

MEMO

CLUB HAMILTON NATIVE VEGETATION CLEARING REPORT

PREPARED FOR: FORTESCUE LTD





© Spectrum Ecology Pty Ltd

ABN 68 615 115 243

PO Box 314 Leederville

Western Australia 6902

Ph: (08) 9317 8233

Email: info@spectrumecology.com.au



Report Details				
Project Description:	Club Hamilton Native Vegetation Clearing Report			
Prepared For:	Fortescue			
Project ID:	2442			
Version History		Author	Reviewer	Date of Issue
V1	Georgia Ford Susan Murrey		Astrid Heidrich	17-10-2024
V2	Georgia Ford		Astrid Heidrich	31-10-2024
V3	Melinda Henderson		Astrid Heidrich	13-11-2024

This document has been prepared to the requirements of the client identified on the cover page and no representation is made to any third party. It may be cited for the purposes of scientific research or other fair use, but it may not be reproduced or distributed to any third party by any physical or electronic means without the express permission of the client for whom it was prepared or Spectrum Ecology & Spatial Pty Ltd.

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY	4
1.1. PROJECT BACKGROUND & OBJECTIVES	4
1.2. METHODS.....	4
1.3. RESULTS	4
1.4. CLEARING PRINCIPLES	5
2. INTRODUCTION.....	6
2.1. BACKGROUND	6
2.2. SURVEY OBJECTIVES	6
3. EXISTING ENVIRONMENT	7
3.1. BIOREGION	7
3.2. SIGNIFICANT LANDS	7
4. METHODS.....	9
4.1. DESKTOP STUDY	9
4.2. LIKELIHOOD OF OCCURRENCE OF SIGNIFICANT FLORA & FAUNA	9
4.3. SURVEY METHODS.....	10
4.4. LIMITATIONS.....	12
5. DESKTOP RESULTS	14
5.1. FLORA	14
5.2. VEGETATION	15
5.3. VERTEBRATE FAUNA.....	15
6. SURVEY RESULTS & DISCUSSION.....	16
6.1. FLORA	16
6.2. VEGETATION	17
6.3. VERTEBRATE FAUNA.....	17
7. ASSESSMENT AGAINST THE TEN CLEARING PRINCIPLES	24
8. CONCLUSIONS.....	26
9. REFERENCES.....	27

MAPS

Map 3.1: Location of the Survey Area.....	8
Map 4.1: Survey Effort	13
Map 6.1: Vegetation Type & Condition.....	22
Map 6.2: Fauna Habitat.....	23

TABLES

Table 3.1: Significant lands in the Survey Area locality	7
Table 4.1: Summary of Database Searches	9
Table 4.2: Likelihood of Occurrence Criteria	10
Table 4.3: Vegetation Condition Scale & Criteria	11

Table 4.4: Survey Limitations & Constraints	12
Table 5.1: Priority Flora recorded within 50 km of the Survey Area.....	14
Table 5.2: Significant Fauna potentially occurring in the Survey Area	15
Table 5.1: Likelihood of Occurrence of Significant Flora.....	16
Table 6.1: Likelihood of Occurrence of Significant Fauna.....	19
Table 7.1: Ten Native Vegetation Clearing Principles.....	24

1. EXECUTIVE SUMMARY

1.1. Project Background & Objectives

Fortescue Ltd (Fortescue) is planning to build a temporary car park to help relieve the overflow parking at the South Hedland Integrated Sports Hub. The proposed development area is located within the township of South Hedland and will require the clearance of approximately 2.6 hectares.

Ecologia Environment (2011) completed a flora, vegetation and fauna survey encompassing the Survey Area which was followed by ground disturbance and vegetation clearance. In August 2024, Fortescue commissioned Spectrum Ecology & Spatial to reassess the Survey Area, to validate and update the data to ensure it is current.

1.2. Methods

A desktop study of relevant biological data sources was undertaken to identify flora and fauna species previously recorded in the Survey Area locality.

One ecologist conducted a site visit on the 19 August 2024 to describe the flora, vegetation and fauna values of the Survey Area and confirm previous findings from ecologia (2011).

1.3. Results

1.3.1. Desktop Results

Seven priority flora taxa were recorded within 50 km of the Survey Area. No Declared Rare Flora were recorded. Ecologia (2011) identified two vegetation types within the Survey Area:

- Sandy plain: Low to medium height sparse *Acacia stellaticeps* heathland over open *Triodia schinzii* and hummock grassland and sparse *Themeda triandra* tussock grassland; and
- Severe **Cenchrus ciliaris* invasion: Closed **Cenchrus ciliaris* tussock grassland.

The vegetation condition within the Survey Area was categorised as mostly 'Very Good' with some areas classed as 'Poor' by ecologia (2011).

The desktop study identified 13 significant fauna species that may occur within the Survey Area: seven mammals, five birds and one reptile. *Acacia* heathland was the dominant habitat within the Survey Area and comprised low to moderate *Acacia* heathland over open spinifex hummock grassland and sparse tussock grassland.

1.3.2. Survey Results

A total of nine taxa were recorded during the 2024 site visit. No Threatened or Priority Flora taxa were recorded or occur within the Survey Area.

The 2024 site visit identified one vegetation type: Sandy plain – Low to medium height sparse *Acacia stellaticeps* heathland over closed **Cenchrus ciliaris* tussock grassland. The vegetation condition within the Survey Area was categorised as 'Degraded'.

During the site visit, four species of bird and species of reptile were recorded, none of which are of significance. The desktop study results indicate that 13 significant fauna species occur in the region. Of these, one species, the Brush-tailed Mulgara, has a medium likelihood to occur within the Survey Area. The remaining 12 species have a low likelihood to occur in the Survey Area.

During the 2024 site visit, one fauna habitat was identified within the Survey Area: *Acacia* Heathland. This habitat comprised *Acacia stellaticeps* over **Cenchrus ciliaris*. Some cleared areas (total of 0.4 ha) were also recorded.

1.4. Clearing Principles

The ecological values for this report were assessed against the ten clearing principles as stipulated under Schedule 5 of the of the *Environment Protection Act 1986* (Western Australian Government, 1986). No ecological values were found to be at variance with the ten clearing principles.

2. INTRODUCTION

2.1. Background

Fortescue Ltd (Fortescue) is planning to build a temporary car park to help relieve the overflow parking at the South Hedland Integrated Sports Hub (SHISH), which the Town of Port Headland has approved. The proposed development area is located within the township of South Hedland and will require the clearance of approximately 2.6 hectares (the Survey Area; Map 3.1).

Ecologia Environment (2011) completed a flora, vegetation and fauna survey encompassing the Survey Area which was followed by ground disturbance and vegetation clearance that has since regrown. In August 2024, Fortescue commissioned Spectrum Ecology & Spatial to reassess the Survey Area, to validate and update the data to ensure it is current.

2.2. Survey Objectives

The survey objective was to conduct a brief desktop study, a field survey, and preparation of this report to support a Native Vegetation Clearing Permit (NVCP) application, as an addendum to the original report prepared by ecologia (2011).

Specific objectives included completion of the following:

- A review of significant flora and fauna species likely to occur in the Survey Area.
- A review of Threatened Ecological Communities (TECs), Priority Ecological Communities (PECs) or other Environmentally Sensitive Areas (ESAs) recorded in the Survey Area locality.
- Identification of vegetation units within the Survey Area.
- An assessment against the ten clearing principles required for an NVCP application (see Section 7).
- Assessment of fauna habitats within the Survey Area and their suitability to support potentially occurring significant fauna species, considering habitat preferences and desktop study results.
- Determining the likelihood of occurrence for significant species within the Survey Area, based on the point above.

3. EXISTING ENVIRONMENT

3.1. Bioregion

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies Australia into regions based on dominant landscape, climate, lithology, geology, landform and vegetation (Thackway and Cresswell, 1995).

The Survey Area is located within the Pilbara Bioregion, within the Roebourne subregion. This subregion is characterised by quaternary alluvial and older colluvial coastal and subcoastal plain with a grass savannah and uplands dominated by *Triodia* hummock grasslands. Climate is arid (semi-desert) tropical with highly variable rainfall, falling mainly in summer (Kendrick and Stanley, 2001).

3.2. Significant Lands

Significant lands may comprise the following:

- Conservation estate - land and waters vested in the Conservation and Parks Commission under the Conservation and Land Management Act 1984. These typically comprise National Parks, Nature Reserves, Conservation Reserves, and other areas managed primarily for biodiversity conservation (DCCEEW, 2022).
- Environmentally Sensitive Areas (ESA) – areas of native vegetation where the exemptions for clearing vegetation under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 do not apply (DWER, 2023). These include areas that are: World Heritage sites; included on the Register of the National Estate; defined wetlands; vegetation containing threatened flora; Threatened Ecological Communities; and Bush Forever sites.

Five ESAs occur in the Survey Area locality, with the closest ESA located 10 km north of the Survey Area (Spoil bank recreation reserve, Table 3.1). The closest nationally significant wetland (listed as ESA), the Leslie (Port Hedland) Saltfields System, is located 16 km northeast of the Survey Area. There are no ESAs or conservation estates within the Survey Area.

Table 3.1: Significant lands in the Survey Area locality

Reserve Name	Distance and Direction from Survey Area	Significant Land Type in Survey Area Locality	
		Conservation Estate	Environmentally Sensitive Area
ESA - Spoil bank recreation reserve	10 km N		X
ESA - Unnamed 7442	13 km N		X
Leslie (Port Hedland) Saltfields System DIWA WA068	16 km NE		X
Weerde Island	16 km NW		X
Little Turtle Island	47 km NE		X

666000

666200

666400

7743800

7743600

7743400

**Legend** Survey Area

0 50 100 m
Scale 1:3,250 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Units: Metre



Author: GF

Date: 13-11-2024

Location of the Survey Area

Club Hamilton NVCP

MAP

Prepared for
Fortescue

3.1

4. METHODS

4.1. Desktop Study

A desktop study of relevant biological data sources was undertaken to identify flora and fauna species previously recorded in the Survey Area locality (50 km buffer of the Survey Area). Regional information was also reviewed to describe the physical and biological characteristics of the Survey Area in an ecological context.

4.1.1. Biological Database Searches

The following databases were searched and incorporated into the desktop study (Table 4.1).

Table 4.1: Summary of Database Searches

Data Source	Custodian	Details
Commonwealth Protected Matters Search Tool (PMST)	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	17/10/2024
Dandjoo	Department of Biodiversity Conservation and Attractions (DBCA)	17/10/2024
Atlas of Living Australia	National Research Infrastructure for Australia (NCRIS) Commonwealth Scientific and Industrial Research Organisation (CSIRO) Global Biodiversity Information Facility (GBIF)	27/09/2024
Threatened Fauna Database	Department of Biodiversity Conservation and Attraction (DBCA)	Date: 27/10/2024 Reference: 56-1024FA

4.2. Likelihood of Occurrence of Significant Flora & Fauna

The following information was collated for each significant flora and fauna species or TEC/PEC identified during the desktop study:

- Conservation status (EPBC Act, BC Act, DBCA listing).
- Description of species and flowering period.
- Description of habitat requirements.
- Description of previous records.
- Distance of record to the Project.
- Time since most recent record (fauna only).

A likelihood of occurrence assessment was then conducted using the criteria listed in Table 4.2. Based on aerial imagery and on-ground assessments, fauna habitats were discerned considering landforms, land systems, geology, and vegetation. Collectively, these determine the species assemblage and the likelihood of occurrence of significant fauna & flora.

Table 4.2: Likelihood of Occurrence Criteria

Likelihood	Flora & Vegetation	Fauna
Recorded	Species or vegetation community accurately recorded within the Survey Area during the literature review (includes TEC/PEC buffers that intersect).	Species recorded within the Survey Area within the previous 10 years.
High	Species or vegetation community recorded within 10 km of the Survey Area, and suitable habitat does, or is likely, to occur.	Species recorded within the Survey Area, more than 10 years ago; or Species recorded within 20 km of the Survey Area and suitable habitat occurs in the Survey Area. Species is easily detectable using standard survey methods.
Medium	Species or vegetation community recorded outside the Survey Area but within 30 km and suitable habitat may occur.	Species recorded within the Survey Area, more than 20 years ago; or Species recorded within 50 km of the Survey Area and suitable habitat occur; or Suitable habitat exists in the Survey Area, but species records are infrequent, or species is not easily detectable using standard survey methods.
Low	Species or vegetation community rarely or not recorded within 50 km of the Survey Area and suitable habitat is not likely to occur within the Survey Area.	Species rarely or not recorded within 50 km of the Survey Area and suitable habitat does not occur within the Survey Area; or Suitable habitat occurs in the Survey Area, but species has not been recorded for more than 50 years.
Very Low	-	Species not recorded within 50 km despite multiple recent surveys. Suitable habitat does not occur within the Survey Area. Species considered locally extinct.

4.3. Survey Methods

One ecologist (Steven Spragg) conducted a site visit on the 19 August 2024 to describe the flora, vegetation and fauna values of the Survey Area and confirm previous findings from Ecologia (2011; Map 4.1). A site visit utilising survey techniques that are in accordance with a reconnaissance flora and vegetation, and a basic fauna survey techniques was completed (EPA, 2016; EPA, 2020). Due to the small size of the Survey Area and the disturbance level, no relevés or vegetation mapping was conducted. The entire Survey Area was traversed to record and identify flora & fauna species present on site (Map 4.1).

Mapping notes were taken with the location and vegetation community present. The survey incorporated opportunistic techniques, including:

- Incidental species observations.
- Identification of secondary signs of fauna, such as tracks, scats, skins, mounds, hollows, nests, and diggings.

4.3.1. Legislation & Guidelines

The survey was compliant with survey guidelines, as outlined in:

- EPA Environmental Factor Guideline: Terrestrial Fauna (Environmental Protection Authority, 2016a).
- EPA Environmental Factor Guideline: Flora and Vegetation (Environmental Protection Authority, 2016b).

- EPA Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (Environmental Protection Authority, 2016c).
- EPA Technical Guidance Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (Environmental Protection Authority, 2020).
- DBCA Threatened and Priority Flora Report Form – Field Manual (Department of Biodiversity Conservation and Attractions, 2017);
- National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual (ESCAVI, 2003); and
- Terrestrial Vertebrate Fauna Assessment Guidelines 100-GU-EN-0006 (Fortescue Metals Group, 2014).

4.3.2. Survey Timing

The Pilbara bioregion is considered part of the Eremaean Botanical province and recommendations are to conduct the primary flora and vegetation survey in Autumn from March to June and the secondary survey following winter rains (EPA 2016c). The field survey was conducted outside the recommended timing. Some annual species may have been absent during survey, however all other flora species were identified. This did not significantly affect the results of the survey.

The survey timing was appropriate for bird, reptile and mammal assemblages in the Pilbara bioregion, however basic fauna assessments are not timing dependant (EPA 2020).

4.3.3. Vegetation Condition

Vegetation condition was recorded throughout the Survey Area using the scale recommended for the Eremaean Botanical Province as shown in Table 4.3 (Environmental Protection Authority, 2016c).

Table 4.3: Vegetation Condition Scale & Criteria

Condition	Disturbance Criteria – Eremaean Botanical Province
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires, or aggressive weeds.
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with multiple weed species present including very aggressive species.
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation, i.e. areas that are cleared or “parkland cleared” with their flora comprising weed or crop species with isolated native trees or shrubs.

4.4. Limitations

Survey specific limitations and constraints for the flora and fauna assessment at the Survey Area are discussed in Table 4.4.

Table 4.4: Survey Limitations & Constraints

Limitation	Constraint	Comment
Availability of the contextual information at a regional and local scale.	No	Beard vegetation, geology and land system mapping were used to determine regional significance of the vegetation types. Database searches provided information, adequate to guide field survey design and effort for the flora and fauna survey.
Competency/experience of the consultant carrying out the survey including experience in bioregion surveyed.	No	Ecologist Steven Spragg has suitable knowledge and experience conducting botanical and fauna surveys, in the Pilbara region of Western Australia.
Timing/weather/season/cycle.	Partial	The site visit was conducted outside the recommended timing for floristic surveys. All species that were recorded on site were identified. Surveying outside the recommended survey time may impact the adequacy of the floristic survey due absence of annual species. A basic level fauna survey is not timing dependent.
Disturbances (e.g., fire, flood, accidental human intervention) which affected results of survey.	No	The Survey Area has been cleared previously but there were no current disturbances that affected the result of the survey.
Remoteness and/or access problems.	No	There were no access restrictions at the Survey Area.
Flora Specific		
Survey effort and extent.	No	The site visit was sufficient to make mapping notes and classify the vegetation for a reconnaissance level survey.
Proportion of flora recorded and/or collected, any identification issues.	No	Plants were identified by the Senior Botanist Raimond Orifici who has over 20 years of botanical and taxonomic experience throughout Western Australia and is particularly experienced in the Pilbara bioregion.
Fauna Specific		
Scope (what faunal groups were sampled and were some sampling methods not able to be employed because of constraints such as weather conditions).	No	Sampling techniques were adequate for a basic terrestrial fauna survey. All fauna groups were sampled, and no survey constraints were experienced.
Proportion of fauna identified, recorded, and/or collected.	No	All vertebrate fauna species encountered were identified in the field. Basic survey methods do not require the identification of all fauna species present within the project.
The proportion of the task achieved and further work which might be needed.	No	All components of a basic fauna assessment were completed.
Resources (degree of expertise available in animal identification to taxon level).	No	Fauna resources available were adequate and did not compromise the outcome of the survey.
Intensity (in retrospect, was the intensity adequate).	No	A basic assessment was adequate to identify faunal assemblages and fauna habitat present within the Survey Area.
Completeness (was the relevant area fully surveyed).	No	All fauna habitat types were sampled and defined. Habitat types that may host significant fauna species were surveyed.

666200

7743600



Legend

-  Survey Area
-  Tracks



0 50 100 m
Scale 1:1,380 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Units: Metre



Author: GF

Date: 13-11-2024

Survey Effort

Club Hamilton NVCP

MAP

Prepared for
Fortescue

4.1

5. DESKTOP RESULTS

5.1. Flora

The desktop study identified six priority flora taxa which have been recorded within 50 km of the Survey Area. These were originally listed by ecologia (2011) as potentially occurring in the Survey Area (Table 5.1). No Declared Rare Flora were recorded.

During the detailed flora and vegetation assessment conducted by ecologia (2011), a total of 52 taxa from 18 families and 43 genera were recorded which was across the previous Survey Area (which covered an additional 8.1 ha to the current Survey Area). The most speciose family was *Poaceae*, with 13 species from 10 genera recorded, followed by *Fabaceae* with 11 species from seven genera. No threatened or priority flora species have been recorded within the Survey Area.

Table 5.1: Priority flora recorded within 50 km of the Survey Area

Taxon	Description	Flowering	Habitat	Distance & Direction to Survey Area
P1 - <i>Tephrosia rosea</i> var. Port Hedland (A.S. George 1114)	Sprawling to erect shrub to 1.7 m but more commonly <0.5 m and up to 1 m wide. Leaves grey-green hirsute underneath more or less green minutely pubescent on upper side. Flower standard wings and keel, pink to purple. Fruit silvery/grey.	July to September	Sand plain with red-brown sandy loam soils.	1.6 km W
P2 - <i>Gomphrena pusilla</i>	Sprawling semi prostrate herb to 20 cm, stems tinged maroon, flowers white, tinged mauve.	March to June	Behind foredune; fine beach sand, limestone. Limestone ridge top.	8 km NW
P3 - <i>Abutilon pritzelianum</i>	Erect, open shrub with large canes, 1–1.5 (3) m high. Orange to yellow flowers.	August	Red sand, red clay, shallow soiled granitic plains. Dunes, roadside, floodplain.	9 km W
P3 - <i>Eragrostis crateriformis</i>	Annual, grass-like or herb, 0.17-0.42 m high.	January to May or Jul	Clayey loam or clay. Creek banks. Depressions.	10 km W
P3 - <i>Euploca mutica</i>	Open, spreading shrub with white flowers with very short but stiff, spiny hairs, growing up to 0.3 m tall.	August	Red silty sand, red-brown loam, bedrock. Floodplains and gentle to steep slopes.	5.7 km W
P3 - <i>Gymnanthera cunninghamii</i>	Erect multi stemmed shrub (pale tubercles on brown stem) to 1.5 m with pendulous foliage and milky sap. Varnished leaves. Green flowers.	January to December	Brown-red sand, swales seasonally inundated on saline bulldust, major drainage on dark red sandy clay loam, base of low limestone ridge above mangrove flats, beach sand at base of dolerite hills.	4 km N

5.2. Vegetation

Ecologia (2011) identified two vegetation types within the Survey Area:

- Sandy plain: Low to medium height sparse *Acacia stellaticeps* heathland over open *Triodia schinzii* and hummock grassland and sparse *Themeda triandra* tussock grassland; and
- Severe *Cenchrus ciliaris* invasion: Closed *Cenchrus ciliaris* tussock grassland.

The vegetation condition within the Survey Area was categorised as 'Very Good' where Sandy plain vegetation was recorded and 'Poor' for areas of severe *Cenchrus ciliaris* invasion (ecologia, 2011).

5.3. Vertebrate Fauna

The desktop study identified a potential fauna assemblage comprising of 42 mammals (including seven introduced), 184 birds, 104 reptiles and 13 amphibians.

5.3.1. Significant Fauna

The desktop study identified 13 significant fauna species that may occur within the Survey Area: seven mammals, five birds and one reptile (Table 5.2). Marine species have been excluded due to the absence of suitable habitat.

Table 5.2: Significant fauna potentially occurring in the Survey Area

Species	Conservation Status		
	EPBC Act	BC Act	DBCA
Mammals			
Northern Quoll (<i>Dasyurus hallucatus</i>)	EN	EN	-
Bilby (<i>Macrotis lagotis</i>)	VU	VU	-
Pilbara Leaf-nosed Bat (<i>Rhinonictis aurantia</i>)	VU	VU	-
Ghost Bat (<i>Macroderma gigas</i>)	VU	VU	-
Brush-tailed Mulgara (<i>Dasymercus blythi</i>)	-	-	P4
Western Pebble-mound Mouse (<i>Pseudomys chapmani</i>)	-	-	P4
Northern Coastal Free-tailed Bat (<i>Ozimops cobourgiensis</i>)	-	-	P1
Birds			
Night Parrot (<i>Pezoporus occidentalis</i>)	EN	CR	-
Red Goshawk (<i>Erythrotriorchis radiatus</i>)	VU	VU	-
Grey Falcon (<i>Falco hypoleucos</i>)	VU	VU	-
Osprey (<i>Pandion haliaetus</i>)	MI	MI	-
Peregrine Falcon (<i>Falco peregrinus</i>)	-	OS	-
Reptiles			
Pilbara Olive Python (<i>Liasis olivaceus barroni</i>)	VU	VU	-

5.3.2. Fauna Habitats

Ecologia (2011) identified two fauna habitats within the Survey Area:

- *Acacia* Heathland; and
- Drainage Lines.

Acacia heathland was the dominant habitat within the Survey Area and comprised low to moderate *Acacia* heathland over open spinifex hummock grassland and sparse tussock grassland.

6. SURVEY RESULTS & DISCUSSION

6.1. Flora

A total of nine taxa were recorded during the 2024 site visit, all but one species (*Acacia sphaerostachya*) was previously identified in 2011. No Threatened or Priority Flora taxa were recorded, or occur within the Survey Area. A species list for the 2011 and 2024 surveys is shown in Appendix A.

One species of significance, *Tephrosia rosea* var. Port Hedland (A.S. George 1114), was given a high likelihood of occurrence during the 2011 survey, however, due to the degradation of the Survey Area since 2011 all potential priority species were given a Low likelihood of occurrence after the 2024 site visit.

Table 6.1: Likelihood of occurrence of significant flora.

Taxon	Description	Flowering	Habitat	Likelihood of Occurrence 2011	Likelihood of Occurrence 2024
P1 - <i>Tephrosia rosea</i> var. Port Hedland (A.S. George 1114)	Sprawling to erect shrub to 1.7 m but more commonly <0.5 m and up to 1 m across. Leaves grey-green hirsute underneath more or less green minutely pubescent on upper side. Flower standard wings and keel, pink to purple. Fruit silvery/grey.	July Sept	Sand plain with red-brown sandy loam soils.	High	Low
P2 - <i>Gomphrena pusilla</i>	Sprawling semi prostrate herb to 20 cm, stems tinged maroon, flowers white, tinged mauve.	March June	Behind foredune; fine beach sand, limestone.	Low	Low
P3 - <i>Abutilon pritzelianum</i>	Erect, open shrub with large canes, 1-1.5 (3) m high. Orange to yellow flowers.	August	Red sand, red clay, shallow soiled granitic plains. Dunes, roadside, floodplain.	Medium	Low
P3 - <i>Eragrostis crateriformis</i>	Annual, grass-like or herb, 0.17-0.42 m high.	Jan to May or Jul	Clayey loam or clay. Creek banks. Depressions.	Not assessed	Low
P3 - <i>Euploca mutica</i>	Open, spreading shrub with white flowers with very short but stiff, spiny hairs, growing up to 0.3 m tall.	August	Red silty sand, red-brown loam, bedrock. Floodplains and gentle to steep slopes.	Medium	Low
P3 - <i>Gymnanthera cunninghamii</i>	Erect multi stemmed shrub (pale tubercles on brown stem) to 1.5 m with pendulous foliage and milky sap. Varnished leaves. Green flowers.	Jan-Dec	Brown-red sand, swales seasonally inundated on saline bulldust, major drainage on dark red sandy clay loam, base of low limestone ridge above mangrove flats, beach sand at base of dolerite hills.	Low	Low

6.2. Vegetation

6.2.1. Vegetation Type

The 2024 site visit identified one vegetation type on sandy plain with *Acacia stellaticeps* sparse heathland, over closed **Cenchrus ciliaris* tussock grassland (Map 6.1). Photos of this vegetation type are shown in Appendix B. Cleared areas were also recorded encompassing 0.4 ha of the Survey Area.

6.2.2. Vegetation Condition

The vegetation condition within the Survey Area was categorised as 'Degraded' during the 2024 site visit due to prevalent cover of **Cenchrus ciliaris* and the presence of cleared areas (Map 6.1).

6.3. Vertebrate Fauna

Four birds and one reptile were recorded during the 2024 site visit:

- Whistling Kite (*Haliastur sphenurus*);
- White-winged Fairy-wren (*Malurus leucopterus*);
- Yellow-throated Miner (*Manorina flavigula*);
- Red-browed Pardalote (*Pardalotus rubricatus*);
- Yellow-spotted Monitor (*Varanus panoptes*).

6.3.1. Significant Fauna

No significant fauna species were recorded during the site visit. The desktop study identified 13 significant fauna species potentially occurring at the Survey Area. For each species, the likelihood of occurrence within the Survey Area was determined based on criteria outlined in Section 4.2. Shorebirds and water birds were excluded from the list due to the lack of suitable habitat at the Survey Area. These may overfly the area but are highly unlikely utilise habitat within the Survey Area. Nine of the 13 species were ranked as having a low likelihood of occurrence (Table 6.2). The following four species were ranked as having a medium or high likelihood of occurrence:

- Grey Falcon, *Falco hypoleucos* – Vulnerable (BC Act and EPBC Act): added in 2024, assessed as having a high likelihood of occurrence, as it was recently recorded 5 km from the Survey Area in 2023.
- Osprey, *Pandion haliaetus* – Migratory (BC Act and EPBC Act): upgraded to medium likelihood in 2024 due to multiple recent records in the Survey Area locality, with the closest record 2 km north of the Survey Area. However, suitable habitat is absent from the Survey Area.
- Peregrine Falcon, *Falco peregrinus* – Specially Protected Fauna (BC Act and EPBC Act): upgraded to medium likelihood in 2024 as it was recently recorded 2 km from the Survey Area in 2019, although and suitable habitat is absent from the Survey Area.
- Brush-tailed Mulgara, *Dasycercus blythi* – Priority 4 (DBCA): was ranked as medium likelihood due to occurrence of suitable habitat within the Survey Area and one record occurring 9 km west of the Survey Area in 2013. No evidence of this species (i.e. diggings, scats) was recorded during the 2024 site visit.

The Northern Coastal Free-tailed Bat changed from medium in 2011 to low in 2024 as they roost in mangroves and feed in adjacent drainage lines which were absent from the 2024 Survey Area.

The Red Goshawk was added to the potential species list in 2024, due to recent reliable observations which included both adults and juveniles in the region, representing a 500 km south range extension. (DCCEEW, 2023; MacColl *et al.*, 2023).

6.3.2. Fauna Habitat

Sandy plain with *Acacia stellaticeps* sparse heathland, over closed **Cenchrus ciliaris* tussock grassland During the 2024 site visit, one fauna habitat was identified within the Survey Area: *Acacia* Heathland (Map 6.2). This habitat comprised *Acacia stellaticeps* over **Cenchrus ciliaris*. Cleared areas were also recorded encompassing 0.4 ha of the Survey Area. Photos of the *Acacia* Heathland habitat type are shown in Appendix B.

Significant species that may utilise this habitat type include Brush-tailed Mulgara (*Dasycercus blythi*; P4) for foraging / as a resident, however no signs (i.e. burrows, diggings) were observed during the 2024 site visit. Additionally, the small area of habitat within the Survey Area is not critical for the survival of this species and comparable habitat occurs contiguously with the Survey Area.

Table 6.2: Likelihood of occurrence of significant fauna.

Species	Conservation Status			Preferred Habitat	Habitat Present in Survey Area	Previous Records	Likelihood of Occurrence 2011	Likelihood of Occurrence 2024
	EPBC Act	BC Act	DBCA					
Mammals								
Northern Quoll <i>(Dasyurus hallucatus)</i>	EN	EN	-	Most common on dissected rocky escarpments, gorges and boulder piles. Typically prefers rocky areas with suitable denning sites and access to surface water. Major drainage lines and treed creek lines may be used for movement and dispersal (Department of the Environment, 2016).	No	Two records with no date between 15 – 31 km from the Survey Area. Two inaccurate records from within 2.5 km of the Survey Area	Low	Low
Bilby <i>(Macrotis lagotis)</i>	VU	VU	-	A variety of habitats with suitable soil substrates and plant species that are fed on directly or host insect larvae. Habitats can include spinifex hummock grassland, acacia shrubland, open woodland and cracking clays (Dziminski and Carpenter, 2016, 2018).	No*	Two records within 10 km W of the Survey Area from 2013 and 2019. .	Low	Low
Pilbara Leaf-nosed Bat <i>(Rhinonicteris aurantia)</i>	VU	VU	-	Dissected rocky escarpments with suitable roost caves with high humidity and stable temperatures (28 - 32°C). Forages in a variety of habitats, particularly along water bodies and riparian vegetation (Armstrong, 2001; Cramer et al., 2016).	No	Five records from 25 km SE of the Survey Area from 2009-2013.	Low	Low
Ghost Bat <i>(Macroderma gigas)</i>	VU	VU	-	A variety of habitats including caves and rock piles. Abandoned mines may be utilized as transient roosts. Maternity/ breeding roosts require dark, warm and humid (>80% RH) microclimates (Armstrong and Anstee, 2000). Will travel up to 2 km from a roost to hunt and will utilize other structures such as culverts, rock overhangs and trees for feeding roosts (Tidemann <i>et al.</i> , 1985).	No	60 records from 25 km SE of the Survey Area from 2009-2013.	Low	Low

Species	Conservation Status			Preferred Habitat	Habitat Present in Survey Area	Previous Records	Likelihood of Occurrence 2011	Likelihood of Occurrence 2024
	EPBC Act	BC Act	DBCA					
Brush-tailed Mulgara (<i>Dasyercus blythi</i>)	-	-	P4	Sandy, loamy and sometimes stony/ gibber plains vegetated with spinifex and/ or tussock grasses. Prefers flats rather than the dune crests preferred by its congener <i>D. cristicauda</i> (Pavey <i>et al.</i> , 2011).	Yes	~60 records from within 5 km of the Survey Area from 2007-2012 (DBCA).	Medium	Medium
Western Pebble-mound Mouse (<i>Pseudomys chapmani</i>)	-	-	P4	Rocky ranges and hills where suitably sized pebbles are available for mound construction. Most common on the lower slopes of ridges vegetated with spinifex hummock grassland (Dunlop and Pound, 1981).	No	Closest record is 25 km SE from 2009, additional records 35 km SE.	Low	Low
Northern Coastal Free-tailed Bat (<i>Ozimops cobourgiensis</i>)	-	-	P1	Restricted to mangrove stands and adjoining areas. Roosts in crevices within dead branches of mangroves (Van Dyck and Strahan, 2008).	No	Two records 10 km N of Survey Area from 2008 & 2009)	Medium	Low
Birds								
Night Parrot (<i>Pezoporus occidentalis</i>)	EN	CR	-	Long, unburnt <i>Triodia</i> hummock grassland in association with low lying saline lakes and drainages hosting chenopods/Samphire (Jackett <i>et al.</i> , 2017).	No	Recorded on PMST only as species or species habitat may occur within area	Not assessed	Low
Grey Falcon (<i>Falco hypoleucos</i>)	VU	VU	-	Varied and widespread habitat, usually within interior plains, patrolling low groundcover below treetop level (Morcombe, 2003a). Distribution is centred inland on lightly timbered lowlands, particularly <i>Acacia</i> shrubland and drainage systems (Olson and Olson, 1986).	Yes	Recorded 5 km SW of the Survey Area in 2023.	Not assessed	High

Species	Conservation Status			Preferred Habitat	Habitat Present in Survey Area	Previous Records	Likelihood of Occurrence 2011	Likelihood of Occurrence 2024
	EPBC Act	BC Act	DBCA					
Red Goshawk (<i>Erythrotriorchis radiatus</i>)	VU	VU	-	Open forest and woodland with mixed vegetation, particularly along streams, swamps and wetlands, mostly along coastal fringes (Morcombe, 2003b; Menkhorst <i>et al.</i> , 2019).	No	This species was previously regarded as absent from the Pilbara. However, recent reliable observations have recorded both adults and juveniles in the region, representing a 500 km south range extension.	Not assessed	Very Low
Osprey (<i>Pandion haliaetus</i>)	MI	MI	-	Coastal and terrestrial wetlands of tropical and temperate Australia and offshore islands, occasionally ranging inland along rivers (Morcombe, 2003b; Menkhorst <i>et al.</i> , 2019).	No	Frequently recorded within 50 km (~80 records). Five records within 8 km of the Survey Area, one historic and four recent ones (2009-2013).	Low	Medium
Peregrine Falcon (<i>Falco peregrinus</i>)	-	OS	-	Widespread but uncommon; variety of habitats including open woodlands, grasslands with trees, lakes, timbered watercourses and urban areas (Pizzey and Knight, 2012). Cliff faces are preferred nesting sites (Morcombe, 2003b; Menkhorst <i>et al.</i> , 2019).	No	Total of six records within 15 km. Recorded 2 km SW in 2019 and 15 km NW in 2023. Also, one historic record (1977) from 3 km SW.	Low	Medium
Reptiles								
Pilbara Olive Python (<i>Liasis olivaceus barroni</i>)	VU	VU	-	Inhabits gorges, gullies, stony ranges, rock piles and along watercourses. Often associated with permanent and temporary water bodies though is not restricted to them. Habitat requirements are likely to vary throughout the year (DSEWPac 2011).	No	Recorded on PMST only as species or species habitat likely to occur within area. One record from 84 km S (from 2012).	Not assessed	Very Low

*Habitat types recorded from the Survey Area present suitable condition for the species, however the degraded condition of the habitats recorded the Survey Area decreased suitability.



Legend

Survey Area

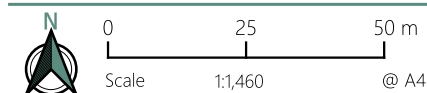
Vegetation Condition

 Degraded

Vegetation Type

 Sandy Plain

 Cleared



Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Units: Metre

 **Spectrum**
ECOLOGICAL & SPATIAL

Author: LL

Date: 13-11-2024

Vegetation Type & Condition

Club Hamilton NVCP

MAP

Prepared for
Fortescue

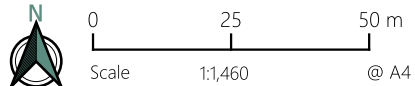
6.1



Legend

Survey Area

- Acacia Heathland
- Cleared Land



Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Units: Metre



Author: LL Date: 13-11-2024

Fauna Habitat

Club Hamilton NVCP

MAP

Prepared for
Fortescue

6.2

7. Assessment Against the Ten Clearing Principles

Schedule 5 of the *Environmental Protection Act 1986* stipulates ten clearing principles to be followed when determining impacts to native vegetation. An assessment on how the proposed vegetation clearing within the Survey Area relative to the principles and the Guideline document '*A guide to the assessment of applications to clear native vegetation*' (Department of Environment Regulation, 2014) for the Survey Area is presented in Table 7.1.

Table 7.1: Ten Native Vegetation Clearing Principles

Principle Number	Principle	Assessment	Outcome
(a)	Native vegetation should not be cleared if it comprises a high level of biological diversity.	Ecologia (2011) carried out a single-phase reconnaissance flora and basic fauna assessment at the Survey Area. Two vegetation types and 52 taxa were recorded during the original assessment. Spectrum resurveyed a reduced Survey Area in 2024 and found that the area had low diversity and had reduced in diversity since 2011 with only 9 species and one vegetation type recorded. No significant flora was found during the 2011 or 2024 surveys.	Not at variance
(b)	Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	One fauna habitat was identified within the Survey Area: <i>Acacia</i> Heathland. This habitat type is not restricted to the Survey Area and is of low value as it is degraded. No significant fauna was found during the 2011 or 2024 surveys. The Brush-tailed Mulgara is considered to have a medium likelihood of occurrence in the Survey Area with the remaining nine significant species having a low likelihood of occurrence.	Not at variance
(c)	Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	No Threatened or Priority Flora taxa were recorded within the Survey Area by Spectrum in 2024 or by ecologia in 2011. The desktop study identified ten priority flora taxa within 50 km of the Survey Area, none of these species have a high likelihood of occurrence based on the results of the survey.	Not at variance
(d)	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a TEC.	The vegetation of the Survey Area does not comprise the whole or part of a currently listed TEC. The vegetation of the Survey Area does not comprise the whole or part of a currently listed PEC.	Not at variance
(e)	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	Only one vegetation type was recorded during the 2024 assessment. Low to medium height sparse <i>Acacia stellaticeps</i> heathland over closed <i>Cenchrus ciliaris</i> tussock grassland is a degraded vegetation type which is common on sandy plains within Pilbara. The native vegetation to be cleared is not significant as a remnant of native vegetation that has been extensively cleared.	Not of variance

Principle Number	Principle	Assessment	Outcome
(f)	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	There are no wetlands or watercourses within the Survey Area. The native vegetation to be cleared is not association with a watercourse or wetland.	Not of variance
(g)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	As the land to be cleared is relatively small and is currently in a degraded state it is unlikely that the activity will cause appreciable land degradation.	Not at variance
(h)	Native vegetation should not be cleared if the clearing of vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	The closest environmentally sensitive area is located 10 km north of the Survey Area. The native vegetation to be cleared is not likely to have an impact on the environmental values of any adjacent or nearby conservation area.	Not at variance
(i)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	No surface water or ground water dependant vegetation types were recorded during the assessment. The native vegetation to be cleared is not likely to cause deterioration in the quality of surface or underground water.	Not at variance
(j)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	The native vegetation to be cleared is not associated with any drainage systems and is not likely to cause, or exacerbate, the incidence or intensity of flooding	Not at variance

8. CONCLUSIONS

No significant flora or fauna species were recorded at the Survey Area, and the remaining vegetation was in a degraded condition. Six priority flora taxa were assessed as potentially occurring at the Survey Area, however all of them have a Low likelihood of occurrence. Thirteen significant fauna species have the potential to occur on site with four species having a medium to high likelihood of occurrence.

The ecological values for this report were assessed against the ten clearing principles as stipulated under Schedule 5 of the of the *Environment Protection Act 1986* (Western Australian Government, 1986). No ecological values were found to be at variance with the ten clearing principles.

9. REFERENCES

- Armstrong, K.N. (2001) 'The distribution and roost habitat of the orange leaf-nosed bat, *Rhinonicteris aurantius*, in the Pilbara region of Western Australia.', *Wildlife Research*, 28, pp. 95–104.
- Armstrong, K.N. and Anstee, S.D. (2000) 'The ghost bat in the Pilbara: 100 years on', *Australian Mammalogy*, 22, pp. 93–101.
- Cramer, V.A. *et al.* (2016) 'Research priorities for the Pilbara leaf-nosed bat (*Rhinonicteris aurantia* Pilbara form)', *Australian Mammalogy*, 38(2), pp. 149–157.
- DCCEEW (2023) *Conservation Advice for Erythrorchis radiatus* (red goshawk).
- Department of Biodiversity Conservation and Attractions (2017) 'Threatened and Priority Flora Report Form - Field Manual'. Department of Biodiversity, Conservation and Attractions.
- Department of Climate Change Energy the Environment and Water (2022) 'Collaborative Australian Protected Areas Database - Terrestrial CAPAD2022'.
- Department of Environment Regulation (2014) *A guide to the assessment of applications to clear native vegetation under part V division 2 of the Environmental Protection Act 1986*. Available at: www.der.wa.gov.au.
- Department of Sustainability Environment Water Population and Communities (2011) 'Survey guidelines for Australia's threatened reptiles. Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999'.
- Department of the Environment (2016) *EPBC Act referral guideline for endangered northern quoll Dasyurus hallucatus*. EPBC Act Policy Statement.
- Department of Water and Environmental Regulation (2023) 'Clearing Regulations - Environmentally Sensitive Areas'. Government of Western Australia. Available at: <https://www.wa.gov.au/service/environment/environment-information-services/environmentally-sensitive-areas> (Accessed: 9 February 2024).
- Dunlop, J.N. and Pound, I.R. (1981) 'Observations on the Pebble-mound Mouse *Pseudomys chapmani* Kitchener, 1980', *Records of the Western Australian Museum* [Preprint].
- ecologia Environment (2011) *Level 1 Flora and Fauna Assessment Proposed Extension to Club Hamilton Accommodation*.
- Environmental Protection Authority (2016a) 'Environmental Factor Guideline: Terrestrial Fauna'. Western Australia: EPA.
- Environmental Protection Authority (2016b) 'EPA Environmental Factor Guideline: Flora and Vegetation'. Western Australia: EPA.
- Environmental Protection Authority (2016c) 'EPA Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment'. Western Australia: EPA.
- Environmental Protection Authority (2020) 'Technical Guidance: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment'. Western Australia: EPA.
- ESCAVI (2003) 'Australian Vegetation Attribute Manual: National Vegetation Information System, Version 6.0'. Canberra: Executive Steering Committee for Australian Vegetation information. Department of Environment and Heritage.

- Fortescue Metals Group (2014) *Terrestrial Vertebrate Fauna Assessment Guidelines (100-GU-EN-0006)*.
- Jackett, N.A. *et al.* (2017) 'A nesting record and vocalisations of the Night Parrot *Pezoporus occidentalis* from the East Murchison, Western Australia', *Australian Field Ornithology*, 34, pp. 144–150.
- Kendrick, P. and Stanley, F. (2001) 'Pilbara 4 (PIL4 - Roebourne Synopsis)', in *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002*.
- MacColl, C. *et al.* (2023) 'Rapid and recent range collapse of Australia's Red Goshawk *Erythrotriorchis radiatus*, *Emu*, 123(2), pp. 93–104. Available at: <https://doi.org/10.1080/01584197.2023.2172735>.
- Menkhorst, P. *et al.* (2019) *The Australian Bird Guide*. Revised. CSIRO Publishing.
- Morcombe, M.K. (2003a) *Field guide to Australian birds*. Steve Parish Publishing.
- Morcombe, M.K. (2003b) *Field guide to Australian birds*. Steve Parish Publishing.
- Olson, P.D. and Olson, J. (1986) 'Distribution, status, movements and breeding of the Grey Falcon *Falco hypoleucos*, *Emu*, 86, pp. 47–51.
- Pavey, C.R. *et al.* (2011) 'Habitat use, population dynamics and species identification of mulgara, *Dasycercus blythi* and *D. cristicauda*, in a zone of sympatry in central Australia', *Australian Journal of Zoology* [Preprint].
- Pizzey, G. and Knight, F. (2012) *The Field Guide to the Birds of Australia. Ninth Edition*. Edited by S. Pizzey.
- Thackway, R. and Cresswell, I.D. (1995) 'An Interim Biogeographic Regionalisation for Australia (IBRA)'.
- Tidemann, C.R.R. *et al.* (1985) 'Foraging Behaviour of the Australian Ghost Bat, *Macroderma gigas* (Microchiroptera: Megadermatidae)', *Australian Journal of Zoology*, 33(5), pp. 705–713.
- Western Australian Government (1986) *Environmental Protection Act 1986*.

Appendix A: Flora Species List



Family	Species	Ecologia 2011	Spectrum 2024
Amaranthaceae	* <i>Aerva javanica</i>	X	
	<i>Alternanthera angustifolia</i>	X	
	<i>Ptilotus fusiformis</i>	X	
Apocynaceae	<i>Carissa lanceolata</i>	X	
Caryophyllaceae	<i>Polycarpaea corymbosa</i>	X	
Cleomaceae	<i>Arivela viscosa</i>	X	
Convolvulaceae	<i>Bonamia linearis</i>	X	
	<i>Bonamia rosea</i>	X	
	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	X	
	<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	X	
	<i>Ipomoea muelleri</i>	X	X
Cucurbitaceae	* <i>Citrullus amarus</i>	X	
	<i>Cucumis variabilis</i>	X	
Euphorbiaceae	<i>Euphorbia wheeleri</i>	X	
Fabaceae	? <i>Neltuma</i> sp.	X	
	<i>Acacia colei</i>	X	X
	<i>Acacia pyrifolia</i>	X	
	<i>Acacia Sericophylla</i>	X	
	<i>Acacia sphaerostachya</i>		X
	<i>Acacia stellaticeps</i>	X	X
	<i>Acacia trachycarpa</i>	X	
	<i>Indigofera monophylla</i>	X	
	<i>Kennedia prorepens</i>	X	
	<i>Petalostylis labicheoides</i>	X	
	<i>Senna notabilis</i>	X	
	* <i>Stylosanthes hamata</i>	X	X
Lauraceae	<i>Cassytha capillaris</i>	X	X
Malvaceae	<i>Abutilon macrum</i>	X	
	<i>Corchorus sidoides</i>	X	X
	<i>Gossypium australe</i>	X	
	<i>Sida</i> sp. <i>Pilbara</i> (A.A. Mitchell PRP 1543)	X	
Molluginaceae	<i>Trigastrotheca molluginea</i>	X	
Myrtaceae	<i>Corymbia flavescent</i>	X	
	<i>Eucalyptus</i> sp.	X	
Nyctaginaceae	<i>Boerhavia coccinea</i>	X	
Poaceae	* <i>Cenchrus ciliaris</i>	X	X
	* <i>Cenchrus setiger</i>	X	X
	<i>Aristida holathera</i> var. <i>holathera</i>	X	
	<i>Dactyloctenium radulans</i>	X	
	<i>Digitaria brownii</i>	X	
	<i>Eragrostis setifolia</i>	X	
	<i>Eriachne</i> sp.	X	
	<i>Neurachne muelleri</i>	X	
	<i>Paspalidium rarum</i>	X	
	<i>Sporobolus virginicus</i>	X	
	<i>Themeda triandra</i>	X	
	<i>Triodia epactia</i>	X	
	<i>Triodia schinzii</i>	X	
Portulacaceae	* <i>Portulaca pilosa</i>	X	
Solanaceae	<i>Solanum lasiophyllum</i>	X	
	<i>Solanum phlomoides</i>	X	
Violaceae	<i>Afrohybanthus aurantiacus</i>	X	
Zygophyllaceae	<i>Tribulopsis angustifolia</i>	X	

Appendix B: Vegetation Type & Fauna Habitat Photos



Vegetation Type & Condition	Fauna Habitat Type	Photo
Sandy plain: Low to medium height sparse <i>Acacia stellaticeps</i> heathland over closed *<i>Cenchrus ciliaris</i> tussock grassland Degraded	<i>Acacia</i> Heathland	