



**WA LIMESTONE**

**Proposed Petermarer Sand Pit and Access  
Reconnaissance Flora, Vegetation and Fauna  
Habitat Survey  
November 2018**

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*Environmental solutions for* **MINING OIL & GAS CONSTRUCTION**

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## **1.0 INTRODUCTION**

### **1.1 Overview**

WA Limestone is proposing to establish a sand mining operation adjacent to Petermarer Creek. The project will involve shallow extraction of alluvial sand from the creek line and banks. Access to the site will be via a purpose-built road from the existing Old Marble Bar Road to the site. An area will also be required for screening and stockpiling sand, truck loading, equipment laydown, machinery/vehicle parking and amenities.

Ecotec (WA) Pty Ltd (Ecotec) was engaged by WA Limestone to undertake an assessment of the flora, vegetation and fauna habitat of the areas to be disturbed by the proposed operation.

The purpose of the assessment was to:

- review available information for previous records of conservation-significant flora and fauna in the vicinity of the proposed development
- conduct a field assessment to determine the likelihood of conservation-significant flora and fauna being present in the area
- assess the fauna habitat present
- provide a broad description of the vegetation present
- assess the condition of vegetation in the area
- prepare a report outlining the findings of the assessment.

### **1.2 Location**

The proposed sand operation is adjacent to Petermarer Creek, approximately 27 km southeast of Port Hedland. Access will be via the Great Northern Highway and the unsealed Newman – Tabba Tabba Road, then via a purpose-built 2.5 km access road to the site.

The Project is located on granted mining tenement M45/1233.

WA Limestone has an established and operating rock quarry approximately 15 km further east of the site.

Figure 1.1 shows the location of the project and surrounds.

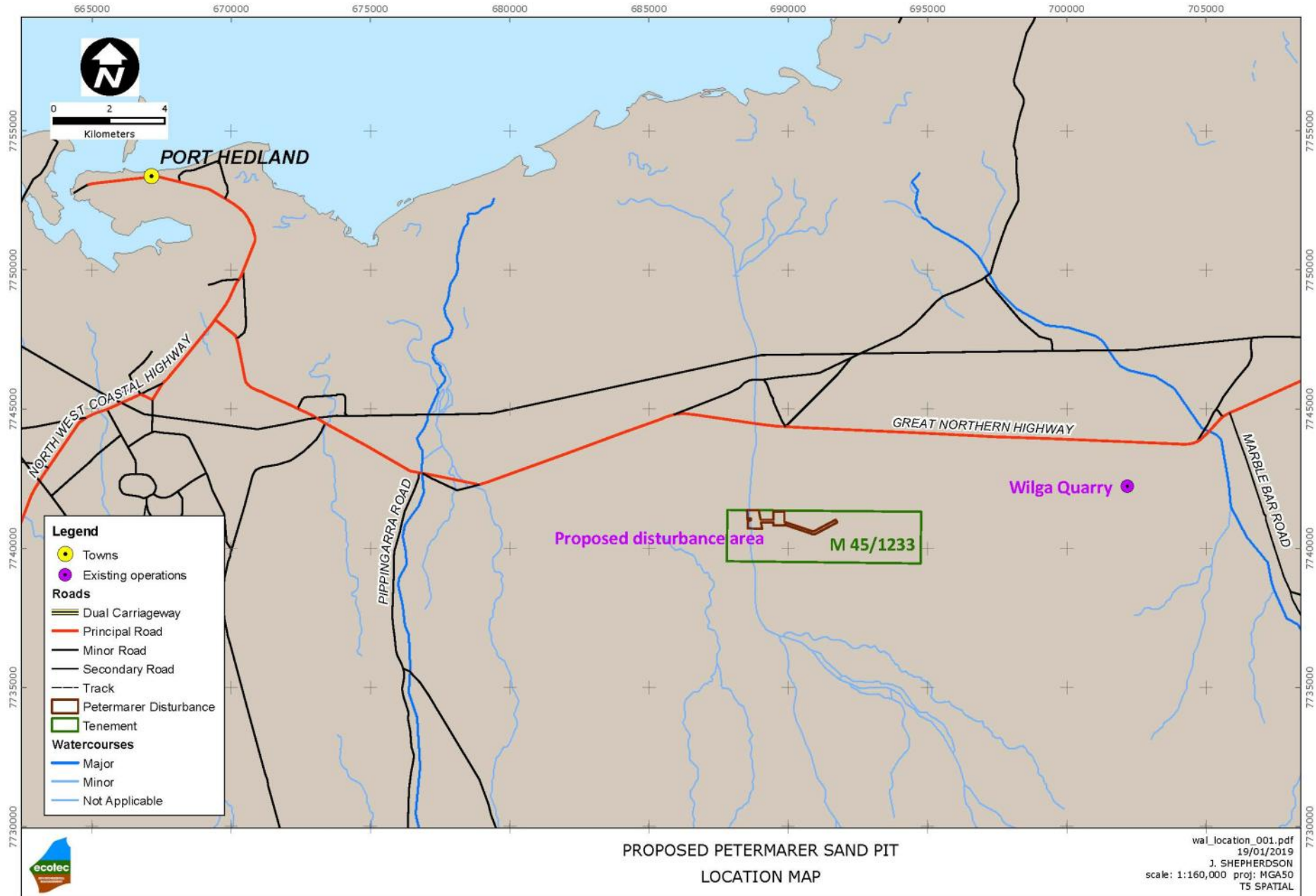


Figure 1.1: Location plan.

## 2.0 EXISTING ENVIRONMENT

### 2.1.1 Climate

The climate in the Project area is characterised by very hot summers, mild winters and low and variable rainfall. The mean maximum temperature in summer is 36.8°C, with an annual mean maximum of 33.3°C. The coolest month is July with a mean minimum temperature of 12.4°C (Figure 2.1).

The mean annual rainfall recorded at the Bureau of Meteorology weather station No.004032 at Port Hedland airport is 319.2 mm (BoM 2018). Rainfall is variable across the region, ranging from 300–350 mm per year in the north-east to less than 250 mm in the south and west. Rainfall can occur throughout the year (refer to Figure 2.1) but is influenced by tropical and monsoonal drivers, which are predominantly active in summer and autumn. Port Hedland typically receives most of its total annual rainfall during the wet season, from December to March.

The evaporation rate in the Pilbara is considerably higher than the average rainfall and can exceed 3000 mm per year.

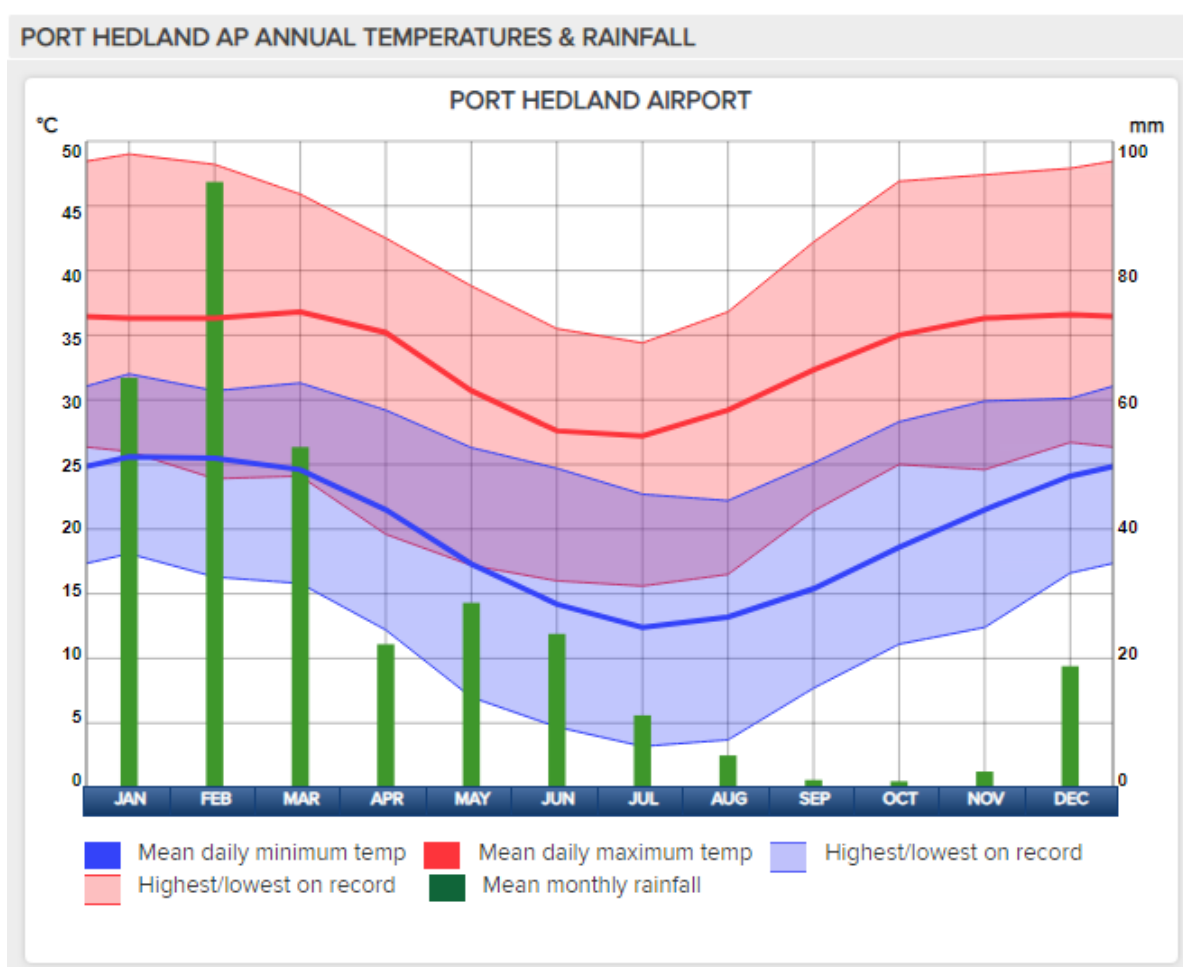


Figure 2.1: Climate data for Port Hedland Airport (Weatherzone 2018).

### 2.1.2 Interim Biogeographic Regionalisation for Australia

The study area is situated within the Pilbara Bioregion of the Interim Biogeographic Regionalisation for Australia (IBRA). The Pilbara Bioregion is further divided into four subregions: Chichester, Fortescue Plains, Hamersley and Roebourne. The study area is situated on the boundary of the Chichester (PIL1) and Roebourne (PIL4) subregions.

The Chichester subregion comprises the northern section of the Pilbara Craton. Undulating Archaean granite and basalt plains include significant areas of basaltic ranges. Plains support a shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* (formerly *Triodia pungens*) hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on ranges. The climate is Semi-desert-tropical and receives 300 mm of rainfall annually. Drainage

occurs to the north via numerous rivers (e.g. De Grey, Oakover, Nullagine, Shaw, Yule, Sherlock). The subregional area is 9,044,560 ha (Kendrick and Stanley 2001).

The Roebourne subregion is characterised by Quaternary alluvial and older colluvial coastal and subcoastal plains with a grass savannah of mixed bunch and hummock grasses, and dwarf shrub steppe of *Acacia stellaticeps* or *A. pyriformis* and *A. inaequilatera*. Uplands are dominated by *Triodia* hummock grasslands. Ephemeral drainage lines support *Eucalyptus victrix* or *Corymbia hamersleyana* woodlands. Samphire, Sporobolus and mangal occur on marine alluvial flats and river deltas. Resistant linear ranges of basalts occur across the coastal plains, with minor exposures of granite. Islands are either Quaternary sand accumulations, or composed of basalt or limestone, or combinations of any of these three. Climate is arid (semi-desert) tropical with highly variable rainfall, falling mainly in summer. Cyclonic activity is significant, with several systems affecting the coast and hinterland annually. The subregional area is 2,008,983 ha (Kendrick and Stanley 2001).

### 2.1.3 Geology, land systems and soils

The project area is located within the Pilbara Craton, which contains the oldest rocks in the Pilbara. The Pilbara Craton is subdivided into two sections. In the north is Archaean granite-greenstone terrain, and further to the south is the Archaean and Proterozoic Hamersley Basin. The Archaean granite-greenstone terrain underlies younger sediment along the coastal area, extending inland to Marble Bar. The granite contains a range of deformed and metamorphosed granitic phases, intruded by veins and dykes. The greenstone comprises volcanic and metasedimentary rocks that have significant volumes of intruding granite (van Vreeswyk et al. 2004).

The project is located in the De Grey-Roebourne Lowlands Zone, as defined by Tille (2006), located in the northern Pilbara between Karratha and the De Grey River. The De Grey-Roebourne Lowlands Zone occupies 19,350 km<sup>2</sup> and is characterised by alluvial plains and sandplains (and some floodplains and stony plains) on alluvial and marine deposits over rocks of the northern Pilbara Craton. Soils comprise red deep sandy duplexes with red loamy earths and some red/brown non-cracking clays, cracking clays, red sandy earths and red deep loamy duplexes. Vegetation is predominately spinifex grasslands with kanji and tussock grasslands (Tille 2006).

Two land systems (van Vreeswyk et al. 2004) occur within the study area, with an additional two land systems found in the surrounding area.

The project area is predominately located in the Uaroo land system (Ua), consisting of broad, level sandy surfaced plains, with minor pebbly plains and tracts, which support shrubby hard and soft spinifex grasslands. The relief is mostly less than 10 m. The majority of the soil is red sandy earths and red loamy earths with a sandy surface grading to loam or clay by 80 cm and deep red loamy surfaced soils often grading to heavier textures (van Vreeswyk et al. 2004).

The western end of the study area is located within the River land system (Rir). This land system comprises active flood plains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands. Flood plains and river terraces of this land system are subject to fairly regular overbank flooding from major channels and watercourses. The creek beds typically have sandy banks and poorly defined levees bounded by cobble plains. Banks, levees and slightly higher upper terraces receive less regular flooding than lower terraces and flood plains. Buffel grass and soft spinifex are common on this system and are highly and moderately preferred respectively by livestock. The system is largely stabilised by buffel grass and spinifex, and may be susceptible to erosion if vegetative cover is removed (van Vreeswyk et al. 2004).

The surrounding area is predominantly Uaroo land system and also includes the Boolaloo and Macroy land systems. These are outside of the proposed area of disturbance and were not included in the survey. Figure 2.2 shows the land systems of the study area and surrounds.

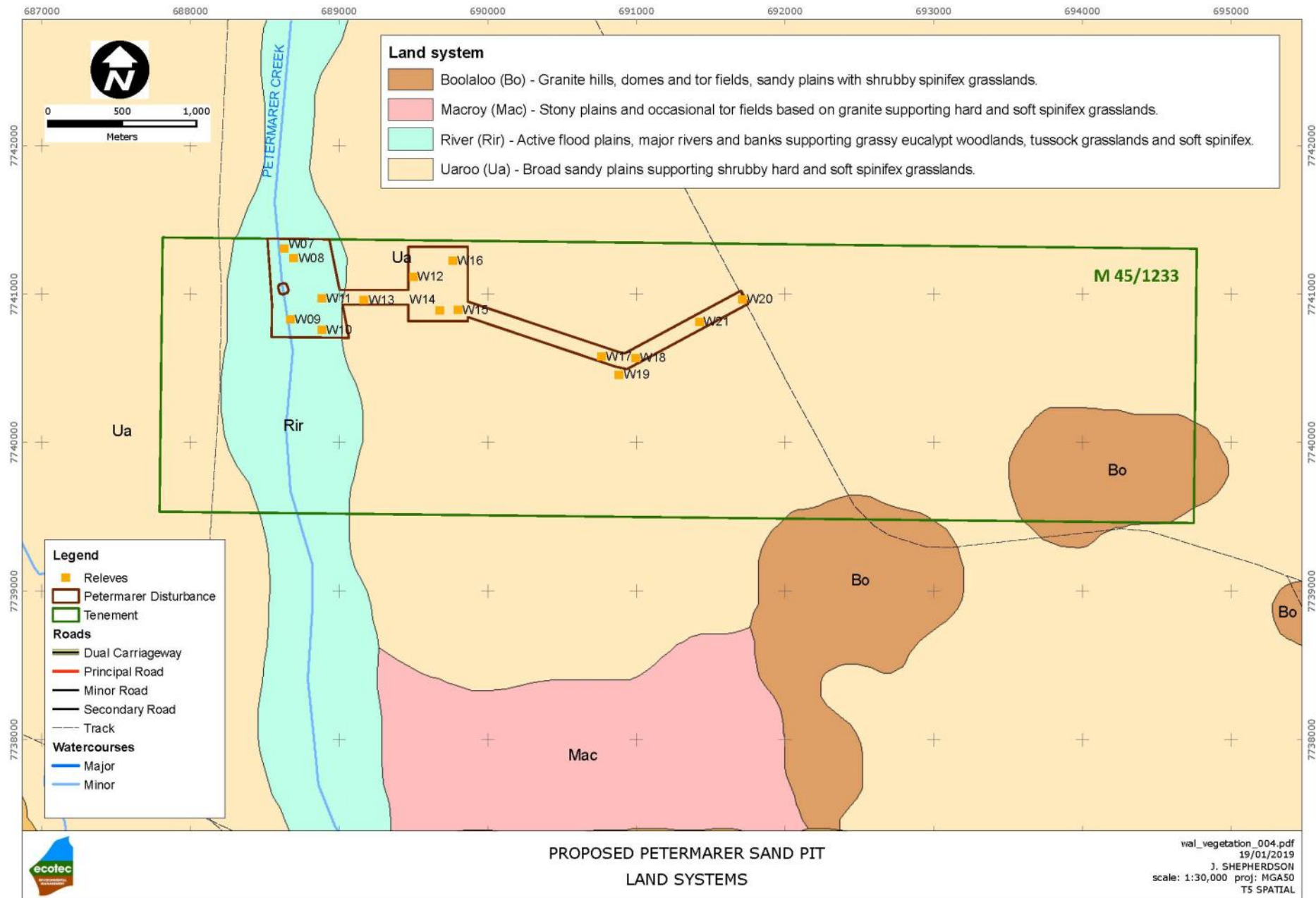


Figure 2.2: Land systems in and surrounding the project area.



Table 2.1 provides the area of the two land systems within the Pilbara Bioregion and within the proposed area of disturbance.

**Table 2.1: Land systems of the survey area.**

Land System	Within Pilbara Bioregion		Within Survey Area	
	Area (km <sup>2</sup> )	% of Pilbara Bioregion	Area (km <sup>2</sup> )	% of land system in Pilbara Bioregion
Uaroo	7681	4.2	0.453	0.005
River	4088	2.3	0.302	0.007

#### 2.1.4 Hydrology

The study area is located within the Port Hedland Coast Surface Water Catchment, which includes a number of major drainage systems that flow to the coast between the De Grey River and Fortescue River catchments (Figure 2.3, DoW 2010). The major rivers of the Pilbara Region discharge over the coastal flats towards the Indian Ocean, often through wide and braided flow paths. The discharge points are frequently a combination of direct ocean outlets and dispersal through marshy flats. The rivers also contribute significant recharge to groundwater resources in the alluvial aquifers on the coastal plains (DoW 2010).

Stream flow is predominately a direct response to rainfall, and is highly seasonal and variable. Most runoff occurs from January to March as a result of cyclones and low pressure systems. For the remainder of the year most of the smaller creeks are dry. The larger rivers cease to flow and pools form at the deepest points of the channels.

The project area is located immediately adjacent to Petermarer Creek, an ephemeral drainage line flowing toward the De Grey River delta and Leslie Saltfields System, northeast of Port Hedland.

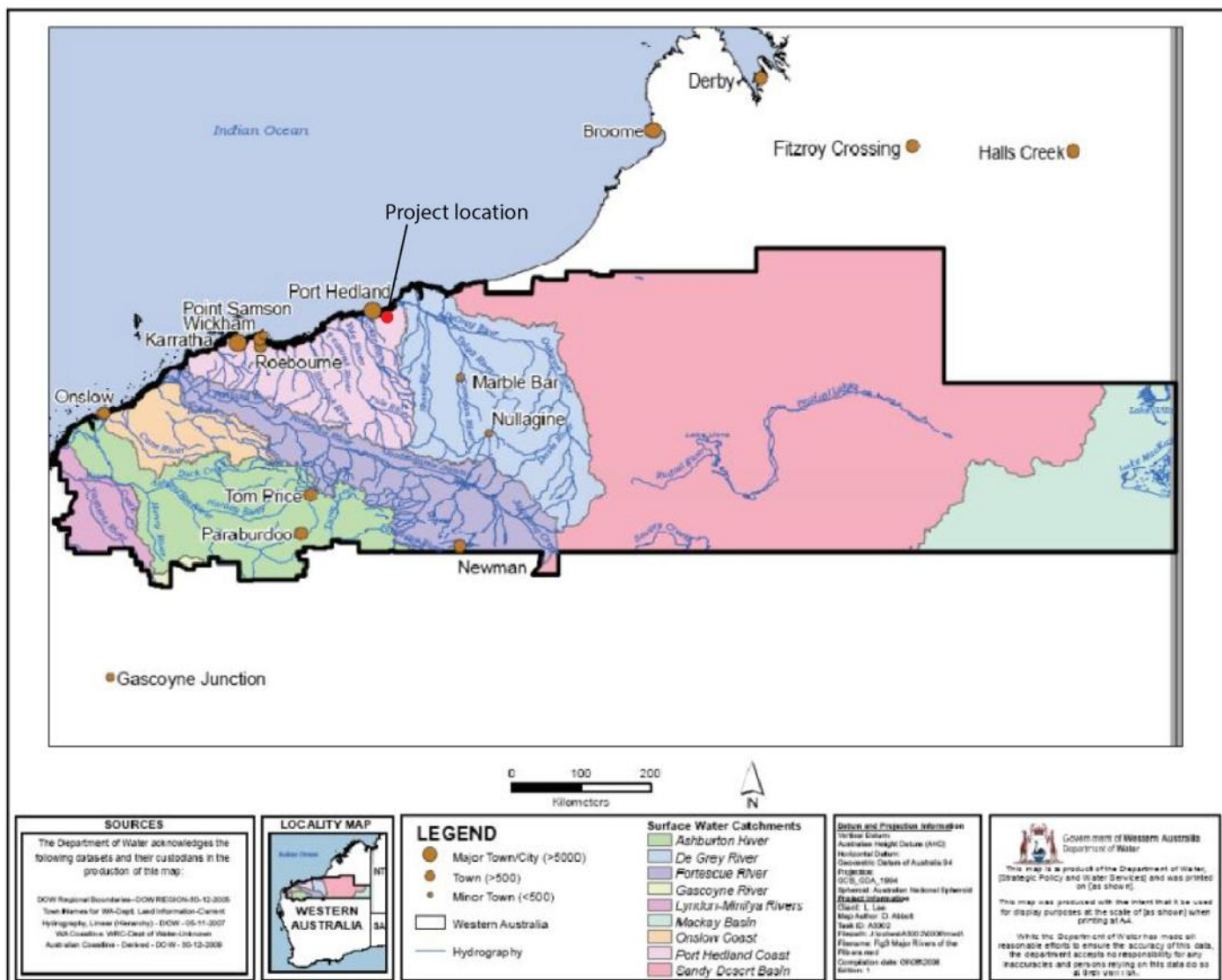


Figure 2.3: Surface water catchments of the Pilbara Region (DoW 2010).

### 2.1.5 Existing land uses

The project area is situated within Pippingarra Pastoral Lease and the area has been subject to grazing by cattle for decades. Cattle are active throughout the area. Pippingarra homestead is located approximately 4 km south of the site.

The area surrounding the proposed project is occupied by a number of mining and quarrying operations including the Poondano Iron Ore Mine (inactive) approximately 5 km to the southwest. WA Limestone operates the Poondano Quarry, approximately 8 km west of the site, and the Wilga Quarry, approximately 15 km to the east (Figure 1.1).

Additionally, the area is used for recreational activities such as off road driving, camping and hunting.

## 3.0 METHODOLOGY

### 3.1 Desktop assessment

The initial desktop review was undertaken in October 2018, with a more detailed review undertaken in December 2018. The desktop review involved:

- searches of the NatureMap (DBCA 2018) and Protected Matters Search Tool databases (DoEE 2018)
- review of a number of fauna, flora and vegetation assessments previously undertaken in the surrounding area.

### 3.2 Field work

The field work was undertaken on 28 and 29 November by biologist/environmental consultant Jeremy Shepherdson and zoologist Dr Stuart Dawson.

The field work involved a series of relevés throughout the proposed areas of disturbance. The points were initially chosen based on obvious changes in vegetation and topographical features observed from aerial imagery. An assessment of the vegetation, flora species and fauna habitat was undertaken of the area surrounding each point (refer to Figure 4.1).

Given the possible presence of the ghost bat (*Macroderma gigas*) and the Pilbara leaf-nosed bat (*Rhinioncteris aurantia*), a bat detector was deployed in the creek line to record bat calls for later analysis.

### 3.3 Personnel

Jeremy Shepherdson has more than 20 years experience in biological surveys and environmental consulting, and has worked in a range of environments across the state. He undertook the flora and vegetation assessment for this survey.

Dr Stuart Dawson (Animal Plant Mineral Pty Ltd) is a zoologist specialising in mammals. Stuart's PhD research explored the impacts of onshore seismic surveys on the vulnerable marsupial, the greater bilby (*Macrotis lagotis*). Stuart has experience working with a range of species including quolls, turtles, woylies, snakes, bilbies, kangaroos and introduced species such as foxes, cats and pigs. He has conducted biological surveys (including targeted fauna trapping, level 1 surveys, vegetation mapping and targeted flora surveys) across a range of environments.

Post-field work plant identification of species unable to be identified in the field was undertaken by Catherine Krens (Anders Environmental Consulting), a botanist with extensive Pilbara experience.

## 4.0 RESULTS

### 4.1 Desktop assessment

The Department of Biodiversity, Conservation and Attractions (DBCA) NatureMap database search was conducted for a 20 km radius from the centre of the project location.

The database search returned over 2700 records of flora and fauna species from within the search area including:

- 12 species listed as *Rare or likely to become extinct*
- 31 species listed as *Protected under international agreement*
- one species listed as *Priority 1*
- five species listed as *Priority 3*
- four species listed as *Priority 4*.

The database results show 153 species of flora and 309 species of fauna having previously been recorded in a 20 km radius of the proposed Petermarer sand pit.

Numerous marine and migratory fauna species were included in the list because the site is within 20 km of the coast. All of these species are considered to be not present, or very unlikely to be present in the project area.

The Department of the Environment and Energy EPBC Act Protected Matters Search Tool was also used to conduct a search of the area within a 20 km radius of the project location. This search returned 26 Threatened species and 50 Migratory species potentially present. Again, this list includes a number of marine and migratory fauna species that will not be found, or are very unlikely to inhabit the project area.

Table 4.1 lists the conservation significant flora species and Table 4.2 lists the conservation significant fauna species returned in the database searches. The presence of suitable habitat for each species and likelihood of presence

within the study area is included. The database search reports are included as Appendix 1. Definitions of the conservation codes used in the tables are included as Appendix 2.

**Table 4.1: Conservation significant flora returned from database searches.**

Conservation Status	Species	Habitat (WAH 2019)	Annual / Perennial	Suitable Habitat	Likelihood
Priority 1	<i>Tephrosia rosea</i> var. Port Hedland	Undescribed, records indicate predominately coastal habitat.	Perennial (?)	No	Unlikely
Priority 3	<i>Bonamia oblongifolia</i>	Sandy or gravelly soils.	Perennial	Yes	Possible
	<i>Eragrostis crateriformis</i>	Clayey loam or clay. Creek banks, depressions. Granite outcrop. Damp clayey edges of flood plains and creeks.	Annual	Yes	Possible
	<i>Heliotropium muticum</i>	Sandy soil. Flat sand plains.	Perennial	Yes	Possible
	<i>Rothica indica</i> subsp. <i>australis</i>	Sandy soils. Sand hills and sandy flats.	Annual	Yes	Possible

**Table 4.2: Conservation significant fauna returned from database searches.**

Common Name	Species	WA Status	EPBC Act Status	Preferred habitat	Likelihood of occurrence
<b>Mammals</b>					
Northern quoll	<i>Dasyurus hallucatus</i>	T-EN S2	EN	Occur in a wide range of habitats but are most common in rugged, rocky areas. In the Pilbara they inhabit mesas, rocky gorges and granite outcrops. Foraging occurs over a wide variety of habitats including dry water courses and spinifex plains.	Likely – foraging habitat present, no denning habitat identified within the surveyed area.  518 records within a 20km radius, mainly on rocky outcrops.
Ghost bat	<i>Macroderma gigas</i>	T-VU S3	VU	Roost sites used permanently are generally deep natural caves or disused mine shafts with a relatively stable temperature of 23°-28°C and moderate to high humidity.	Possible  61 records within a 20km radius.  No suitable roosting habitat, most likely present while hunting for food.
Pilbara leaf-nosed bat	<i>Rhinioncteris aurantia</i> (Pilbara)	T-VU S3	VU	Warm, humid environments, including caves formed between ascending rock layers, in gorges, and within granite rock piles as well as disused mines and mine shafts where high humidity is maintained from seeping groundwater.	Possible  No records returned from the NatureMap database within 20km radius.  PMST database states “Species or species habitat known to occur in the area.”  No suitable roosting habitat, most likely present while hunting for food.
Greater bilby	<i>Macrotis lagotis</i>	T-VU S3	VU	Sand plains with mature spinifex.	Unlikely  1 record within the 20km radius.  Frequent burning and grazing has damaged required habitat.
Brush-tailed mulgara	<i>Dasyercus blythi</i>	P4	-	Sand plains with mature spinifex.	Possible  34 records within a 20km radius.  Suitable habitat may be present however frequent burning and grazing has reduced habitat quality.

Western pebble-mound mouse	<i>Pseudomys chapmani</i>	P4	-	Pebble mounds are usually found on gentle stony slopes vegetated by hard spinifex. Pebble mounds are constructed from small stones, which typically cover areas from 0.5-9.0 m <sup>2</sup> .	Unlikely 4 records within a 20km radius. No suitable habitat present in the survey area.
<b>Birds</b>					
Curlew sandpiper	<i>Calidris ferruginea</i>	T-VU & IA S3	CR & MI	Migratory. Known to frequent the Port Hedland salt works. Prefer mudflats in sheltered coastal areas, and ponds in salt works and sewage farms. Recorded inland around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand.	Unlikely Possible short-term visitor.
Great knot	<i>Calidris tenuirostris</i>	T-VU & IA S3	CR & MI	Mudflats in sheltered coastal areas, and ponds in salt works and sewage farms. Recorded inland around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand.	Unlikely Possible short-term visitor.
Greater sand plover	<i>Charadrius leschenaultii</i>	IA S5	VU & MI	Migratory. In Australia usually inhabits intertidal mudflats.	Unlikely Possible short-term visitor.
Lesser sand plover	<i>Charadrius mongolus</i>	T-EN & IA S2	EN & MI	Migratory. In Australia usually inhabits intertidal mudflats.	Unlikely Possible short-term visitor.
Grey falcon	<i>Falco hypoleucos</i>	T-VU S3	-	Occurs in a wide range of habitats including lightly timbered country, stony plains and lightly timbered Acacia shrubland.	Possible 2 records within a 20km radius. Suitable habitat present.
Eastern curlew	<i>Numenius madagascariensis</i>	T-VU & IA S3	CR & MI	Migratory. In Australia usually inhabits intertidal mudflats.	Unlikely Possible short-term visitor.
Grey-tailed tattler	<i>Tringa brevipes</i> ( <i>Heteroscelus brevipes</i> )	IA & P4 S5	MI	Migratory marine species. Coastal habitats, forages in intertidal pools and shallow mudflats.	Unlikely Possible short-term visitor.

Rainbow Bee-eater	<i>Merops ornatus</i>		IA	Common and widespread species in WA, except the drier interior of the State and the far south-west. Occurs in lightly wooded sandy country, preferring areas near water. It nests in burrows excavated in sandy ground or banks, often at the margins of roads and tracks.	Likely No prior records within the 20km radius, however suitable habitat is present.
30 species listed as "Protected under an international agreement"		Refer to Appendix 1		Migratory and marine species, predominately associated with coastal habitats.	Unlikely Possible short-term visitors.
<b>Reptiles</b>					
Olive python	<i>Liasis olivaceus barroni</i>	T-VU S3	VU	Gorges and gullies with permanent water present.	Unlikely No records returned from the NatureMap database within 20km radius. PMST database states "Species or species habitat known to occur in the area." No suitable habitat present.
Airlie Island ctenotus / North-western coastal ctenotus	<i>Ctenotus angusticeps</i>	P3	VU	Appear to have a preference for tussock grass in coastal areas. Also found on coastal mudflats vegetated with samphire.	Unlikely No suitable habitat present.

## 4.2 Reconnaissance survey

### 4.2.1 Limitations

The timing of the survey, being late in the year, was not ideal for flora assessment as many of the annual species were not present, or were in the late stages of their life cycle. The database search returned five Priority species of flora having previously been recorded in the surrounding area. There is some potential for these species to be located in the survey area as suitable habitat for four of the five species is present.

Due to the timing of the survey (November 2018), a comprehensive flora list has not been obtained for the study area. The area has been subject to regular fire and grazing activity over a long period of time, which is quite likely to have impacted the species diversity. It is therefore expected that the majority of flora species that occur within the study area were recorded during the survey.

### 4.2.2 Flora and vegetation

The reconnaissance survey was undertaken to produce a list of the flora species present at the time of the survey and to identify the broad vegetation types and vegetation condition occurring within the project area. Identification of habitat suitable for the conservation significant flora species identified in the desktop assessment was also included.

Fifteen relevés were undertaken throughout the survey area, generally positioned where changes in vegetation were noted. Figure 4.1 shows the relevé locations. Appendix 3 provides the data collected from each of the relevé sites.

#### Flora

Forty nine species of flora from 16 families were recorded during the survey with the most abundant family being Fabaceae with 16 species recorded. Due to the timing of the survey, it is expected that a number of annual species that would be present in the area following the wet season are not represented in the species list. The full list of species recorded is included in Appendix 4.

No conservation significant flora was recorded during the survey, however suitable habitat is present for four of the five species returned from the database searches (refer to Table 4.1).

The introduced flora species *Cenchrus ciliaris* (Buffel grass) and *Calotropis procera* (Caltrope) were recorded during the survey. Buffel grass is prolific along the banks of the creek and dominates the understorey in much of this area. The species is preferential fodder for cattle with the seed being spread predominately by surface water flow.

*Calotropis procera* is a shrub or small tree, originating from Asia and growing to approximately 4 m tall (Photograph 4.1). It is declared agricultural pest species in Western Australia. Caltrope was recorded in the vicinity of relevé W08, but is expected to be present along the length of the creek.



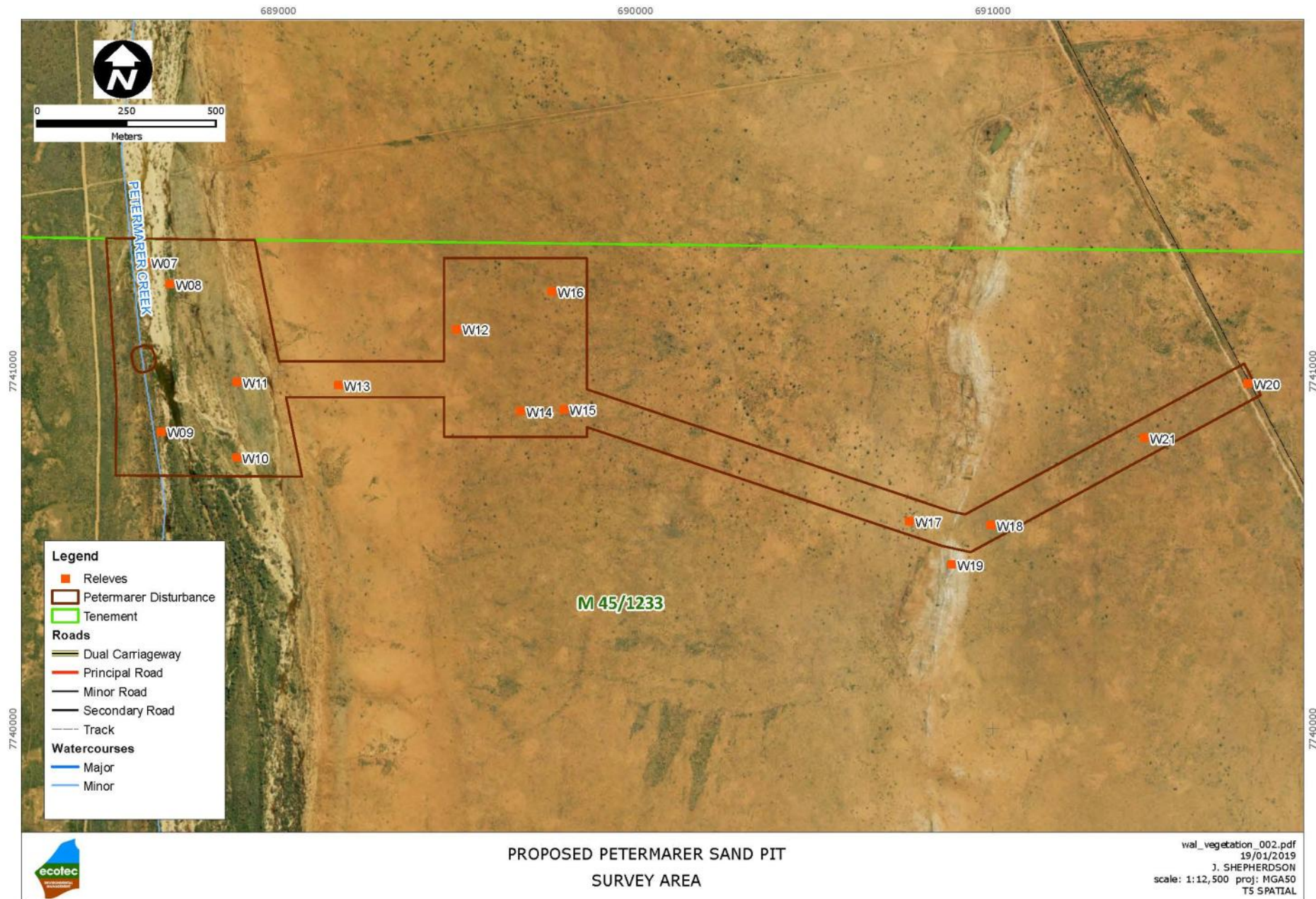


Figure 4.1: Survey area and relevé locations.



Photograph 4.1: The form and flower of *Calotropis procera*, a declared agricultural pest.

## Vegetation

Broadly, two main vegetation types dominate the survey area.

*Triodia* (spinifex) hummock grassland (Photograph 4.2) dominates the sand plain areas and occupies most of the survey area. *Triodia epactia* is the most abundant species throughout this vegetation type. The dominant species of this vegetation type is typically very widely spaced *Corymbia* and *Acacia* species.

*Corymbia* very open low woodland with *Acacia* shrubland (Photograph 4.3) is found predominately along the creek lines and drainage channels. Variations of the *Acacia* shrubland vegetation exist throughout the survey area, with long unburnt areas typically supporting dense thickets of *Acacia* species. *Acacia colei* var. *colei*, *A. inaequilatera* and *A. tumida* var. *pilbarensis* are the most common species found throughout the survey area.

More detailed vegetation descriptions of each of the surveyed sites are provided in Appendix 3.

Vegetation condition throughout the area is generally classified as “Good” (refer to Table 4.3), reflecting grazing by livestock, frequent fire and vehicular activity. Vegetation condition in the long unburnt areas (+ 5 years) is generally considered to be “Very Good”.



**Photograph 4.2: Typical spinifex hummock grassland vegetation of the sand plain areas.**



**Photograph 4.3: Corymbia very open woodland over Acacia shrubland, typical of the creek line.**

**Table 4.3: Vegetation condition scale (Keighery 1994).**

Vegetation Condition	Criterion
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 very 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 a number of 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.

Figure 4.2 shows the vegetation associations within and surrounding the survey area.

### 4.2.3 Fauna and habitat

Fauna habitat was assessed at each of the relevé locations to assist in determining the likelihood of presence of conservation significant species identified during the desktop review.

Three main fauna habitats exist in the surveyed area.

#### Sand plain

Sand plain habitat is ubiquitous throughout much of the region, characterised by low vegetation (shrubs and hummock grasses), on flat sandy soils. This habitat is generally homogenous, with any heterogeneity driven by the fire mosaic. This habitat is suitable for burrowing and, in suitable areas, may be occupied by the brush-tailed mulgara (*Dasyercus blythi*) and the greater bilby (*Macrotis lagotis*). In addition, this habitat type is likely to provide appropriate habitat for a range of reptiles including dragons and goannas.

One Australian bustard (*Ardeotis australis*) was recorded during the survey. The zebra finch (*Taeniopygia guttata*) and willie wagtail (*Rhipidura leucophrys*) were also observed in this habitat.

Photograph 4.4 shows typical Sand Plain habitat that is long unburnt (+ 5 years), while Photograph 4.5 shows an area of the same habitat that has been burnt within the last two years.



**Photograph 4.4: An example of Sand Plain habitat, long unburnt.**



**Photograph 4.5: An example of Sand Plain habitat, burnt within the last two years.**

## Ephemeral Drainage Line

The broad ephemeral drainage line (Petermarer Creek) will contain water for short periods of time following significant rainfall events. The sandy banks provide suitable substrate for burrowing species such as pardalotes (*Pardalotus* sp.) and the rainbow bee-eater (*Merops ornatus*), as well as goannas and skinks. The larger trees provide perching and nesting habitat for birds. Photograph 4.6 shows typical Ephemeral Drainage Line habitat.

During the survey, a range of common bird species were observed including the black-faced wood swallow (*Artamus cinereus*) and yellow throated miner (*Manorina flavigula*). The long-nosed dragon (*Gowidon longirostis*) was also sighted. The rainbow bee-eater was observed at the WA Limestone camp, approximately 8 km north-west of the site, and is expected to be present along the creek line periodically.

This creek line also supports a range of introduced species. Sign of the feral cat, cattle, dog and camel were observed during the survey.

This habitat type may provide foraging habitat for the ghost bat (*Macroderma gigas*) and Pilbara leaf-nosed bat (*Rhinonictis aurantia*), both listed as Threatened (Vulnerable) species in Western Australia and as Vulnerable under the Commonwealth EPBC Act. As such, two acoustic bat detectors (one AnaBat Swift and one D500x) were deployed for two nights.

No appropriate roosting sites for the ghost bat were located in the survey area, nor are there any known in the surrounding area.

Four common species of bat from three families were identified following analysis of the recordings. The species are listed in Table 2.1 and the report is included as Appendix 5.

**Table 4.4: Bat species identified in the creek line area.**

Common name	Species
Common Sheath-tailed Bat	<i>Taphozous georgianus</i>
Little Broad-nosed Bat	<i>Scotorepens greyii</i>
Finlayson's Cave Bat	<i>Vespadelus finlaysoni</i>
Greater Northern Free-tailed Bat	<i>Chaerephon jobensis</i>



**Photograph 4.6: Typical Ephemeral Drainage Line habitat.**

### **Rocky outcrop**

A deeply incised quartz rock outcrop exists immediately north and south of the survey area (refer to Figure 4.2) The outcrop contains numerous overhangs and shallow caves and was investigated during the survey due to its proximity to the proposed haul road route. This outcrop is sparsely vegetated by hummock and tussock grasses and some very widely spaced trees. This habitat type is likely to provide appropriate habitat for a range of reptile and amphibian species, including pythons and dragons. In addition, a range of mammal species may use this habitat. During the survey, sign of the euro (*Osphranter robustus*) was frequently recorded.

The database search indicated previous records of the northern quoll (*Dasyurus hallucatus*) in this area, however no evidence was located during the survey. Investigation of the site found no crevices or caves considered suitable for denning burrows. It was concluded that the outcrop is therefore likely to be used by the species for foraging only. Photograph 4.7 shows the Rocky Outcrop habitat to the south of the survey area.



**Photograph 4.7: A small area of Rocky Outcrop habitat adjacent to the survey area.**

Figure 4.2 shows the location of the fauna habitats identified during the survey. The NatureMap database report lists all fauna species previously recorded in a 20 km radius of the survey area.

#### **4.2.4 Environmentally Sensitive Areas**

The nearest environmentally sensitive area is the Leslie (Port Hedland) Saltfields System, listed as a Nationally Important Wetland (DoEE 2018), located on the coast approximately 10 km northeast of the project area.

There are no Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC) within the project area, or in the nearby vicinity.



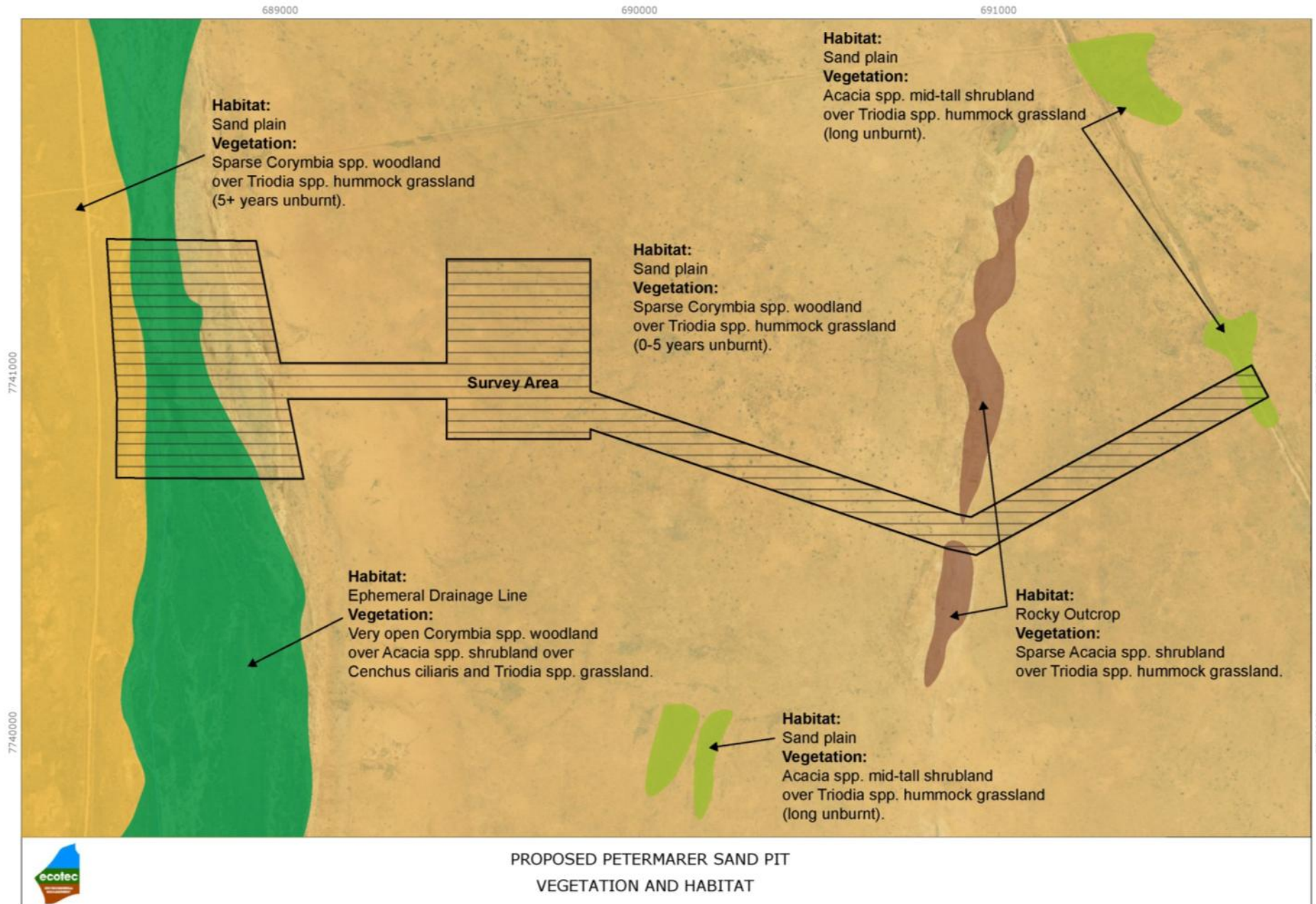


Figure 4.2: Vegetation and fauna habitat of the survey area.

## 5.0 DISCUSSION

The survey area supports two broad vegetation types and three main fauna habitats.

There is potential for four of the five conservation-significant flora species - *Bonamia oblongifolia*, *Eragrostis crateriformis*, *Heliotropium muticum* and *Rothica indica* subsp. *australis*, all Priority 3 - to be found in the area, as suitable habitat is present, being sand plain and sandy soils. None of these species were located during the survey, although they are generally annual species, so may be present following the wet season. The areas of suitable habitat are common and widespread throughout the surrounding region. Development of the area is considered unlikely to have an impact on the survival or conservation significance of any of these species of flora.

The database search returned over 500 records of the northern quoll in a 20 km radius of the survey area. Recorded activity appears to be concentrated on the rocky outcrops, including the north-south aligned quartz outcrop that passes through the project area. This feature was investigated during the survey and does not appear to provide any suitable denning habitat for the northern quoll. It is therefore likely to be utilised by the species when foraging for food. The proposed access road passes through a gap in the outcrop and the main areas of disturbance will be more than 1 km to the west. The outcrop will not be impacted by the proposed development of the sand pit.

The Ephemeral Drainage Line habitat may provide hunting areas for the ghost and Pilbara leaf-nosed bats, however no suitable roosting habitat exists in the surrounding area.

The absence of permanent pools and deep rocky gorges makes the area unlikely to support the olive python.

Sand Plain habitat occupies most of the surveyed area and the surroundings. As a result of frequent fires in the area, most of this habitat comprises low hummock grass land and very widely spaced small trees. Long unburnt areas (+ 5 years) support much larger spinifex hummocks and denser stands of Acacia. These areas provide more suitable habitat for burrowing mammals, with greater potential to support the mulgara. The bilby is considered unlikely to be found in the area due to the long history of grazing, frequent fire and presence of predators.

There is no suitable habitat for the western pebble-mound mouse or the north-western coastal ctenotus in the survey area.

Thirty one species of bird protected under an international agreement (refer to Appendix 2) as migratory species were returned in the database search. Most of these birds are dependent on coastal habitat for feeding and resting prior to migrating to the northern hemisphere. It is considered very unlikely that any of these species would be found in the area due to lack of suitable habitat. Short term visits to lasting pools in the creek may occur infrequently.

The long history of livestock grazing and frequent fires in the area, have undoubtedly altered the vegetation composition and reduces the likelihood of flora and fauna species of conservation significance being present in the area. Recreational activities such as off road driving, hunting and a number of unsealed roads in the area are also likely to have impacted the biology.

The habitat and vegetation that will potentially be impacted are common and widespread. Therefore, the proposed development is considered unlikely to adversely impact the status of any species of conservation significance known or potentially inhabiting the area.

## 6.0 REFERENCES

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# Appendix 1

## Desktop Survey Results

# NatureMap Species Report

Created By Jeremy Shepherdson on 24/01/2019

**Current Names Only** Yes  
**Core Datasets Only** Yes  
**Method** 'By Circle'  
**Centre** 118° 48' 36" E, 20° 25' 12" S  
**Buffer** 20km  
**Group By** Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	411	1796
Priority 1	1	2
Priority 3	5	17
Priority 4	4	57
Protected under international agreement	31	200
Rare or likely to become extinct	12	646
<b>TOTAL</b>	<b>464</b>	<b>2718</b>

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
<b>Rare or likely to become extinct</b>				
1.	24784 <i>Calidris ferruginea</i> (Curlew Sandpiper)		T	
2.	24790 <i>Calidris tenuirostris</i> (Great Knot)		T	
3.	25575 <i>Charadrius leschenaultii</i> (Greater Sand Plover)		T	
4.	25576 <i>Charadrius mongolus</i> (Lesser Sand Plover)		T	
5.	24093 <i>Dasyurus hallucatus</i> (Northern Quoll)		T	
6.	24473 <i>Falco hypoleucos</i> (Grey Falcon)		T	
7.	24128 <i>Lagostrophus fasciatus</i> subsp. <i>fasciatus</i> (Banded hare-wallaby, Mermine)		T	
8.	24796 <i>Limosa lapponica</i> subsp. <i>menzbieri</i> (Bar-tailed Godwit (northern Siberian))		T	
9.	24180 <i>Macroderma gigas</i> (Ghost Bat)		T	
10.	24168 <i>Macrotis lagotis</i> (Bilby, Dalgyte, Ninu)		T	
11.	25344 <i>Natator depressus</i> (Flatback Turtle)		T	
12.	24798 <i>Numenius madagascariensis</i> (Eastern Curlew)		T	
<b>Protected under international agreement</b>				
13.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
14.	25736 <i>Arenaria interpres</i> (Ruddy Turnstone)		IA	
15.	24779 <i>Calidris acuminata</i> (Sharp-tailed Sandpiper)		IA	
16.	24780 <i>Calidris alba</i> (Sanderling)		IA	
17.	25738 <i>Calidris canutus</i> (Red Knot, knot)		IA	
18.	24786 <i>Calidris melanotos</i> (Pectoral Sandpiper)		IA	
19.	24788 <i>Calidris ruficollis</i> (Red-necked Stint)		IA	
20.	24789 <i>Calidris subminuta</i> (Long-toed Stint)		IA	
21.	41332 <i>Chlidonias leucopterus</i> (White-winged Black Tern, white-winged tern)		IA	
22.	24478 <i>Fregata ariel</i> (Lesser Frigatebird)		IA	
23.	47954 <i>Gelochelidon nilotica</i> (Gull-billed Tern)		IA	
24.	24481 <i>Glareola maldivarum</i> (Oriental Pratincole)		IA	
25.	25630 <i>Hirundo rustica</i> (Barn Swallow)		IA	
26.	48587 <i>Hydroprogne caspia</i> (Caspian Tern)		IA	
27.	25739 <i>Limicola falcinellus</i> (Broad-billed Sandpiper)		IA	
28.	24795 <i>Limnodromus semipalmatus</i> (Asian Dowitcher)		IA	
29.	30932 <i>Limosa lapponica</i> (Bar-tailed Godwit)		IA	
30.	25741 <i>Limosa limosa</i> (Black-tailed Godwit)		IA	
31.	24799 <i>Numenius minutus</i> (Little Curlew, Little Whimbrel)		IA	
32.	25742 <i>Numenius phaeopus</i> (Whimbrel)		IA	
33.	48591 <i>Pandion cristatus</i> (Osprey, Eastern Osprey)		IA	
34.	24801 <i>Phalaropus lobatus</i> (Red-necked Phalarope)		IA	
35.	24802 <i>Philomachus pugnax</i> (Ruff, reeve)		IA	
36.	24382 <i>Pluvialis fulva</i> (Pacific Golden Plover)		IA	
37.	24383 <i>Pluvialis squatarola</i> (Grey Plover)		IA	
38.	48593 <i>Sternula albifrons</i> (Little Tern)		IA	
39.	48597 <i>Thalasseus bergii</i> (Crested Tern)		IA	
40.	24806 <i>Tringa glareola</i> (Wood Sandpiper)		IA	

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
41.	24808 <i>Tringa nebularia</i> (Common Greenshank, greenshank)		IA	
42.	24809 <i>Tringa stagnatilis</i> (Marsh Sandpiper, little greenshank)		IA	
43.	41351 <i>Xenus cinereus</i> (Terek Sandpiper)		IA	
<b>Priority 1</b>				
44.	41920 <i>Tephrosia rosea</i> var. <i>Port Hedland</i> (A.S. George 1114)		P1	
<b>Priority 3</b>				
45.	6607 <i>Bonamia oblongifolia</i>		P3	
46.	25024 <i>Ctenotus angusticeps</i> (Airlie Island Ctenotus, Northwestern coastal Ctenotus)		P3	
47.	16730 <i>Eragrostis crateriformis</i>		P3	
48.	10891 <i>Heliotropium muticum</i>		P3	
49.	17720 <i>Rothia indica</i> subsp. <i>australis</i>		P3	
<b>Priority 4</b>				
50.	30903 <i>Dasyercus blythi</i> (Brush-tailed Mulgara, Ampurta)		P4	
51.	48395 <i>Dasyercus</i> sp. ( <i>mulgara</i> )		P4	
52.	24233 <i>Pseudomys chapmani</i> (Western Pebble-mound Mouse, Ngadji)		P4	
53.	24803 <i>Tringa brevipes</i> (Grey-tailed Tattler)		P4	
<b>Non-conservation taxon</b>				
54.	4901 <i>Abutilon otocarpum</i> (Desert Chinese Lantern)			
55.	43020 <i>Abutilon oxycarpum</i> subsp. <i>prostrate</i> (A.A. Mitchell PRP 1266)			
56.	13403 <i>Acacia colei</i>			
57.	17013 <i>Acacia colei</i> var. <i>colei</i>			
58.	3377 <i>Acacia inaequilatera</i> (Baderi)			
59.	3471 <i>Acacia orthocarpa</i> (Needleleaf Wattle)			
60.	19456 <i>Acacia stellaticeps</i>			
61.	3579 <i>Acacia trachycarpa</i> (Minni Ritchi, Balgali)			
62.	20319 <i>Acacia tumida</i> var. <i>pilbarensis</i>			
63.	<i>Acanthophis</i> GT NOTHERN species			Y
64.	25243 <i>Acanthophis pyrrius</i> (Desert Death Adder)			
65.	<i>Acariformes</i> sp.			
66.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
67.	2646 <i>Aerva javanica</i> (Kapok Bush)	Y		
68.	2651 <i>Alternanthera nana</i> (Hairy Joyweed)			
69.	17147 <i>Alysicarpus muelleri</i>			
70.	30833 <i>Amphibolurus longirostris</i> (Long-nosed Dragon)			
71.	<i>Aname ellenae</i>			
72.	24312 <i>Anas gracilis</i> (Grey Teal)			
73.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
74.	47414 <i>Anhinga novaehollandiae</i> (Australasian Darter)			
75.	25318 <i>Antaresia perthensis</i> (Pygmy Python)			
76.	46630 <i>Anthracoctysis paraneurachnis</i>			Y
77.	25670 <i>Anthus australis</i> (Australian Pipit)			
78.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
79.	25559 <i>Ardea intermedia</i> (Intermediate Egret)			
80.	41324 <i>Ardea modesta</i> (great egret, white egret)			
81.	24340 <i>Ardea novaehollandiae</i> (White-faced Heron)			
82.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
83.	24610 <i>Ardeotis australis</i> (Australian Bustard)			
84.	<i>Areacandona 'iuno'</i> (PSS)			
85.	<i>Areacandona 'jessicae'</i> (PSS)			
86.	207 <i>Aristida contorta</i> (Bunched Kerosene Grass)			
87.	210 <i>Aristida holathera</i>			
88.	211 <i>Aristida hygrometrica</i> (Northern Kerosene Grass)			
89.	212 <i>Aristida inaequiglumis</i> (Feathertop Threeawn)			
90.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
91.	25567 <i>Artamus leucorhynchus</i> (White-breasted Woodswallow)			
92.	24354 <i>Artamus leucorhynchus</i> subsp. <i>leucopygialis</i> (White-breasted Woodswallow)			
93.	<i>Arthrorhabdus paucispinus</i>			
94.	25236 <i>Aspidites ramsayi</i> (Woma)			
95.	<i>Australobolbus pseudobscurus</i>			
96.	<i>Blackburnium neocavicolle</i>			
97.	2770 <i>Boerhavia coccinea</i> (Tar Vine, Wituka)			
98.	2774 <i>Boerhavia repleta</i>			
99.	<i>Bolboleaus truncatus</i>			
100.	6603 <i>Bonamia alatisemina</i>			
101.	11167 <i>Bonamia erecta</i>			
102.	6605 <i>Bonamia linearis</i>			
103.	6606 <i>Bonamia media</i>			
104.	24251 <i>Bos taurus</i> (European Cattle)	Y		

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
105.	750 <i>Bulbostylis barbata</i>			
106.	24359 <i>Burhinus grallarius</i> (Bush Stone-curlew)			
107.	47897 <i>Butorides striata</i> (Striated Heron, Mangrove Heron)			
108.	<i>Byblis</i> sp.			
109.	25715 <i>Cacatua roseicapilla</i> (Galah)			
110.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
111.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
112.	40825 <i>Calandrinia pentavalvis</i>			
113.	2870 <i>Calandrinia stagnensis</i>			
114.	<i>Carenum pulchrum</i>			
115.	<i>Carenum venustum</i>			
116.	6567 <i>Carissa lanceolata</i> (Conkerberry, Marnuwiji)			
117.	25015 <i>Carlia munda</i> (Shaded-litter Rainbow Skink)			
118.	25017 <i>Carlia triacantha</i> (Desert Rainbow Skink)			
119.	2949 <i>Cassytha capillaris</i>			
120.	<i>Cavisternum clavatum</i>			
121.	258 <i>Cenchrus ciliaris</i> (Buffel Grass)	Y		
122.	29721 <i>Cenchrus setiger</i> (Birdwood Grass)	Y		
123.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattled Bat)			
124.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
125.	<i>Chilibathynella</i> sp.			
126.	<i>Chlaenius australis</i>			
127.	<i>Chroicocephalus novaehollandiae</i>			
128.	24431 <i>Chrysococcyx basalis</i> (Horsfield's Bronze Cuckoo)			
129.	273 <i>Chrysopogon fallax</i> (Golden Beard Grass)			
130.	24288 <i>Circus approximans</i> (Swamp Harrier)			
131.	24289 <i>Circus assimilis</i> (Spotted Harrier)			
132.	24774 <i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
133.	2987 <i>Cleome uncifera</i>			
134.	29101 <i>Cleome uncifera</i> subsp. <i>uncifera</i>			
135.	2988 <i>Cleome viscosa</i> (Tickweed, Tjinduwadhu)			
136.	13689 <i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>			
137.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
138.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
139.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
140.	4857 <i>Corchorus elachocarpus</i>			
141.	17339 <i>Corchorus incanus</i>			
142.	25847 <i>Corchorus incanus</i> subsp. <i>incanus</i>			
143.	13659 <i>Corchorus laniflorus</i>			
144.	4865 <i>Corchorus tridens</i>			
145.	25593 <i>Corvus orru</i> (Torresian Crow)			
146.	17073 <i>Corymbia aspera</i>			
147.	16781 <i>Corymbia candida</i> subsp. <i>lautifolia</i>			
148.	17083 <i>Corymbia deserticola</i> subsp. <i>deserticola</i>			
149.	14650 <i>Corymbia flavescens</i>			
150.	17093 <i>Corymbia hamersleyana</i>			
151.	17092 <i>Corymbia opaca</i>			
152.	17084 <i>Corymbia zygophylla</i>			
153.	25701 <i>Coturnix ypsilophora</i> (Brown Quail)			
154.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
155.	20179 <i>Crotalaria medicaginea</i> var. <i>neglecta</i>			
156.	19398 <i>Crotalaria ramosissima</i>			
157.	25458 <i>Ctenophorus caudicinctus</i> (Ring-tailed Dragon)			
158.	24865 <i>Ctenophorus caudicinctus</i> subsp. <i>caudicinctus</i> (Ring-tailed Dragon)			
159.	25459 <i>Ctenophorus isolepis</i> (Crested Dragon, Military Dragon)			
160.	24876 <i>Ctenophorus isolepis</i> subsp. <i>isolepis</i> (Crested Dragon, Military Dragon)			
161.	24882 <i>Ctenophorus nuchalis</i> (Central Netted Dragon)			
162.	24886 <i>Ctenophorus reticulatus</i> (Western Netted Dragon)			
163.	25036 <i>Ctenotus duricola</i>			
164.	25462 <i>Ctenotus grandis</i>			
165.	25043 <i>Ctenotus grandis</i> subsp. <i>titan</i>			
166.	25045 <i>Ctenotus helenae</i>			
167.	25463 <i>Ctenotus pantherinus</i> (Leopard Ctenotus)			
168.	25064 <i>Ctenotus pantherinus</i> subsp. <i>ocellifer</i> (Leopard Ctenotus)			
169.	25073 <i>Ctenotus saxatilis</i> (Rock Ctenotus)			
170.	25077 <i>Ctenotus serventyi</i>			
171.	41720 <i>Cucumis argenteus</i>			
172.	41721 <i>Cucumis variabilis</i>			
173.	17439 <i>Cullen lachnostachys</i>			
174.	15714 <i>Cullen stipulaceum</i>			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
175.	25371 <i>Cyclorana australis</i> (Giant Frog)			
176.	25375 <i>Cyclorana maini</i> (Sheep Frog)			
177.	24322 <i>Cygnus atratus</i> (Black Swan)			
178.	12801 <i>Cyperus blakeanus</i>			
179.	290 <i>Dactyloctenium radulans</i> (Button Grass)			
180.	24091 <i>Dasykaluta rosamondae</i> (Little Red Kaluta)			
181.	25000 <i>Delma haroldi</i>			
182.	25002 <i>Delma pax</i>			
183.	25004 <i>Delma tincta</i>			
184.	25468 <i>Demansia psammophis</i> (Yellow-faced Whipsnake)			
185.	24325 <i>Dendrocygna eytoni</i> (Plumed Whistling Duck)			
186.	3853 <i>Desmodium filiforme</i>			
187.	<i>Diacyclops cockingi</i>			
188.	<i>Diacyclops humphreysi humphreysi</i>			
189.	<i>Diacyclops scanloni</i>			
190.	<i>Diacyclops sobeprolatus</i>			
191.	323 <i>Diplachne fusca</i> (Brown Beetle Grass)			
192.	24926 <i>Diplodactylus conspicillatus</i> (Fat-tailed Gecko)			
193.	24899 <i>Diporiphora valens</i> (Southern Pilbara Tree Dragon)			
194.	42402 <i>Diporiphora vescus</i> (Northern Pilbara Tree Dragon)			
195.	48742 <i>Distimake davenportii</i>			
196.	48738 <i>Distimake dissectus</i> var. <i>dissectus</i>	Y		
197.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
198.	2506 <i>Dysphania rhadinostachya</i>			
199.	25092 <i>Egernia depressa</i> (Southern Pygmy Spiny-tailed Skink)			
200.	<i>Egretta garzetta</i>			
201.	<i>Egretta novaehollandiae</i>			
202.	25540 <i>Elanus caeruleus</i> (Black-shouldered Kite)			
203.	24290 <i>Elanus caeruleus</i> subsp. <i>axillaris</i> (Australian Black-shouldered Kite)			
204.	<i>Elaphoidella humphreysi</i>			
205.	47937 <i>Eiseyornis melanops</i> (Black-fronted Dotterel)			
206.	24631 <i>Emblema pictum</i> (Painted Finch)			
207.	20377 <i>Enneapogon robustissimus</i>			
208.	<i>Eolophus roseicapillus</i>			
209.	24653 <i>Eopsaltria pulverulenta</i> (Mangrove Robin)			
210.	25578 <i>Ephippiorhynchus asiaticus</i> (Black-necked Stork)			
211.	24568 <i>Epthianura aurifrons</i> (Orange Chat)			
212.	375 <i>Eragrostis cumingii</i> (Cuming's Love Grass)			
213.	378 <i>Eragrostis dielsii</i> (Mallee Lovegrass)			
214.	380 <i>Eragrostis eriopoda</i> (Woollybutt Grass, Wangurnu)			
215.	43381 <i>Eremiascincus pallidus</i> (Western Narrow-banded Skink, Narrow-banded Sand Swimmer)			
216.	24837 <i>Eremiornis carteri</i> (Spinifex-bird)			
217.	400 <i>Eriachne aristidea</i>			
218.	404 <i>Eriachne ciliata</i> (Slender Wandarrie Grass)			
219.	12055 <i>Eriachne glauca</i> var. <i>glauca</i>			
220.	414 <i>Eriachne obtusa</i> (Northern Wandarrie Grass)			
221.	24379 <i>Erythronys cinctus</i> (Red-kneed Dotterel)			
222.	47938 <i>Esacus magnirostris</i> (Beach Stone-curlew, Beach Thick-knee)			
223.	<i>Ethmostigmus curtipes</i>			
224.	35307 <i>Euphorbia australis</i> var. <i>australis</i>			
225.	35303 <i>Euphorbia australis</i> var. <i>subtomentosa</i>			
226.	4623 <i>Euphorbia coghlanii</i> (Namana)			
227.	42870 <i>Euphorbia psilosperma</i>			
228.	12097 <i>Euphorbia tannensis</i> subsp. <i>eremophila</i> (Desert Spurge)			
229.	18124 <i>Euphorbia tirucalli</i>	Y		
230.	42876 <i>Euphorbia vaccaria</i> var. <i>vaccaria</i>			
231.	24368 <i>Eurostopodus argus</i> (Spotted Nightjar)			
232.	<i>Euryscaphus waterhousei</i>			
233.	11416 <i>Evolvulus alsinoides</i> var. <i>decumbens</i>			
234.	11200 <i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>			
235.	25621 <i>Falco berigora</i> (Brown Falcon)			
236.	24471 <i>Falco berigora</i> subsp. <i>berigora</i> (Brown Falcon)			
237.	25622 <i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
238.	24472 <i>Falco cenchroides</i> subsp. <i>cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
239.	25623 <i>Falco longipennis</i> (Australian Hobby)			
240.	24041 <i>Felis catus</i> (Cat)	Y		
241.	851 <i>Fimbristylis dichotoma</i> (Eight Day Grass)			
242.	865 <i>Fimbristylis neilsonii</i>			
243.	870 <i>Fimbristylis oxystachya</i>			



Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
244.	878 <i>Fimbristylis rara</i>			
245.	25727 <i>Fulica atra</i> (Eurasian Coot)			
246.	42314 <i>Gavicalis virescens</i> (Singing Honeyeater)			
247.	24956 <i>Gehyra pilbara</i>			
248.	24958 <i>Gehyra punctata</i>			
249.	24957 <i>Gehyra purpurascens</i>			
250.	24959 <i>Gehyra variegata</i>			
251.	24401 <i>Geopelia cuneata</i> (Diamond Dove)			
252.	24402 <i>Geopelia humeralis</i> (Bar-shouldered Dove)			
253.	25585 <i>Geopelia striata</i> (Zebra Dove)			
254.	24404 <i>Geophaps plumifera</i> (Spinifex Pigeon)			
255.	24276 <i>Gerygone tenebrosa</i> (Dusky Gerygone)			
256.	2683 <i>Gomphrena leptoclada</i>			
257.	18257 <i>Gomphrena leptoclada</i> subsp. <i>leptoclada</i>			
258.	11131 <i>Gomphrena sordida</i>			
259.	6151 <i>Gonocarpus ephemerus</i>			
260.	7490 <i>Goodenia armitiana</i>			
261.	7509 <i>Goodenia forrestii</i>			
262.	7526 <i>Goodenia microptera</i>			
263.	12552 <i>Goodenia muelleriana</i>			
264.	10982 <i>Goodenia stobbsiana</i>			
265.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
266.	19570 <i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>			
267.	24484 <i>Grus rubicunda</i> (Brolga)			
268.	25627 <i>Haematopus fuliginosus</i> (Sooty Oystercatcher)			
269.	24487 <i>Haematopus longirostris</i> (Pied Oystercatcher)			
270.	24293 <i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)			
271.	25541 <i>Haliastur indus</i> (Brahminy Kite)			
272.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
273.	<i>Halicyclops</i> (Rochacyclops) <i>calm</i>			
274.	6705 <i>Heliotropium crispatum</i>			
275.	24633 <i>Heteromunia pectoralis</i> (Pictorella Mannikin)			
276.	24961 <i>Heteronotia binoei</i> (Bynoe's Gecko)			
277.	24962 <i>Heteronotia spelea</i> (Desert Cave Gecko, Pilbara Cave Gecko)			
278.	4933 <i>Hibiscus leptocladus</i>			
279.	11651 <i>Hibiscus sturtii</i> var. <i>campylochlamys</i>			
280.	47965 <i>Hieraaetus morphnoides</i> (Little Eagle)			
281.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
282.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
283.	5215 <i>Hybanthus aurantiacus</i>			
284.	3973 <i>Indigofera colutea</i> (Sticky Indigo)			
285.	3978 <i>Indigofera hirsuta</i> (Hairy Indigo)			
286.	38080 <i>Indigofera hochstetteri</i>	Y		
287.	3980 <i>Indigofera linifolia</i>			
288.	3981 <i>Indigofera linnaei</i> (Birdsville Indigo)			
289.	3982 <i>Indigofera monophylla</i>			
290.	16061 <i>Indigofera oblongifolia</i>	Y		
291.	<i>Indolpium</i> sp.			
292.	6633 <i>Ipomoea muelleri</i> (Poison Morning Glory, Yumbu)			
293.	6637 <i>Ipomoea polymorpha</i>			
294.	<i>Knoelle clara</i>			
295.	24367 <i>Lalage tricolor</i> (White-winged Triller)			
296.	<i>Lampona ampeinna</i>			
297.	<i>Lamponina scutata</i>			
298.	25637 <i>Larus novaehollandiae</i> (Silver Gull)			
299.	25125 <i>Lerista bipes</i>			
300.	30928 <i>Lerista clara</i>			
301.	25005 <i>Lialis burtonis</i>			
302.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
303.	25380 <i>Litoria caerulea</i> (Green Tree Frog)			
304.	25391 <i>Litoria rothii</i> (Northern Laughing Tree Frog)			
305.	25392 <i>Litoria rubella</i> (Little Red Tree Frog)			
306.	30933 <i>Lucasium stenodactylum</i>			
307.	<i>Lycidas</i> sp. 1			
308.	25489 <i>Macropus robustus</i> (Euro, Biggada)			
309.	24135 <i>Macropus robustus</i> subsp. <i>erubescens</i> (Euro, Biggada)			
310.	24136 <i>Macropus rufus</i> (Red Kangaroo, Marlu)			
311.	25651 <i>Malurus lamberti</i> (Variegated Fairy-wren)			
312.	25652 <i>Malurus leucopterus</i> (White-winged Fairy-wren)			
313.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
314.	<i>Marsilea</i> sp.			
315.	<i>Masasteron tealei</i>			
316.	5051 <i>Melhania oblongifolia</i>			
317.	<i>Melitidae</i> sp.			
318.	24736 <i>Melopsittacus undulatus</i> (Budgerigar)			
319.	25184 <i>Menetia greyii</i>			
320.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)			
321.	25542 <i>Milvus migrans</i> (Black Kite)			
322.	24298 <i>Milvus migrans subsp. affinis</i> (Black Kite)			
323.	<i>Minasteron minusculum</i>			
324.	25545 <i>Mirafra javanica</i> (Horsfield's Bushlark, Singing Bushlark)			
325.	6522 <i>Mitrasacme exserta</i>			
326.	<i>Monopylephorus</i> n. sp. WA29 (ex <i>Pristina</i> WA3) (PSS)			
327.	25495 <i>Morethia ruficauda</i>			
328.	25193 <i>Morethia ruficauda subsp. exquisita</i>			
329.	<i>Mormopterus (Ozimops) cobourgianus</i>			
330.	24223 <i>Mus musculus</i> (House Mouse)	Y		
331.	<i>Naididae</i> (ex <i>Tubificidae</i> )			
332.	<i>Nedsia</i> nr <i>hurlberti</i>			
333.	<i>Nedsia</i> sp.			
334.	<i>Nematoda</i> sp.			
335.	25422 <i>Neobatrachus aquilonius</i> (Northern Burrowing Frog)			
336.	25427 <i>Neobatrachus sutor</i> (Shoemaker Frog)			
337.	25685 <i>Neochmia ruficauda</i> (Star Finch)			
338.	25497 <i>Nephurus levis</i>			
339.	24969 <i>Nephurus levis subsp. pilbarensis</i>			
340.	24095 <i>Ningau timealeyi</i> (Pilbara Ningau)			
341.	No invertebrates			
342.	25430 <i>Notaden nicholli</i> (Desert Spadefoot)			
343.	24224 <i>Notomys alexis</i> (Spinifex Hopping-mouse)			
344.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
345.	24742 <i>Nymphicus hollandicus</i> (Cockatiel)			
346.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
347.	<i>Onthophagus margaretensis</i>			
348.	24618 <i>Oreoica gutturalis</i> (Crested Bellbird)			
349.	<i>Ostracoda</i> (unident.)			
350.	24620 <i>Pachycephala lanioides</i> (White-breasted Whistler)			
351.	25678 <i>Pachycephala melanura</i> (Mangrove Golden Whistler)			
352.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
353.	<i>Parastenocaris jane</i>			
354.	24627 <i>Pardalotus rubricatus</i> (Red-browed Pardalote)			
355.	523 <i>Paspalidium rarum</i> (Rare Paspalidium)			
356.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
357.	546 <i>Perotis rara</i> (Comet Grass)			
358.	3675 <i>Petalostylis labicheoides</i> (Slender Petalostylis)			
359.	48060 <i>Petrochelidon ariel</i> (Fairy Martin)			
360.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
361.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
362.	25697 <i>Phalacrocorax carbo</i> (Great Cormorant)			
363.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
364.	25699 <i>Phalacrocorax varius</i> (Pied Cormorant)			
365.	<i>Phorticosomus gularis</i>			
366.	<i>Phreodrilid with dissimilar ventral chaetae</i>			
367.	<i>Phreodrilid with similar ventral chaetae</i>			
368.	<i>Pilbarascutigera incola</i>			
369.	24101 <i>Planigale ingrami</i> (Long-tailed Planigale)			
370.	24842 <i>Platalea regia</i> (Royal Spoonbill)			
371.	42306 <i>Platyplectrum spenceri</i> (Centralian Burrowing Frog)			
372.	8170 <i>Plucheia tetranthera</i>			
373.	25510 <i>Pogona minor</i> (Dwarf Bearded Dragon)			
374.	24908 <i>Pogona minor subsp. mitchelli</i> (Dwarf Bearded Dragon)			
375.	12075 <i>Polycarpha corymbosa</i> var. <i>corymbosa</i>			
376.	41357 <i>Polygala saccopetala</i>			
377.	17513 <i>Polymeria lanata</i>			
378.	25706 <i>Pomatostomus temporalis</i> (Grey-crowned Babbler)			
379.	2884 <i>Portulaca oleracea</i> (Purslane, Wakati)			
380.	2886 <i>Portulaca pilosa</i> (Djanggara)	Y		
381.	24769 <i>Porzana fluminea</i> (Australian Spotted Crane)			
382.	25199 <i>Proablepharus reginae</i>			
383.	24106 <i>Pseudantechinus woolleyae</i> (Woolley's Pseudantechinus)			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
384.	25261 <i>Pseudechis australis</i> (Mulga Snake)			
385.	24235 <i>Pseudomys desertor</i> (Desert Mouse)			
386.	24237 <i>Pseudomys hermannsburgensis</i> (Sandy Inland Mouse)			
387.	42416 <i>Pseudonaja mengdeni</i> (Western Brown Snake)			
388.	25263 <i>Pseudonaja modesta</i> (Ringed Brown Snake)			
389.	25264 <i>Pseudonaja nuchalis</i> (Gwardar, Northern Brown Snake)			
390.	41224 <i>Pterocaulon intermedium</i>			
391.	8192 <i>Pterocaulon sphacelatum</i> (Apple Bush, Fruit Salad Plant)			
392.	<i>Ptilonorhynchus guttatus</i>			
393.	25724 <i>Ptilonorhynchus maculatus</i> (Spotted Bowerbird)			
394.	2696 <i>Ptilotus astrolasius</i>			
395.	2725 <i>Ptilotus fusiformis</i>			
396.	25009 <i>Pygopus nigriceps</i>			
397.	<i>Ramphotyphlops</i> GT NOTHERN species			Y
398.	24776 <i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
399.	<i>Rendahlia jaubertensis</i>			
400.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
401.	24457 <i>Rhipidura phasiana</i> (Mangrove Grey Fantail)			
402.	4191 <i>Rhynchosia minima</i> (Rhynchosia)			
403.	<i>Riccia crystallina</i>			
404.	5285 <i>Rotala diandra</i>			
405.	<i>Scolopendra laeta</i>			
406.	<i>Scolopendra morsitans</i>			
407.	24200 <i>Scotorepens greyii</i> (Little Broad-nosed Bat)			
408.	12152 <i>Senna curvistyla</i>			
409.	12312 <i>Senna notabilis</i>			
410.	612 <i>Setaria surgens</i> (Pigeon Grass)			
411.	4988 <i>Sida rohlenae</i>			
412.	24120 <i>Sminthopsis youngsoni</i> (Lesser Hairy-footed Dunnart)			
413.	7002 <i>Solanum diversiflorum</i>			
414.	12489 <i>Stemodia lathraia</i>			
415.	24482 <i>Stiltia isabella</i> (Australian Pratincole)			
416.	8240 <i>Streptoglossa odora</i>			
417.	24927 <i>Strophurus elderi</i>			
418.	24932 <i>Strophurus jeanae</i>			
419.	<i>Stygonitocrella trispinosa</i>			
420.	25307 <i>Suta punctata</i> (Spotted Snake)			
421.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
422.	30870 <i>Taeniopygia guttata</i> (Zebra Finch)			
423.	24175 <i>Taphozous georgianus</i> (Common Sheath-tailed Bat)			
424.	4272 <i>Tephrosia leptoclada</i>			
425.	19529 <i>Tephrosia rosea</i> var. <i>rosea</i>			
426.	17768 <i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)			
427.	15949 <i>Tephrosia</i> sp. D Kimberley Flora (R.D. Royce 1848)			
428.	<i>Tesserodon novaehollandiae</i>			
429.	<i>Thalasseus bengalensis</i>			
430.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
431.	25202 <i>Tiliqua multifasciata</i> (Central Blue-tongue)			
432.	2942 <i>Tinospora smilacina</i> (Snakevine, Oondala)			
433.	42351 <i>Todiramphus pyrrhopygius</i> (Red-backed Kingfisher)			
434.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
435.	44305 <i>Trianthema pilosum</i>			
436.	4368 <i>Tribulopsis angustifolia</i>			
437.	4377 <i>Tribulus hirsutus</i>			
438.	<i>Trichocycclus gnalooma</i>			
439.	48201 <i>Trigastrotheca molluginea</i>			
440.	13131 <i>Triodia epactia</i>			
441.	4873 <i>Triumfetta appendiculata</i>			
442.	13481 <i>Triumfetta ramosa</i>			
443.	24851 <i>Turnix velox</i> (Little Button-quail)			
444.	24852 <i>Tyto alba</i> subsp. <i>delicatula</i> (Barn Owl)			
445.	25439 <i>Uperoleia glandulosa</i> (Glandular Toadlet)			
446.	25446 <i>Uperoleia talpa</i> (Ratcheting Toadlet)			
447.	11321 <i>Urochloa holosericea</i> subsp. <i>velutina</i>			
448.	25209 <i>Varanus acanthurus</i> (Spiny-tailed Monitor)			
449.	25210 <i>Varanus brevicauda</i> (Short-tailed Pygmy Monitor)			
450.	25212 <i>Varanus eremius</i> (Pygmy Desert Monitor)			
451.	25216 <i>Varanus giganteus</i> (Perentie)			
452.	25524 <i>Varanus panoptes</i> (Yellow-spotted Monitor)			
453.	25224 <i>Varanus pilbarensis</i> (Pilbara Rock Monitor, Northern Pilbara Rock Goanna)			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
454.	24205 <i>Vespadelus finlaysoni</i> (Finlayson's Cave Bat)			
455.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		
456.	5106 <i>Waltheria indica</i>			
457.	728 <i>Whiteochloa cymbiformis</i>			
458.	28181 <i>Xanthoparmelia taractica</i>			
459.	732 <i>Yakirra australiensis</i>			
460.	<i>Zebraplatys keyserlingi</i>			
461.	4326 <i>Zornia albiflora</i>			
462.	18661 <i>Zornia muelleriana</i>			
463.	24857 <i>Zosterops luteus</i> (Yellow White-eye)			
464.	24248 <i>Zyzomys argurus</i> (Common Rock-rat)			

**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

<sup>1</sup> For NatureMap's purposes, species flagged as endemic are those whose records are wholly 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.



# EPBC Act Protected Matters Report

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

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

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 04/10/18 13:55:02

[Summary](#)

[Details](#)

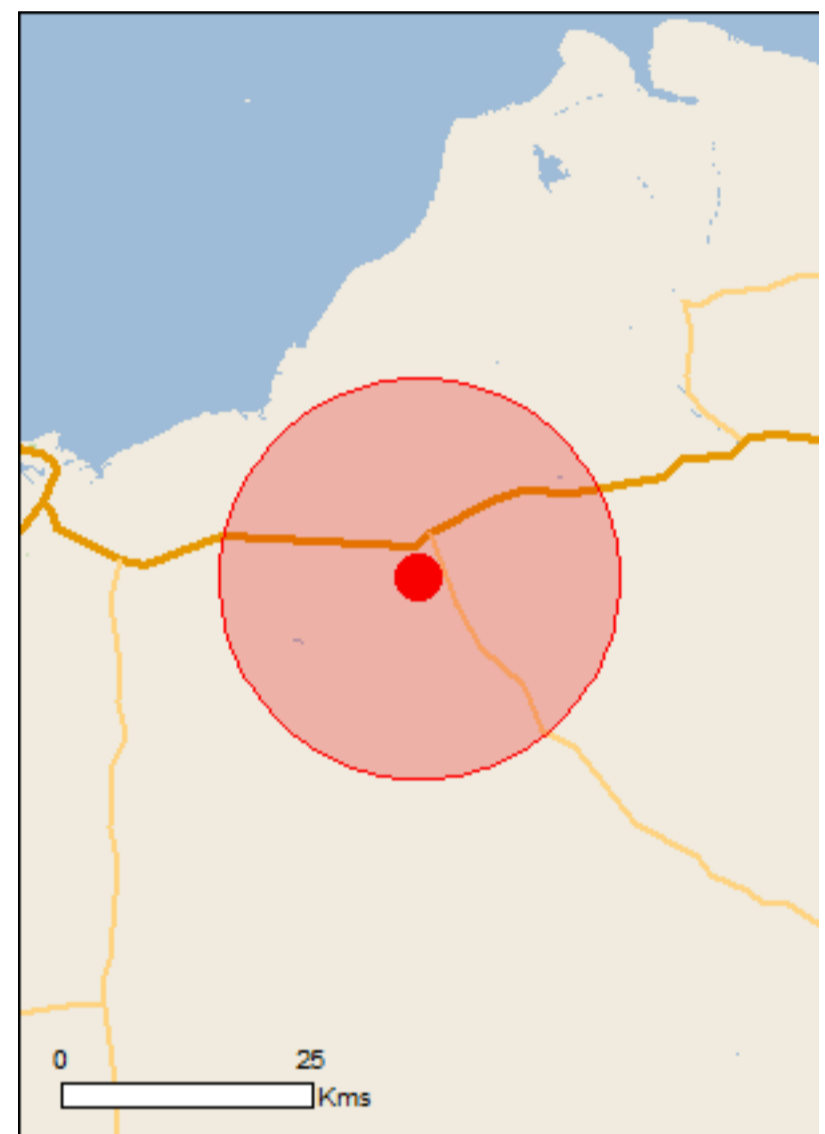
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

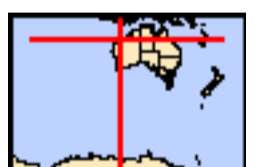
[Acknowledgements](#)



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[Coordinates](#)

Buffer: 20.0Km



# Summary

## Matters of National Environmental Significance

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

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	26
<a href="#">Listed Migratory Species:</a>	50

## Other Matters Protected by the EPBC Act

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

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

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

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	48
<a href="#">Whales and Other Cetaceans:</a>	4
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	15
<a href="#">Nationally Important Wetlands:</a>	1
<a href="#">Key Ecological Features (Marine)</a>	None

# Details

## Matters of National Environmental Significance

Listed Threatened Species		[ Resource Information ]
Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Calidris tenuirostris</a> Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Charadrius mongolus</a> Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
<a href="#">Limosa lapponica baueri</a> Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Limosa lapponica menzbieri</a> Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Pezoporus occidentalis</a> Night Parrot [59350]	Endangered	Species or species habitat may occur within area
<a href="#">Rostratula australis</a> Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
<b>Mammals</b>		
<a href="#">Dasyurus hallucatus</a> Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
<a href="#">Macroderma gigas</a> Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Macrotis lagotis</a> Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhinonictoris aurantia (Pilbara form)</a> Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
<b>Reptiles</b>		
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Ctenotus angusticeps</a> Northwestern Coastal Ctenotus, Airlie Island Ctenotus [25937]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Liasis olivaceus barroni</a> Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>Sharks</b>		
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pristis clavata</a> Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding likely to occur within area
<b>Listed Migratory Species</b>		<b>[ Resource Information ]</b>
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
<b>Migratory Marine Birds</b>		
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species



Name	Threatened	Type of Presence
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		habitat may occur within area  Species or species habitat likely to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<b>Migratory Marine Species</b>		
<a href="#">Anoxypristis cuspidata</a> Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Manta alfredi</a> Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
<a href="#">Manta birostris</a> Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat likely to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Pristis clavata</a> Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding likely to occur within area
<a href="#">Sousa chinensis</a> Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Cuculus optatus</a> Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species

Name	Threatened	Type of Presence
<a href="#">Hirundo rustica</a> Barn Swallow [662]		habitat may occur within area  Species or species habitat known to occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat likely to occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area
<a href="#">Arenaria interpres</a> Ruddy Turnstone [872]		Species or species habitat known to occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat known to occur within area
<a href="#">Calidris ruficollis</a> Red-necked Stint [860]		Species or species habitat known to occur within area
<a href="#">Calidris tenuirostris</a> Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Charadrius mongolus</a> Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat known to occur within area
<a href="#">Limicola falcinellus</a> Broad-billed Sandpiper [842]		Species or species habitat known to occur within area
<a href="#">Limnodromus semipalmatus</a> Asian Dowitcher [843]		Species or species habitat known to occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species

Name	Threatened	Type of Presence
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	habitat known to occur within area Species or species habitat known to occur within area
<a href="#">Numenius minutus</a> Little Curlew, Little Whimbrel [848]		Species or species habitat known to occur within area
<a href="#">Numenius phaeopus</a> Whimbrel [849]		Species or species habitat known to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area
<a href="#">Phalaropus lobatus</a> Red-necked Phalarope [838]		Species or species habitat known to occur within area
<a href="#">Pluvialis fulva</a> Pacific Golden Plover [25545]		Species or species habitat known to occur within area
<a href="#">Pluvialis squatarola</a> Grey Plover [865]		Species or species habitat known to occur within area
<a href="#">Tringa brevipes</a> Grey-tailed Tattler [851]		Species or species habitat known to occur within area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
<a href="#">Tringa stagnatilis</a> Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area
<a href="#">Xenus cinereus</a> Terek Sandpiper [59300]		Species or species habitat known to occur within area

## Other Matters Protected by the EPBC Act

Listed Marine Species	<a href="#">[ Resource Information ]</a>	
Name	Threatened	Type of Presence
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
<b>Birds</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat known to occur

Name	Threatened	Type of Presence within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Arenaria interpres</a> Ruddy Turnstone [872]		Species or species habitat known to occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat known to occur within area
<a href="#">Calidris ruficollis</a> Red-necked Stint [860]		Species or species habitat known to occur within area
<a href="#">Calidris tenuirostris</a> Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat may occur within area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Charadrius mongolus</a> Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
<a href="#">Charadrius ruficapillus</a> Red-capped Plover [881]		Species or species habitat known to occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area
<a href="#">Chrysococcyx osculans</a> Black-eared Cuckoo [705]		Species or species habitat may occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat known to occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<a href="#">Heteroscelus brevipes</a> Grey-tailed Tattler [59311]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
<a href="#">Himantopus himantopus</a> Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat known to occur within area
<a href="#">Limicola falcinellus</a> Broad-billed Sandpiper [842]		Species or species habitat known to occur within area
<a href="#">Limnodromus semipalmatus</a> Asian Dowitcher [843]		Species or species habitat known to occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat likely to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Numenius minutus</a> Little Curlew, Little Whimbrel [848]		Species or species habitat known to occur within area
<a href="#">Numenius phaeopus</a> Whimbrel [849]		Species or species habitat known to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area
<a href="#">Phalaropus lobatus</a> Red-necked Phalarope [838]		Species or species habitat known to occur within area
<a href="#">Pluvialis fulva</a> Pacific Golden Plover [25545]		Species or species habitat known to occur within area
<a href="#">Pluvialis squatarola</a> Grey Plover [865]		Species or species habitat known to occur within area
<a href="#">Recurvirostra novaehollandiae</a> Red-necked Avocet [871]		Species or species habitat known to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
<a href="#">Tringa stagnatilis</a> Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area
<a href="#">Xenus cinereus</a> Terek Sandpiper [59300]		Species or species habitat known to occur within area

## Reptiles

<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

## Whales and other Cetaceans

[ [Resource Information](#) ]

Name	Status	Type of Presence
<b>Mammals</b>		
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Sousa chinensis</a> Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area

## Extra Information

## Invasive Species

[\[ Resource Information \]](#)

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

Name	Status	Type of Presence
<b>Birds</b>		
<i>Columba livia</i> Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
<i>Passer montanus</i> Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
<b>Mammals</b>		
<i>Camelus dromedarius</i> Dromedary, Camel [7]		Species or species habitat likely to occur within area
<i>Canis lupus familiaris</i> Domestic Dog [82654]		Species or species habitat likely to occur within area
<i>Equus asinus</i> Donkey, Ass [4]		Species or species habitat likely to occur within area
<i>Equus caballus</i> Horse [5]		Species or species habitat likely to occur within area
<i>Felis catus</i> Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
<i>Sus scrofa</i> Pig [6]		Species or species habitat likely to occur within area
<i>Vulpes vulpes</i> Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		
<i>Cenchrus ciliaris</i> Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
<i>Jatropha gossypifolia</i> Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
<i>Parkinsonia aculeata</i> Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
<i>Prosopis</i> spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
<b>Reptiles</b>		
<i>Hemidactylus frenatus</i> Asian House Gecko [1708]		Species or species habitat likely to occur within area
<i>Ramphotyphlops braminus</i> Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat may occur within area

## Nationally Important Wetlands

[\[ Resource Information \]](#)

Name

State

[Leslie \(Port Hedland\) Saltfields System](#)

WA



# Caveat

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

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

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

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

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

- migratory and
- marine

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

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

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

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

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

# Coordinates

-20.42088 118.96168

# Acknowledgements

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

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-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.

## Appendix 2

### Conservation Codes and Definitions

## Conservation codes for Western Australian flora and fauna (BC Regulations 2018).

Code	Definition
T	<p><b><u>Threatened species</u></b></p> <p>Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act).</p> <p>Threatened fauna is that subset of ‘Specially Protected Fauna’ listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna.</p> <p>Threatened flora is that subset of ‘Rare Flora’ listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora.</p> <p>The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.</p>
CR	<p><b>Critically endangered species</b></p> <p>Threatened species considered to be “facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines”.</p> <p>Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.</p>
EN	<p><b>Endangered species</b></p> <p>Threatened species considered to be “facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines”.</p> <p>Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.</p>
VU	<p><b>Vulnerable species</b></p> <p>Threatened species considered to be “facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines”. Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.</p>
	<p><b><u>Extinct species</u></b></p> <p>Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.</p>
EX	<p><b>Extinct species</b></p> <p>Species where “there is no reasonable doubt that the last member of the species has died”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).</p> <p>Published as presumed extinct under schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for extinct fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora.</p>
EW	<p><b>Extinct in the wild species</b></p> <p>Species that “is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).</p> <p>Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a</p>

	species as extinct in the wild occurs, then a schedule will be added to the applicable notice.
	<p><b><u>Specially protected species</u></b></p> <p>Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.</p> <p>Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.</p>
MI	<p><b>Migratory species</b></p> <p>Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).</p> <p>Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.</p> <p>Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.</p>
CD	<p><b>Species of special conservation interest (conservation dependent fauna)</b></p> <p>Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).</p> <p>Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.</p>
OS	<p><b>Other specially protected species</b></p> <p>Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).</p> <p>Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.</p>
	<p><b><u>Priority species</u></b></p> <p>Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora 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 fauna or flora.</p> <p>Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.</p> <p>Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.</p>
P1	<p><b>Priority 1: Poorly-known species</b></p> <p>Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of</p>

	habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
<b>P2</b>	<p><b>Priority 2: Poorly-known species</b></p> <p>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.</p>
<b>P3</b>	<p><b>Priority 3: Poorly-known species</b></p> <p>Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.</p>
<b>P4</b>	<p><b>Priority 4: Rare, Near Threatened and other species in need of monitoring</b></p> <p>(a) Rare. Species 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 species are usually represented on conservation lands.</p> <p>(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>
	<b>Specially protected fauna as defined by the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i>.</b>
<b>S1</b>	Schedule 1—Fauna that is rare or is likely to become extinct as critically endangered fauna.
<b>S2</b>	Schedule 2—Fauna that is rare or is likely to become extinct as endangered fauna.
<b>S3</b>	Schedule 3—Fauna that is rare or is likely to become extinct as vulnerable fauna.
<b>S4</b>	Schedule 4—Fauna presumed to be extinct.
<b>S5</b>	Schedule 5—Migratory birds protected under an international agreement.
<b>S6</b>	Schedule 6—Fauna that is of special conservation need as conservation dependent fauna.


**Conservation codes for species listed under the Environmental Protection and Biodiversity Conversation Act 1999**


Status	Definition
<b>Extinct</b>	There is no reasonable doubt that the last member of the species has died.
<b>Extinct in the wild</b>	<p>It is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range, or</p> <p>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.</p>
<b>Critically Endangered</b>	It is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
<b>Endangered</b>	<p>It is not critically endangered; and</p> <p>It is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.</p>
<b>Vulnerable</b>	<p>It is not critically endangered or endangered; and</p> <p>It is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.</p>
<b>Conservation dependant</b>	<p>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</p> <p>The following subparagraphs are satisfied:</p> <ul style="list-style-type: none"> <li>- The species is a species of fish</li> <li>- 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</li> <li>- The plan of management is in force under a law of the Commonwealth or of a State or Territory</li> <li>- Cessation of the plan of management would adversely affect the conservation status of the species.</li> </ul>


# Appendix 3


## Site Data





<b>Site:</b>	W07	<b>Location:</b>	Petermarer Creek																
																			
<b>Vegetation description</b>	<i>Corymbia flavescens</i> very open low woodland over <i>Melaleuca linophylla</i> and <i>M. ?lasiandra</i> very open shrubland over scattered grasses and herbaceous species.																		
<b>Habitat</b>	Creek line																		
<b>Vegetation condition</b>	Good – evidence of vehicle and livestock activity, weeds.																		
<b>Flora species present</b>																			
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"><i>Acacia pyrifolia</i></td> <td style="width: 50%; border: none;"><i>Cyperus blakeanus</i></td> </tr> <tr> <td style="border: none;"><i>Acacia trachycarpa</i></td> <td style="border: none;"><i>Goodenia armitiana</i></td> </tr> <tr> <td style="border: none;"><i>Cajanus pubescens</i></td> <td style="border: none;"><i>Melaleuca ?lasiandra</i></td> </tr> <tr> <td style="border: none;"><i>Cajanus sp</i></td> <td style="border: none;"><i>Melaleuca linophylla</i></td> </tr> <tr> <td style="border: none;"><i>Cassytha capillaris</i></td> <td style="border: none;"><i>Pluchea rubelliflora</i></td> </tr> <tr> <td style="border: none;">*<i>Cenchrus ciliaris</i></td> <td style="border: none;"><i>Tinospora smilacina</i></td> </tr> <tr> <td style="border: none;"><i>Corchorus incanus subsp. incanus</i></td> <td style="border: none;"><i>Triodia epactia</i></td> </tr> <tr> <td style="border: none;"><i>Corymbia flavescens</i></td> <td style="border: none;"></td> </tr> </table>				<i>Acacia pyrifolia</i>	<i>Cyperus blakeanus</i>	<i>Acacia trachycarpa</i>	<i>Goodenia armitiana</i>	<i>Cajanus pubescens</i>	<i>Melaleuca ?lasiandra</i>	<i>Cajanus sp</i>	<i>Melaleuca linophylla</i>	<i>Cassytha capillaris</i>	<i>Pluchea rubelliflora</i>	* <i>Cenchrus ciliaris</i>	<i>Tinospora smilacina</i>	<i>Corchorus incanus subsp. incanus</i>	<i>Triodia epactia</i>	<i>Corymbia flavescens</i>	
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<i>Corchorus incanus subsp. incanus</i>	<i>Triodia epactia</i>																		
<i>Corymbia flavescens</i>																			
<b>Comments</b>																			
Buffel grass is common in the area. Evidence of heavy grazing and recreational vehicle use. <i>Cassytha capillaris</i> covers most low shrubs.																			


<b>Site:</b>	W08	<b>Location:</b>	Petermarer Creek														
																	
<b>Vegetation description</b>	<i>Corymbia flavescens</i> sparse low woodland over <i>Acacia trachycarpa</i> , <i>A. pyrifolia</i> and <i>A. ancistrocarpa</i> very open shrubland over <i>Cenchrus ciliaris</i> dense grassland and herbaceous species.																
<b>Habitat</b>	Creek line/creek bank																
<b>Vegetation condition</b>	Good – evidence of livestock activity, weeds are abundant.																
<b>Flora species present</b>																	
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"><i>Acacia ancistrocarpa</i></td> <td style="width: 50%; border: none;"><i>Dysphania plantaginella</i></td> </tr> <tr> <td style="border: none;"><i>Acacia pyrifolia</i></td> <td style="border: none;"><i>Melaleuca linophylla</i></td> </tr> <tr> <td style="border: none;"><i>Acacia trachycarpa</i></td> <td style="border: none;"><i>Pluchea rubelliflora</i></td> </tr> <tr> <td style="border: none;">*<i>Calotropis procera</i></td> <td style="border: none;"><i>Pterocaulon sphacelatum</i></td> </tr> <tr> <td style="border: none;">*<i>Cenchrus ciliaris</i></td> <td style="border: none;"><i>Sesbania cannabina</i></td> </tr> <tr> <td style="border: none;"><i>Corymbia flavescens</i></td> <td style="border: none;"><i>Sida</i> sp. Pilbara</td> </tr> <tr> <td style="border: none;"><i>Crotalaria cunninghamii</i></td> <td style="border: none;"><i>Triodia epactia</i></td> </tr> </table>				<i>Acacia ancistrocarpa</i>	<i>Dysphania plantaginella</i>	<i>Acacia pyrifolia</i>	<i>Melaleuca linophylla</i>	<i>Acacia trachycarpa</i>	<i>Pluchea rubelliflora</i>	* <i>Calotropis procera</i>	<i>Pterocaulon sphacelatum</i>	* <i>Cenchrus ciliaris</i>	<i>Sesbania cannabina</i>	<i>Corymbia flavescens</i>	<i>Sida</i> sp. Pilbara	<i>Crotalaria cunninghamii</i>	<i>Triodia epactia</i>
<i>Acacia ancistrocarpa</i>	<i>Dysphania plantaginella</i>																
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<i>Corymbia flavescens</i>	<i>Sida</i> sp. Pilbara																
<i>Crotalaria cunninghamii</i>	<i>Triodia epactia</i>																
<b>Comments</b>																	
Buffel grass is abundant along creek banks in the area. Evidence of grazing. The declared agricultural weed <i>Calotropis procera</i> is present in low numbers.																	


<b>Site:</b>	W09	<b>Location:</b>	Petermarer Creek
			
<b>Vegetation description</b>	<i>Corymbia flavescens</i> and <i>C. hamersleyana</i> very open low woodland over <i>Hakea lorea</i> and <i>Acacia tumida</i> very open low shrubland over <i>Triodia epactia</i> and various herbaceous species.		
<b>Habitat</b>	Creek line/creek bank		
<b>Vegetation condition</b>	Very good – evidence of livestock activity.		
<b>Flora species present</b>			
<i>Acacia ancistrocarpa</i>	<i>Corymbia flavescens</i>	<i>Pluchea rubelliflora</i>	
<i>Acacia colei</i> var. <i>colei</i>	<i>Corymbia hamersleyana</i>	<i>Ptilotus axillaris</i>	
<i>Acacia pyrifolia</i>	<i>Corymbia zygophylla</i>	<i>Ptilotus obovatus</i>	
<i>Acacia tumida</i> var. <i>pilbarensis</i>	<i>Crotalaria cunninghamii</i>	<i>Sida arenicola</i>	
<i>Adriana tomentosa</i>	<i>Goodenia lamprosperma</i>	<i>Sida</i> sp. <i>Pilbara</i>	
* <i>Cenchrus ciliaris</i>	<i>Hakea lorea</i> subsp. <i>lorea</i>	<i>Solanum ?diversiflorum</i>	
<i>Cassytha capillaris</i>	<i>Petalostylis labicheoides</i>	<i>Triodia epactia</i>	
<i>Corchorus incanus</i> subsp. <i>incanus</i>	<i>Pluchea ferdinandi-muelleri</i>	<i>Triumfetta ramosa</i>	
<b>Comments</b>			
Rocky substrate, less accessible to livestock and vehicles. Minimal occurrence within the survey area, mainly on the western side of the creek. Buffel grass is present in low numbers.			

<b>Site:</b>	W10	<b>Location:</b>	Petermarer Creek																		
																					
<b>Vegetation description</b>	<i>Acacia colei</i> var <i>colei</i> and <i>A. trachycarpa</i> open shrubland over <i>Cenchrus ciliaris</i> dense grassland and herbaceous species.																				
<b>Habitat</b>	Creek line/creek bank																				
<b>Vegetation condition</b>	Good – evidence of livestock activity, abundant weeds.																				
<b>Flora species present</b>																					
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><i>Acacia colei</i> var. <i>colei</i></td> <td style="width: 50%;"><i>Ptilotus axillaris</i></td> </tr> <tr> <td><i>Acacia trachycarpa</i></td> <td><i>Ptilotus obovatus</i></td> </tr> <tr> <td><i>Cajanus pubescens</i></td> <td><i>Senna notabilis</i></td> </tr> <tr> <td><i>Carissa lanceolata</i></td> <td><i>Sida</i> sp. <i>Pilbara</i></td> </tr> <tr> <td>*<i>Cenchrus ciliaris</i></td> <td><i>Solanum</i> ?<i>diversiflorum</i></td> </tr> <tr> <td><i>Crotalaria cunninghamii</i></td> <td><i>Streptoglossa decurrens</i></td> </tr> <tr> <td><i>Hakea lorea</i> subsp. <i>lorea</i></td> <td><i>Triodia epactia</i></td> </tr> <tr> <td><i>Petalostylis labicheoides</i></td> <td><i>Triumfetta ramosa</i></td> </tr> <tr> <td><i>Pluchea rubelliflora</i></td> <td></td> </tr> </table>				<i>Acacia colei</i> var. <i>colei</i>	<i>Ptilotus axillaris</i>	<i>Acacia trachycarpa</i>	<i>Ptilotus obovatus</i>	<i>Cajanus pubescens</i>	<i>Senna notabilis</i>	<i>Carissa lanceolata</i>	<i>Sida</i> sp. <i>Pilbara</i>	* <i>Cenchrus ciliaris</i>	<i>Solanum</i> ? <i>diversiflorum</i>	<i>Crotalaria cunninghamii</i>	<i>Streptoglossa decurrens</i>	<i>Hakea lorea</i> subsp. <i>lorea</i>	<i>Triodia epactia</i>	<i>Petalostylis labicheoides</i>	<i>Triumfetta ramosa</i>	<i>Pluchea rubelliflora</i>	
<i>Acacia colei</i> var. <i>colei</i>	<i>Ptilotus axillaris</i>																				
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<i>Petalostylis labicheoides</i>	<i>Triumfetta ramosa</i>																				
<i>Pluchea rubelliflora</i>																					
<b>Comments</b>																					
Sandy substrate. Buffel grass is abundant. Typical of most of the creek bank, particularly on the eastern side.																					


<b>Site:</b>	W11	<b>Location:</b>	Petermarer Creek																		
																					
<b>Vegetation description</b>	<i>Acacia colei</i> var <i>colei</i> and <i>A. trachycarpa</i> sparse shrubland over <i>Acacia stellaticeps</i> low open shrubland <i>Cenchrus ciliaris</i> and <i>Triodia epactia</i> grassland and various herbaceous species.																				
<b>Habitat</b>	Sand plain																				
<b>Vegetation condition</b>	Very Good – evidence of livestock activity, not burnt recently.																				
<b>Flora species present</b>																					
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"><i>Acacia colei</i> var. <i>colei</i></td> <td style="width: 50%; border: none;"><i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i></td> </tr> <tr> <td style="border: none;"><i>Acacia stellaticeps</i></td> <td style="border: none;"><i>Hakea lorea</i> subsp. <i>lorea</i></td> </tr> <tr> <td style="border: none;"><i>Acacia trachycarpa</i></td> <td style="border: none;"><i>Petalostylis labicheoides</i></td> </tr> <tr> <td style="border: none;"><i>Acacia tumida</i> var. <i>pilbarensis</i></td> <td style="border: none;"><i>Ptilotus axillaris</i></td> </tr> <tr> <td style="border: none;"><i>Carissa lanceolata</i></td> <td style="border: none;"><i>Streptoglossa decurrens</i></td> </tr> <tr> <td style="border: none;"><i>Cassythia capillaris</i></td> <td style="border: none;"><i>Tephrosia</i> sp.</td> </tr> <tr> <td style="border: none;">*<i>Cenchrus ciliaris</i></td> <td style="border: none;"><i>Triodia epactia</i></td> </tr> <tr> <td style="border: none;"><i>Corymbia flavescens</i></td> <td style="border: none;"><i>Triumfetta ramosa</i></td> </tr> <tr> <td style="border: none;"><i>Crotalaria cunninghamii</i></td> <td style="border: none;"></td> </tr> </table>				<i>Acacia colei</i> var. <i>colei</i>	<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	<i>Acacia stellaticeps</i>	<i>Hakea lorea</i> subsp. <i>lorea</i>	<i>Acacia trachycarpa</i>	<i>Petalostylis labicheoides</i>	<i>Acacia tumida</i> var. <i>pilbarensis</i>	<i>Ptilotus axillaris</i>	<i>Carissa lanceolata</i>	<i>Streptoglossa decurrens</i>	<i>Cassythia capillaris</i>	<i>Tephrosia</i> sp.	* <i>Cenchrus ciliaris</i>	<i>Triodia epactia</i>	<i>Corymbia flavescens</i>	<i>Triumfetta ramosa</i>	<i>Crotalaria cunninghamii</i>	
<i>Acacia colei</i> var. <i>colei</i>	<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>																				
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<i>Corymbia flavescens</i>	<i>Triumfetta ramosa</i>																				
<i>Crotalaria cunninghamii</i>																					
<b>Comments</b>																					
Buffel grass is present in low numbers. Estimated 5+ years since last burnt.																					


<b>Site:</b>	W12 / W13	<b>Location:</b>	Petermarer Creek																
																			
<b>Vegetation description</b>	Isolated <i>Corymbia flavescens</i> and <i>C. hamersleyana</i> low trees over <i>Acacia coleii</i> var <i>coleii</i> and <i>A. inaequilatera</i> very open low shrubland over <i>Triodia epactia</i> open hummock grassland and scattered herbaceous species.																		
<b>Habitat</b>	Sand plain																		
<b>Vegetation condition</b>	Good – evidence of livestock activity and frequent fire.																		
<b>Flora species present</b>																			
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"><i>Acacia ancistrocarpa</i></td> <td style="width: 50%; border: none;"><i>Corymbia flavescens</i></td> </tr> <tr> <td style="border: none;"><i>Acacia coleii</i> var. <i>coleii</i></td> <td style="border: none;"><i>Corymbia hamersleyana</i></td> </tr> <tr> <td style="border: none;"><i>Acacia inaequilatera</i></td> <td style="border: none;"><i>Goodenia stobbsiana</i></td> </tr> <tr> <td style="border: none;"><i>Acacia orthocarpa</i></td> <td style="border: none;"><i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i></td> </tr> <tr> <td style="border: none;"><i>Acacia stellaticeps</i></td> <td style="border: none;"><i>Petalostylis labicheoides</i></td> </tr> <tr> <td style="border: none;"><i>Acacia tumida</i> var. <i>pilbarensis</i></td> <td style="border: none;"><i>Ptilotus axillaris</i></td> </tr> <tr> <td style="border: none;"><i>Carissa lanceolata</i></td> <td style="border: none;"><i>Streptoglossa decurrens</i></td> </tr> <tr> <td style="border: none;"><i>Cassutha capillaris</i></td> <td style="border: none;"><i>Triodia epactia</i></td> </tr> </table>				<i>Acacia ancistrocarpa</i>	<i>Corymbia flavescens</i>	<i>Acacia coleii</i> var. <i>coleii</i>	<i>Corymbia hamersleyana</i>	<i>Acacia inaequilatera</i>	<i>Goodenia stobbsiana</i>	<i>Acacia orthocarpa</i>	<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	<i>Acacia stellaticeps</i>	<i>Petalostylis labicheoides</i>	<i>Acacia tumida</i> var. <i>pilbarensis</i>	<i>Ptilotus axillaris</i>	<i>Carissa lanceolata</i>	<i>Streptoglossa decurrens</i>	<i>Cassutha capillaris</i>	<i>Triodia epactia</i>
<i>Acacia ancistrocarpa</i>	<i>Corymbia flavescens</i>																		
<i>Acacia coleii</i> var. <i>coleii</i>	<i>Corymbia hamersleyana</i>																		
<i>Acacia inaequilatera</i>	<i>Goodenia stobbsiana</i>																		
<i>Acacia orthocarpa</i>	<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>																		
<i>Acacia stellaticeps</i>	<i>Petalostylis labicheoides</i>																		
<i>Acacia tumida</i> var. <i>pilbarensis</i>	<i>Ptilotus axillaris</i>																		
<i>Carissa lanceolata</i>	<i>Streptoglossa decurrens</i>																		
<i>Cassutha capillaris</i>	<i>Triodia epactia</i>																		
<b>Comments</b>																			
Estimated 2 years since last burnt.																			


<b>Site:</b>	W14 / W15	<b>Location:</b>	Petermarer Creek
			
<b>Vegetation description</b>	Isolated <i>Corymbia flavescens</i> , <i>C. hamersleyana</i> and <i>C. zygophylla</i> low trees over <i>Acacia ancistrocarpa</i> , <i>A. colei</i> var <i>colei</i> and <i>A. inaequilatera</i> , <i>A. orthocarpa</i> very open low shrubland over <i>Triodia epactia</i> open hummock grassland and scattered herbaceous species.		
<b>Habitat</b>	Sand plain		
<b>Vegetation condition</b>	Very Good – evidence of livestock activity, not burnt recently.		
<b>Flora species present</b>			
<i>Acacia ancistrocarpa</i>		<i>Corymbia flavescens</i>	
<i>Acacia colei</i> var. <i>colei</i>		<i>Corymbia hamersleyana</i>	
<i>Acacia inaequilatera</i>		<i>Corymbia zygophylla</i>	
<i>Acacia orthocarpa</i>		<i>Goodenia stobbsiana</i>	
<i>Acacia stellaticeps</i>		<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	
<i>Acacia tumida</i> var. <i>pilbarensis</i>		<i>Ptilotus axillaris</i>	
<i>Carissa lanceolata</i>		<i>Streptoglossa decurrens</i>	
<i>Cassytha capillaris</i>		<i>Triodia epactia</i>	
<b>Comments</b>			
Estimated 5+ years since last burnt.			


<b>Site:</b>	W16 / W17	<b>Location:</b>	Petermarer Creek
			
<b>Vegetation description</b>	<i>Corymbia zygophylla</i> sparse low trees over <i>Acacia ancistrocarpa</i> , <i>A. colei</i> var <i>colei</i> , <i>A. inaequilatera</i> , <i>A. orthocarpa</i> , <i>A. stellaticeps</i> and <i>A. tumida</i> var. <i>pilbarensis</i> sparse low shrubland over <i>Triodia epactia</i> open hummock grassland and scattered herbaceous species.		
<b>Habitat</b>	Sand plain		
<b>Vegetation condition</b>	Very Good – evidence of livestock activity, not burnt recently.		
<b>Flora species present</b>			
<i>Acacia ancistrocarpa</i> <i>Acacia colei</i> var. <i>colei</i> <i>Acacia inaequilatera</i> <i>Acacia orthocarpa</i> <i>Acacia stellaticeps</i> <i>Acacia tumida</i> var. <i>pilbarensis</i> <i>Cassytha capillaris</i>		<i>Corymbia zygophylla</i> <i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i> <i>Goodenia stobbsiana</i> <i>Petalostylis labicheoides</i> <i>Ptilotus axillaris</i> <i>Streptoglossa decurrens</i> <i>Triodia epactia</i>	
<b>Comments</b>			
Estimated 5+ years since last burnt.			



<b>Site:</b>	W18	<b>Location:</b>	Petermarer Creek
			
<b>Vegetation description</b>	<i>Corymbia zygophylla</i> sparse low trees over <i>Acacia ancistrocarpa</i> , <i>A. colei</i> var <i>colei</i> , <i>A. orthocarpa</i> , <i>A. stellaticeps</i> , <i>A. trachycarpa</i> and <i>A. tumida</i> var. <i>pilbarensis</i> sparse low shrubland over <i>Triodia epactia</i> open hummock grassland and herbaceous species.		
<b>Habitat</b>	Sand plain		
<b>Vegetation condition</b>	Very Good – evidence of livestock activity, not burnt recently.		
<b>Flora species present</b>			
<i>Acacia ancistrocarpa</i> <i>Acacia colei</i> var. <i>colei</i> <i>Acacia inaequilatera</i> <i>Acacia orthocarpa</i> <i>Acacia stellaticeps</i> <i>Acacia trachycarpa</i> <i>Acacia tumida</i> var. <i>pilbarensis</i>		<i>Cassytha capillaris</i> <i>Corymbia zygophylla</i> <i>Goodenia stobbsiana</i> <i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i> <i>Petalostylis labicheoides</i> <i>Streptoglossa decurrens</i> <i>Triodia epactia</i>	
<b>Comments</b>			
Estimated 5+ years since last burnt.			

<b>Site:</b>	W19	<b>Location:</b>	Petermarer Creek
			
<b>Vegetation description</b>	Isolated <i>Acacia ancistrocarpa</i> , <i>A. inaequilatera</i> , <i>A. orthocarpa</i> , <i>A. stellaticeps</i> and <i>A. tumida</i> var. <i>pilbarensis</i> shrubs over <i>Acacia adoxa</i> var. <i>subglabra</i> very open low shrubland, <i>Triodia epactia</i> open hummock grassland and scattered herbaceous species.		
<b>Habitat</b>	Rocky outcrop (quartz)		
<b>Vegetation condition</b>	Very Good		
<b>Flora species present</b>			
<i>Acacia adoxa</i> var. <i>subglabra</i>		<i>Eriachne</i> sp.	
<i>Acacia ancistrocarpa</i>		<i>Hibiscus brachychlaenus</i>	
<i>Acacia inaequilatera</i>		<i>Senna notabilis</i>	
<i>Acacia orthocarpa</i>		<i>Tinospora smilacina</i>	
<i>Acacia stellaticeps</i>		<i>Triodia epactia</i>	
<i>Acacia tumida</i> var. <i>pilbarensis</i>			
<b>Comments</b>			
Outside the proposed area of disturbance, north and south of the survey area. Estimated 5+ years since last burnt.			

<b>Site:</b>	W20	<b>Location:</b>	Petermarer Creek
			
<b>Vegetation description</b>	<i>Acacia ancistrocarpa</i> tall shrubland over <i>A. stellaticeps</i> and <i>A. tumida</i> var. <i>pilbarensis</i> low open shrubland over <i>Triodia epactia</i> and <i>Cenchrus ciliaris</i> open hummock grassland.		
<b>Habitat</b>	Dense <i>Acacia</i> shrubland (road verge)		
<b>Vegetation condition</b>	Good – low species diversity, weeds present.		
<b>Flora species present</b>			
<i>Acacia ancistrocarpa</i>		<i>Bonamia erecta</i>	
<i>Acacia stellaticeps</i>		* <i>Cenchrus ciliaris</i>	
<i>Acacia tumida</i> var. <i>pilbarensis</i>		<i>Triodia epactia</i>	
<b>Comments</b>			
Exists as a narrow strip along the length of the road. Long unburnt. Proximity of road has altered the original vegetation composition.			

<b>Site:</b>	W21	<b>Location:</b>	Petermarer Creek
			
<b>Vegetation description</b>	<p><i>Corymbia zygomphylla</i> very open low woodland over <i>Acacia ancistrocarpa</i> and <i>A. inaequilatera</i> open low shrubland over <i>Acacia stellaticeps</i> sparse low shrubland and <i>Triodia epactia</i> open hummock grassland with scattered herbaceous species.</p>		
<b>Habitat</b>	Sand plain with <i>Acacia</i> thickets		
<b>Vegetation condition</b>	Very Good		
<b>Flora species present</b>			
<p><i>Acacia ancistrocarpa</i> <span style="float: right;"><i>Goodenia stobbsiana</i></span>  <i>Acacia inaequilatera</i> <span style="float: right;"><i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i></span>  <i>Acacia stellaticeps</i> <span style="float: right;"><i>Triodia epactia</i></span>  <i>Corymbia zygomphylla</i></p>			
<b>Comments</b>			
Estimated 5+ years since last burnt.			

## Appendix 4

### Flora Species Recorded





## Appendix 5

Bat call identification report.





## Bat call identification from near Port Hedland, WA

Type: Acoustic analysis

Prepared for: Animal Plant Mineral Pty Ltd

Date: 17 December 2018

Job No.: SZ474

Prepared by: Kyle Armstrong and Yuki Konishi  
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This report should be included as an appendix in any larger submission to Government, and cited as:

Specialised Zoological (2018). Bat call identification from near Port Hedland, WA. Acoustic analysis. Unpublished report by Specialised Zoological for Animal Plant Mineral Pty Ltd, 17 December 2018, Job number SZ474.

## Summary

Bat identifications from acoustic recordings are provided from near Port Hedland, in the Pilbara region of Western Australia. Four species of bat were identified as being present (**Tables 1** and **2**). Attribution of call types to species was straightforward for this dataset. Representative echolocation calls for each identification are illustrated (**Figure 1**), as recommended by the Australasian Bat Society (ABS 2006). Further data are available should verification be required.

## Methods

Data were recorded in full spectrum WAV format with Titley Scientific AnaBat Swift and Pettersson Elektronik D500X bat detectors (sampling rate 500 kHz, set to turn on automatically at sunset and off at sunrise).

A multi-step acoustic analysis procedure developed to process large full spectrum echolocation recording datasets from insectivorous bats (Armstrong and Aplin 2014; Armstrong et al. 2016) was then applied to the recordings made on the survey. Firstly, the WAV files were scanned for bat echolocation calls using several parameter sets in the software SCAN'R version 1.8.3 (Binary Acoustic Technology), which also provides measurements (in "SonoBat™ compatible output") from each putative bat pulse. The output was then used to determine if putative bat pulses measured in SCAN'R could be identified to species. This was done using a custom [R] language script that performed three tasks: 1. undertook a Discriminant Function Analysis on training data from representative calls from the Pilbara region; 2. from the measurements of each putative bat pulse from SCAN'R, calculated values for the first two Discriminant Functions that could separate the echolocation call types derived from the analysis of training data, and plotted these resulting coordinates over confidence regions for the defined call types; and 3. facilitated an inspection in a spectrogram of multiple examples of each call type for each recording night by opening the original WAV files containing pulses of interest in Adobe Audition CS6 version 5.0.2. Species were identified based on information in McKenzie and Bullen (2009), and nomenclature follows Jackson and Groves (2015).

## Limitations

The identifications presented in this report have been made within the following context:

1. The identifications made herein were based on the ultrasonic acoustic data recorded and provided by a 'third party' (the client named on the front of this report).
2. The scope of this report extended to providing information on the identification of bat species in bulk ultrasonic recordings. Further comment on these species and the possible impacts of a planned project on bat species were not part of the scope.
3. In the case of the present report, the recording equipment was set up and supplied by Specialised Zoological. The equipment was operated by the third party during the survey.
4. Other than the general locality of the study area, Specialised Zoological has not been provided with detailed information of the survey area, has not made a site visit to observe the habitats available for bats, nor have we visited the specific project areas on a previous occasion.
5. Specialised Zoological has had no input into the overall design of this bat survey, including its timing, recording site placement, nor degree of recording site replication.
6. While Specialised Zoological has made identifications to the best of our ability given the available materials, and reserves the right to re-examine the data and revise any identification following a query, it is the client's and / or proponent's responsibility to provide supporting evidence for any identification, which might require follow-up trapping effort or non-invasive methods such as video recordings. Specialised Zoological bears no liability for any follow-up work that may be required to support an identification based initially on the analysis of acoustic recordings undertaken and reported on here.
7. There are a variety of factors that affect the 'detectability' of each bat species, given the frequency, power and shape characteristics of their calls. Further information on the analysis and the various factors that can impinge on the reliability of identifications can be provided upon request.

## References

- ABS (2006). Recommendations of the Australasian Bat Society Inc for reporting standards for insectivorous bat surveys using bat detectors. *The Australasian Bat Society Newsletter* 27: 6–9. [ISSN 1448-5877]
- Armstrong, K.N. and Aplin, K.P. (2014). Identifying bats in an unknown acoustic realm using a semi-automated approach to the analysis of large full spectrum datasets. Oral presentation at the 16th Australasian Bat Society Conference 22–25 April 2014, Townsville, Queensland. *The Australasian Bat Society Newsletter* 42: 35–36.
- Armstrong, K.N., Aplin, K.P. and Crotty, S. (2016). A pipeline and app for massive filtering, and assisted inspection of enormous acoustic datasets. Poster presentation at the 17th Australasian Bat Society Conference, 29 March-1 April 2016, Hobart, Tasmania, Australia. *The Australasian Bat Society Newsletter* 46: 51.
- Jackson, S.M. and Groves, C.P. (2015). *Taxonomy of Australian mammals*. CSIRO Publishing, Victoria.
- McKenzie, N.L. and Bullen, R.D. (2009). The echolocation calls, habitat relationships, foraging niches and communities of Pilbara microbats. *Records of the Western Australian Museum Supplement* 78: 123–155.

**Table 1.** Species identified in the present survey from all sites combined.

<b>EMBALLONURIDAE</b>	
Common Sheath-tailed Bat	<i>Taphozous georgianus</i>
<b>VESPERTILIONIDAE</b>	
Little Broad-nosed Bat Finlayson's Cave Bat	<i>Scotorepens greyii</i> <i>Vespadelus finlaysoni</i>
<b>MOLOSSIDAE</b>	
Greater Northern Free-tailed Bat	<i>Chaerephon jobensis</i>

**Table 2.** Species identifications, with the degree of confidence indicated by a code. Date and serial/unit number correlates with site; see **Table 1** for full species names.

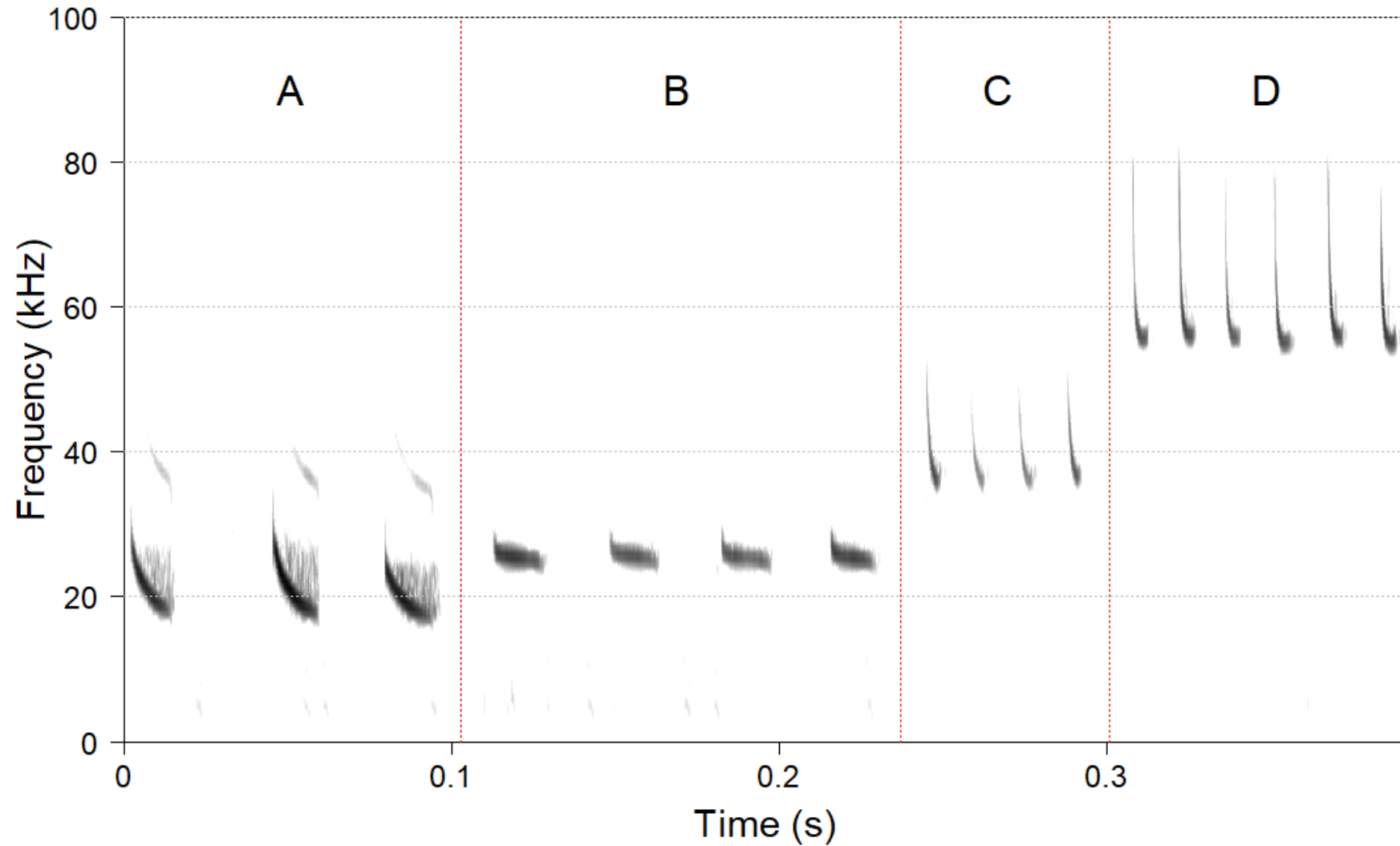
	<i>C. jobensis</i>	<i>S. greyii</i>	<i>T. georgianus</i>	<i>V. finlaysoni</i>
<b>D500X 1009</b>				
28/11/2018	◆	—	—	◆
29/11/2018	—	◆	—	◆
<b>AnaBat Swift 450057</b>				
28/11/2018	◆	—	◆	—
29/11/2018	◆	—	◆	◆
<b>AnaBat Swift 450083</b>				
28/11/2018	◆	◆	—	—
29/11/2018	—	◆	—	◆

**Definition of confidence level codes:**

— Not detected.

◆ Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or a DNA sequence.

**NC Needs Confirmation.** Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in the *Comments on identifications* section of this report. If this is a species of conservation significance, further survey work might be required to confirm the record.



**Figure 1.** Representative call sequence portions of the species identified (**A:** *Chaerephon jobensis*; **B:** *Taphozous georgianus*; **C:** *Scotorepens greyii*; **D:** *Vespadelus finlaysoni*; time between pulses has been compressed).