eucalyptus leucophloia, Acacia bivenosa, A. inaequilatera, A. pruinocarpa, Triodia* spp.	Y	N	Y	Y	Possible
Pityrodia augustensis	T	Sandstone, granite, sand	Gully, slope, hilltop	*Acacia* spp., *Eucalyptus camaldulensis/Corymbia ferriticola, Eremophila* spp.	N	N	N	N	None (Rare)
Thryptomene wittweri	T	Skeletal red stony soils	Breakaways, stony creek beds	*Eucalyptus kingsmillii*	Y	N	N	N	Almost none
Aristida jerichoensis var. *subspinulifera*	P1	Hardpan	Plain	Mulga, *Acacia falcata, Triodia epactia, Eragrostis cumingii*	N	Y	Y	Y	Possible
Bothriochloa decipiens var. *cloncurrensis*	P1	Clay, loam	Damp depression; clay plain	Mulga, *Eucalyptus camaldulensis*	N	Y	Y	N	Unlikely
Brachyscome sp. Wanna Munna Flats (S. van Leeuwen 4662)	P1	Red brown clay	Flat	Mulga, grasses	Y	Y	Y	Y	Almost certain
Brunonia sp. Long hairs (D.E. Symon 2440)	P1	Clay	Creeklines	*Acacia* sp. (trees)	Y	Y	U	Y	Possible
Calotis squamigera	P1	Pebbly loam	Plain	Mulga, *Acacia xiphophylla*	N	Y	Y	Y	Possible
Cochlospermum sp. Pilbara (D. Brassington, E. Agar & J. Macknay LCH 31756) PN	P1	Granite	Hill		N	N	U	N	None (Rare)
Eragrostis sp. Mt Robinson (S.van Leeuwen 4109)	P1	Red-brown skeletal soils, ironstone	Steep slopes, summits	*Eucalyptus kingsmillii*	Y	N	N	U	Unlikely
Eremophila pilosa	P1	Loamy soil	Depression in sandplain	*Triodia pungens, T. basedowii, T. longiceps*	Y	Y	N	Y	Possible
Eremophila sp. Hamersley Range (K. Walker KW 136) PN	P1	Loam, ironstone	Hill crest, cliff top, gorge top	Mulga	Y	N	Y	Y	Possible

Species	Cons Code	Soil	Landform	Vegetation	Soil Type Present	Landform Present	Associated Vegetation Present	Known from Nearby	Likelihood of Occurring in the Study Area
Eremophila sp. Snowy Mountain (S. van. Leeuwen 3737)	P1	Ironstone	High hills, summits	*Eucalyptus leucophloia*	Y	N	Y	N	Unlikely
Eremophila sp. West Angelas (S. van Leeuwen 4086)	P1	Banded ironstone	High hills, summits	*Eucalyptus kingsmillii*, Mulga	N	N	N	Y	Almost none
Eremophila spongiocarpa	P1	Weakly saline alluvium	Alluvial plain on margins of marsh	Samphire	N	N	N	N	None (Rare)
Eucalyptus lucens	P1	Ironstone rocks	Rocky slopes and mountain tops, high in the landscape	*Eucalyptus kingsmillii*	Y	N	N	N	Almost none
Genus sp. Hamersley Range hilltops (S van Leeuwen 4345)	P1	Skeletal, brown gritty soil over ironstone	Hill summit	*Eucalyptus leucophloia, Triodia* spp.	Y	N	N	N	Almost none
Goodenia pallida	P1	Red soil		Annual grassland, *Acacia* scrub-steppe	N	U	U	N	None (Rare)
Grevillea sp. Turee (J. Bull & G. Hopkinson ONS JJ 01.01) PN	P1	Loam, rocky soil, banded ironstone	Steep scree slope, hillcrest of low foothill	*Acacia aneura* open woodland	Y	N	N	N	Unlikely
Gunniopsis sp. Fortescue (M.E. Trudgen 11019)	P1				U	U	U	N	None (Rare)
Helichrysum oligochaetum	P1	Red clay	Alluvial plains	*Eucalyptus camaldulensis, Gossypium* sp. etc.	Y	Y	Y	Y	Almost certain
Hibiscus sp. Mt Brockman (E. Thoma ET 1354) PN	P1		Gorges		N	N	U	N	None (Rare)
Myriocephalus scalpellus	P1	Clay	Floodplain		N	N	U	Y	Almost none
Nicotiana heterantha	P1	Black clay	Seasonally wet flats	*Eucalyptus victrix, Melaleuca* spp., samphire	N	N	N	Y	Almost none
Peplidium sp. Fortescue Marsh (S. van Leeuwen 4865)	P1	Stony clay	Saline flat	*Halosarcia indica, H. halocnemoides, H. auriculata, Eremophila spongiocarpa*	N	N	N	Y	Almost none
Sida sp. Hamersley Range (K. Newbey 10692)	P1	Skeletal soil; ironstone	Hilltops, cliffs, scree	*Eucalyptus leucophloia, Eucalyptus gamophylla*	Y	N	Y	N	Unlikely
Stemodia sp. Battle Hill (A.L. Payne 1006)	P1	Cracking clay	Floodplains	*Eriachne, Eragrostis* spp.	N	N	N	Y	Possible
Tecticornia globulifera	P1		Samphire flats	Samphire	N	N	N	N	None (Rare)

Species	Cons Code	Soil	Landform	Vegetation	Soil Type Present	Landform Present	Associated Vegetation Present	Known from Nearby	Likelihood of Occurring in the Study Area
Tecticornia sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)	P1	Red clayey sands	Floodway	Samphire	N	N	N	Y	Almost none
Tetratheca fordiana ms	P1	Shale pocket amongst ironstone	Midslope	*Eucalyptus kingsmillii*	Y	N	N	N	Unlikely
Teucrium pilbaranum	P1	Clay	Crab hole plain in a river floodplain, margin of calcrete table	*Eucalyptus camaldulensis, Eucalyptus victrix, Chrysopogon fallax*	N	N	Y	N	Almost none
Triodia triticoides	P1	Red sandstone, limestone	Hillslopes		N	N	N	N	None (Rare)
Vittadinia sp. Coondewanna Flats (S. van Leeuwen 4684)	P1	Clay loam soils	Plain	Mulga	Y	Y	Y	N	Unlikely
Adiantum capillus-veneris	P2	Rocky	Moist, sheltered sites in gorges and on cliff walls	Unknown	Y	N	N	N	None (Rare)
Aristida lazaridis	P2	Sand, loam	Crest	*Eucalyptus leucophloia*	Y	N	N	N	Unlikely
Cladium procerum	P2	Loam, gravel	Perennial pools	Unknown	Y	N	U	N	Almost none
Dicladanthera glabra	P2	Alluvium	Watercourses, near rock pools		Y	N	U	N	Almost none
Eremophila forrestii subsp. Pingandy (M.E. Trudgen 2662)	P2	Stony soil	Slopes, low in landscape	Mulga	Y	Y	N	N	Unlikely
Gompholobium karijini	P2	Shale, red brown gravelly loam	Hilltop	*Eucalyptus leucophloia*	Y	N	N	N	Almost none
Hibiscus sp. Gurinbiddy Range (M.E. Trudgen MET 15708) PN	P2	Skeletal red brown stony soil over massive ironstone	Hilltops, high in landscape	*Eucalyptus kingsmillii*	Y	N	N	Y	Unlikely
Isotropis parviflora	P2		Valley slope of ironstone plateau	*Corymbia hamersleyana, Triodia basedowii*	U	N	Y	Y	Possible
Oxalis sp. Pilbara (M.E. Trudgen 12725)	P2	Red-brown pebbly/rocky loam amongst boulders	Gullies	*Acacia* spp, *Eucalyptus leucophloia*	Y	N	N	N	Almost none
Paspalidium retiglume	P2	Clay; cracking	Plain	Grassland/herbland	Y	Y	Y	N	Unlikely
Pilbara trudgenii	P2	Skeletal, red stony soil over ironstone	Hill summits, steep slopes, screes, cliff faces	*Eucalyptus kingsmillii*	Y	N	N	N	Almost none

Species	Cons Code	Soil	Landform	Vegetation	Soil Type Present	Landform Present	Associated Vegetation Present	Known from Nearby	Likelihood of Occurring in the Study Area
Scaevola sp. Hamersley Range basalts (S. van Leeuwen 3675)	P2	Skeletal, brown gritty soil over basalt	Summits of hills, steep hills	*Eucalyptus kingsmillii*	Y	N	N	N	Almost none
Spartothamnella puberula	P2	Rocky loam, sandy or skeletal soils, clay	Gorge, gully	*Acacia* spp.	Y	N	N	N	Almost none
Acacia daweana	P3	Stony red loamy soils	Low rocky rises, along drainage lines	*Acacia* spp, *Eucalyptus* spp.	Y	Y	Y	N	Unlikely
Acacia effusa	P3	Red stony loam	Scree, low ranges	*Eucalyptus leucophloia*, *Acacia. bivenosa, Triodia basedowii, Themeda triandra*	Y	N	Y	N	Unlikely
Acacia glaucocaesia	P3	Red loam, sandy loam, clay	Floodplain	*Eucalyptus camaldulensis, Acacia bivenosa*	Y	Y	Y	N	Unlikely
Acacia subtiliformis	P3	Rocky calcrete plateau	Plateau	*Triodia* spp.	N	N	Y	Y	Unlikely
Amaranthus centralis	P3		River banks	*Eucalyptus camaldulensis, *Cenchrus ciliaris*, Mulga, grasses	Y	Y	Y	Y	Almost certain
Ampelopteris prolifera	P3	Wet	Gorges	*Eucalyptus victrix, Eucalyptus camaldulensis*	Y	N	Y	N	Almost none
Astrebla lappacea	P3	Clay, loam	Plain	*Astrebla* spp., Mulga, *Acacia xiphophylla*	N	Y	N	N	Almost none
Atriplex flabelliformis	P3	Clay loam, loam, saline	Saline flats, marshes	Samphire	N	N	N	N	None (Rare)
Calotis latiuscula	P3	Sand, loam	Plain	Mulga	Y	Y	Y	N	Unlikely
Crotalaria smithiana	P3		Floodplain	Mulga, *Astrebla* spp., *Aristida contorta*	U	Y	Y	Y	Possible
Dampiera anonyma ms	P3	Skeletal red-brown to brown gravelly soil over banded ironstone, basalt, shale and jaspilite	Hill summits, upper slopes	*Eucalyptus kingsmillii, Acacia hamersleyana*	N	N	N	N	None (Rare)
Dampiera metallorum	P3	Skeletal red-brown gravely soils over banded ironstone	Steep slopes and summits	*Eucalyptus kingsmillii*	Y	N	N	N	None (Rare)
Elatine macrocalyx	P3	Shallow sand over clay	Edge of playa lakes, clay pans	*Eucalyptus victrix*	N	N	Y	N	Almost none
Eragrostis crateriformis	P3	Clayey loam or clay	Creek banks, depressions	*Triodia epactia, Eucalyptus victrix*	N	Y	N	N	None (Rare)

Species	Cons Code	Soil	Landform	Vegetation	Soil Type Present	Landform Present	Associated Vegetation Present	Known from Nearby	Likelihood of Occurring in the Study Area
Eragrostis surreyana	P3	Red-brown clay	Drainage line	*Eucalyptus victrix, Eucalyptus camaldulensis, Cyperus vaginatus*	N	N	N	N	None (Rare)
Eremophila forrestii subsp. *viridis*	P3	Unknown	Sandplain	Unknown	U	Y	U	N	Almost none
Eremophila magnifica subsp. *velutina*	P3	Skeletal soils over ironstone	Summits	*Eucalyptus kingsmillii*	Y	N	N	Y	Possible
Eremophila rigida	P3	Clayey loam, clay	Creek beds, depressions	Mulga	N	Y	Y	Y	Almost certain
Euphorbia inappendiculata	P3	Clay	Rock screes	*Triodia epactia, Acacia xiphophylla*	N	N	Y	N	Almost none
Euphorbia stevenii	P3	Clay, sand	Slope, plain	*Aristida* sp.	Y	Y	Y	N	Unlikely
Fimbristylis sieberiana	P3	Mud, skeletal soil pockets	Pool edges, sandstone cliffs	*Cyperus vaginatus*	N	N	U	N	Almost none
Geijera salicifolia	P3	Skeletal soils, stony soils	Massive rock scree, gorges	Mulga	N	N	Y	N	None (Rare)
Glycine falcata	P3	Black clayey sand	Floodplains; depressions in crabhole plains on river	Grassland; *Eriachne* spp.	N	N	N	N	None (Rare)
Goodenia lyrata	P3	Red sandy loam	Claypan	Mulga	Y	N	Y	N	Unlikely
Gymnanthera cunninghamii	P3	Sand, calcrete, clay loam	Drainage line	*Eucalyptus camaldulensis, Eucalyptus victrix, Acacia citrinoviridis*	Y	Y	Y	Y	Almost certain
Indigofera gilesii subsp. *gilesii*	P3	Pebbly loam amongst boulders & outcrops	Hills	*Eucalyptus leucophloia, Corymbia hamersleyana, Corymbia ferriticola*	Y	N	N	Y	Possible
Indigofera sp. Bungaroo Creek (S. van Leeuwen 4301)	P3	Alluvium, skeletal ironstone	Creeks and gorges	Not given	Y	N	N	N	Almost none
Iotasperma sessilifolium	P3	Cracking clay, black loam	Edges of waterholes, plains	Grassland, *Eriachne* spp., *Astrebla* spp., *Eucalyptus victrix*	N	N	Y	Y	Possible
Nicotiana umbratica	P3	Shallow	Rocky outcrops		Y	N	U	N	Almost none
Oldenlandia sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	Cracking clay, basalt	Gently undulating plain with large surface rocks, flat	*Astrebla* grassland; Mulga	N	N	Y	N	Almost none

Species	Cons Code	Soil	Landform	Vegetation	Soil Type Present	Landform Present	Associated Vegetation Present	Known from Nearby	Likelihood of Occurring in the Study Area
			crabholed plain						
Olearia mucronata	P3	Schist	Schistose hills, along drainage channels	Mulga; grassland	N	N	Y	N	Almost none
Phyllanthus aridus	P3	Sandstone, gravel, red sand	Sandplain, hills	Coastal	N	N	N	N	None (Rare)
Polymeria distigma	P3	Sand, clay	Coastal plain	*Acacia* spp., grasses	Y	N	N	N	Almost none
Ptilotus subspinescens	P3	Rocky	Gentle rocky slopes, screes and the bases of screes	Unknown	Y	N	U	N	Almost none
Rhagodia sp. Hamersley (M. Trudgen 17794)	P3	Clay loam, sand loam, colluvium	Floodplain / lower slopes	Mulga; *Triodia* grassland	Y	Y	Y	Y	Almost certain
Rostellularia adscendens var. *latifolia*	P3	Ironstone soils	Near creeks, rocky hills	Mulga; *Eucalyptus kingsmillii*	Y	N	N	N	Almost none
Sida sp. Barlee Range (S van Leeuwen 1642)	P3	Skeletal red soils pockets	Steep slope	*Ficus brachypoda, Corymbia ferriticola, Eucalyptus victrix, Eucalyptus kingsmillii*	Y	N	N	N	Almost none
Solanum sp. Hamersley clay (D. Halford Q 9280) PN	P3	Red brown clay, cracking clay, scattered ironstone	Flat to slightly undulating plain	Tussock grasslands	N	N	Y	N	Almost none
Swainsona sp. Hamersley Station (A.A. Mitchell 196)	P3	Clay loam (cracking)	Flat crabholed plain	*Astrebla* grassland; Mulga	N	N	Y	N	Almost none
Tecticornia medusa	P3	Red clayey sands	Floodplain	Samphire	N	N	N	Y	Almost none
Themeda sp. Hamersley Station (M.E. Trudgen 11431)	P3	Red clay	Clay pan, grass plain		N	Y	Y	Y	Possible
Triodia sp. Mt. Ella (ME Trudgen 12739)	P3	Light orange-brown, pebbly loam. Amongst rocks & outcrops, gully slopes	Hilltops, gorges, gullies	*Eucalyptus leucophloia, Corymbia ferriticola*, Mulga	Y	N	N	N	Unlikely
Triodia sp. Robe River (M.E. Trudgen et al. MET 12367)	P3	Banded ironstone, Robe pisolite	Rocky hills and mesas	*Eucalyptus leucophloia, Acacia pruinocarpa, Acacia bivenosa, Acacia inaequilatera*	N	N	N	N	None (Rare)
Whiteochloa capillipes	P3	Sand	Sandplain	*Astrebla* tussock grassland	Y	Y	N	N	Unlikely

Species	Cons Code	Soil	Landform	Vegetation	Soil Type Present	Landform Present	Associated Vegetation Present	Known from Nearby	Likelihood of Occurring in the Study Area
Acacia bromilowiana	P4	Red skeletal stony loam, orange-brown pebbly, gravel loam, laterite, banded ironstone, basalt	Rocky hills, breakaways, scree slopes, gorges, creek beds	*Eucalyptus leucophloia, Eucalyptus kingsmillii, Corymbia ferriticola, Acacia hamersleyensis*	N	N	N	Y	Almost none
Eremophila magnifica subsp. *magnifica*	P4	Skeletal soils over ironstone	Rocky screes	*Corymbia hamersleyana, Eucalyptus leucophloia, Eucalyptus kingsmillii*	Y	N	N	Y	Possible
Eremophila youngii subsp. *lepidota*		Stony red sandy loam	Flats, plains, semi-saline areas, clay flats	Mulga, *Acacia xiphophylla*, Samphire, *Triodia longiceps*	Y	Y	Y	Y	Almost certain
Goodenia nuda	P4	Alluvium, loam, clay (various)	Adjacent to drainage, floodplain, hills	Various	Y	Y	Y	Y	Almost certain
Rhynchosia bungarensis	P4	Pebbly, coarse sand	Banks of flow line	Various	Y	Y	Y	N	Unlikely