



PHOENIX

ENVIRONMENTAL SCIENCES

Detailed terrestrial fauna survey for the Port Hedland Green Steel Project

Prepared for Port Hedland Green Steel Pty Ltd

February 2024

Final



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Prepared for Port Hedland Green Steel Pty Ltd

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EXECUTIVE SUMMARY

Port Hedland Green Steel Pty Ltd (PHGS) is progressing the development of large-scale downstream iron ore processing capability known as the Port Hedland Green Steel Project (the Project), located approximately 15 km southwest of Port Hedland, Western Australia (WA; Figure 1-1). PHGS intend to seek approval under Part IV of the Environmental Protection Act 1986 (EP Act) to enable development of the Project which will consist of a pellet plant and a hot briquette iron (HBI) plant, consuming approximately 3-3.5 million tonnes per annum (Mtpa) of iron ore. In February 2023, Phoenix Environmental Sciences Pty Ltd (Phoenix) was commissioned by Preston Consulting to undertake a Detailed terrestrial fauna survey for the Project.

The survey was undertaken in Autumn from 17-30 April 2023. The purpose of the survey was to define the fauna values of the study area to inform Project planning and environmental impact assessment processes.

A total of 58 survey sites were sampled including 6 systematic survey sites, 25 Bilby plots, 7 Bilby transects (BT) and 20 additional opportunistic/reference/targeted survey sites. A total of 103 terrestrial vertebrate species representing 44 families and 79 genera were recorded in the study area during the field surveys. The assemblage included 101 native species and 2 introduced species.

Three broad fauna habitat types were identified in the study area, comprising sandplains, open woodlands and drainage lines. Sandplains comprise the majority of the study area, accounting for over 95%. Open woodlands and drainage lines comprised less than 1% (0.9% and 0.6%, respectively) of the study area), the remainder being cleared.

Five significant vertebrate species comprising 2 Threatened, one Priority and 2 Migratory listed species were recorded in the study area. These included: Greater Bilby (Vulnerable; EPBC and BC Acts), Grey Falcon (Vulnerable; EPBC and BC Acts), Brush-tailed Mulgara (Priority 4; Department of Biodiversity, Conservation and Attractions (DBCAs) Priority list), Fork-tailed Swift (Migratory; EPBC and BC Acts) and Osprey (Migratory; EPBC and BC Acts). Black Falcon was also recorded (not conservation listed, but rare and considered locally significant).

The most significant result of the survey was the 128 records of Bilby sign, comprising 32 old diggings, 69 old scats, 12 recent diggings and 15 recent scats. However, despite both intensive and extensive targeted survey effort, no Bilby burrows (old, recently active, or active burrows) were detected. Together, the evidence therefore suggests that the study area forms part of a local population's home range, but it is not core breeding habitat. Instead, it is considered foraging habitat that is temporarily used as season conditions within the broader landscape dictate.

The Brush-tailed Mulgara was also recorded in the study area from 2 active or recently active burrows.

A breeding pair and recently fledged juvenile Grey Falcon were recorded perched next to a nest on a transmission tower adjacent to the Alinta Energy Power Station at the western extent of the study area are unlikely to be impacted by Project related disturbances, given the species large foraging home range of which the study area represents only a fraction.

The 2 Migratory listed bird species, Fork-tailed Swift and Osprey, while recorded in the study area, are not relevant to the habitats present. Fork-tailed swifts are an almost exclusively aerial species and are therefore not limited by the availability of specific terrestrial habitats. Ospreys are a predominantly coastal species but also forage in mangroves and other large water bodies where they prey on large fish. Therefore, development of the Project, including clearing of native vegetation within the study area poses no threats to these species.

With respect to Short-range endemic (SRE) invertebrates, while the open woodland habitat seems locally isolated, it extends to the east, outside the study area via diffuse drainages to more extensive open woodland habitat associated with the large drainage line known as South-west Creek.

The SRE fauna of the region is well understood with several confirmed SRE species known in the area and a high number of records from several different SRE groups. The desktop review identified 7

confirmed SRE taxa and 78 potential SRE taxa from within the SRE desktop search area. Of these most were recorded in habitat types that are not present in the study area, except for one record of a mygalomorph. This record was located approximately 165 m from the southeastern boundary of the study area. During the field survey 2 mygalomorph specimens were collected that could not be identified as the sequencing failed. These records are cautiously determined as potential SRE species. Overall, the study area comprises low value SRE habitat. No confirmed SRE species were recorded within the study area, and it is unlikely any of the recorded potential SRE's are restricted to the study area.

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1 INTRODUCTION

Port Hedland Green Steel Pty Ltd (PHGS) is progressing the development of large-scale downstream iron ore processing capability known as the Port Hedland Green Steel Project (the Project), located approximately 15 km southwest of Port Hedland, Western Australia (WA; Figure 1-1). PHGS intend to seek approval under Part IV of the Environmental Protection Act 1986 (EP Act) to enable development of the Project which will consist of a pellet plant and a hot briquette iron (HBI) Plant, consuming approximately 3-3.5 million tonnes per annum (Mtpa) of iron ore.

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The purpose of the survey was to define the fauna values of the study area to inform Project planning and environmental impact assessment processes.

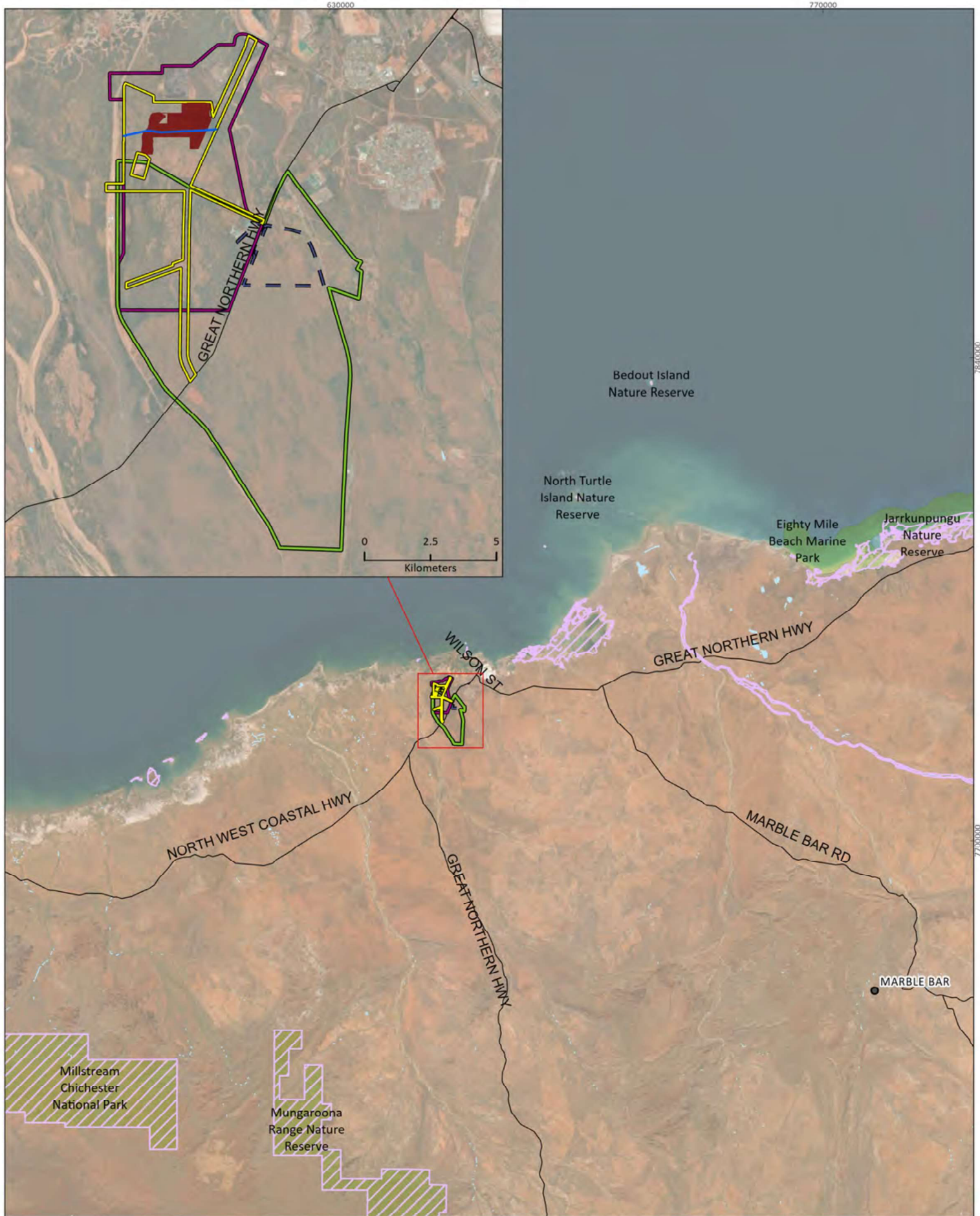
1.1 SCOPE OF WORK

The scope of work for the Detailed terrestrial fauna survey was as follows:

- Desktop study:
 - gather contextual information on the potential terrestrial fauna and fauna habitats of the study area.
 - identify significant fauna that potentially occur in the study area.
- Detailed survey:
 - collect comprehensive, quantitative data on species, assemblages and habitats in the study area.
- Targeted survey:
 - determine the presence/absence of one or more significant species identified in the desktop review as likely to occur in the study area, including (but not limited to) Mulgara and Greater Bilby.
 - determine distribution and abundance (where possible) of specific significant species.
 - describe and map habitats or features that are important to significant fauna or faunal assemblages, such as for breeding, foraging or dispersal.
- Stand-alone technical report suitable for inclusion in environmental approval documentation.

1.2 STUDY AREA

The study area is located in the Town of Port Hedland and the Eremaean Climatic Province as defined by EPA (2020). It is approximately 1,476.3 ha and includes 4 corridors with the western-most corridor located adjacent to the Port Hedland power station (Figure 1-1).



Port Hedland Green Steel Pty Ltd
 Port Hedland Green Steel Project

Project No 1557
 Date 5/02/2024
 Drawn by JL
 Map author SP

0 25 50
 Kilometers

1:1,419,800 (at A4) GDA 1994 MGA Zone 50

- Study area
- Indicative disturbance footprint
- Boodarie Strategic Industrial Area
- Phoenix (2022) targeted Bilby survey
- Phoenix (2021) detailed fauna survey
- Environmentally sensitive areas
- Lakes
- DBCA managed land
- Whim Creek Road

Figure 1-1
Project location and study area



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2 LEGISLATIVE CONTEXT

The protection of fauna in WA is principally governed by 3 acts:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- State *Biodiversity Conservation Act 2016* (BC Act)
- State *Environmental Protection Act 1986* (EP Act).

The BC Act came into full effect on 1 January 2019 and replaced the functions of the *Wildlife Conservation Act 1950* (WC Act).

2.1 COMMONWEALTH

The EPBC Act is administered by the Federal Department of Climate Change, Energy, the Environment and Water (DCCEE). The EPBC Act provides for the listing of Threatened fauna as matters of National Environmental Significance (NES). Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of NES, require approval from the Australian Government Minister for the Environment through a formal referral process. Key threats and habitat critical to the survival of EPBC Act Threatened species are usually defined in the conservation advice and/or recovery plan for the species.

Conservation categories applicable to fauna species under the EPBC Act are as follows:

- Extinct (EX)¹ – there is no reasonable doubt that the last individual has died
- Extinct in the Wild (EW) – taxa known to survive only in captivity
- Critically Endangered (CR) – taxa facing an extremely high risk of extinction in the wild in the immediate future
- Endangered (EN) – taxa facing a very high risk of extinction in the wild in the near future
- Vulnerable (VU) – taxa facing a high risk of extinction in the wild in the medium-term
- Conservation Dependent (CD)¹ – taxa whose survival depends upon ongoing conservation measures; without these measures, a conservation dependent taxon would be classified as Vulnerable, Endangered or Critically Endangered.

The EPBC Act is also the enabling legislation for protection of Migratory species as matters of NES under several international agreements:

- Japan-Australia Migratory Bird Agreement (JAMBA)
- China-Australia Migratory Bird Agreement (CAMBA)
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn)
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

¹ Species listed as Extinct and Conservation Dependent are not matters of NES and therefore do not trigger the EPBC Act.

2.2 STATE

2.2.1 Threatened and Priority species

In WA, the BC Act provides for the listing of Threatened fauna species (Government of Western Australia 2018a, b)² in the following categories:

- Critically Endangered (CR) – species facing an extremely high risk of extinction in the wild in the immediate future³
- Endangered (EN) – species facing a very high risk of extinction in the wild in the near future³
- Vulnerable (VU) – species facing a high risk of extinction in the wild in the medium-term future³.

Species may also be listed as Specially Protected (SP) under the BC Act in one or more of the following categories:

- species of special conservation interest (conservation dependent fauna, CD) – species with a naturally low population, restricted natural range, of special interest to science, or subject to or recovering from a significant population decline or reduction in natural range
- Migratory species (Mig.), including birds subject to international agreement
- species otherwise in need of special protection (OS).

The Department of Biodiversity, Conservation and Attractions (DBCA) administers the BC Act and also maintains a non-statutory list of Priority fauna. Priority species are still considered to be of conservation significance – that is they may be Threatened – but cannot be considered for listing under the BC Act until there is adequate understanding of threat levels imposed on them. Species on the Priority fauna lists are assigned to one of 4 Priority (P) categories, P1 (highest) – P4 (lowest), based on level of knowledge/concern.

2.2.2 Critical habitat

Under the BC Act, habitat is eligible for listing as critical habitat if it is critical to the survival of a Threatened species or a Threatened Ecological Community (TEC) and its listing is otherwise in accordance with the ministerial guidelines.

2.2.3 Other significant fauna

Under the EPA's environmental factor guidelines, fauna may be considered significant for a range of reasons other than listing as a Threatened or Priority species.

In addition to listing as Threatened or Priority, EPA (2016a) identifies the following attributes that constitute significant fauna:

- species with restricted distribution (see also section 2.2.4)
- species subject to a degree of historical impact from threatening processes
- providing an important function required to maintain the ecological integrity of a significant ecosystem.

² The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the BC Act.

³ As determined in accordance with criteria set out in the ministerial guidelines.

2.2.4 Short-range endemic invertebrates

Short-range endemic (SRE) fauna are defined as animals that display restricted geographic distributions, nominally less than 10,000 km², that may also be disjunct and highly localised (Harvey 2002). EPA (2016a) identifies species with restricted distributions as being significant fauna in the context of environmental impact assessments (EIA). SRE fauna need to be considered in EIA as localised, small populations of species that are generally at greater risk of changes in conservation status due to environmental change than other, more widely distributed taxa.

Short-range endemism in terrestrial invertebrates is believed to have evolved through 2 primary processes (Harvey 2002):

- Relictual – where the drying climate reduced the area of suitable habitat available to a species, forcing a range contraction. Such habitats typically maintain historic mesic conditions (e.g. south facing rock faces or slopes of mountains or gullies).
- Habitat speciality – where species settled in particular isolated habitat types (e.g. rocky outcrops) by means of dispersal and evolved in isolation into distinct species.

SRE invertebrates have however also been reported in more widespread habitats such as spinifex plains or woodlands, mainly in groups with low dispersal capabilities, for example mygalomorph spiders and millipedes (see for example Car & Harvey 2014; Rix *et al.* 2018).

There can be uncertainty in categorising a specimen as an SRE due to several factors including poor regional survey density, lack of taxonomic research and problems of identification, i.e. specimens that may represent SREs cannot be identified to species level based on the life stage. For example, in contrast to mature males, juvenile and female millipedes, mygalomorph spiders and scorpions cannot be identified to species level. Molecular techniques such as ‘barcoding’ (Hebert *et al.* 2003a; Hebert *et al.* 2003b) are routinely employed to overcome taxonomic or identification problems.

2.2.5 Environmentally Sensitive Areas

Under section 51B of the EP Act the Minister for Environment may declare by notice either a specified area of the State or a class of areas of the State to be Environmentally Sensitive Areas (ESAs). ESAs are declared in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, which was gazetted on 8 April 2005 (Government of Western Australia 2005).

ESAs are areas where the vegetation has high conservation value. Several types of areas are declared ESAs including:

- the area covered by vegetation within 50 meters (m) of Threatened flora, to the extent to which the vegetation is continuous with the vegetation in which the Threatened flora is located
- the area covered by a Threatened Ecological Community (TEC)
- a defined wetland (Ramsar wetlands, conservation category wetlands and nationally important wetlands) and the area within 50 m of the wetland
- Bush Forever sites.

3 EXISTING ENVIRONMENT

3.1 INTERIM BIOGEOGRAPHIC REGIONALISATION OF AUSTRALIA

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies Australia’s landscapes into large ‘bioregions’ and ‘subregions’ based on climate, geology, landform, native vegetation and species information (DoEE 2016). The study area is located in the Roebourne subregion (PIL4) of the Pilbara bioregion (Figure 3-1) which is characterised as (Kendrick & Stanley 2001):

“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. pyrifolia* 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.”

3.2 LAND SYSTEMS AND SURFACE GEOLOGY

The Department of Primary Industries and Regional Development (DPIRD) undertakes land system mapping for WA using a nesting soil-landscape mapping hierarchy (Schoknecht & Payne 2011). While the primary purpose of the mapping is to inform pastoral and agricultural land capability, it is also useful for informing biological assessments. Under this hierarchy, land systems are defined as areas with recurring patterns of landforms, soils, vegetation and drainage (Payne & Leighton 2004).

The study area intersects 2 land systems (Table 3-1; Figure 3-2). Most of the study area comprises the Uaroo system with a hiatus in the northeast corridor representing the Littoral system.

Table 3-1 Land systems and extent in study area

Land system	Description	Area (ha)	% of study area
Uaroo System	Broad sandy plains, pebbly plains and drainage tracts supporting hard and soft spinifex hummock grasslands with scattered acacia shrubs.	1,474.0	99.8
Littoral System	Bare coastal mudflats (unvegetated), samphire flats, sandy islands, coastal dunes and beaches, supporting samphire low shrublands, sparse acacia shrublands and mangrove forests.	2.3	0.2
Total		1,476.3	100.0

According to the Surface Geology of Australia 1:1,000,000 scale, WA database (Stewart *et al.* 2008), the study area intersects one geological formation representing alluvium 38485 (Table 3-2; Figure 3-2).

Table 3-2 Surface geology of the study area, extent by deposit type

Surface geology	Abbreviation	Description	Area (ha)	% of study area
alluvium 38485	Qa	Channel and flood plain alluvium; gravel, sand, silt, clay, locally calcreted	1,476.3	100.0
Total			1,476.3	100.0



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Port Hedland Green Steel Project

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Map author	SP

0 20 40
Kilometers

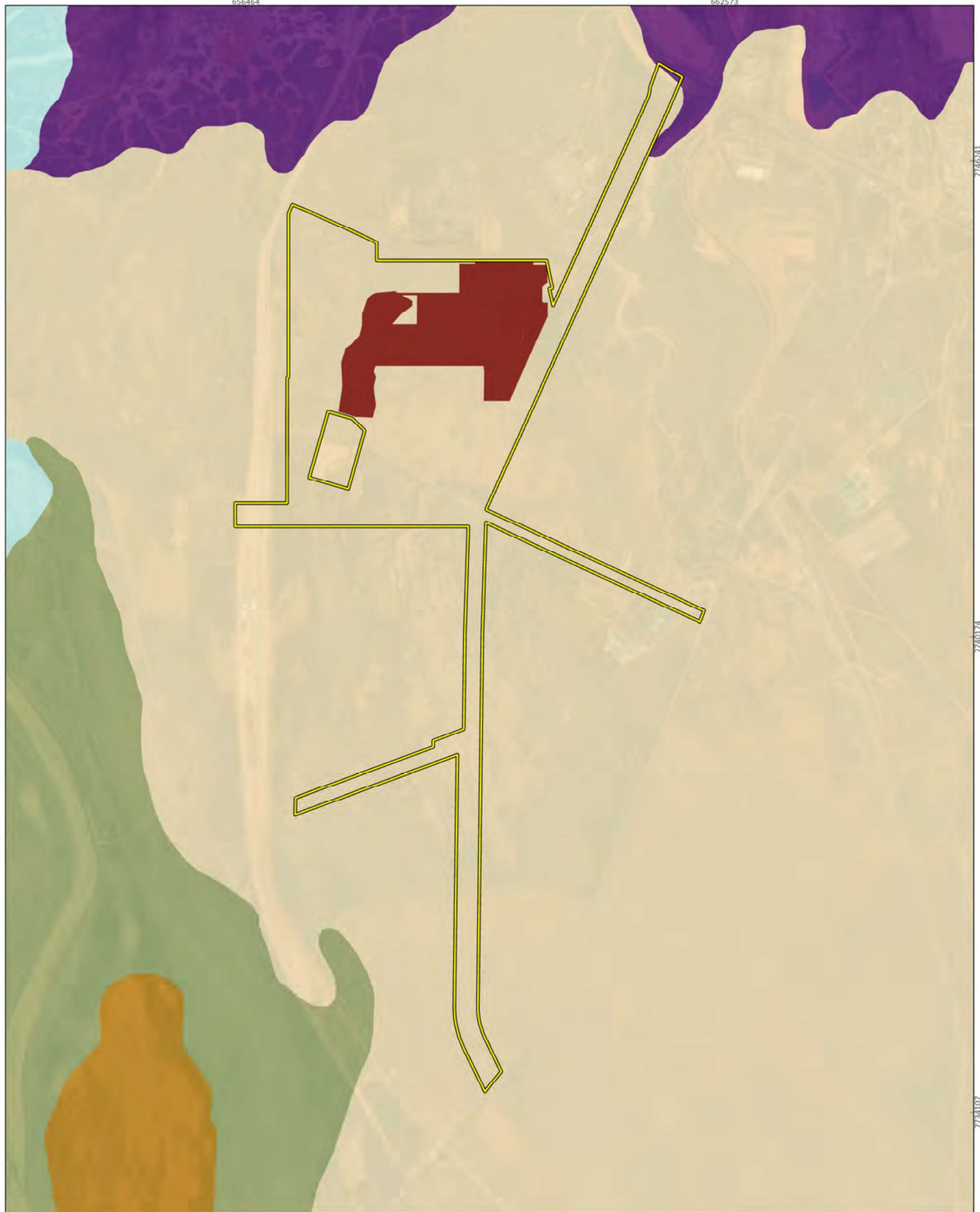
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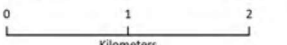
- Study area
- Region, subregion**
- Dampierland, Pindanland
- Great Sandy Desert, McLarty
- Pilbara, Chichester
- Pilbara, Fortescue
- Pilbara, Roebourne

Figure 3-1
Study area in relation to IBRA bioregions and subregions



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Drawn by	FK
Map author	SP
	
	
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-  Study area
-  Indicative disturbance footprint
- Land systems**
-  Littoral System
-  Mallina System
-  River System
-  Uaroo System
-  Yamerina System

Figure 3-2

Land systems and surface geology in the study area


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3.3 CLIMATE AND WEATHER

The climate of the Roebourne subregion is described as arid (semi-desert) tropical with highly variable rainfall, falling mainly in summer (Kendrick & Stanley 2001). The nearest Bureau of Meteorology (BoM) weather station with comprehensive data collection and recent historic climate data is Port Hedland Airport (no. 004032), Latitude: 20.37°S Longitude 118.63°E, located approximately 11 km north-east of the study area.

Port Hedland Airport records the highest mean maximum monthly temperature (36.8°C) in December and March (lowest in July, 27.4°C) and the lowest minimum mean monthly temperature (12.5°C) in July (highest in January, 25.7°C) (BoM 2023) (Figure 3-3). Median annual rainfall is 310.6 mm with January and February recording the highest monthly median (25.6 and 71.2 mm respectively; Figure 3-3). Cyclonic activity is significant with several systems affecting the coast and hinterland annually (Kendrick & Stanley 2001). Prior to commencement of the survey, Cyclone Ilsa (Category 5) threatened the town of Port Hedland; however, local precipitation and damage was negligible.

Daily mean temperatures at Port Hedland Airport in the 3 months preceding the surveys were on average consistent with the long-term averages for the region (Figure 3-3). The average mean maximum and minimum temperatures were 0.3°C and 1.3°C warmer than the long-term averages, respectively. Daily maximum temperatures during the survey ranged from 31.7°C to 34.9°C, and daily minimum temperatures from 15.6°C to 25.4°C (Appendix 8).

Records from Port Hedland Airport show a total of 22.5 mm (19.8 %) more local precipitation was recorded in the 3 months leading up to the survey compared to the long-term averages for the region; local precipitation was almost identical to the long-term median, with 3.8 mm more (314.4 mm) recorded in the 12 months preceding the survey. No rainfall was recorded during the survey (Appendix 6).

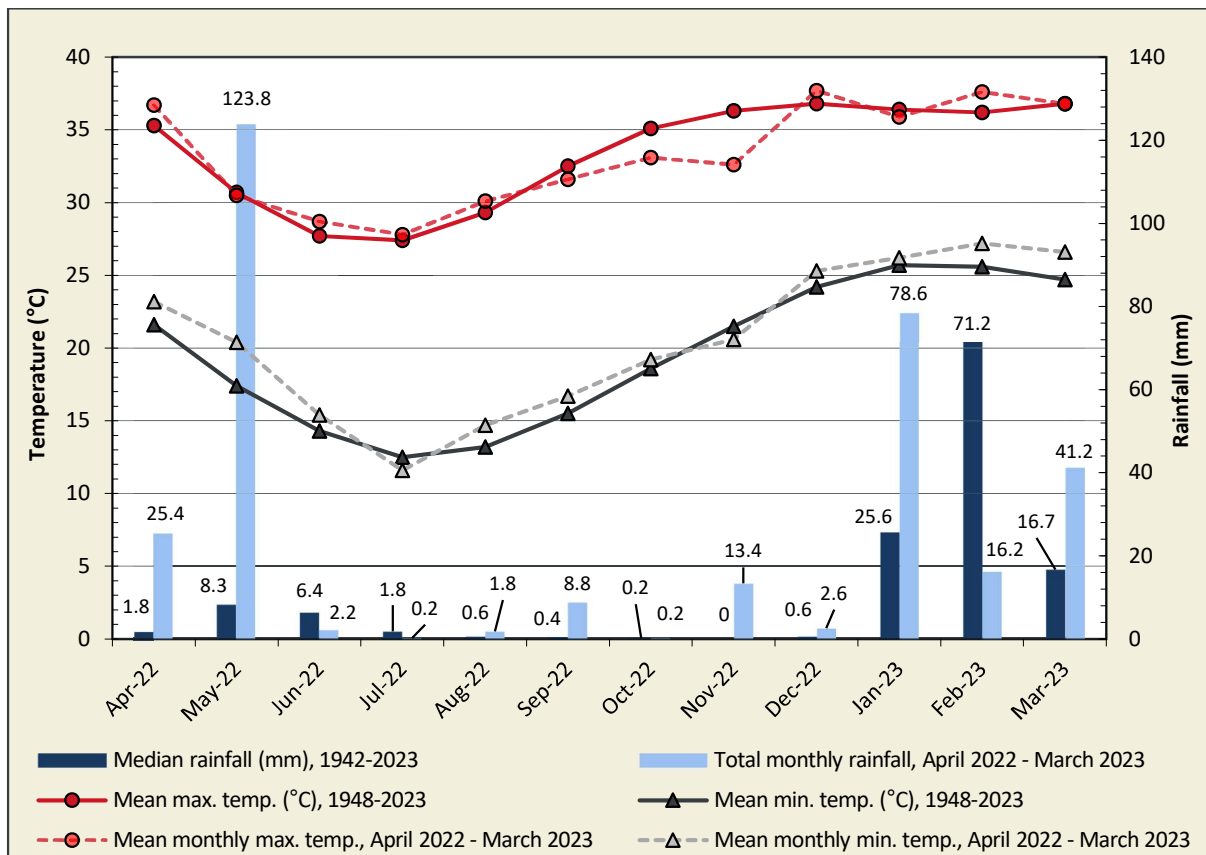


Figure 3-3 Annual climate and weather data for Port Hedland Airport (no. 004032) and mean monthly data for the 12 months preceding the survey (BoM 2023)

3.4 LAND USE

The dominant land use of the PIL4 subregion comprises grazing (native pastures), Aboriginal lands and reserves, conservation, mining leases and urban development (Kendrick & Stanley 2001). As per land use summaries extracted from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES 2018) and summarised in Table 3-3, ‘production from relatively natural environments’ and ‘conservation and natural environments’ are the dominant land use components comprising the PIL4 subregion. The majority of the study area is covered by the area allocated as the ‘Boodarie Strategic Industrial Area’ (Figure 1-1). Land use across the study area is subject to similar usages (and proportional area) to the PIL4 subregion; the dominant secondary components represent ‘grazing native vegetation’ (1,008.5 ha, 68.3%) and ‘other minimal uses’ (461.1 ha, 31.2%), which does not have any formal environmental protection. The Port Hedland and South Hedland power stations and a pipe stockyard are situated adjacent to the study area to the east.

Table 3-3 Land use of the study area, according to ABARES (2018)

Land use	PIL4 subregion		Study area	
	Area (ha)	% of PIL4	Area (ha)	% of study area
Conservation and natural environments	492,279.8	26.5	461.1	31.2
Intensive uses	8,481.1	0.5	4.2	0.3
Production from dryland agriculture and plantations	367.7	<0.01	-	-
Production from irrigated agriculture and plantations	0.4	<0.01	-	-
Production from relatively natural environments	1,302,639.7	70.1	1,008.7	68.3
Water	54,528.3	2.9	2.3	0.2
Total	1,858,297.0	100.0	1,476.3	100.0

3.5 CONSERVATION RESERVES AND ESAS

No conservation reserves intersect the study area or occur within the 40 km desktop search extent. The nearest conservation reserves are Mungaroon Range Nature Reserve and Eighty Mile Beach Marine Park, located approximately 101 km south-southwest and 110 km north-east from the study area boundary, respectively (Figure 1-1). No DBCA lands of interest proposed for conservation occur near the study area. A total of 7 ESAs occur within the desktop search extent (Figure 1-1; Table 3-4); 2 small ESAs (IDs 15126 and 15128) occur nearby, located approximately 8 and 10.7 km north-northwest and north-northeast of the study area, respectively. A larger ESA is located approximately 18.7 km north-east of the study area, encompassing salt evaporator ponds and the surrounding tidal mudflats. This ESA comprises a system of evaporation ponds and adjacent mudflats, classified by Birdlife International (2022) as an Important Bird Area (IBA) due to its global importance for Migratory bird populations, particularly Red-necked Stints and Sharp-tailed Sandpipers (Figure 1-1).

Table 3-4 ESAs in the desktop search extent

Identity	Area (ha)	Distance to study area
12070	36.4	34.2 km NE
12071	32.3	39.4 km NE
12074	206.0	36.8 km NE
12075	19,732.6	18.7 km NE
15126	7.8	8.0 km NNW
15127	36.1	8.0 km N
15128	1.5	10.7 km NNE

4 METHODS

The Detailed terrestrial fauna survey was conducted in accordance with relevant survey guidelines and guidance, including:

- *EPA Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020)
- *EPA Technical Guidance: Sampling of short-range endemic invertebrate fauna* (EPA 2016c)
- *Guideline for survey and relocation of Bilby in WA* (DBCA 2018)
- *Interim guideline for preliminary surveys of Night Parrot (*Pezoporus occidentalis*) in WA* (DPaW 2017).

4.1 DESKTOP REVIEW

Searches of several biological databases were undertaken to identify and prepare lists of significant fauna that may occur within the study area (Table 4-1). A literature search was conducted for accessible reports for biological surveys conducted within 40 km of the study area to build on the lists developed from the database searches (Table 4-2).

Table 4-1 Database searches conducted for the desktop review

Database	Target group/s	Search coordinates and extent
Protected Matters Search Tool (DCCEEW 2022)	EPBC Act Threatened fauna	Study area plus a 40 km buffer
DBCA Threatened and Priority Fauna Database (DBCA 2022b)	Threatened and Priority fauna	Study area plus a 40 km buffer
DBCA NatureMap Database (DBCA 2022a)	Fauna records	Study area plus a 40 km buffer
WA Museum Arachnid and Myriapod Database, Mollusca Database (WAM 2022)	Arachnid, myriapod and mollusc SREs	100 x 100 km search area encompassing the study area between 19.5269°S, 117.5647°E (NW corner) and 21.3154°S, 119.4991°E (SE corner)

Table 4-2 Survey reports included in the desktop review

Report author	Survey description	Project	Relative location
Bennelongia (2011)	Migratory shorebird survey	Outer Harbour Development	Adjacent (N)
ENV (2009)	Terrestrial fauna surveys	Outer Harbour Development	Overlapping
ENV and Phoenix (2009)	Level 2 SRE invertebrate survey	Outer Harbour Development and Goldsworthy Rail Duplication	Overlapping
ENV (2011)	Basic and targeted terrestrial fauna surveys	Port Hedland Regional Assessment	Overlapping
Phoenix (2022a)	Basic vertebrate fauna survey	Port Hedland Source Planning	6.5 km N
Phoenix (2022b)	Detailed terrestrial fauna (2021) and targeted Bilby survey	Port Hedland Solar Farm	Adjacent (E)

Report author	Survey description	Project	Relative location
Phoenix (2013)	SRE invertebrate survey	East Pilbara Independent Rail Project	Overlapping (all sites to S)

Vertebrate taxonomy follows the current WAM checklist (Western Australian Museum Department of Terrestrial Zoology 2023) except where known to be superseded by recently published revisions (e.g. Nankivell *et al.* 2023; Prates *et al.* 2023; Umbrello *et al.* 2023). Recent changes in nomenclature are noted under 'Status/comments' for the relevant species in Appendix 3. Exclusively marine reptile and mammal species are included in Appendix 5 but not considered further in this report.

4.2 FIELD SURVEY

4.2.1 Survey timing

The survey was undertaken in Autumn from the 17-30 April 2023.

4.2.2 Terrestrial fauna

Field methods undertaken within the study area included:

- habitat assessment and mapping (see 4.2.2.1)
- systematic trapping (4.2.2.2)
- active diurnal and nocturnal searches (4.2.2.3)
- avifauna surveys (4.2.2.4)
- bat echolocation recordings (4.2.2.5)
- camera trapping (4.2.2.6)
- targeted surveys for Greater Bilby (4.2.2.7; *Macrotis lagotis*, VU)
- SRE invertebrate sampling (4.2.2.9).

A total of 58 survey sites were sampled during the survey (Figure 4-1; Appendix 1). These include 6 systematic survey sites, 25 Bilby plots (BP), 7 Bilby transects (BT) and 20 additional opportunistic/reference/targeted survey sites.

4.2.2.1 Habitat assessment and mapping

Initial habitat characterisation was undertaken using various remote geographical tools, including aerial photography (Google Earth®), land system maps and topographic maps. Habitats with the potential to support significant terrestrial fauna species were identified based on known habitats of such species within the Pilbara bioregion. Tentative sites were selected for the terrestrial fauna survey to represent all habitat types. Final survey site selection was conducted after ground-truthing of site characteristics.

At the broadest scale, site selection considered aspect, topography and land systems. At the finer scale, consideration was given to proximity to water bodies (drainage lines and creek), vegetation complexes and condition and soil type. Sites were primarily chosen to represent the best example of distinct habitats within the broader habitat associations of the study area with a focus on species of conservation significance identified in the desktop review. Two replicates per habitat type were selected for Detailed systematic sampling. Habitat descriptions and characteristics were recorded at all Level 2 systematic survey sites (Figure 4-1; Table 4-3; Appendix 2).

To more accurately define and delineate the fauna habitats in the study area, photographs were taken while traversing the study area (Figure 4-1) with a focus on transitions between fauna habitats (ecotones) apparent from aerial imagery. All photographs were geolocated and spatially mapped to reference. Photographs were used in conjunction with survey site descriptions and regional land system descriptions (Schoknecht & Payne 2011) to map the fauna habitats of the study area.

Table 4-3 Terrestrial fauna survey effort

Site	Site type	Habitat assessment (#)	Diurnal active searches (hours)	Nocturnal active searches (hours)	Birding (hours)	Ultrasonic recording (nights)	Acoustic recorder (nights)	Camera trap (trap-nights)	Bucket (trap-nights)	Aluminium box (trap-nights)	Funnel (trap-nights)	Pipe (trap-nights)	Bilby 2 ha plot (#)	Bilby transect (#)	Opp sighting (#)	SRE foraging (hours)	Litter sieve (#)
BIE001	FS	1	0.7	4	1.3	4	6		35	70	140	35			4	0.3	
BIE002	FS	1	0.3	4	1.0	6	8		35	70	140	35				0.3	
BIE003	FS	1	1.0	3	1.0				35	70	140	35			4	0.3	
BIE004	FS	1	1.0	4	1.0	(3)	3		35	70	140	35			1	0.3	
BIE005	FS	1	0.7	3	0.7	4			35	70	140	35			4	0.3	3
BIE006	FS	1	6.3	3	3.0	4		20	35	70	140	35			3	0.3	3
BIE007	FS		0.7		0.7												
BIE008	FS		0.7		0.7												
BIE009	TFS									1							
BIE010	TFS									20							
BP001-025	TFS												25				
BT001-007	TFS													18			
Opp001-016	FS														22		
Total		6	11.3	21.0	9.3	21	17	20	210	441	840	210	25	18	38	1.8	6

Rows highlighted in grey are systematic sites. Values in parentheses indicate intended survey effort in the absence of device malfunction. TFS = Targeted fauna site; FS = Fauna site; SP = Site photo; BT = Bilby transect; BP = Bilby plot.

4.2.2.2 Systematic trapping

Six systematic trapping sites were established to capture terrestrial mammals, reptiles and amphibians (Figure 4-1). Each site comprised 5 'sub-sites' which consisted of 2 dry pitfall traps including one PVC pipe (15 cm diameter x 60 cm depth) and one 20 L bucket, 4 funnel traps (75 cm x 18 cm x 18 cm) and 2 aluminium box traps (9 cm x 10 cm x 33 cm). The pipes and buckets were installed flush with the substrate, with a 10 m long, 30 cm high aluminium drift fence bisecting each pit. Funnel traps were positioned at the start and finish of each drift fence, and one on either side of the drift fence in the centre between pitfall traps. Aluminium box traps were placed in vegetation adjacent to the trap line. Sub-sites were positioned approximately 20 m apart along a 100 m transect.

The aluminium box traps were baited with a universal bait mixture consisting of oats, peanut butter and sardines to attract small mammals. Aluminium box and funnel traps were shrouded with reflective closed cell insulation (R2.5 rated) to provide shade and protection for any captured animals. All traps were given as much shade as possible under/around vegetation. Reflective closed cell insulation (R2.5 rated) and leaf litter were used to provide protection from the elements in the bottom of all buckets. Traps were open for 7 consecutive nights and checked within 3 hours of sunrise. Baits were removed and replaced every second day.

The total vertebrate trapping effort for the 6 systematic trapping sites during the surveys was 1,608 trap-nights (Table 4-3), where a trap-night is defined as one trap remaining open for one night.

4.2.2.3 Active diurnal and nocturnal searches

Active searches were undertaken at each systematic site and 2 additional sites throughout the study area (Figure 4-1). Active searches primarily targeted diurnal herpetofauna and mammals from direct sightings and secondary evidence. Searches focused primarily on significant species identified in the desktop review as potentially occurring within the study area, including Brush-tailed Mulgara (*Dasyercus blythi*, P4) and Greater Bilby (*Macrotis lagotis*, VU).

Searches were undertaken in any observable microhabitats considered likely to support mammals, reptiles and amphibians. Techniques included: raking leaf and bark litter, overturning logs, searching beneath the bark of trees, investigating dead trees and logs, investigating burrows and identifying any secondary evidence including tracks, diggings, scats, fur or sloughs (shed skins), predation or feeding sites, and fauna constructed structures such as nests. Between 0.7 to 6.3 person hours was spent active searching at each site for a total of 11.3 hours over the duration of the field survey (Table 4-3).

Nocturnal searches were undertaken at each systematic site to detect the presence of any nocturnal fauna species. Nocturnal searches were undertaken between sunset and 9 pm when activity levels were highest for most nocturnal species. Searches consisted of using head torches to detect animal movement, eye shine, or other evidence of fauna presence. These searches particularly targeted reptiles and mammals, but also nocturnal birds. Approximately 21 person hours of nocturnal searches were undertaken during the field surveys (Table 4-3).

4.2.2.4 Avifauna surveys

Twenty-minute avifauna surveys were undertaken at each of systematic site and 2 additional sites (Figure 4-1; Table 4-3). Avifauna surveys were confined to the habitat type (up to 2 ha) represented by each site to collect assemblage data for each habitat. Avifauna surveys were undertaken throughout the day with a focus on periods of higher activity around sunrise and sunset. Surveys consisted of bird recordings from visual sightings and call recognition. Between 0.7 to 3.0 person hours was spent of avifauna census at each site for total of 9.3 hours over the during the field survey (Table 4-3).

Additional avifauna observations were also recorded opportunistically while other field work was being completed, including observations made during travel and active searches.

SongMeter SM4 recording devices were deployed at 3 sites for between 3 to 8 nights to target Night Parrot (*Pezoporus occidentalis*, CR; Table 4-3) in accordance with survey guidelines (DPaW 2017). The Song Meters were deployed at systematic sites in locations considered potential roost habitat for Night Parrot and set to record continuously over the deployment period.

The migratory and non-migratory avifauna assemblage identified in the desktop review as potentially occurring was taken into consideration when undertaking systematic avifauna surveys and traversing the study area.

4.2.2.5 Bat echolocation recordings

Song Meter SM4 recording devices were used to record bat echolocation calls at 5 sites during the field survey (Table 4-3, Figure 4-1). Recording devices were deployed at each site for a minimum of 4 nights of recording for between 8 and 12 continuous hours per night (Table 4-3). Devices were aimed at a 45° angle to the ground. The Song Meters were positioned in areas of habitat likely to have increased insect activity and to attract bats (i.e. likely foraging areas or movement corridors) and/or potential roosting sites where possible.

4.2.2.6 Camera trapping

Four motion-sensitive camera traps baited with universal bait were deployed for 5 nights at BIE006 to gather broad fauna assemblage data outside of disturbance periods (Table 4-3). Cameras were deployed for a total of 20 camera trap-nights. Cameras were set to take 3 rapid-fire images with one second intervals and a 5-second video with a 15-second trigger interval. Camera sensitivity was set to high.

4.2.2.7 Targeted surveys for Bilby (*Macrotis lagotis*, VU)

The objective of the targeted Bilby survey was to determine their presence/absence from the study area and identify areas of recent activity by adopting survey methods detailed in DBCA (2018). Bilby populations are known to have moving home ranges (Dziminski *et al.* 2020). Detection of secondary evidence including scats, tracks, burrows and diggings is the most reliable technique to determine whether bilbies are currently or were formerly present in an area. The occurrence of fresh scats, definitive tracks and/or multiple concentrated diggings can be indicative of current presence; unclear tracks, burrows and diggings in the open can indicate potential activity but cannot alone be used to verify current presence.

A combination of linear transects and 2 ha sign plots were undertaken to provide extensive and representative coverage in all suitable habitat types across a large study area that varies considerably in shape. It is recommended for 2-4 plots be searched per 100 ha, with plot spacing increasing with the size of the study area (DBCA 2018). By combining these methods, there is an increase in confidence in detecting the presence of Bilby in a given area (DBCA 2018).

Linear transects were searched with ~20 m spacing in the study area corridors where suitable habitat was located (Figure 4-2). A total of 18 transects were traversed on foot to detect Bilby presence (Appendix 7).

The standardised 2 ha sign plot method was used for the centre portion of the study area where suitable habitat was identified. The methods involved searching multiple 2 ha plots for Bilby sign, for 25 minutes. Sign plots were distributed to include all areas of suitable Bilby habitat across the study area. A total of 25 2 ha plots were searched.

All locations of secondary evidence were recorded on GPS enabled devices (Figure 5-3)

4.2.2.8 Analysis of survey completeness

Species accumulation curves were produced on a samples and abundance basis using PRIMER V6 (Clarke & Gorley 2006) to obtain an estimate of survey completeness (i.e. whether the collection adequately represents the vertebrate fauna assemblage of the study area) for systematic methods completed within the study area (overall). All sample types were aggregated per site and no data transformation was undertaken. The maximum permutations were set at 999.

4.2.2.9 SRE invertebrate sampling

Sampling for SRE invertebrates was conducted at all 6 systematic sites (Figure 4-1), including areas identified as suitable habitat for SREs. Sampling comprised the following methods:

- dry pit trapping
- active foraging
- litter/soil sieving
- blowing for mygalomorph spiders.

SRE were collected from dry pitfall traps and other systematic traps during the Detailed survey of the study area.

Active foraging for SRE invertebrate groups (concurrently with active vertebrate fauna searches) comprised inspection of logs, the underside of bark of larger trees and the underside of rocks. Methodical searches were conducted amongst the leaf litter of shade-bearing tall shrubs and trees, including raking of litter.

A standardised approach was undertaken whereby each site (considered suitable SRE habitat) was sampled for 20 minutes, with a total search effort of approximately 1.8 hours (Table 4-3). Trapdoor spider burrows identified during the searches were excavated if they were considered inhabited. Spider burrows were located by visual inspection and blowing, whereby a leaf blower is used to open the lid and expose the burrow. Excavation involved removing soil from around the burrow to carefully expose the burrow chamber and remove the spider.

Combined litter/soil sifts were undertaken at 2 sites, with up to 3 sifts conducted at each site dependent on abundance of leaf litter. In total, 6 sifts were undertaken (Table 4-3). The collection of leaf litter samples was standardised volumetrically by the diameter and height (310 mm x 50 mm = 1.55 L) of the sieves which were completely filled with compressed litter and the upper layers of underlying soil. Samples were sieved through 3 stages of decreasing mesh size over a round tray and invertebrates were picked from the sieves and tray with forceps. These samples particularly targeted small spiders (Araneomorphae), pseudoscorpions, buthid scorpions, millipedes, centipedes (in particular Geophilomorpha and Cryptopidae), smaller species of molluscs (e.g. Pupillidae) and slaters.

SRE potential habitat rating

Fauna habitat mapping was assessed for its potential to support endemic SRE species and communities. Potential SRE habitat was rated as follows:

- High – defined/known areas of habitat that contain elements that often give rise to specialisation or dependency in invertebrate fauna, such as aspect (e.g. south facing slopes, geological features, granite), soil types that retain water (e.g. clay, loam). These habitats may also include habitat isolates which have the capacity to restrict dispersal.
- Low – areas of largely intact native vegetation that occur broadly across the landscape, are less incised and typically link more restricted habitats. This may include land that was cleared but has since been rehabilitated or is in the process of being rehabilitated.

- None – land that has been previously cleared for other uses that no longer contains native vegetation.

SRE status rating

Currently, there is no accepted system to determine the likelihood that a species is an SRE. The WA Museum applies 3 categories: Confirmed, Potential, and Widespread. Confirmed SREs are taxa for which the distribution is known to be less than 10,000 km², the taxonomy is well known, and the group is well represented in collections and/or via comprehensive sampling (WAM 2013). Potential SREs include those taxa for which there is incomplete knowledge of taxonomy or geographic distribution, and the group is not well represented in collections. Phoenix applies 4 categories based on the WA Museum criteria (Table 4-4).

Table 4-4 SRE categories

SRE category	Criteria
Confirmed	Distribution <10,000 km ² . Taxonomy of the group is well known (but not necessarily published); group is well represented in collections, in particular from the region in question; high levels of endemism exist in documented species; inference is often possible from immature specimens.
Likely	Distribution < 10,000 km ² . Taxonomically poorly resolved group but group is generally well represented in collections; unusual morphology for the group (e.g. some form of troglomorphism); often recorded as singletons in survey and few, if any, regional records.
Potential	Distribution <10,000 km ² . Taxonomically poorly resolved group; patchy distribution, often common in certain microhabitats, but no other regional records; congeners (= species in the same genus) both widespread and restricted in distribution.
Widespread	Distribution >10,000 km ² .

SRE taxonomy

Initial higher-level (class, order, family) identifications of specimens are undertaken by Phoenix staff in Phoenix' invertebrate laboratory. Final special designations are allocated using specialist morphological and/or molecular sequencing (Table 4-5).

Where possible identifications are on compared with reference material from the WA Museum and/or taxonomist reference collections.

Table 4-5 Specialist taxonomists

Person	Title	Taxa
Dr Erich S. Volschenk	Taxonomic consultant, Alacran	Scorpiones, Pseudoscorpiones
Dr Simon Judd	Taxonomic consultant	Isopoda
Dr Cathy Carr	Taxonomist	<i>Antichiropus</i> millipedes
Jane McRae	Taxonomist; Bennelongia	Stygofaunal amphipods, copepods, ostracods, oligochaetes, coleoptera, bathynellaceae
Anna Jacks	Invertebrate zoologist, Phoenix	Selenopidae spiders, Chilopoda, Gastropoda, Isopoda, Diplopoda

Sequences were edited and analysed using Genious 2022.2. Sequences for comparison were sourced from GenBank (Benson *et al.* 2012) and Phoenix's DNA database using the megablast search function in Geneious. For each sequence, the most similar 10 matches were retrieved. In cases where the retrieved sequences represented a species more than twice, then the 2 longest sequences were

retained and the shorter conspecific sequences discarded. Where megablast results yielded families differing from the morphological assessment, then additional sequences were obtained from GenBank, representing the morphological taxonomic assessment. If all of the resulting blast sequences represented organisms from a different taxonomic class, sequences were discarded as likely contamination.

SRE specimens collected during the survey have been lodged with the WA Museum.

4.2.3 Likelihood of occurrence assessment

Following the field survey, the likelihood of occurrence for each significant fauna species identified in the desktop review was assessed and assigned to one of 4 ratings:

- recorded – species recorded within the study area by previous or current survey
- likely – study area within current known range of species, suitable habitat within the study area and home range of species intersects study area based on known records
- possible – study area within current known range of species, suitable habitat within the study area and home range of species does not intersect study area based on known records
- unlikely – study area outside current known range of species or no suitable habitat present in study area.

4.2.4 Survey personnel

The personnel involved in the surveys are listed in Table 4-6. All survey work was carried out under relevant licences issued by DBCA under the BC Act (Table 4-6).

Table 4-6 Survey personnel

Name	Permit	Qualifications	Role/s
Simon Pynt	Fauna taking (biological assessment) licence no. BA27000780, TFA2223-0183	BSc Zoology	Project management and logistics, field survey, reporting
Jade Larkman		BSc Environmental Sciences	Field survey, desktop review
Will Purser		MSc Biological Sciences (Zoology)	Field survey, reporting
Patrick Williams		MSc Environmental Sciences	Field survey
Kerryn Fox		MSc Veterinary Science (Wildlife Health and Conservation)	Reporting
John Scanlon		BSc Hons (Zoology), PhD (Zoology)	Reporting
Brigitte Kovar		MSc Geographical Information Systems (GIS)	GIS



Port Hedland Green Steel Pty Ltd
 Port Hedland Green Steel Project

Project No	1557
Date	5/02/2024
Drawn by	JL
Map author	SP

0 1 2
 Kilometers

1:56,400 (at A4) GDA 1994 MGA Zone 50

- Study area
- Indicative disturbance footprint
- Whim Creek Road
- Fauna site type**
- Basic
- Detailed
- Opportunistic sighting
- Targeted

Figure 4-1
Terrestrial fauna survey sites

PHOENIX
 ENVIRONMENTAL SCIENCES

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Port Hedland Green Steel Pty Ltd
 Port Hedland Green Steel Project

Project No	1557
Date	5/02/2024
Drawn by	JL
Map author	SP

0 1 2
 Kilometers

1:54,300 (at A4) GDA 1994 MGA Zone 50

- Study area
- Indicative disturbance footprint
- Whim Creek Road
- 2 ha search plots
- Transect search tracks
- Plot search tracks

Figure 4-2
Bilby plot and transect search locations



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5 RESULTS

5.1 DESKTOP REVIEW

5.1.1 Vertebrate fauna

The desktop review identified records of 372 vertebrate taxa within the desktop search extent. The list comprised 11 frogs, 93 reptiles (including 2 introduced species), 222 birds (including 2 naturalised species) and 46 mammals (including 11 introduced species) (Table 5-1; Appendix 3).

Phoenix previously carried out a Detailed terrestrial fauna and targeted Bilby survey in the Boodarie area (Phoenix 2022b); the Detailed study area lies adjacent to the Project's eastern corridor, and the targeted Bilby survey area intersects the southern half of the study area (Figure 1-1). A total of 82 species were recorded during the Detailed fauna survey, comprising 6 amphibians, 36 reptiles, 25 birds and 15 mammals (including 4 introduced species).

Table 5-1 Summary of terrestrial fauna desktop results

Class	Introduced	Native	Total
Amphibians	0	11	11
Reptiles	2	91	93
Birds	2	220	222
Mammals	11	35	46
Total	15	357	372

EPBC Protected Matters Search (DCCEEW 2023a) does not return species locations and includes instances where suitable habitat may occur but the species has not necessarily been observed (indicated with an asterisk in Table 5-2).

Seventy-one significant vertebrate species were identified in the desktop review, comprising 18 species listed as Threatened, Conservation Dependent or SP under the EPBC Act and/or BC Act, 55 avifauna species listed as Migratory under the EPBC Act and BC Act (7 of these also Threatened), and a further 6 species are listed as Priority by DBCA (including one locally extinct species, and one also Migratory) (Table 5-2).

Two significant vertebrate species have previously been recorded within the study area (Figure 5-1):

- Bilby, *Macrotis lagotis* (VU), recorded by DBCA (2022b); one record in the west of the study area from 1899. Over 100 records of secondary evidence were recorded by Phoenix (2022b) within and nearby the study area.
- Brush-tailed Mulgara, *Dasyercus blythi* (P4), recorded by DBCA (2022b); 3 records in the study area between 2008 and 2012. An additional 269 records occur in the wider desktop review area from 1982 to 2019.

An additional 31 significant species have been recorded within 5 km of the study area, comprising one reptile, 28 birds and 2 mammals (highlighted in grey in Table 5-2).

Table 5-2 Significant vertebrate fauna identified in the desktop review

Species	Status	Proximity to study area	Habitat
Reptiles (3)			
<i>Ctenotus angusticeps</i> Airlie Island Ctenotus	P3 (DBCA list)	2.7 km NNE	Associated with samphire shrublands and saltmarshes (Maryan <i>et al.</i> 2013). Has been reported using crab holes for avoiding humans and for shelter at night.
<i>Liasis olivaceus barroni</i> Pilbara Olive Python	VU (EPBC & BC Acts)	26.4 km SSE	Commonly found in rocky areas in association with watercourses and pools and often associated with areas of permanent pooling water near rocky habitats, such as gullies, gorges and rocky ranges or boulder sites. It has also been recorded in riparian vegetation along major rivers (Barker & Barker 1994; Pearson 2003).
<i>Liopholis kintorei</i> Great Desert Skink	VU (EPBC Act; BC Act)	*	The Great Desert Skink is a large social lizard restricted to central desert regions, occupying complex burrow systems. Habitats range from hard spinifex gravelly plains and sandplains to semi-saline soft spinifex sandplains, and even non-spinifex mulga woodland (Indigenous Desert Alliance 2022).
Non-migratory birds (5)			
<i>Falco hypoleucos</i> Grey Falcon	VU (EPBC & BC Act)	6.7 km SSW	The Grey Falcon is a widespread but rare species inhabiting much of the hot, semi-arid and arid interior of Australia. Occurs in a wide variety of arid habitats including open woodlands and open <i>Acacia</i> shrubland, hummock and tussock grasslands and low shrublands, particularly where crossed by tree-lined water courses (Schoenjahn <i>et al.</i> 2019; Threatened Species Scientific Committee 2020).
<i>Falco peregrinus</i> Peregrine Falcon	OS (BC Act)	1.4 km SW	Preferred habitat includes cliffs and wooded watercourses. Nesting occurs mainly on cliff ledges, granite outcrops, quarries and in trees with old raven or Wedge-tailed Eagle nests (Johnstone & Storr 1998).
<i>Pezoporus occidentalis</i> Night Parrot	EN/CR (EPBC Act; BC Act)	*	Rare and cryptic species appearing to favour areas of dense vegetation comprising old-growth (often > 50 years unburnt) spinifex (<i>Triodia</i> spp.) especially hummocks that are ring-forming for roosting and nesting. Such areas may also be associated with dense chenopod shrubs. It is thought that spinifex hummocks that are <40-50 cm in height are not likely to provide adequate shelter for roosting and nesting (DPaW 2017).
<i>Rostratula australis</i> Australian Painted Snipe	EN (EPBC & BC Acts)	*	Generally, inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans (DCCEEW 2023b).
<i>Sternula nereis nereis</i> Fairy Tern	VU (EPBC & BC Acts)	6.7 km NNE	In WA, the species is present along the entire coastline, with rare records from the far north (Kimberley) and off the Nullarbor Plain. It nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation (DCCEEW 2023b).

Species	Status	Proximity to study area	Habitat
Migratory birds (55)			
<i>Actitis hypoleucos</i> Common Sandpiper	Mig. (EPBC & BC Acts)	2.2 km E	Found across a wide range of wetlands: small ponds, large inlets and mudflats where they forage on the shore usually close to the vegetation (DCCEEW 2023b). Prefers rocky creeks, channels, dams, and mangrove-lined inlets (Geering <i>et al.</i> 2007).
<i>Anous stolidus</i> Common Noddy	Mig. (EPBC & BC Acts)	*	In Australia the species, occurs mainly in ocean off the Queensland coast, but the species also occurs off the north-west and central WA coast. During the breeding season, the Common Noddy usually occurs on or near islands, on rocky islets and stacks with precipitous cliffs, or on shoals or cays of coral or sand (DCCEEW 2023b).
<i>Apus pacificus</i> Fork-tailed Swift	Mig. (EPBC & BC Acts)	9.1 km NE	Widespread Migratory species that does not breed in Australia, typically present from October to April. It occurs in a wide range of dry or open habitats across most of WA and is uncommon to moderately common in the north-west (DCCEEW 2023b). Forages and roosts in flight so not limited by terrestrial habitat; flocks most often seen ahead of cyclones or during thunderstorms (Johnstone <i>et al.</i> 2013).
<i>Ardeanna pacifica</i> Wedge-tailed Shearwater	Mig. (EPBC & BC Acts)	*	The Wedge-tailed Shearwater is a pelagic, marine bird known from tropical and subtropical waters. It breeds on offshore islands of the east and west coasts of Australia in summer (del Hoyo <i>et al.</i> 1996). Common breeding visitor to Pilbara waters and islands (Johnstone <i>et al.</i> 2013).
<i>Arenaria interpres</i> Ruddy Turnstone	Mig. (EPBC & BC Acts)	2.3 km E	Non-breeding migrant, common on Pilbara coast mainly from late August – April, but may be present year-round as juvenile birds overwinter here (Johnstone <i>et al.</i> 2013). Usually found on ocean coasts with exposed rock, stones, or shell beaches (Morcombe 2004).
<i>Calidris acuminata</i> Sharp-tailed Sandpiper	Mig. (EPBC & BC Acts)	2.2 km E	The Sharp-tailed Sandpiper is one of the most common Australian shorebirds. It occurs on saline wetlands such as coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands (DCCEEW 2023b).
<i>Calidris alba</i> Sanderling	Mig. (EPBC & BC Acts)	3.4 km SSW	Found mostly on open sandy beaches exposed to open sea swell, and also on exposed sandbars and spits, shingle banks and beaches that may contain wave-washed rocky outcrops (DCCEEW 2023b).
<i>Calidris canutus</i> Red Knot	EN/Mig. (EPBC Act; BC Act)	3.4 km SSW	Widespread across coastal Australia often found in intertidal mudflats, sandbars, estuaries, harbours, lagoons, beaches, and reefs (IUCN 2019).
<i>Calidris ferruginea</i> Curlew Sandpiper	CR/Mig. (EPBC Act; BC Act)	2.3 km E	In Australia the species is strictly migratory and occurs in large numbers. Mainly occur on intertidal mudflats in sheltered coastal areas, also around non-tidal swamps, lakes, and lagoons near the coast. Less often inland around ephemeral and permanent lakes and waterholes, usually with bare edges of mud or sand (DCCEEW 2023b).

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Species	Status	Proximity to study area	Habitat
<i>Calidris melanotos</i> Pectoral Sandpiper	Mig. (EPBC & BC Acts)	8.9 km ENE	The Pectoral Sandpiper is an uncommon solitary shorebird found in wetlands, inland as well as on the coast. Occurs on shallow fresh to saline wetlands, usually coastal or near-coastal but occasionally further inland. Prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation (DCCEE 2023b).
<i>Calidris ruficollis</i> Red-necked Stint	Mig. (EPBC & BC Acts)	2.1 km NNW	Mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores (DCCEE 2023b).
<i>Calidris subminuta</i> Long-toed Stint	Mig. (EPBC & BC Acts)	2.3 km E	Occurs in a variety of terrestrial wetlands, preferring shallow freshwater or brackish wetlands including lakes, swamps, river floodplains, streams, lagoons and sewage ponds (DCCEE 2023b).
<i>Calidris tenuirostris</i> Great Knot	CR/Mig. (EPBC Act; BC Act)	3.4 km SSW	Rarely found inland and are mainly found in coastal areas, intertidal mudflats, estuaries, inlets, harbours, lagoons, saltworks and mangrove swamps (DCCEE 2023b).
<i>Calonectris leucomelas</i> Streaked Shearwater	Mig. (EPBC & BC Acts)	*	A marine species, occurs frequently in northern Australia, with records from central WA, around the north coast, and south to central New South Wales (Marchant & Higgins 1990).
<i>Charadrius leschenaultii</i> Greater Sand Plover	VU/Mig. (EPBC Act; BC Act)	3.4 km SSW	Almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur on sheltered sandy, shelly, or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons, inshore reefs, rock platforms, small rocky islands or sand cays on coral reefs (DCCEE 2023b).
<i>Charadrius mongolus</i> Lesser Sand Plover	EN/Mig. (EPBC & BC Acts)	3.4 km SSW	Found in coastal littoral and estuarine environments, it inhabits intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops (DCCEE 2023b).
<i>Charadrius veredus</i> Oriental Plover	Mig. (EPBC & BC Acts)	6.7 km NNE	Inhabits coastal habitats such as estuarine mudflats and sandbanks, sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further inland where they inhabit flat, open, semi-arid or arid grasslands (DCCEE 2023b).
<i>Chlidonias leucopterus</i> White-winged Black Tern	Mig. (EPBC & BC Acts)	2.2 km E	In Australia, the species mostly inhabits fresh, brackish or saline, and coastal or subcoastal wetlands. They also inhabit tidal wetlands, such as harbours, bays, estuaries and lagoons, and their associated tidal sandflats and mudflats (DCCEE 2023b).
<i>Cuculus optatus</i> Oriental Cuckoo	Mig. (EPBC & BC Acts)	*	This species has an extremely large range that includes parts of Europe, Asia and northern Australia (IUCN 2019). Typically occurs on margins of tropical forest habitats. Occurs as a rare non-breeding visitor to mangrove habitat on the Pilbara coast (Johnstone <i>et al.</i> 2013).
<i>Fregata ariel</i> Lesser Frigatebird	Mig. (EPBC & BC Acts)	6.4 km NNE	A pelagic bird, this species is usually found far from land over water (Marchant & Higgins 1990).

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Species	Status	Proximity to study area	Habitat
<i>Fregata minor</i> Great Frigatebird	Mig. (EPBC & BC Acts)	*	Occurs in tropical and subtropical seas, coasts and islands, and is a regular visitor to the west Australian coast (Pizzey & Knight 2012).
<i>Gallinago stenura</i> Pin-tailed Snipe	Mig. (EPBC & BC Acts)	4.7 km ENE	Occurs at edges of freshwaters swamp and ponds, and is also found on more open wetlands such as claypans (DCCEEW 2023b).
<i>Gelochelidon nilotica</i> Gull-billed Tern	Mig. (BC Act)	1.1 km SSE	Occur in freshwater swamps, salt lakes, beaches, mudflats and sewage farms, and are rarely found over the ocean (DCCEEW 2023b).
<i>Glareola maldivarum</i> Oriental Pratincole	Mig. (EPBC & BC Acts)	19 m ESE	In Australia, it inhabits open plains, floodplains and grasslands, often with extensive bare areas (DCCEEW 2023b).
<i>Hirundo rustica</i> Barn Swallow	Mig. (EPBC & BC Acts)	2.2 km E	Occurs in open country in coastal lowlands, an uncommon visitor to Australia (DCCEEW 2023b).
<i>Hydroprogne caspia</i> Caspian Tern	Mig. (EPBC & BC Acts)	2.3 km E	Found in sheltered coastal habitats and near-coastal terrestrial wetlands (DCCEEW 2023b).
<i>Limicola faicinelus</i> Broad-billed Sandpiper	Mig. (BC Act)	9.8 km NE	Occurs in sheltered coastal habitats such as saltmarshes, lagoons, sewage farms and mudflats (DCCEEW 2023b).
<i>Limnodromus semipalmatus</i> Asian Dowitcher	Mig. (EPBC & BC Acts)	7.5 km NE	Occurs in sheltered coastal environments, such as lagoons and estuaries, and exposed mudflats. The Port Hedland Saltworks IBA provides crucial habitat for this species (DCCEEW 2023b).
<i>Limosa lapponica</i> Bar-tailed Godwit	Mig. (EPBC & BC Acts)	3.3 km E	Found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays (DCCEEW 2023b).
<i>Limosa limosa</i> Black-tailed Godwit	Mig. (BC Act)	12.8 km ENE	Occurs in coastal habitats, such as sheltered bays, estuaries, lagoons, mudflats and sandflats, and is also found in near-coastal wetlands (DCCEEW 2023b).
<i>Macronectes giganteus</i> Southern Giant Petrel	EN/Mig. (EPBC Act; BC Act)	*	The Southern Giant Petrel occurs in Antarctic to subtropical waters and breeds on 6 subantarctic and Antarctic islands in Australian territory; Macquarie Island, Heard Island and McDonald Island in the Southern Ocean, and Giganteus Island, Hawker Island, and Frazier Island in the Australian Antarctic Territories (DCCEEW 2023b).
<i>Motacilla cinerea</i> Grey Wagtail	Mig. (EPBC & BC Acts)	*	Vagrant visitor to Australia that inhabits fast-flowing streams and rivers (IUCN 2019).
<i>Motacilla flava</i> Yellow Wagtail	Mig. (EPBC & BC Acts)	7.9 km NNE	Uncommon but regular visitor to Pilbara in small numbers; inhabits a range of damp or wet habitats with low vegetation including damp meadows, marshes, waterside pastures, and sewage farms (IUCN 2019; Johnstone <i>et al.</i> 2013).

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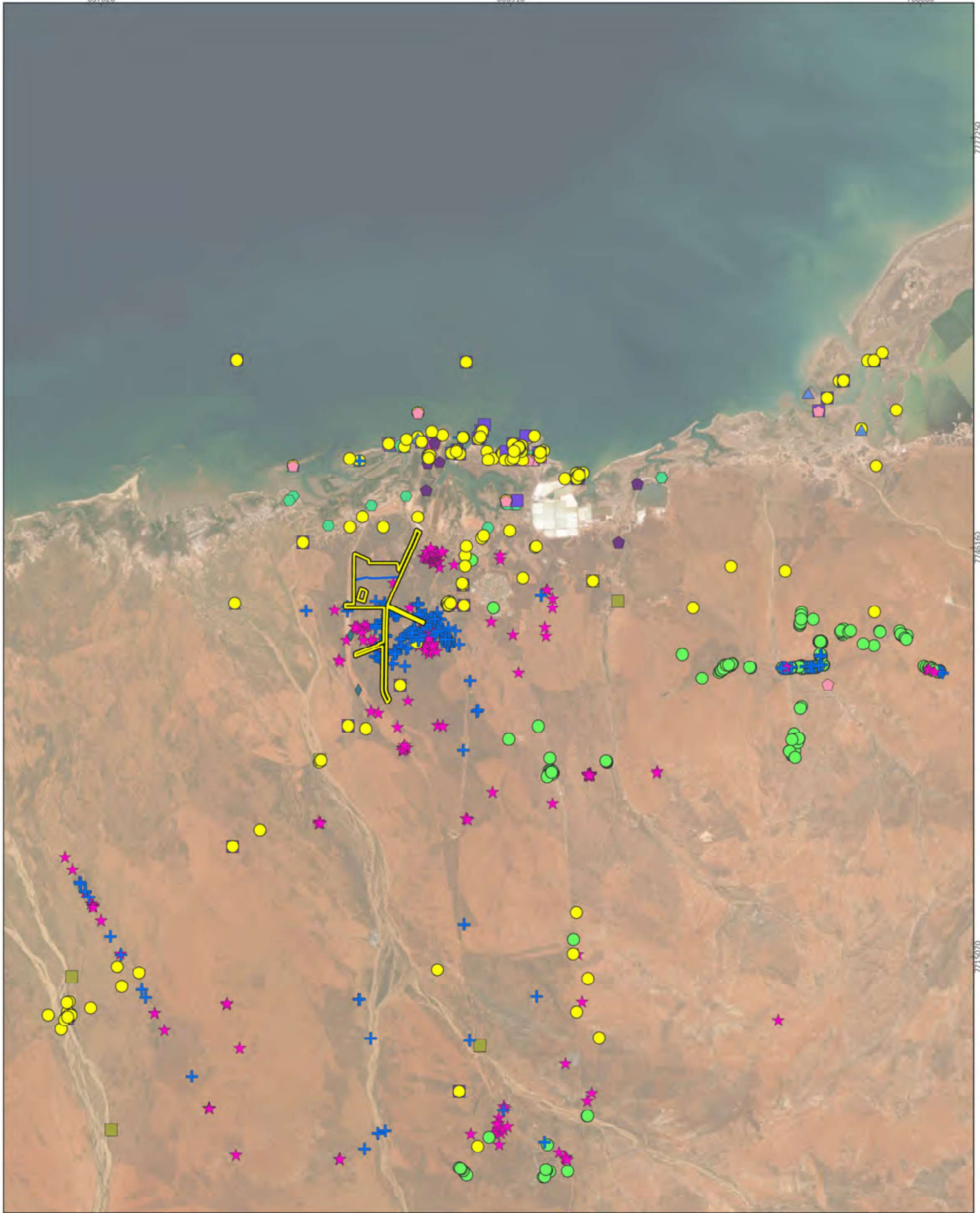
Species	Status	Proximity to study area	Habitat
<i>Numenius madagascariensis</i> Eastern Curlew	CR/Mig. (EPBC Act; BC Act)	3.3 km E	Occurs mainly on intertidal mudflats, on exposed seagrass beds or mudflats (Geering <i>et al.</i> 2007). Also utilises sand spits of estuaries, mangroves, lake shores and ocean beaches.
<i>Numenius minutus</i> Little Curlew	Mig. (EPBC & BC Acts)	2.3 km E	Found on short, dry grasslands and dry grass edges of freshwater inlands (Geering <i>et al.</i> 2007).
<i>Numenius phaeopus</i> Whimbrel	Mig. (EPBC & BC Acts)	3.3 km E	Forages on intertidal mudflats, estuaries and lagoons, occasionally foraging on beaches and on rock platforms (DCCEEW 2023b).
<i>Oceanites oceanicus</i> Wilson's Storm Petrel	Mig. (EPBC & BC Acts)	7.9 km NNE	Only occurs at sea, mainly found in tropical and subtropical waters (DCCEEW 2023b).
<i>Onychoprion anaethetus</i> Bridled Tern	Mig. (EPBC & BC Acts)	6.8 km N	Occurs in tropical and subtropical seas, rarely found in inshore continental waters (DCCEEW 2023b).
<i>Pandion cristatus</i> Osprey	Mig. (EPBC & BC Acts)	1.0 km NNE	Occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. Occur in a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes (DCCEEW 2023b).
<i>Phaethon lepturus</i> White-tailed Tropicbird	Mig. (EPBC & BC Acts)	*	Found across pelagic waters and the coasts of tropical and subtropical seas (IUCN 2019). Occurs only as a rare visitor to Pilbara coastal waters (Johnstone <i>et al.</i> 2013).
<i>Phalaropus lobatus</i> Red-necked Phalarope	Mig. (EPBC & BC Acts)	34.2 km E	In Australia, this species occurs at lakes and swamps, both inland and coastal (DCCEEW 2023b).
<i>Philomachus pugnax</i> Ruff	Mig. (EPBC & BC Acts)	3.4 km SSW	In Australia the Ruff is found on generally fresh, brackish of saline wetlands with exposed mudflats at the edges (DCCEEW 2023b).
<i>Plegadis falcinellus</i> Glossy Ibis	Mig. (EPBC & BC Acts)	28.5 km NE	Predominantly inhabits terrestrial wetlands, foraging in shallow water over soft substrate or on grassy or muddy verges of wetlands providing a variety of water depths. Inland, freshwater wetlands are preferred, especially permanent or ephemeral waterbodies on floodplains and shallow swamps with abundant aquatic flora (Johnstone <i>et al.</i> 2013; Marchant & Higgins 1990).
<i>Pluvialis fulva</i> Pacific Golden Plover	Mig. (EPBC & BC Acts)	8.4 km W	In Australia this species usually inhabits coastal habitats, on beaches, mudflats and sandflats (DCCEEW 2023b).
<i>Pluvialis squatarola</i> Grey Plover	Mig. (EPBC & BC Acts)	3.3 km E	Occurs on intertidal mudflats, saltmarshes, sandflats and beaches of oceanic coastlines, bays and estuaries. During migration it may also be found inland on lakes, pools or grasslands (del Hoyo <i>et al.</i> 2014; IUCN 2019).

Species	Status	Proximity to study area	Habitat
<i>Sterna dougallii</i> Roseate Tern	Mig. (EPBC & BC Acts)	9 km NE	This medium size tern breeds on several Australian Islands, including in WA. Unlike many species of tern, they don't occur inland, seen over coastal and offshore blue water, coral reefs, lagoons and islands. Pilbara records include passage migrants, breeding visitors and some breeding residents (Johnstone <i>et al.</i> 2013; Johnstone & Storr 1998).
<i>Sterna hirundo</i> Common Tern	Mig. (EPBC & BC Acts)	6.4 km NNE	In Australia, they occur in near-coastal waters, both on ocean beaches, platforms and headlands and in sheltered waters, such as bays, harbours and estuaries with muddy, sandy or rocky shores (DCCEEW 2023b).
<i>Sterna albifrons</i> Little Tern	Mig. (EPBC & BC Acts)	6.4 km N	In Australia, they inhabit sheltered coastal environments, including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and inlets (DCCEEW 2023b).
<i>Sula leucogaster</i> Brown Booby	Mig. (EPBC & BC Acts)	13.3 km NNE	Occurs in tropical waters, including coastal waters, harbour and estuaries, but is rarely seen flying over land (DCCEEW 2023b).
<i>Thalasseus bergii</i> Crested Tern	Mig. (BC Act)	3.3 km E	Inhabits tropical and subtropical coastlines. Found along the entire Australian coast (IUCN 2019).
<i>Tringa brevipes</i> Grey-tailed Tattler	Mig. (EPBC & BC Acts), P4 (DBCA list)	3.3 km E	Occurs on sheltered coasts with reefs and rock platforms or mudflats, and can also be found on reefs or platforms that are exposed at low tide (DCCEEW 2023b).
<i>Tringa glareola</i> Wood Sandpiper	Mig. (EPBC & BC Acts)	2.2 km E	Prefers the shallows of wooded lakes or swamps with trees. It also inhabits freshwater swamps, lakes, flooded pastures and occasionally, mangroves (Morcombe 2004).
<i>Tringa nebularia</i> Common Greenshank	Mig. (EPBC & BC Acts)	2.3 km E	Mostly on the coast but sometimes inland; uses permanent and ephemeral terrestrial wetlands, including rivers and creeks (DCCEEW 2023b).
<i>Tringa stagnatilis</i> Marsh Sandpiper	Mig. (EPBC & BC Acts)	6.4 km NNE	Inhabits coastal and inland wetlands, estuarine and mangrove mudflats, beaches, swamps, lakes and several other types of wetlands (Morcombe 2004).
<i>Xenus cinereus</i> Terek Sandpiper	Mig. (EPBC & BC Acts)	3.4 km SSW	Inhabits coastal mudflats, sheltered estuaries and lagoons. In Australia, it has a primarily coastal distribution, with occasional records inland (Morcombe 2004).
Mammals (8)			
<i>Dasyercus blythi</i> Brush-tailed Mulgara	P4 (DBCA list)	Inside	Occurs in spinifex grasslands throughout much of the arid zone, digging their burrows in the flats between low sand dunes (Van Dyck & Strahan 2008).

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Species	Status	Proximity to study area	Habitat
<i>Dasyurus hallucatus</i> Northern Quoll	EN (EPBC & BC Acts)	4.0 km ENE	Most commonly found in rocky areas, with rugged rocky habitats such as gorges, gullies, escarpments, boulder fields and small caves critical for denning and shelter (DCCEEW 2023b). Drainage lines connecting rocky areas represents dispersal and foraging habitat for the species.
<i>Lagostraphus fasciatus</i> Banded Hare-wallaby (mainland)	P4 (DBCA list)	<~50 km	Extinct on the mainland – last confirmed sighting was in 1906. Natural (wild) populations are restricted to Bernier and Dorre Islands in Shark Bay, WA (Morris & Burbidge 2008).
<i>Macroderma gigas</i> Ghost Bat	VU (EPBC & BC Acts)	25.0 km SSE	Roost sites include caves, rock crevices and disused mine adits. Foraging habitat in areas surrounding roost sites, mostly woodlands and watercourses (Bullen 2021).
<i>Macrotis lagotis</i> Greater Bilby	VU (EPBC & BC Acts)	Inside	Bilby prefers hummock grassland in plains and alluvial areas, open tussock grassland on uplands and hills, mulga woodland/shrubland on ridges and rises (DCCEEW 2023b), loamy or sandy soils associated with palaeodrainage lines and perched drainage lines, dune fields and sandplains; recently burnt habitat (1-3 years) is used frequently (DBCA 2018).
<i>Mormopterus cobourgiatus</i> North-western Free-tailed Bat	P1 (DBCA list)	3.1 km NNE	Occurs in mangrove habitats in WA, where they roost in tree hollows (Reardon 2014).
<i>Pseudomys chapmani</i> Western Pebble-mound Mouse	P4 (DBCA list)	27.7 km E	Restricted to non-coastal, central and eastern parts of the Pilbara where preferred habitat comprises gentle, sparsely vegetated slopes of rocky ranges with surface fragments of abundant gravel and pebbles (Morris & Burbidge 2008).
<i>Rhinonicteris aurantia</i> (Pilbara) Pilbara Leaf-nosed Bat	VU (EPBC & BC Acts)	27.4 km E	Normally restricted to caves and mine adits (horizontal shafts) with stable, warm and humid microclimates (Van Dyck & Strahan 2008), but temporary roosts such as crevices and tree hollows may be used in warm and humid conditions, allowing greater dispersal during the wet season.

* EPBC Protected Matters Search does not return species location and includes instances where suitable habitat may occur but the species has not necessarily been observed. Rows highlighted in grey represent significant vertebrate species recorded within 5 km of the study area.



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Project No 1557
 Date 29/09/2023
 Drawn by FK
 Map author SP

0 7.5 15
 Kilometers

1:371,900 (at A4) GDA 1994 MGA Zone 50

- Study area
- Whim Creek Road
- Status
- ▲ CR/Mig./CR (EPBC Act; BC Act)
- EN (EPBC & BC Acts)
- ▲ EN/CR (EPBC Act; BC Act)
- EN/Mig. (EPBC & BC Acts)
- ◆ EN/Mig./EN (EPBC Act; BC Act)
- EN/Mig./Mig. (EPBC Act; BC Act)
- ◆ Mar/Mig. (EPBC Act; BC Act)
- Mig. (BC Act)
- Mig. (EPBC & BC Acts)
- ◆ Mig. EPBC and BC Acts; P4 DBCA list
- ◆ OS (BC Act)
- P1 (DBCA list)
- P3 (DBCA list)
- ★ P4 (DBCA list)
- VU (BC Act)
- + VU (EPBC & BC Acts)
- ◆ VU/Mig./VU (EPBC Act; BC Act)

Figure 5-1
Desktop records of significant vertebrate fauna



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5.1.2 SRE invertebrate fauna

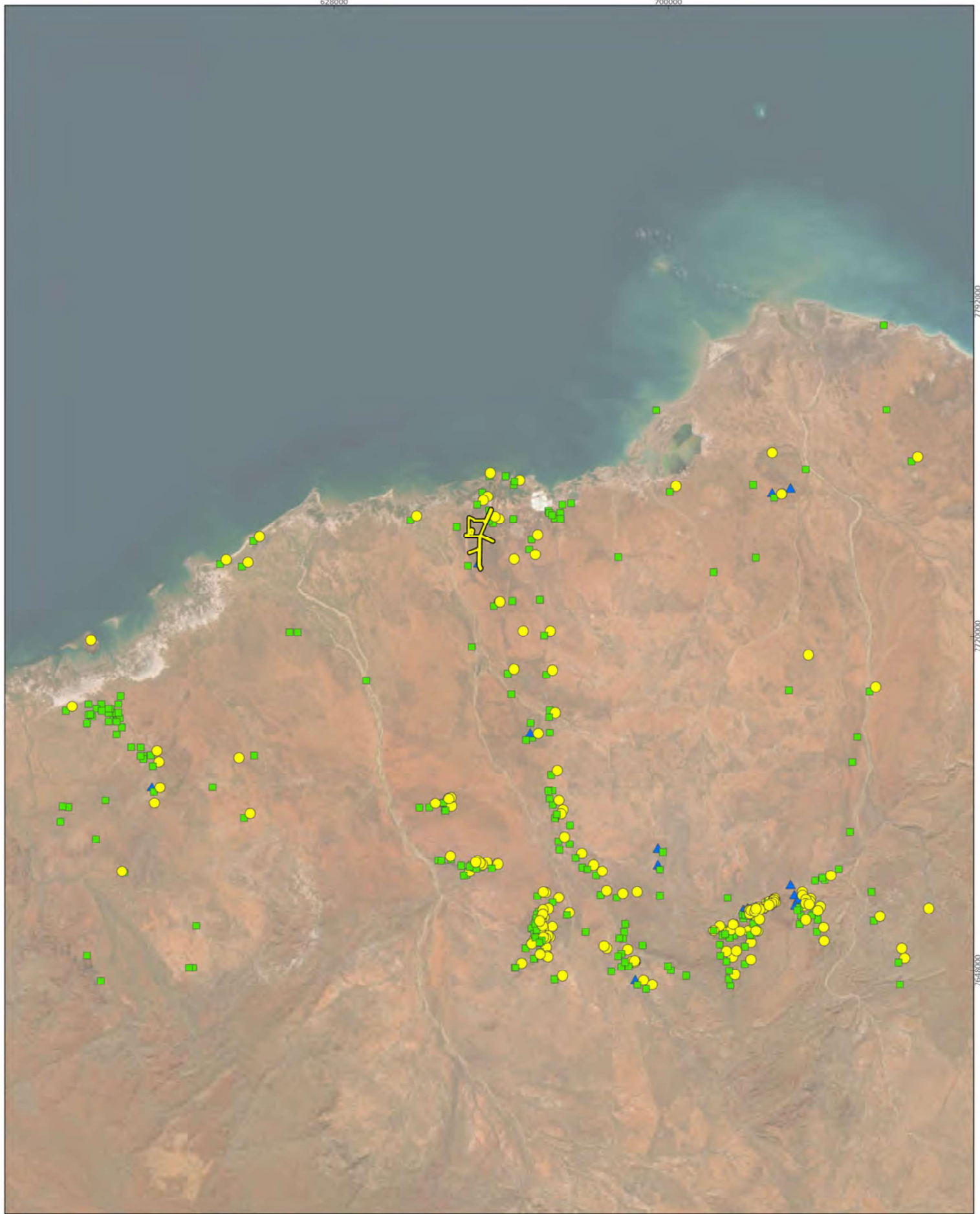
The desktop review identified records of 7 confirmed SRE taxa and 78 potential SRE taxa from within the SRE desktop search area (Table 5-3; Figure 5-2; Appendix 4). A further 50 taxa of uncertain SRE status and 70 non-SRE (i.e., Widespread) taxa from SRE groups were identified. The desktop records indicate one SRE-group species of uncertain status (*Rhagada* 'sp. indet', one record) has been recorded within the study area (Figure 5-2). A further 23 taxa have been recorded within 5 km of the study area, comprising 5 mygalomorph spiders (family Anamididae), 5 pseudoscorpions (Chthoniidae, Olpiidae), 5 scorpions (Buthidae, Urodacidae), 2 isopods (Armadillidae) and 6 land snails (Pupillidae), of which 13 are Widespread, 7 are uncertain and 3 are potential SRE taxa.

Scorpions were the most commonly recorded SRE group within the 100 km buffered desktop search area (20.5% of the total number of taxa), followed by land snails (19.5%) and pseudoscorpions (19.0%). Centipedes and harvestmen spiders were poorly represented with only 4 and 2 taxa identified respectively, none of which were confirmed or potential SREs.

Of the 85 taxa confirmed or potential SRE taxa, 13 are named species. These comprise 5 millipedes, 3 land snails, 2 mygalomorph spiders, 1 isopod, 1 pseudoscorpion and 1 selenopid spider. The remaining 72 comprise taxa named only to morphospecies codes as applied by the WA Museum or are not identified to confirmed species level (i.e. "sp." or "cf."). The majority of taxa records of uncertain SRE status are unidentifiable ("sp. indet.", i.e. female or juvenile specimens) or could not be identified to species or morphospecies and may represent new species or other species listed in the same genus where records exist (Table 5-3).

Table 5-3 Summary of SRE taxa identified in the desktop review

Group	SRE Status				Total
	Confirmed	Potential	Uncertain	Not SRE	
Centipedes	0	0	3	1	4
Harvestmen spiders	0	0	2	0	2
Isopods	0	7	5	6	18
Land snails	0	11	5	24	40
Millipedes	3	7	5	3	18
Mygalomorph spiders	2	18	10	8	38
Pseudoscorpions	1	16	16	6	39
Scorpions	0	18	3	21	42
Selenopid spiders	1	1	1	1	4
Total	7	78	50	70	205



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Project No	1557
Date	29/09/2023
Drawn by	FK
Map author	SP

0 20 40
 Kilometers

1:1,054,000 (at A4) GDA 1994 MGA Zone 50

- Study area
- SRE status
- Potential
- ▲ Confirmed
- Uncertain

Figure 5-2
 Desktop records of SRE invertebrates



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5.2 FIELD SURVEY

5.2.1 Vertebrate fauna

5.2.1.1 Habitats

Three broad fauna habitat types were identified in the study area during the survey. These comprise (in order of extent): sandplains, open woodlands and drainage lines (Table 5-4; Figure 5-3). The study area also contains areas that are mapped as cleared/disturbed; these areas are largely devoid of native vegetation and predominantly comprise roads and unsealed access tracks).


Sandplains cover most of the study area (1,411.5 ha; 95.6%) and are characterised by red-orange sandy soils on a gently undulating plain. The dominant vegetation complexes comprise spinifex hummock grasslands and low *Acacia stellaticeps* shrublands. At the low points of the undulating plain, there are shallower sandy soils and small isolated clay pans (<10 m²) occur that support shallow temporary water pools, immediately after rain. The surrounding vegetation surrounding the low points are typically dominated by small (stunted) spinifex hummock grasslands, often without a supporting shrub layer. In contrast to this, at local high points of the undulating plain, sandy soils are deeper and support taller shrublands usually dominated by *Acacia tumida pilbarensis* over dense-low *Acacia stellaticeps*, isolated to scattered *Acacia inaequilatera* and *Grevillea wickhamii* over spinifex hummock grass. Isolated *Owenia reticulata* trees (pundul/pundle, native walnut) also occur in this habitat.

Open woodlands comprise only 14.4 ha (1.0%) of the study area, occurring at 2 discrete locations within the study area. The majority of open woodlands habitat (13.4 ha) is situated in the east, intersecting the eastern boundary of the study area (approximately 500 m south of the old Whim Creek Road; Figure 5-3). The remaining 0.9 ha of open woodlands is situated near the western boundary, approximately 250 m north of the old Whim Creek Road (Figure 5-3). Open woodlands are characterised by the presence of low to moderately dense, evenly distributed *Eucalyptus leucophloia* trees. These are set over a sparse to scattered layer of stage 2 and 3 spinifex hummocks, native tussock, and invasive buffel grasses. The soil is a red-orange sandy-clay, featuring an almost flat surface layer of shallow clay, indicative of seasonal or sporadic inundation. At the eastern extent of the study area the open woodland habitat continues eastward, beyond the study area boundary, narrowing into diffuse drainages heading east and northeast.


The linear infrastructure corridor in the north-east intersects a small section of drainage line habitat (8.3 ha; 0.6%). This area comprises open to scattered low *Acacia stellaticeps* shrubland over small stage 3 and 4 spinifex hummock grasses. The small area comprising drainage line habitat within the study area is a Heritage protected area due to the presence of shell middens. As a result of its existing Heritage status and small extent, no fauna sampling was conducted in this area and it is only considered in brief.

A total of 42.1 ha (2.8%) of the study area has been cleared/disturbed and is largely devoid of native vegetation.

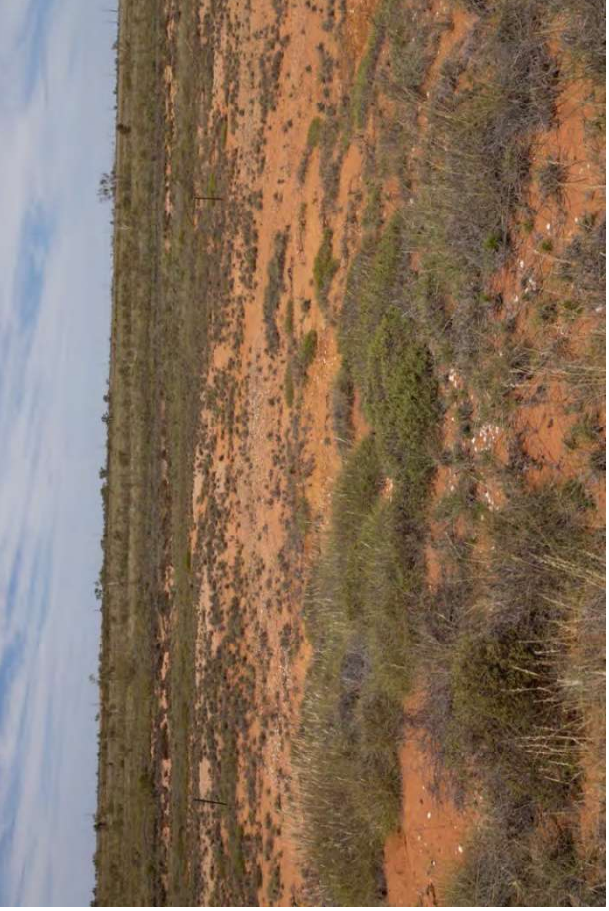
Table 5-4 Extent and description of each fauna habitat in the study area

Habitat type	Site/s	Description	Extent and % of study area	Representative photos
Sandplains	BP025, BT004, BT006, BP021, BP023, BP024, BP022, BT007, BIE001, BIE003, BIE004, Opp013, BIE002, Opp001, Opp008, Opp002, BT003, Opp005, BP004, BIE007, Opp014, Opp006, BP005, Opp003, Opp010, Opp009, BP006, BP003, BIE010, BIE009, BT002, BP002, BP001, BP015, Opp004, Opp007, BP016, Opp015, BT001, Opp016, BP018, BP007, BP008, BP009, BP011, BP013, BP020	Mosaic of spinifex hummock grasslands and low <i>Acacia stellaticeps</i> shrublands on an undulating plain. Isolated <i>Owenia reticulata</i> trees over mixed <i>Acacia stellaticeps</i> dominant shrublands (<i>A. tumida</i> and <i>A. inaequilatera</i> scattered to widely scattered) over stage 2 to 5 spinifex hummock grasslands on red-orange sandy soils.	1,406.9 ha (95.6)	

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Habitat type	Site/s	Description	Extent and % of study area	Representative photos
Open woodlands	BIE006, BIE005, BIE008, BP017, BP019, BP014	<p>Shallow flat depression relative to surrounding sandplain. Open low to mid <i>Eucalyptus</i> woodland over evenly scattered, open tussock grasses (native and buffel) with spinifex hummocks variably present. Predominantly sandy soil with a shallow sandy-clay crust.</p> <p>Surrounded by low sandy rise with dense mature spinifex hummocks and mixed <i>Acacia</i> dominant shrubs including <i>A. stellaticeps</i>, <i>A. tumida pilbarensis</i> and isolated <i>A. inaequilatera</i>. Higher percentage cover of leaf litter than the surrounding areas, forming transported clumps.</p>	15.4 ha (0.9)	

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Habitat type	Site/s	Description	Extent and % of study area	Representative photos
Drainage line	BIE011	Small section of the Foreshore flats with intertidal water flow, predominantly dry. Heritage protected area due to incidence of shell middens. Low <i>Acacia stellaticeps</i> shrubland with widely scattered <i>Acacia tumida pilbarensis</i> over stage 3 and 4 spinifex hummock grasses on red-orange to orange sandplain.	8.9 ha (0.6)	
Cleared/disturbed	Opp011	Cleared areas with infrastructure and roads.	45.1 ha (2.9)	



Port Hedland Green Steel Pty Ltd
Port Hedland Green Steel Project

Project No 1557
 Date 5/02/2024
 Drawn by JL
 Map author SP

0 1 2
 Kilometers

1:56,400 (at A4) GDA 1994 MGA Zone 50

- Study area
- Indicative disturbance footprint
- Whim Creek Road
- Habitat**
- Cleared/disturbed
- Disturbed infrastructure
- Drainage line
- Open woodland
- Sandplain

- Species, status**
- Brush-tailed Mulgara, P4 (DBC list)
- Fork-tailed Swift, Mig. (EPBC & BC Acts)
- Grey Falcon, VU (BC Act)
- Osprey, Mig. (EPBC & BC Acts)
- Bilby, VU (EPBC & BC Acts), old digging
- Bilby, VU (EPBC & BC Acts), old scat
- Bilby, VU (EPBC & BC Acts), recent digging
- Bilby, VU (EPBC & BC Acts), recent scat

Figure 5-3
Fauna habitats and significant fauna records from the field survey



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5.2.1.2 Assemblage

A total of 103 terrestrial vertebrate species representing 44 families and 79 genera were recorded in the study area (Appendix 3; Appendix 6). The assemblage included 101 native species and 2 introduced species.

The recorded assemblage represents 27.7% of the species identified in the desktop review (Table 5-5).

Table 5-5 Number of species recorded in survey compared to desktop results, by group

Group	No. species identified in desktop review	No. species recorded in survey	Recorded assemblage (%)
Amphibians	11	2	18.2 (1.9)
Reptiles	93 (inc. 2 introduced)	38	40.9 (36.9)
Birds	222 (including 2 naturalised)	48	21.6 (46.6)
Mammals	46 (inc. 11 introduced)	15 (inc. 2 introduced)	32.6 (14.6)
Total	372	103	27.7 (100.0)

Values in parentheses indicate the overall percentage of records per class recorded during the survey

Two species of amphibian were recorded within the study area including, one species of tree frog (family Pelodryadidae) and one burrowing frog (Limnodryadidae).

Thirty-eight species of reptile were recorded. These comprise 5 snakes (Elapidae, Typhlopidae), 4 legless lizards (Pygopodidae), 6 geckoes (Diplodactylidae, Gekkonidae), 16 skinks (Scincidae), 4 goannas (Varanidae) and 3 dragons (Agamidae).

Of the 48 species of bird recorded, 23 species from 16 families represent passerines (perching birds). The remaining 25 species from 12 families represent non-passerines. Raptors (Pandionidae, Accipitridae, Falconidae) recorded the highest diversity among birds, representing over 20% of the recorded assemblage.

Thirteen native mammal species were recorded. These comprise 3 species of carnivorous marsupials (Dasyuridae), one species of macropod (Macropodidae), one species of omnivorous marsupial (Thylacomyidae), 5 microchiropteran bats from 2 families (Molossidae, Vespertilionidae), 2 species of native rodent (Muridae) and one monotreme (Tachyglossidae).

One species was recorded during the survey that was not identified by the desktop results, the Black Falcon (*Falco subniger*). This bird is a rare visitor in the Pilbara (Johnstone *et al.* 2013) and considered locally significant (Figure 5-3). While the Black Falcon is not listed as significant in WA, it is protected by State lists in other parts of its range. In New South Wales it is listed as VU under the BC Act (April 2023 list); in South Australia as Rare under the *National Parks and Wildlife Act 1972 (January 2020 list)*, and in Victoria as CR under the *Flora and Fauna Guarantee Act 1988 (June 2023 list)* (DCCEEW 2023b).

Figure 5-4 plots the species accumulation of systematic data captured during the survey. The 4 indices (Sobs, Chao2, Jackknife2 and Bootstrap) all indicate that the systematic survey effort was adequate for the study area, in that few additional species were recorded towards the end of the sample period. It is expected that few remain undetected within the study area.

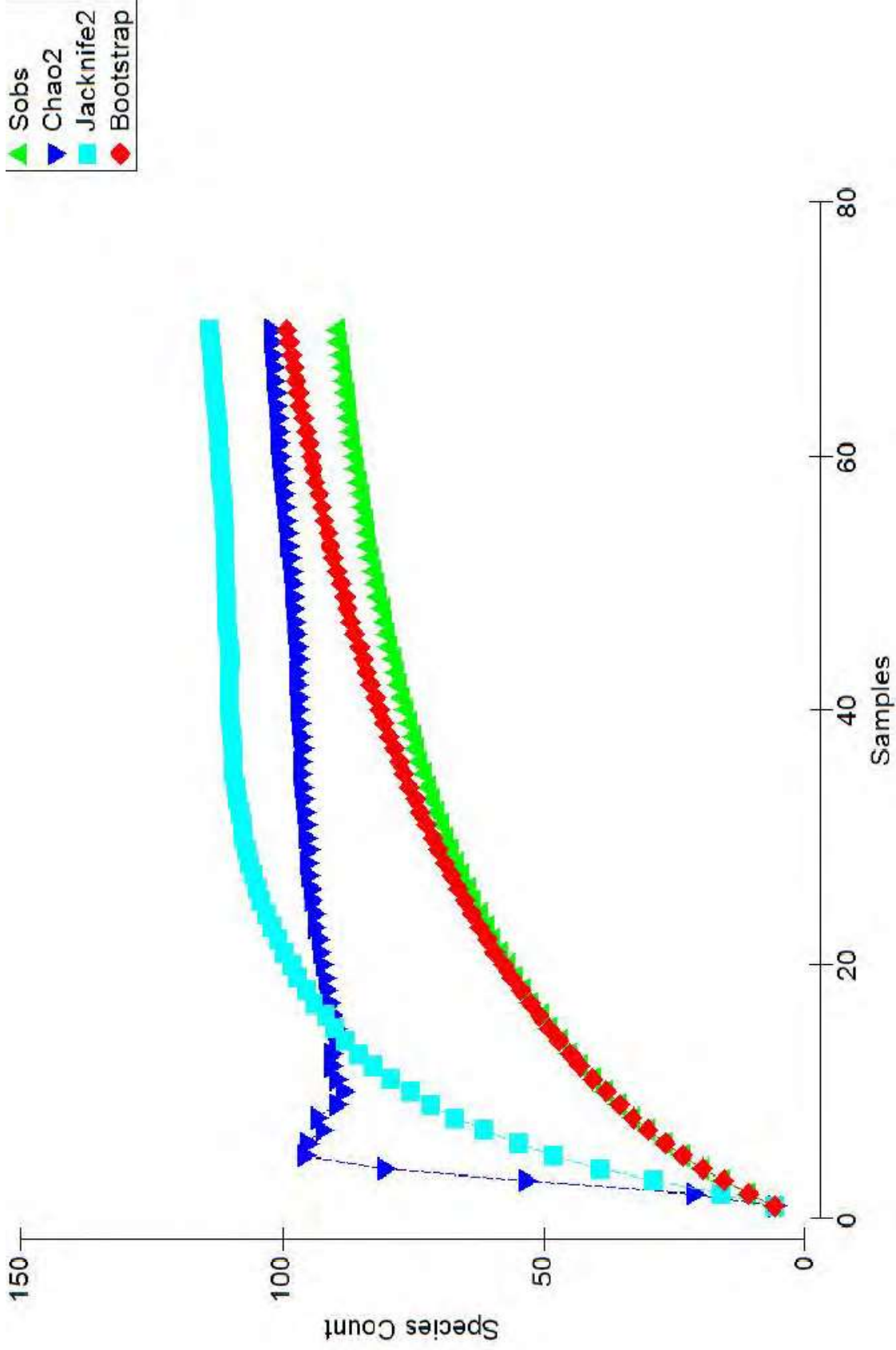



Figure 5-4 Species accumulation curve for vertebrate fauna

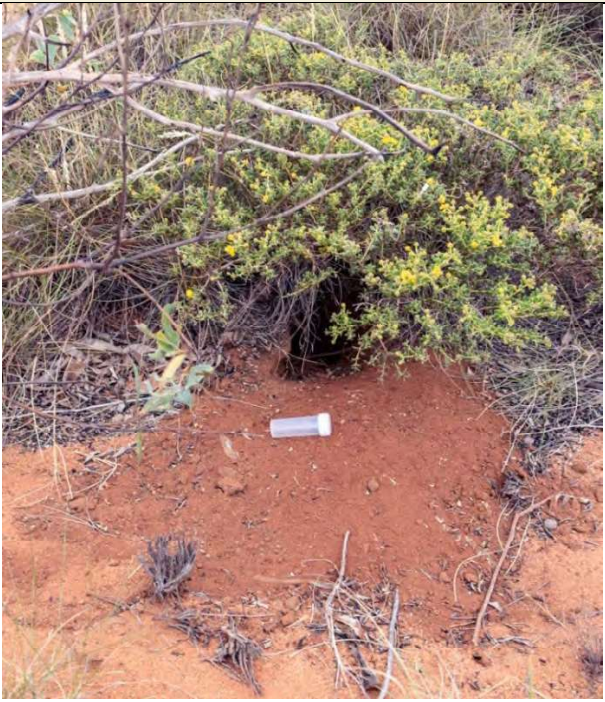


5.2.2 Significant vertebrate fauna

Two Threatened, one Priority and 2 Migratory listed species were recorded in the survey, including: Greater Bilby (*Macrotis lagotis*, VU), Grey Falcon (*Falco hypoleucos*, VU), Brush-tailed Mulgara (*Dasycercus blythi*, P4), Fork-tailed Swift (*Apus pacificus*, Mig.) and Osprey (*Pandion cristatus*, Mig.) (Table 5-6; Figure 5-3). No other significant fauna were identified in the survey in accordance with EPA (2020) (see section 2.2.3), but Black Falcon (*Falco subniger*) is also considered locally significant. Threatened and Priority fauna records were reported to DBCA via the licencing return system.

Table 5-6 Details of significant vertebrate fauna recorded during the field survey

Species	Status	Survey records	Representative photograph
<i>Macrotis lagotis</i> Greater Bilby	VU (EPBC & BC Acts)	128 records (112 in study area): 32 old diggings (top photo) 53 old scats in study area, 16 nearby (bottom right photo); 12 records of recent diggings (middle photo) and 15 records of recent scats (bottom left photo).	

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Species	Status	Survey records	Representative photograph
<i>Dasyercus blythi</i> Brush-tailed Mulgara	P4 (DBCAList)	2 records of active or recently active burrows (BIE010, BIE009).	
<i>Apus pacificus</i> Fork-tailed Swift	Mig. (EPBC & BC Acts)	1 record, directly sighted (BIE04).	No photo.
<i>Pandion cristatus</i> Osprey	Mig. (EPBC & BC Acts)	One record, directly sighted (Opp11).	
<i>Falco hypoleucos</i> Grey Falcon	VU (EPBC & BC Acts)	2 records (one pair and fledged juv.), directly sighted (BIE001, Opp15).	

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Species	Status	Survey records	Representative photograph
<i>Falco subniger</i> Black Falcon	Not conservation listed but locally significant	1 record, directly sighted (BIE003)	No photo.

The likelihood of occurrence assessment (section 4.2.3) for the significant species identified in the desktop review (Table 5-2) but not recorded in the survey determined that none were likely to occur, one may possibly occur and 65 are unlikely to occur in the study area (Table 5-7). A more exhaustive analysis is provided in Appendix 5.

Table 5-7 Likelihood of occurrence of relevant significant vertebrate fauna identified in the desktop review, and recorded in the field survey, categorised as Recorded (5), likely (0), possible (1) and unlikely (65)

Species	Status	Proximity to study area	Habitat Preferences	Likelihood	Comment
Reptiles (3)					
<i>Ctenotus angusticeps</i> Airlie Island Ctenotus	P3 (DBCA list)	2.7 km NNW	The Airlie Island Ctenotus is known from approximately 12 locations in northwest WA (DoEE 2018b). On the mainland it generally inhabits the landward fringe of salt marsh communities in samphire shrubland or marine couch grassland (Maryan <i>et al.</i> 2013) in the intertidal zone along mangrove (Grey Mangrove (<i>Avicennia marina</i>) with occasional Red Mangrove (<i>Rhizophora stylosa</i>)) margins, however, subtle differences in vegetation/topography exist among sites where the species has been recorded (Biologic 2012).	Unlikely	The Project is unlikely to significantly impact populations nearby and this species may only be detected in low abundance (if detected at all).
<i>Liasis olivaceus barroni</i> Pilbara Olive Python	VU (EPBC & BC Acts)	26.4 km SSE	It is commonly found in rocky areas in association with watercourses and pools and often associated with areas of permanent pooling water near rocky habitats, such as gullies, gorges and rocky ranges or boulder sites.	Unlikely	Given the lack of recent records and the wide available habitats outside the study area, it is unlikely that the study area supports a significant number of this species or provides important resources for significant life history stages.
<i>Liopholis kintorei</i> Great Desert Skink	VU (EPBC Act; BC Act)	Projected distribution	Restricted to central desert regions, occupying complex burrow systems. Habitats range from hard spinifex gravelly plains and sandplains to semi-saline soft spinifex sandplains, and even non-spinifex mulga woodland (Indigenous Desert Alliance 2022).	Unlikely	Not recorded from the Pilbara, despite structurally similar habitat occurring.
Non-migratory Birds (5)					
<i>Falco hypoleucos</i> Grey Falcon	VU (EPBC & BC Acts)	463 m SSW	It uses a large variety of habitats such as timbered plains, creeklines, shrublands and open grasslands.	Recorded	
<i>Falco peregrinus</i> Peregrine Falcon	OS (BC Act)	238 m NNW	The Peregrine Falcon's preferred habitat includes cliffs and wooded watercourses. Nesting occurs mainly on cliff ledges,	Unlikely	Despite wide foraging home ranges, no roosting habitat is present within the study area or adjacent or nearby to suggest the species is likely

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Species	Status	Proximity to study area	Habitat Preferences	Likelihood	Comment
			granite outcrops, quarries and in trees with old raven or Wedge-tailed Eagle nests.		to frequently visit the study area for foraging. Study area does not provide specific value critical to the species.
<i>Pezoporus occidentalis</i> Night Parrot	EN/CR (EPBC Act; BC Act)	Projected distribution	Appears to favour areas of dense vegetation comprising old-growth (often > 50 years unburnt) spinifex (<i>Triodia</i> spp.) especially hummocks that are ring-forming for roosting and nesting. Such areas may also be associated with dense chenopod shrubs.	Unlikely	While suitable habitat exists within the study area, the lack of records reduces the probability of occupying the study area. Considering the threats to dispersal for Night Parrot, it is likely the study area occurs outside their typical range and would not support this species.
<i>Rostratula australis</i> Australian Painted Snipe	EN (EPBC & BC Acts)	Projected distribution	Inhabits shallow terrestrial fresh-brackish wetlands, including temporary and permanent lakes, swamps and claypans, waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains.	Unlikely	Negligible suitable habitat is within the study area, it is unlikely to be the preferred habitat when other, better-quality habitat is available.
<i>Sternula nereis nereis</i> Fairy Tern	VU (BC Act)	N/A	Sheltered beaches, banks and spits above the tide and usually below vegetation. They have been found to utilise a variety of other habitats including estuaries, lake islands, wetlands and the mainland coastline (DCCEEW 2023b).	Unlikely	While possible for this species to occur, the lack of spatial data and limited available habitat means that it is unlikely for this species to occupy the available habitat in significant numbers or during important life history stages (e.g., courtship or breeding).
Migratory Birds (55)					
<i>Apus pacificus</i> Fork-tailed Swift	Mig. (EPBC & BC Acts)	8.8 km NE	Occurs in a wide range of dry or open habitats, including riparian woodlands, tea-tree swamps, low scrub, heathland, Saltmarsh, grassland and spinifex sandplains, open farmland and inland and coastal sand dunes (DSEWPac 2011).	Recorded	
<i>Pandion cristatus</i> Osprey	Mig. (EPBC & BC Acts)	975 m N	<i>P. cristatus</i> is present across most of coastal Australia but is absent from Tasmania and Victoria. In south coastal WA, the species extends as far east as Esperance (Johnstone & Storr 1998; Poole <i>et al.</i> 2002).	Recorded	
<i>Actitis hypoleucos</i> Common Sandpiper	Mig. (EPBC & BC Acts)	1.9 km ENE	Small ponds, large inlets, and mudflats where they forage on the shore usually close to the vegetation.	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant

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Species	Status	Proximity to study area	Habitat Preferences	Likelihood	Comment
<i>Anous stolidus</i> Common Noddy	Mig. (EPBC & BC Acts)	Projected distribution	Found primarily in coastal areas and inland wetlands of the Pilbara and Kimberley regions (DCCEEW 2023b).	Unlikely	number of individuals and therefore the outcome is unlikely. Given the lack of recent records and the wide available habitats outside the study area, it is unlikely that the study area supports a significant number of this species or provides important resources for significant life history stages.
<i>Ardenna pacifica</i> Wedge-tailed Shearwater	Mig. (EPBC & BC Acts)	*	Pelagic marine bird known from tropical and subtropical waters, breeds on offshore islands of the east and west coasts of Australia in summer (del Hoyo <i>et al.</i> 1996). Common breeding visitor to Pilbara waters and islands (Johnstone <i>et al.</i> 2013).	Unlikely	Suitable marine or island habitat not present in the study area; mainland terrestrial habitats are not used.
<i>Arenaria interpres</i> Ruddy Turnstone	Mig. (EPBC & BC Acts)	2.3 km ENE	Typically found in the northern parts of Australia in aquatic environments (ALA 2023).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Calidris acuminata</i> Sharp-tailed Sandpiper	Mig. (EPBC & BC Acts)	1.9 km ENE	Usually found in coastal regions containing exposed rocks. They are also found in tidal pools and beaches. They are also known to be found on sandy beaches, clay ridges and occasionally in estuaries, harbours and lagoons. They have been recorded on sewage ponds and mudflats (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Calidris alba</i> Sanderling	Mig. (EPBC & BC Acts)	3.4 km WSW	Found utilising coastal environments open to sea swell as well as sandbars and spits and shingle banks. They also occur on wave-washed rock outcrops. They are also less frequently found in estuaries and inlet harbours and near-coastal inland wetlands (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Calidris canutus</i> Red Knot	EN/Mig./EN (EPBC Act; BC Act)	1.9 km ENE	Muddy edges of shallow fresh or brackish vegetated wetlands, including lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, salt pans and hypersaline salt lakes inland (DoEE 2018b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.

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Species	Status	Proximity to study area	Habitat Preferences	Likelihood	Comment
<i>Calidris ferruginea</i> Curlew Sandpiper	CR/Mig./CR (EPBC Act; BC Act)	2.3 km ENE	Typically occupying intertidal mudflats, sandflats and sheltered coasts. They are also known to occupy beaches, lagoons, harbours and sandy beaches. They have also been recorded occupying saline terrestrial wetlands and sewage ponds and are rarely found in freshwater swamps (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Calidris melanotos</i> Pectoral Sandpiper	Mig. (EPBC & BC Acts)	8.9 km E	Occurs on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand.	Unlikely	Negligible suitable habitat is within the study area, it is unlikely to be the preferred habitat when other, better-quality habitat is available.
<i>Calidris ruficollis</i> Red-necked Stint	Mig. (EPBC & BC Acts)	1.9 km ENE	Shallow fresh to saline wetlands such as coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Calidris subminuta</i> Long-toed Stint	Mig. (EPBC & BC Acts)	1.9 km ENE	They are found across a wide range of open mudflat-like habitats in salt as well as freshwater systems.	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Calidris tenuirostris</i> Great Knot	CR/Mig./CR (EPBC Act; BC Act)	3.4 km WSW	They occupy a variety of wetlands. They appear to favour shallow, freshwater and brackish wetlands including river floodplains, sewage ponds, swamps and lagoons. They are also known to occupy muddy shorelines, weeds and sedges and occasionally stunted samphire. They are known to occupy permanent wetlands and artificial lakes (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Calonectris leucomelas</i> Streaked Shearwater	Mig. (EPBC & BC Acts)	Projected distribution	They usually occupy sheltered coastal habitats as well as mudflats and sandflats such as inlets, bays, harbours, estuaries and lagoons. They have been known to occupy reefs and rock platforms as well as shorelines and mangroves. There are also records in swamps near the coast, salt lakes and non-tidal lagoons (DCCEEW 2023b).	Unlikely	Coastal environments are marginally available within the study area but prone to disturbance. While technically possible due to dispersal potential, habitat preferences and lack of evidence mean it is unlikely for this species to

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Species	Status	Proximity to study area	Habitat Preferences	Likelihood	Comment
<i>Charadrius leschenaultii</i> Greater Sand Plover	VU/Mig./VU (EPBC Act; BC Act)	3.4 km WSW	It occurs frequently in northern Australia, with records from central WA, around the north coast, and south to central New South Wales (Marchant & Higgins 1990).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Charadrius mongolus</i> Lesser Sand Plover	EN/Mig. (EPBC & BC Acts)	3.4 km WSW	Utilises coastal and estuarine environments. They typically occupy sheltered sandy or muddy beaches as well as intertidal sandbanks and mudflats, reefs and rock platforms. They have occasional records occupying saltworks, salt lakes and marginal saltmarshes and brackish swamps (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Charadrius veredus</i> Oriental Plover	Mig. (EPBC & BC Acts)	1.1 km E	Typically found in coastal and estuarine environments. They are known to utilise intertidal mudflats and sandflats, as well as sheltered harbours. They are known to occasionally occupy sandy beaches and rock platforms. There are records of this species utilising saltmarshes, mangrove saltworks, brackish swamps and silt islands (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Chlidonias leucopterus</i> White-winged Black Tern	Mig. (EPBC & BC Acts)	2.2 km NE	Oriental Plovers spend a few weeks in coastal habitats such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further inland, where they are found in sparsely vegetated plains or recently burnt open areas.	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Cuculus optatus</i> Oriental Cuckoo	Mig. (EPBC & BC Acts)	*	Wide-ranging species of tropical forest margins including coastal mangrove habitat (IUCN 2019), occurs as a rare non-breeding visitor to the Pilbara coast (Johnstone <i>et al.</i> 2013).	Unlikely	No suitable forest or mangrove habitat present in the study area.
<i>Fregata ariel</i> Lesser Frigatebird	Mig. (EPBC & BC Acts)	6.4 km NNE	Typically occurs in wetland environments such as brackish, saline and coastal areas. They are also known to occupy sheltered areas such as estuaries, harbours and lagoons particularly those with sandflats and mudflats (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.

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Species	Status	Proximity to study area	Habitat Preferences	Likelihood	Comment
<i>Fregata minor</i> Greater Frigatebird	Mig. (EPBC & BC Acts)	Projected distribution	This species has a wide distribution, moving between countries along the equator during non-breeding season, including the northern parts of Australia (BirdLife International 2023)	Unlikely	Coastal environments are marginally available within the study area but prone to disturbance. While technically possible due to dispersal potential, habitat preferences and lack of evidence mean it is unlikely for this species to occupy the study area in significant numbers or for significant life history stages.
<i>Gallinago stenura</i> Pin-tailed Snipe	Mig. (EPBC & BC Acts)	4.7 km E	It is usually seen in tropical or warmer waters off northern WA, Northern Territory, Queensland and northern New South Wales.	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Gelochelidon nilotica</i> Gull-billed Tern	Mig. (BC Act)	1.1 km E	They occur in marine, coastal and pelagic environments and are usually observed in coastal waters in beaches, platforms and sheltered areas including harbours and estuaries (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Glareola maldivarum</i> Oriental Pratincole	Mig. (EPBC & BC Acts)	1.1 km E	Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands. They are only rarely found over the ocean.	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Hirundo rustica</i> Barn Swallow	Mig. (EPBC & BC Acts)	2.2 km ENE	Inhabits open plains, floodplains or short grassland, wetlands, saltworks and sewage farms. May also occur along the coast, inhabiting beaches, mudflats and islands, or around coastal lagoons.	Unlikely	It is unlikely to occur within the study area as a resident or foraging visitor. It may fly near or over the study area given the proximity to coastal, tidal mudflat, saltworks and mangroves.
<i>Hydroprogne caspia</i> Caspian Tern	Mig. (EPBC & BC Acts)	2.3 km ENE	Found in a variety of aquatic habitats including coastal areas, salt exploitation sites, wastewater treatment areas, cliffs and rocky islands, estuaries and intertidal areas with sand, rocks, mud or a combination of these substrates.	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Limicola falcinellus</i> Broad-billed Sandpiper	Mig. (BC Act)	7.3 km NE	Found in sheltered coastal environments, mudflats and favours estuarine habitats. Occasionally they have been found occupying saltmarshes, freshwater lagoons, saltworks and sewage farms. They have also been known to occupy creeks, swamps and lakes	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.

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Species	Status	Proximity to study area	Habitat Preferences	Likelihood	Comment
			near the coast, favouring those with mudflats and exposed sands with receding tides (DCCEEW 2023b).		
<i>Limnodromus semipalmatus</i> Asian Dowitcher	Mig. (EPBC & BC Acts)	2.3 km ENE of study area	Found in sheltered coastal habitats and near-coastal terrestrial wetlands (DAWE 2022).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Limosa lapponica</i> Bar-tailed Godwit	Mig. (EPBC & BC Acts)	3.3 km ENE	Inhabits sheltered coastal habitats including tidal creeks, coastal lagoons and estuaries. There are many records utilising mudflats and sandflats. They are also known to occupy ponds, saltworks and sewage farms (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Limosa limosa</i> Black-tailed Godwit	Mig. (BC Act)	3.3 km ENE	Occurs predominantly in coastal habitats including sandflats, banks, mudflats harbours, estuaries and lagoons and bays. There are some records of sightings in sewage farms, salt lakes and brackish wetlands near the coast, as well as sandy beaches and rock platforms (Department of the Environment 2015).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Macronectes giganteus</i> Southern Giant Petrel	EN/Mig./Mig. (EPBC Act; BC Act)	Projected distribution	Typically found in coastal environments with sheltered bays, estuaries and lagoons. Habitat use is dictated by the tides. They are also found in shallow and sparsely vegetated near-coastal wetlands (DCCEEW 2023b).	Unlikely	It is very unlikely this species will occupy the study area and if found inside or nearby, will likely be passing through and not reliant on the habitat available within the study area in significant proportions or during important life history stages.
<i>Motacilla cinerea</i> Grey Wagtail	Mig. (EPBC & BC Acts)	Projected distribution	A small wagtail that is a vagrant visitor to Australia, inhabits fast flowing streams, rivers and wetland margins (IUCN 2019).	Unlikely	Given the lack of local records and absence of suitable stream habitat in the study area, it is unlikely to occur.
<i>Motacilla flava</i> Yellow Wagtail	Mig. (EPBC & BC Acts)	7.3 km NE	Uncommon but regular visitor to Pilbara; inhabits a range of damp or wet habitats with low vegetation including damp meadows, marshes, waterside pastures, and sewage farms (IUCN 2019; Johnstone <i>et al.</i> 2013).	Unlikely	Given the lack of recent records and the wide available habitats outside the study area, it is unlikely that the study area supports a significant number of this species or provides important resources for significant life history stages.

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Species	Status	Proximity to study area	Habitat Preferences	Likelihood	Comment
<i>Numenius madagascariensis</i> Eastern Curlew	CR/Mig./CR (EPBC Act; BC Act)	3.3 km ENE	Uses a large variety of habitats.	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Numenius minutus</i> Little Curlew	Mig. (EPBC & BC Acts)	1.9 km ENE of study area	Australia's largest and elusive shorebird. Little information is available on this species given this species' shyness and records taking flight at the first sign of disturbance (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Numenius phaeopus</i> Whimbrel	Mig. (EPBC & BC Acts)	606 m ESE	They spend the non-breeding season in northern Australia from Port Hedland to the Queensland coast (DoEE 2018b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Oceanites oceanicus</i> Wilson's Storm Petrel	Mig. (EPBC & BC Acts)	606 m ESE	Usually found on intertidal mudflats and sheltered coastal areas. They have also been found in other waterbodies including harbours, lagoons, estuaries, rivers and mangroves. Occasionally they are found in sandy and rocky beaches or intertidal areas (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Onychoprion anaethetus</i> Bridled Tern	Mig. (EPBC & BC Acts)	6.8 km NW	Usually found on intertidal mudflats and sheltered coastal areas. They have also been found in other waterbodies including harbours, lagoons, estuaries, rivers and mangroves. Occasionally they are found in sandy and rocky beaches or intertidal areas (DCCEEW 2023b).	Unlikely	Given the age of this record as well as the species' habitat preferences, it is unlikely that this species will be occupying habitats within the study area and even less likely to be found within the study area in significant abundance.
<i>Phaethon lepturus</i> White-tailed Tropicbird	Mig. (EPBC & BC Acts)	Projected distribution	Found across pelagic waters and the coasts of tropical and subtropical seas (IUCN 2019). Occurs only as a rare visitor to Pilbara coastal waters (Johnstone <i>et al.</i> 2013).	Unlikely	No suitable marine habitat occurs in the study area.
<i>Phalaropus lobatus</i> Red-necked Phalarope	Mar/Mig. (EPBC Act; BC Act)	34.2 km E	Records indicate their preference for occurring at sea during non-breeding periods. They have been recorded in inland coastal areas, highly saline water bodies including lakes, swamps and wetlands in Australia (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.

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Species	Status	Proximity to study area	Habitat Preferences	Likelihood	Comment
<i>Philomachus pugnax</i> Ruff	Mig. (EPBC & BC Acts)	3.4 km WSW of study area	Typically occupies saline and brackish wetlands with mudflats. They have been found in a range of wetlands including lakes, swamps, tidal rivers, and flood lands. There are some records of them occupying sheltered coastal areas such as harbours and estuaries and wetlands surrounded by dense vegetation (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Plegadis falcinellus</i> Glossy Ibis	Mig. (EPBC & BC Acts)	1.9 km ENE of study area	Marine habitats and tropical waters. They typically occur in Pisonia-coconut vegetation and on sandy substrates. Other habitat preferences are not well understood (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Pluvialis fulva</i> Pacific Golden Plover	Mig. (EPBC & BC Acts)	7.3 km NE	Inland, freshwater wetlands are preferred, permanent or ephemeral waterbodies on floodplains and shallow swamps with abundant aquatic flora.	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Pluvialis squatarola</i> Grey Plover	Mig. (EPBC & BC Acts)	3.3 km ENE	Typically inhabits coastal environments and occasionally can be found in wetlands, mudflats and sandflats in sheltered areas. They have been found on islands, sand and coral cays. They have been recorded in terrestrial environments, usually near waterbodies and paddocks areas (DCCEEW 2023b).	Unlikely	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely.
<i>Sterna dougallii</i> Roseate Tern	Mig. (EPBC & BC Acts)	9 km NE	This medium size tern is seen over coastal and offshore blue water, coral reefs, lagoons and islands (breeding on several Australian Islands, including in WA) but does not occur inland. Pilbara records include passage migrants, breeding visitors and some breeding residents (Johnstone <i>et al.</i> 2013; Johnstone & Storr 1998)	Unlikely	Suitable marine habitat is not present in the study area.
<i>Sterna hirundo</i> Common Tern	Mig. (EPBC & BC Acts)	6.4 km NNE	Occupies mostly sheltered coastal areas such as harbours, lagoons, estuaries and river deltas, particularly those with margins of sand or mud. They have been recorded utilising inland wetlands of both fresh and saline conditions, including lakes, rivers, creeks and artificial wetlands (sewage pools and saltworks included) (DCCEEW 2023b).	Unlikely	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages.

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Species	Status	Proximity to study area	Habitat Preferences	Likelihood	Comment
<i>Sterna albifrons</i> Little Tern	Mig. (EPBC & BC Acts)	6.4 km N	Occupies a range of natural and artificial aquatic environments including irrigation land, water storage areas, lagoons, estuaries, coastal dunes, freshwater lakes as well as seasonal and intermittent freshwater lakes.	Unlikely	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages.
<i>Sula leucogaster</i> Brown Booby	Mig. (EPBC & BC Acts)	13.3 km NNE	In WA, the Brown Booby is found from Bedout Island and near Onslow, and north to Bunker Group of islands in Queensland Off north-west WA. Brown Boobies are most abundant 18–36 km from land, but also occur inside and outside these limits (DoEE 2018b). It uses both marine and terrestrial habitats but tends to stay close to breeding sites, such as tropical islands, continental islands, sand cays and atolls for breeding. It is known to approach mainland coastlines more than other boobies and has been recorded in coastal waters, harbours and estuaries and near offshore islands but seldom flying over land (DoEE 2018b).	Unlikely	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages.
<i>Thalasseus bergii</i> Crested Tern	Mig. (EPBC & BC Acts)	3.3 km ENE	Inhabit a variety of aquatic environments including estuaries, lagoons, sheltered coastal areas, lakes, bays and harbours. Particularly those with sand banks or splits and exposed ocean beaches. This species is widespread but not favouring offshore continental islands or coral cays (DCCEE 2023b).	Unlikely	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages.
<i>Tringa brevipes</i> Grey-tailed Tattler	Mig. (EPBC and BC Acts; P4 DBCA list)	606 m ESE	Inhabits coastal areas, typically those sheltered such as embayments and estuaries, although they are also known to occupy rocky coasts and platforms. Occasionally they are found in inland waterbodies (DCCEE 2023b).	Unlikely	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages.
<i>Tringa glareola</i> Wood Sandpiper	Mig. (EPBC & BC Acts)	1.9 km ENE	Habitat preferences vary with activities. Feeding habitat preferences include shallow water and intertidal areas on rocky substrates, coral rubble, mudflats, mangroves and potentially seagrass. Breeding habitat includes the branches of mangroves or	Unlikely	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages.

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Species	Status	Proximity to study area	Habitat Preferences	Likelihood	Comment
			shrubs and driftwood. Otherwise, they favour habitats in sheltered coastal environments and mudflat aquatic areas (DCCEW 2023b).		
<i>Tringa nebularia</i> Common Greenshank	Mig. (EPBC & BC Acts)	1.9 km ENE	The Wood Sandpiper uses well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes (DoEE 2018a).	Unlikely	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages.
<i>Tringa stagnatilis</i> Marsh Sandpiper	Mig. (EPBC & BC Acts)	6.4 km NNE	They prefer coastal open mudflats.	Unlikely	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages.
<i>Xenus cinereus</i> Terek Sandpiper	Mig. (EPBC & BC Acts)	3.4 km WSW	The Marsh Sandpiper occurs along the WA NW coast and throughout parts of eastern Australia. It inhabits coastal and inland wetlands, estuarine and mangrove mudflats, beaches, swamps, lakes and several other types of wetlands (Morcombe 2004).	Unlikely	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages.
Mammals (8)					
<i>Dasyercus blythi</i> Brush-tailed Mulgara	P4 (DBCA list)	Within study area	Occurs in spinifex grasslands throughout much of the arid zone, digging their burrows in the flats between low sand dunes.	Recorded	
<i>Macrotis lagotis</i> Greater Bilby	VU (EPBC & BC Acts)	Within study area	Prefers hummock grassland in plains and alluvial areas, open tussock grassland on uplands and hills, and mulga woodland/shrubland on ridges and rises.	Recorded	
<i>Dasyurus hallucatus</i> Northern Quoll	EN (EPBC & BC Acts)	4.0 km WNW	Found in a variety of habitats; however, rocky areas provide important denning habitat, while they forage in nearby grasslands and creeklines.	Possible	Absence of suitable denning habitat (rocky ranges, outcrops, and boulder piles), suitable dispersal habitat present in minor drainage habitat.
<i>Pseudomys chapmani</i> Western Pebble-mound Mouse	P4 (DBCA list)	27.7 km E	The mounds are located on the gentle slopes of rocky ranges covered in rocky mulch, hard spinifex and sparse trees and shrubs (<i>Eucalyptus</i> , <i>Senna</i> , <i>Acacia</i> and <i>Ptilotus</i>). They are also often found near Acacia-dominated drainage lines.	Unlikely	No suitable habitat within the study area despite the proximity and date of the desktop record, the study area.

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Species	Status	Proximity to study area	Habitat Preferences	Likelihood	Comment
<i>Rhinioncteris aurantia</i> (Pilbara) Pilbara Leaf-nosed Bat	VU (EPBC & BC Acts)	27.4 km E	Obligate cave roosting species, forage for insects almost exclusively over freestanding water. Disperses between roost and foraging habitat via humid gorges and gullies to avoid desiccation and shelter from predation.	Unlikely	No suitable roost caves of any category within the study area. No suitable dispersal habitat (drainage lines) nor permanent water pools critical for foraging.
<i>Macroderma gigas</i> Ghost Bat	VU (EPBC & BC Acts)	25.0 km SSE	Prefers to roost in caves beneath bluffs of low, rounded hills composed of Marra Mamba geology, granite rock piles in the Pilbara and sandstone elsewhere, as well as adits (abandoned mines).	Unlikely	No suitable roost caves of any category within the study area. No dispersal habitat (drainage lines). Study area does not contain important habitat features likely to attract the species on a regular or repeated basis. More productive foraging and dispersal habitat nearby, outside the study area.
<i>Lagostrophus fasciatus</i> Banded Hare-wallaby (mainland)	P4 (DBCA list)	Within study area	Extinct on the mainland – last confirmed sighting on the mainland was in 1906. Natural (wild) populations are restricted to Bernier and Dorre Islands in Shark Bay, WA (Morris & Burbidge 2008).	Unlikely	Species extinct on the mainland.
<i>Mormopterus cobourgiensis</i> North-western Free-tailed Bat	P1 (DBCA list)	3.1 km NNE	Restricted range appearing to favour mangroves and adjoining areas in small spouts, crevices and dead branches of mangroves. This species is relatively data deficient (Australian Museum 2020).	Unlikely	Unlikely for this species to occupy the study area for important life history stages. Possible for them to infrequently fly over or nearby given the proximity to mangrove habitats to the North, outside the study area.

5.2.2.1 SRE invertebrate fauna

5.2.2.1.1 Habitats

Three habitats were identified within the study area that are suitable habitat for SRE invertebrates (Table 5-8; Figure 5-5). All SRE habitats represent low value SRE habitat. While the open woodland habitat seems locally isolated, it extends eastward outside the study area and connects to larger open woodlands along drainage lines.

Table 5-8 Extent and description of each SRE habitat in the study area

Habitat type	Site/s	Description	SRE habitat rating	Extent in study area and % of study area
Sandplains	BP(001, 002, 004, 005, 006, 015, 025, 008, 009, 011, 013 016, 017, 020, 021, 022 023, 024) BT007, BIE001, BIE003, BIE004, BIE002, Opp001, Opp008, Opp002, BT003, Opp005, BIE007, Opp014, Opp006, Opp003, Opp010, Opp009, B003, BIE010, BIE009, BT002, Opp004, Opp007, Opp015, BT001,	Mosaic of spinifex hummock grasslands and low <i>Acacia stellaticeps</i> shrublands on an undulating plain. Isolated <i>Owenia reticulata</i> trees over mixed <i>Acacia stellaticeps</i> dominant shrublands (<i>A. tumida</i> and <i>A. inequalatera</i> scattered to widely scattered) over stage 2 to 5 spinifex hummock grasslands on red-orange sandy soils.	Low	1,406.9 ha (95.6)
Open woodlands	BIE006, BIE005, BIE008, BP017, BP019, BP014	Shallow flat depression relative to surrounding sandplain. Open low to mid Eucalyptus woodland over evenly scattered, open tussock grasses (native and Buffel) with isolated spinifex hummocks also present. Substrate predominantly sandy with some clay. Hardened crust present. Surrounded by low sandy rise with dense mature spinifex hummocks and mixed <i>Acacia</i> dominant shrubs including <i>A. stellaticeps</i> , <i>A. tumida pilbarensis</i> and isolated <i>A. inequalatera</i> . Higher percentage cover of leaf litter than the surrounding areas, forming transported clumps.	Low	15.41 ha (0.9)

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Habitat type	Site/s	Description	SRE habitat rating	Extent in study area and % of study area
Drainage lines	BT001	Small section of area known as Foreshore flats. Tidal influenced though predominantly dry. Heritage protected area due to incidence of shell middens. Low <i>Acacia stellaticeps</i> shrubland with widely scattered <i>Acacia tumida pilbarensis</i> over small stage 3 and 4 spinifex hummock grasses on red-orange to orange sandplain.	Low	8.9 ha (0.6)
Cleared/disturbed	Opp011	Cleared areas with infrastructure and roads.	Low	45.0 ha (2.9)

5.2.2.1.2 SRE records

A total of 14 specimens from SRE groups were collected within the study area (Figure 5-5; Table 5-9). The assemblage comprises of 5 mygalomorph spiders (*Aname*), 5 Isopods (*Armadillidae*), and 4 Pseudoscorpions (*Chernetidae*). Of these, 4 specimens could not be identified to species or morphospecies code as applied from the WA Museum. The assemblage includes one taxa resolved to species and 3 taxa to morphospecies code. All species represent potential SRE's except for the mygalomorph spider, *Aname sinuate*, which is Widespread. Specimens were collected from sandplains and open woodlands within the study area; both are considered low value SRE habitat.

Table 5-9 Specimens from SRE groups recorded in the field survey

Higher order/ Family	Taxa	Site/s	Spec. num	Habitat	SRE status	Comments on status
Class Arachnida, order Araneae						
Anamidae	Aname 'Phoenix0068'	BIE003	1	Sandplain	Potential	Species only known to morphospecies code from the Port Hedland Solar Farm project. Specimens were collected in a widespread habitat type that is not restricted to the study area.
Anamidae	Aname sinuata	BIE005	2	Open Woodland	Widespread	Widespread species known across the Pilbara region.
Mygalomorphae	Mygalomorphae sp. indet.	BIE006	2	Open Woodland	Potential	Specimens sequencing failed so could not be identified properly. Specimens recorded in a widespread habitat type; however, it is not continuous in the local area. Specimens recorded in this habitat type alone are likely restricted to the study area.
Class Arachnida, order Pseudoscorpion						
Chernetidae	Chernetidae 'Phoenix0146'	BIE006	4	Open Woodland	Potential	Specimens recorded in a widespread habitat type; however, it is not continuous in the local area. Specimens recorded in this habitat type alone are likely restricted to the study area.

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Higher order/ Family	Taxa	Site/s	Spec. num	Habitat	SRE status	Comments on status
Class Malacostraca, order Isopoda						
Armadillidae	Buddelundia 'Phoenix0145'	BIE006	3	Open Woodland	Potential	Specimens recorded in a widespread habitat type; however, it is not continuous in the local area. Specimens recorded in this habitat type alone are likely restricted to the study area.
Armadillidae	Buddelundia sp. indet.	BIE005, BIE006	2	Open Woodland	Potential	Specimens sequencing failed so could not be identified properly. Specimens recorded in a widespread habitat type; however, it is not continuous in the local area. Specimens recorded in this habitat type alone are likely restricted to the study area.



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 Port Hedland Green Steel Project

Project No 1557
 Date 5/02/2024
 Drawn by JL
 Map author SP

0 1 2
 Kilometers

1:56,400 (at A4) GDA 1994 MGA Zone 50

- Study area
- Indicative disturbance footprint
- Whim Creek Road
- Drainage line
- Open woodland
- Sandplain
- Cleared/disturbed
- Disturbed Infrastructure
- Potential
- ▲ Wisepread

Figure 5-5
 SRE habitats and recorded
 SRE taxa



All information within this map is current as of 5/02/2024. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

5.3 SURVEY LIMITATIONS

The limitations of the terrestrial fauna survey have been considered in accordance with EPA (2016b, d) and are presented in Table 5-10.

Table 5-10 Consideration of potential survey limitations

Limitations	Comments
Availability of contextual information at a regional and local scale	Database searches and previous surveys within the vicinity of the Project provided a comprehensive species list for the region.
Competency/experience of the team carrying out the survey	The survey team have more than 20 years of combined experience conducting fauna surveys in the Pilbara region of WA.
Scope and completeness	The scope was sufficient for the size of the study area and the fauna habitats present and is considered complete.
Proportion of fauna recorded and/or collected, any identification issues	Based on species accumulation curves, a sufficient proportion of fauna was recorded for the study area.
Access within the study area	All parts of the study area were accessible.
Timing, rainfall, season	Timing of the survey (Autumn season) was optimal for the study area and consistent with EPA (2020) guidance for the Eremaean Climatic Province.
Disturbance that may have affected the results of the survey	No disturbances affected the results of the survey.

6 DISCUSSION

6.1 VERTEBRATE FAUNA

6.1.1 Fauna habitats

All habitat types identified in the study area are typical of the Roebourne subregion and Uaroo land system (Table 3-1; Figure 3-2). Characterised by “broad sandy plains, pebbly plains and drainage tracts supporting hard and soft spinifex hummock grasslands with scattered *Acacia* shrubs (Payne & Leighton 2004),” the Uaroo system represents more than 5% (7.02%) of the of the Pilbara Bioregion. Less than 1% of this (0.31%) is currently cleared for ‘intensive use’, 16% is in the conservation estate and 83.5% is used for pastoral activities (in the Pilbara Bioregion – Uaroo extends outside this region also). As such, the fauna habitats present within the study area are considered abundant and widespread throughout the Pilbara. While open woodlands show some local isolation within the study area, the most prominent example of this habitat type within the study area (in the east) is functionally connected, via diffuse drainages to open woodlands along the large drainage approximately 2 km east of the study area.

6.1.2 Fauna assemblage

The recorded fauna assemblage represents only 27.9% of the desktop assemblage; however, this is accounted for by the small size of the study area (1,476 ha) and low diversity of fauna habitats present, compared to the those within the desktop search extent, which include: pelagic, littoral/coastal, estuarine, mangrove, salt flats, drainage, wetland, granite outcrop, banded ironstone ranges, major rivers and offshore islands. These habitats combined, support a comparatively higher diversity of vertebrate fauna than those (habitats) present in the study area. This is exemplified by the 218 bird species identified by the desktop review, of which only 48 species (22%) were recorded in the survey (Table 5-5). Of the 218 species of bird identified by the desktop review at least 108 are largely restricted to coastal/littoral, pelagic, mangrove, wetland, mudflat and rock platform habitats.

The record of the Black Falcon (*Falco subniger*) is considered locally significant. While the species is not conservation listed in WA, it is listed in other parts of its range. In New South Wales Black Falcon is listed as VU under the BC Act (April 2023 list); in South Australia it is listed as Rare under the National Parks and Wildlife Act 1972 (January 2020 list), and in Victoria it is listed as CR under the Flora and Fauna Guarantee Act 1988 (June 2023 list) (DCCEEW 2023b).

6.1.3 Bilby

Prior to European settlement, the Bilby occurred continuously across three-quarters of the continent in the semi-arid and arid zones. Since European settlement, largely due to introduction of foxes and cats, habitat changes caused by livestock and other introduced herbivores; Bilby occupy approximately 20% of its former range.

Having been previously recorded within the study area by Phoenix (2022b), it is no surprise that secondary evidence of the species was recorded throughout the study area during the current survey. While most of the secondary evidence identified was old (> 2 week), some recent evidence of Bilby activity was identified from odorous scats and loose sandy spoil associated with diggings that are indicative of Bilby foraging activity. All recent scats and diggings were located near the northern boundary of the study area. Despite both intensive and extensive targeted survey effort (25 Bilby search plots and 7 transects searches), no Bilby burrows (old, recently active, or active burrows) were located within the study area.

Bilby are known to utilise relatively large, mobile home ranges in response to the scarcity of food resources in the semi-arid and arid parts of their range. While the study area clearly forms part of a local population's home range, the absence of track sequences and wider spread of recent activity (indicative of current or very recent Bilby presence) within the study area, particularly the area near the northern boundary, may suggest that they have dispersed elsewhere, outside of the study area. Nevertheless, whether the local Bilby population is currently occupying the study area or not, it is likely to return given that it has been recorded nearby on multiple occasions (albeit via secondary evidence; DBCA 2022b).

6.1.4 Mulgara

Mulgara were previously recorded in the study area and nearby (DBCA 2022b). While no direct sightings of the species were recorded during the current survey, 2 recently active, or active burrows were recorded and subsequently targeted with Elliot traps but evaded capture. Given the dominance of suitable sandplain habitat within the study area it is recommended that pre-clearance surveys for the species be conducted prior to clearing of native vegetation within the study area, concurrently with pre-clearance surveys for Bilby.

6.1.5 Grey Falcon

Grey falcons typically nest and roost along heavily wooded drainage lines. With large foraging home ranges, they predominantly prey on other bird species in flight from above. The breeding pair and single fledged juvenile were recorded perched on a transmission tower at the western end of the study area adjacent to the Alinta Power Station. Grey Falcons and numerous other birds of prey species frequently nest high up on transmission towers which provide nest security from predators and a vantage point from which to observe prey. The study area would only comprise a fraction of the resident Grey Falcons' foraging home range and given the means with which they hunt their prey (on the wing) clearing of native vegetation for the Project, and subsequent Project activities are unlikely to negatively impact the pair.

6.1.6 Fork-tailed Swift

Fork-tailed swifts are an almost exclusively aerial species and are therefore not limited by the availability of specific terrestrial habitats. As such, the species will not be affected by the clearing of native vegetation or Project related activities within the study area.

6.1.7 Osprey

The Osprey observed perching on a sign in the study area is not considered relevant to the proposed development of the Project. Ospreys are a predominantly coastal species but also forage in mangroves and other large water bodies where they almost exclusively prey on large fish. The habitats present within the study area are unlikely to provide any utility to the species and therefore will not be impacted by the Project.

6.1.8 Northern Quoll

No rocky habitats, critical to support Northern Quoll are present within the study area. As such the study area is unlikely to support a resident population. However, the species has been recorded approximately 4 km east-northeast of the study area and given its wide foraging range (>5 km) and the proximity and connectivity of the study area to the large drainage line to the east, it is possible, Northern Quoll may, albeit infrequently, forage in the eastern extent of the study area.

6.2 SRE INVERTEBRATE FAUNA

Three SRE habitats were identified within the study area, primarily comprising sandplains (95.6%). The sandplains are considered low prospectivity SRE habitat as they are very dry environments, with limited shade, which are not conducive to the formation of the SRE fauna.

While the open woodland habitat seems locally isolated, it does extend eastward outside the study area and connects to larger open woodlands along drainage lines. This habitat type is well represented in the local area and within the Roebourne subregion.

The SRE fauna of the region is well understood with several confirmed SRE species known in the area and a high number of records from several different SRE groups. The desktop review identified 7 Confirmed SRE taxa and 78 Potential SRE taxa from within the SRE desktop search area. Of these most were recorded in habitat types that are not present in the study area, except for one record of mygalomorph. This record was located approximately 165m from the southeastern boundary of the study area. During the field survey 2 mygalomorph specimens were collected that could not be identified as the sequencing failed. These specimens are cautiously classified as Potential SRE species.

Overall, the study area comprises extensive and mostly continuous low prospectivity SRE habitat. No Confirmed SRE species were recorded within the study area, and it is unlikely any of the recorded Potential SRE's are restricted to the study area.

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Appendix 1 Survey site locations

Sitename	Site type	Latitude	Longitude
BIE001	FS	-20.4110	118.5177
BIE002	FS	-20.4167	118.5326
BIE003	FS	-20.3913	118.5140
BIE004	FS	-20.4002	118.5110
BIE005	FS	-20.4010	118.5306
BIE006	FS	-20.4033	118.5328
BIE007	FS	-20.3866	118.5130
BIE008	FS	-20.3955	118.5066
BIE009	TSFS	-20.3912	118.5145
BIE010	TSFS	-20.4048	118.5079
BP001	TSFS	-20.4144	118.5127
BP002	TSFS	-20.4174	118.5336
BP003	TSFS	-20.3998	118.5113
BP004	TSFS	-20.4120	118.5189
BP005	TSFS	-20.3948	118.5175
BP006	TSFS	-20.3950	118.5197
BP007	TSFS	-20.4172	118.5328
BP008	TSFS	-20.4110	118.5179
BP009	TSFS	-20.4116	118.5141
BP010	TSFS	-20.4124	118.5107
BP011	TSFS	-20.4162	118.5094
BP012	TSFS	-20.4116	118.5119
BP013	TSFS	-20.4040	118.5075
BP014	TSFS	-20.3955	118.5064
BP015	TSFS	-20.3911	118.5139
BP016	TSFS	-20.3867	118.5126
BP017	TSFS	-20.4045	118.5319
BP018	TSFS	-20.4039	118.5297
BP019	TSFS	-20.4003	118.5302

Sitename	Site type	Latitude	Longitude
BP020	TSFS	-20.3953	118.5283
BP021	TSFS	-20.3931	118.5304
BP022	TSFS	-20.3886	118.5239
BP023	TSFS	-20.3877	118.5266
BP024	TSFS	-20.4132	118.5263
BP025	TSFS	-20.3894	118.5249
BT001	TSFS	-20.4574	118.5276
BT002	TSFS	-20.3799	118.5440
BT003	TSFS	-20.3880	118.5159
BT004	TSFS	-20.4286	118.5277
BT005	TSFS	-20.4213	118.5513
BT006	TSFS	-20.3919	118.5288
BT007	TSFS	-20.4150	118.5215
Opp001	FS	-20.3980	118.5214
Opp002	IFS	-20.4162	118.5099
Opp003	IFS	-20.3964	118.5188
Opp004	IFS	-20.3962	118.5377
Opp005	IFS	-20.4050	118.5079
Opp006	IFS	-20.4116	118.5140
Opp007	IFS	-20.4162	118.5296
Opp008	IFS	-20.3964	118.5344
Opp009	IFS	-20.4018	118.5322
Opp010	IFS	-20.4005	118.5320
Opp011	IFS	-20.4074	118.5083
Opp012	IFS	-20.3986	118.5393
Opp013	FS	-20.3958	118.5150
Opp014	IFS	-20.3978	118.5302
Opp015	IFS	20.4242	118.5475
Opp016	IFS	-20.3772	118.5461

TSFS = Targeted species fauna site; FS = Fauna site; IFS = Individual specimen (fauna); BT = Bilby transect; BP = Bilby plot. Systematic sites are highlighted grey.

Appendix 2 Terrestrial fauna survey site descriptions

Appendix 3 Vertebrate fauna and desktop field results

Rows highlighted in grey indicate significant records during the survey

Family	Species	Common name	Status/comment	Introduced	Source				This survey
					EPBC PMST	NatureMap	PESDB	Past reports	
Amphibians (11)									
Hylidae	<i>Cyclorana australis</i>	Northern Snapping Frog				•			•
	<i>Cyclorana maini</i>	Sheep Frog				•			•
	<i>Litoria caerulea</i>	Green Tree Frog				•			•
	<i>Litoria rubella</i>	Little Red Tree Frog				•			•
Limnodynastidae	<i>Neobatrachus aquilonius</i>	Northern Burrowing Frog				•			•
	<i>Neobatrachus sutor</i>	Shoemaker Frog				•			•
	<i>Notaden nichollsi</i>	Desert Spadefoot				•			•
	<i>Platyplectrum spenceri</i>	Centralian Burrowing Frog				•			•
Myobatrachidae	<i>Uperoleia glandulosa</i>	Glandular Toadlet				•			•
	<i>Uperoleia russelli</i>	Northwest Toadlet				•			•
	<i>Uperoleia saxatilis</i>	Pilbara Toadlet				•			•
Reptiles (93)									
Agamidae	<i>Ctenophorus caudicinctus</i>	Ring-tailed Dragon				•			•
	<i>Ctenophorus isolepis</i>	Central Military Dragon				•			•
	<i>Ctenophorus nuchalis</i>	Central Netted Dragon				•			•
	<i>Ctenophorus reticulatus</i>	Western Netted Dragon				•			•
	<i>Diporiphora paraconvergans</i>	Grey-striped Western Desert Dragon				•			•
	<i>Diporiphora pindan</i>	Pindan Dragon				•			•
	<i>Diporiphora valens</i>	Southern Pilbara Tree Dragon				•			•
	<i>Diporiphora vescus</i>	Northern Pilbara Tree Dragon				•			•
	<i>Gowidon longirostris</i>	Long-nosed Dragon				•			•
	<i>Lophognathus horneri</i>	Horner's Dragon				•			•
	<i>Pogona minor</i>	Dwarf Bearded Dragon				•			•
Gekkonidae	<i>Gehyra pilbara</i>	Pilbara Dtella				•			•
	<i>Gehyra punctata</i>	Spotted Dtella				•			•
	<i>Gehyra purpurascens</i>	Purple Dtella				•			•
	<i>Gehyra variegata</i>	Variegated Dtella				•			•

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Family	Species	Common name	Status/comment	Introduced	Source				This survey
					EPBC PMST	NatureMap	PESDB	Past reports	
	<i>Hemidactylus frenatus</i>	Asian House Gecko		*					
	<i>Heteronotia binoei</i>	Bynoe's Gecko							
	<i>Heteronotia spelea</i>	Desert Cave Gecko							
Carphodactylidae	<i>Nephrurus levis</i>	Smooth Knob-tailed Gecko							
Diplodactylidae	<i>Diplodactylus bilybara</i>	Western Fat-tailed Gecko	(ex <i>D. conspicillatus</i>)						
	<i>Lucasium woodwardi</i>	Pilbara Sandplain Gecko	(ex <i>L. stenodactylus</i>)						
	<i>Rhynchoedura ornata</i>	Western Beaked Gecko							
	<i>Strophurus ciliaris</i>	Northern Spiny-tailed Gecko							
	<i>Strophurus elderi</i>	Jewelled Gecko							
	<i>Strophurus jeanae</i>	Southern Phasmid Gecko							
Pygopodidae	<i>Delma butleri</i>	Unbanded Delma							
	<i>Delma haroldi</i>	Neck-barred Delma							
	<i>Delma nasuta</i>	Sharp-snouted Delma							
	<i>Delma pax</i>	Peaceful Delma							
	<i>Delma tincta</i>	Excitable Delma							
	<i>Lialis burtonis</i>	Burton's Legless Lizard							
	<i>Pygopus nigriceps</i>	Western Hooded Scaly-foot							
	<i>Carlia munda</i>	Shaded-litter Rainbow Skink							
	<i>Carlia triacantha</i>	Desert Rainbow Skink							
	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink							
<i>Cryptoblepharus plagiocephalus</i>	Peron's Snake-eyed Skink								
<i>Ctenotus angusticeps</i>	Airlie Island Ctenotus		P3 (DBCA list)						
<i>Ctenotus pallasotus</i>	Western Pilbara Lined Ctenotus		(ex <i>C. duricola</i>)						
<i>Ctenotus dux</i>	Narrow-lined Ctenotus								
<i>Ctenotus grandis</i>	Grand Ctenotus								
<i>Ctenotus hanloni</i>	Nimble Ctenotus								
<i>Ctenotus helenae</i>	Clay-soil Ctenotus								
<i>Ctenotus pantherinus</i>	Leopard Ctenotus								
<i>Ctenotus piankai</i>	Pianka's Ctenotus								
<i>Ctenotus rufescens</i>	Rufous Fine-snout Ctenotus								

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Family	Species	Common name	Status/comment	Introduced	Source						
					EPBC PMST	NatureMap	PESDB	Past reports	DBCA TFA	This survey	
	<i>Ctenotus saxatilis</i>	Rock Ctenotus									
	<i>Ctenotus serventyi</i>	North-western Sandy-loam Ctenotus									
	<i>Egernia epsilolus</i>	Eastern Pilbara Spiny-tailed Skink (ex <i>E. depressa</i>)									
	<i>Eremiascincus isolepis</i>	Northern Bar-lipped Skink									
	<i>Eremiascincus musivus</i>	Mosaic Desert Skink									
	<i>Eremiascincus pallidus</i>	Western Narrow-banded Skink									
	<i>Eremiascincus richardsonii</i>	Broad-banded Sand Swimmer									
	<i>Lerista bipes</i>	North-western Sandslider									
	<i>Lerista clara</i>	Sharp-blazed Three-toed Slider									
	<i>Lerista muelleri</i>	Wood Mulch-slider									
	<i>Lerista verhmens</i>	Powerful Three-toed Slider									
	<i>Liopholis kintorei</i>	Great Desert Skink	VU (EPBC & BC Acts)								
	<i>Menetia greyii</i>	Common Dwarf Skink									
	<i>Morethia ruficauda</i>	Lined Firetail Skink									
	<i>Notoscincus ornatus</i>	Ornate Snake-eyed Skink									
	<i>Proablepharus reginae</i>	Spinifex Snake-eyed Skink									
	<i>Tiliqua multifasciata</i>	Central Blue-tongue									
Varanidae	<i>Varanus acanthurus</i>	Spiny-tailed Monitor									
	<i>Varanus brevicauda</i>	Short-tailed Pygmy Monitor									
	<i>Varanus bushi</i>	Pilbara Mulga Monitor									
	<i>Varanus eremius</i>	Pygmy Desert Monitor									
	<i>Varanus giganteus</i>	Perentie									
	<i>Varanus gouldii</i>	Sand Monitor									
	<i>Varanus panoptes</i>	Yellow-spotted Monitor									
	<i>Varanus pilbarensis</i>	Pilbara Rock Monitor									
	<i>Varanus tristis</i>	Black-headed Monitor									
	<i>Anilios ammodytes</i>	Sand-diving Blind Snake									
	<i>Anilios grypus</i>	Northern Beaked Blind Snake									
	<i>Anilios pilbarensis</i>	Pilbara Hook-snouted Blind Snake									
Typhlopidae	<i>Indotyphlops braminus</i>	Flowerpot snake		*							

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Family	Species	Common name	Status/comment	Introduced	Source				This survey	
					EPBC PMST	NatureMap	PESDB	Past reports		DBCA TFA
Pythonidae	<i>Antaresia childreni</i>	Children's Python								
	<i>Antaresia perthensis</i>	Pygmy Python								
	<i>Aspidites melanocephalus</i>	Black-headed Python								
	<i>Aspidites ramsayi</i>	Woma								
	<i>Liasis olivaceus barroni</i>	Pilbara Olive Python	VU (EPBC & BC Acts)							
	<i>Fordonia leucobalia</i>	White-bellied Mangrove Snake								
Homalopsidae Elapidae	<i>Acanthophis pyrrhus</i>	Desert Death Adder								
	<i>Acanthophis wellsi</i>	Pilbara Death Adder								
	<i>Brachyuropsis approximans</i>	North-western Shovel-nosed Snake								
	<i>Demansia reticulata</i>	Reticulated Whipsnake								
	<i>Demansia rufescens</i>	Rufous Whipsnake								
	<i>Furina ornata</i>	Moon Snake								
	<i>Pseudechis australis</i>	Mulga Snake								
	<i>Pseudonaja mengdeni</i>	Western Brown Snake								
	<i>Pseudonaja modesta</i>	Ringed Brown Snake								
	<i>Pseudonaja nuchalis</i>	Gwardar								
	<i>Simoselaps anomalus</i>	Desert Banded Snake								
	<i>Suta punctata</i>	Spotted Snake								
	Birds (222)									
	Casuariidae Anatidae	<i>Dromaius novaehollandiae</i>	Emu							
<i>Anas gracilis</i>		Grey Teal								
<i>Anas superciliosa</i>		Pacific Black Duck								
<i>Aythya australis</i>		Hardhead								
<i>Cygnus atratus</i>		Black Swan								
<i>Dendrocygna arcuata</i>		Wandering Whistling Duck								
<i>Dendrocygna eytoni</i>		Plumed Whistling Duck								
<i>Malacorhynchus membranaceus</i>		Pink-eared Duck								
<i>Spatula rhynchotis</i>		Australasian Shoveler	(ex <i>Anas</i>)							
<i>Synoicus ypsilophora</i>		Brown Quail								
<i>Podargus strigoides</i>		Tawny Frogmouth								

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Family	Species	Common name	Status/comment	Introduced	Source				This survey
					EPBC PMST	NatureMap	PESDB	Past reports	
Caprimulgidae	<i>Eurostodopus argus</i>	Spotted Nightjar							
Aegothelidae	<i>Aegotheles cristatus</i>	Australian Owllet-nightjar							
Apodidae	<i>Apus pacificus</i>	Fork-tailed Swift	Mig. (EPBC & BC Acts)						
Otididae	<i>Ardeotis australis</i>	Australian Bustard							
Cuculidae	<i>Centropus phasianinus</i>	Pheasant Coucal							
	<i>Chalcites basalis</i>	Horsfield's Bronze Cuckoo							
	<i>Chalcites osculans</i>	Black-eared Cuckoo							
	<i>Cuculus optatus</i>	Oriental Cuckoo	Mig. (EPBC & BC Acts)						
	<i>Heteroscenes pallidus</i>	Pallid Cuckoo	(ex <i>Cacomantis</i>)						
Columbidae	<i>Columba livia</i>	Domestic Pigeon		*					
	<i>Geopelia cuneata</i>	Diamond Dove							
	<i>Geopelia humeralis</i>	Bar-shouldered Dove							
	<i>Geopelia striata placida</i>	Peaceful Dove							
	<i>Geophaps plumifera</i>	Spinifex Pigeon							
	<i>Ocyphaps lophotes</i>	Crested Pigeon							
	<i>Phaps chalcoptera</i>	Common Bronzewing							
	<i>Phaps histrionica</i>	Flock Bronzewing							
Rallidae	<i>Fulica atra</i>	Eurasian Coot							
	<i>Hypotaenidia philippensis</i>	Buff-banded Rail	(ex <i>Gallirallus</i>)						
	<i>Porphyrio melanotus</i>	Australasian Swamphen	(ex <i>P. porphyrio</i>)						
	<i>Porzana fluminea</i>	Australian Spotted Crane							
	<i>Tribonyx ventralis</i>	Black-tailed Native-hen							
Gruidae	<i>Grus rubicunda</i>	Brolga							
Podicipedidae	<i>Podiceps cristatus</i>	Great Crested Grebe							
	<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe							
	<i>Tachybaptus novaehollandiae</i>	Australasian Grebe							
Turnicidae	<i>Turnix velox</i>	Little Button-quail							
Burhinidae	<i>Burhinus grallarius</i>	Bush Stone-curlew							
	<i>Esacus magnirostris</i>	Beach Stone-curlew							
Haematopodidae	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher							

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Recurvirostridae	<i>Haematopus longirostris</i>	Pied Oystercatcher							
	<i>Cladorhynchus leucocephalus</i>	Banded Stilt							
Charadriidae	<i>Himantopus himantopus</i>	Black-winged Stilt							
	<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet							
	<i>Charadrius leschenaultii</i>	Greater Sand Plover	VU/Mig./VU (EPBC Act; BC Act)						
	<i>Charadrius mongolus</i>	Lesser Sand Plover	EN/Mig. (EPBC & BC Acts)						
	<i>Charadrius ruficapillus</i>	Red-capped Plover							
	<i>Charadrius veredus</i>	Oriental Plover	Mig. (EPBC & BC Acts)						
	<i>Eisayornis melanops</i>	Black-fronted Dotterel							
	<i>Erythronyx cinctus</i>	Red-kneed Dotterel							
	<i>Pluvialis fulva</i>	Pacific Golden Plover	Mig. (EPBC & BC Acts)						
	<i>Pluvialis squatarola</i>	Grey Plover	Mig. (EPBC & BC Acts)						
	<i>Vanellus miles</i>	Masked Lapwing							
	<i>Vanellus tricolor</i>	Banded Lapwing							
	Rostratulidae	<i>Rostratula australis</i>	Australian Painted Snipe	EN (EPBC & BC Acts)					
Scolopacidae	<i>Actitis hypoleucos</i>	Common Sandpiper	Mig. (EPBC & BC Acts)						
	<i>Arenaria interpres</i>	Ruddy Turnstone	Mig. (EPBC & BC Acts)						
	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mig. (EPBC & BC Acts)						
	<i>Calidris alba</i>	Sanderling	Mig. (EPBC & BC Acts)						
	<i>Calidris canutus</i>	Red Knot	EN/Mig./EN (EPBC Act; BC Act)						
	<i>Calidris falcinellus</i>	Broad-billed Sandpiper	Mig. (BC Act)						
	<i>Calidris ferruginea</i>	Curlew Sandpiper	CR/Mig./CR (EPBC Act; BC Act)						
	<i>Calidris melanotos</i>	Pectoral Sandpiper	Mig. (EPBC & BC Acts)						
	<i>Calidris pugnax</i>	Ruff	Mig. (EPBC & BC Acts)						
	<i>Calidris ruficollis</i>	Red-necked Stint	Mig. (EPBC & BC Acts)						
	<i>Calidris subminuta</i>	Long-toed Stint	Mig. (EPBC & BC Acts)						
	<i>Calidris tenuirostris</i>	Great Knot	CR/Mig./CR (EPBC Act; BC Act)						
	<i>Gallinago stenura</i>	Pin-tailed Snipe	Mig. (EPBC & BC Acts)						
<i>Limnodromus semipalmatus</i>	Asian Dowitcher	Mig. (EPBC & BC Acts)							
<i>Limosa lapponica menzibieri</i>	Bar-tailed Godwit	CR/Mig. (EPBC & BC Acts)							

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Glareolidae	<i>Limosa limosa</i>	Black-tailed Godwit	Mig. (BC Act)		•	•			•	
	<i>Numenius madagascariensis</i>	Eastern Curlew	CR/Mig./CR (EPBC Act; BC Act)		•	•	•	•	•	
	<i>Numenius minutus</i>	Little Curlew	Mig. (EPBC & BC Acts)		•	•	•	•	•	
	<i>Numenius phaeopus</i>	Whimbrel	Mig. (EPBC & BC Acts)		•	•	•	•	•	
	<i>Phalaropus lobatus</i>	Red-necked Phalarope	Mar/Mig. (EPBC Act; BC Act)		•	•	•	•	•	
	<i>Tringa brevipes</i>	Grey-tailed Tattler	Mig. EPBC and BC Acts; P4 DBCA list		•	•	•	•	•	
	<i>Tringa glareola</i>	Wood Sandpiper	Mig. (EPBC & BC Acts)		•	•	•	•	•	
	<i>Tringa nebularia</i>	Common Greenshank	Mig. (EPBC & BC Acts)		•	•	•	•	•	
	<i>Tringa stagnatilis</i>	Marsh Sandpiper	Mig. (EPBC & BC Acts)		•	•	•	•	•	
	<i>Xenus cinereus</i>	Terek Sandpiper	Mig. (EPBC & BC Acts)		•	•	•	•	•	
	<i>Glareola maldivarum</i>	Oriental Pratincole	Mig. (EPBC & BC Acts)		•	•	•	•	•	
	<i>Stiltia isabella</i>	Australian Pratincole			•	•	•	•	•	
	Laridae	<i>Anous stolidus</i>	Common Noddy	Mig. (EPBC & BC Acts)		•	•	•	•	•
		<i>Chlidonias hybrida</i>	Whiskered Tern	(ex <i>Sterna</i>)		•	•	•	•	•
		<i>Chlidonias leucopterus</i>	White-winged Black Tern	Mig. (EPBC & BC Acts)		•	•	•	•	•
		<i>Chroicocephalus novaehollandiae</i>	Silver Gull	(ex <i>Larus</i>)		•	•	•	•	•
		<i>Gelochelidon nilotica</i>	Gull-billed Tern	Mig. (BC Act)		•	•	•	•	•
		<i>Hydroprogne caspia</i>	Caspian Tern	Mig. (EPBC & BC Acts)		•	•	•	•	•
		<i>Onychoprion anaethetus</i>	Bridled Tern	Mig. (EPBC & BC Acts)		•	•	•	•	•
		<i>Sterna dougallii</i>	Roseate Tern	Mig. (EPBC & BC Acts)		•	•	•	•	•
<i>Sterna hirundo</i>		Common Tern	Mig. (EPBC & BC Acts)		•	•	•	•	•	
<i>Sternula albifrons</i>		Little Tern	Mig. (EPBC & BC Acts)		•	•	•	•	•	
<i>Sternula nereis nereis</i>		Fairy Tern	VU (EPBC & BC Acts)		•	•	•	•	•	
<i>Thalasseus bengalensis</i>		Lesser Crested Tern			•	•	•	•	•	
<i>Thalasseus bergii</i>		Crested Tern	Mig. (BC Act)		•	•	•	•	•	
<i>Phaethon lepturus</i>		White-tailed Tropicbird	Mig. (EPBC & BC Acts)		•	•	•	•	•	
Procellariidae	<i>Oceanites oceanicus</i>	Wilson's Storm Petrel	Mig. (EPBC & BC Acts)		•	•	•	•	•	
	<i>Ardenna pacifica</i>	Wedge-tailed Shearwater	Mig. (EPBC & BC Acts) (ex <i>Puffinus</i>)		•	•	•	•	•	
	<i>Calonectris leucomelas</i>	Streaked Shearwater	Mig. (EPBC & BC Acts)		•	•	•	•	•	
	<i>Macronectes giganteus</i>	Southern Giant Petrel	EN/Mig./Mig. (EPBC Act; BC Act)		•	•	•	•	•	

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Ciconiidae	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork							
Fregatidae	<i>Fregata ariel</i>	Lesser Frigatebird	Mig. (EPBC & BC Acts)						
	<i>Fregata minor</i>	Great Frigatebird	Mig. (EPBC & BC Acts)						
Sulidae	<i>Sula leucogaster</i>	Brown Booby	Mig. (EPBC & BC Acts)						
Anhingidae	<i>Anhinga novaehollandiae</i>	Australasian Darter							
Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	Little Pied Cormorant							
	<i>Phalacrocorax carbo</i>	Great Cormorant							
	<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant							
	<i>Phalacrocorax varius</i>	Pied Cormorant							
	<i>Platalea flavipes</i>	Yellow-billed Spoonbill							
	<i>Platalea regia</i>	Royal Spoonbill							
Threskiornithidae	<i>Plegadis falcinellus</i>	Glossy Ibis	Mig. (EPBC & BC Acts)						
	<i>Threskiornis moluccus</i>	Australian White Ibis							
	<i>Threskiornis spinicollis</i>	Straw-necked Ibis							
	<i>Ardea alba modesta</i>	Great Egret							
	<i>Ardea intermedia</i>	Intermediate Egret							
	<i>Ardea pacifica</i>	White-necked Heron							
Ardeidae	<i>Bubulcus coromandus</i>	Eastern Cattle Egret	(ex <i>Ardea ibis</i>)						
	<i>Butorides striata</i>	Striated Heron							
	<i>Egretta garzetta</i>	Little Egret							
	<i>Egretta novaehollandiae</i>	White-faced Heron							
	<i>Egretta sacra</i>	Eastern Reef Egret							
	<i>Nycticorax caledonicus</i>	Rufous Night Heron							
Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian Pelican							
Pandionidae	<i>Pandion cristatus</i>	Osprey	Mig. (EPBC & BC Acts)						
Accipitridae	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk							
	<i>Accipiter fasciatus</i>	Brown Goshawk							
	<i>Aquila audax</i>	Wedge-tailed Eagle							
	<i>Circus approximans</i>	Swamp Harrier							
	<i>Circus assimilis</i>	Spotted Harrier							

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	<i>Elanus caeruleus</i>	Black-shouldered Kite			•					•
	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle				•				•
	<i>Haliastur indus</i>	Brahminy Kite			•	•				•
	<i>Haliastur sphenurus</i>	Whistling Kite			•					•
	<i>Hieraetus morphnoides</i>	Little Eagle			•					•
	<i>Milvus migrans</i>	Black Kite			•					•
Tytonidae	<i>Tyto alba</i>	Barn Owl			•					•
Strigidae	<i>Ninox connivens</i>	Barking Owl			•					
Alcedinidae	<i>Dacelo leachii</i>	Blue-winged Kookaburra			•					•
	<i>Todiramphus chloris</i>	Collared Kingfisher			•					•
	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher			•					•
	<i>Todiramphus sanctus</i>	Sacred Kingfisher			•					•
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater			•					•
Falconidae	<i>Falco berigora</i>	Brown Falcon			•					•
	<i>Falco cenchroides</i>	Australian Kestrel			•					•
	<i>Falco hypoleucos</i>	Grey Falcon	VU (BC Act)		•					•
	<i>Falco longipennis</i>	Australian Hobby			•					•
Cacatuidae	<i>Falco peregrinus</i>	Peregrine Falcon	OS (BC Act)		•					•
	<i>Falco subniger</i>	Black Falcon								•
	<i>Cacatua sanguinea</i>	Little Corella			•					•
	<i>Eolophus roseicapilla</i>	Galah			•					•
Psittaculidae	<i>Nymphicus hollandicus</i>	Cockatiel			•					•
	<i>Barnardius zonarius</i>	Australian Ringneck			•					•
	<i>Melopsittacus undulatus</i>	Budgerigar			•					•
	<i>Pezoporus occidentalis</i>	Night Parrot	EN/CR (EPBC Act; BC Act)		•					•
Ptilonorhynchidae	<i>Purpureicephalus spurius</i>	Red-capped Parrot	(SW species, extralimital)		•					•
	<i>Chlamydera guttata</i>	Western Bowerbird	(ex <i>Ptilonorhynchus maculatus</i>)		•					•
Maluridae	<i>Malurus assimilis</i>	Purple-backed Fairy-wren			•					•
	<i>Malurus leucopterus</i>	White-winged Fairy-wren			•					•
	<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren			•					•

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Meliphagidae	<i>Epthianura aurifrons</i>	Orange Chat							
	<i>Epthianura tricolor</i>	Crimson Chat							
	<i>Gavicalis virescens</i>	Singing Honeyeater							
	<i>Lichmera indistincta</i>	Brown Honeyeater							
	<i>Manorina flavigula</i>	Yellow-throated Miner							
	<i>Melithreptus gularis</i>	Black-chinned Honeyeater							
	<i>Ptilotula keartlandi</i>	Grey-headed Honeyeater							
	<i>Ptilotula penicillata</i>	White-plumed Honeyeater							
	<i>Sugomel nigrum</i>	Black Honeyeater							
	<i>Pardalotus rubricatus</i>	Red-browed Pardalote							
Acanthizidae	<i>Pardalotus striatus</i>	Striated Pardalote							
	<i>Gerygone fusca</i>	Western Gerygone							
	<i>Gerygone tenebrosa</i>	Dusky Gerygone							
	<i>Smicrornis brevirostris</i>	Weebill							
Pomatostomidae	<i>Pomatostomus superciliosus</i>	White-browed Babbler							
	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler							
Cinclosomatidae	<i>Cinclosoma marginatum</i>	Western Quail-thrush	(ex C. castaneothorax; extralimital, southern Pilbara)						
Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow							
	<i>Artamus cyanopterus</i>	Dusky Woodswallow							
	<i>Artamus leucorhynchus</i>	White-breasted Woodswallow							
	<i>Artamus minor</i>	Little Woodswallow							
	<i>Artamus personatus</i>	Masked Woodswallow							
	<i>Artamus superciliosus</i>	White-browed Woodswallow							
	<i>Cracticus nigrogularis</i>	Pied Butcherbird							
Campephagidae	<i>Gymnorhina tibicen</i>	Australian Magpie							
	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike							
	<i>Lalage tricolor</i>	White-winged Triller							
Oreoicidae	<i>Oreoica gutturalis</i>	Crested Bellbird							
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike-thrush							
	<i>Pachycephala lanioides</i>	White-breasted Whistler							

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	<i>Motacilla flava</i>	Yellow Wagtail	Mig. (EPBC & BC Acts)		•	•			•
Mammals (46)									
Tachyglorissidae	<i>Tachyglorissus aculeatus</i>	Short-beaked Echidna							•
Dasyuridae	<i>Antechinomys laniger</i>	Kultarr			•	•			
	<i>Dasyercus blythi</i>	Brush-tailed Mulgara	P4 (DBCA list)		•	•			•
	<i>Dasykaluta rosamondae</i>	Little Red Kaluta			•	•			•
	<i>Dasyurus hallucatus</i>	Northern Quoll	EN (EPBC & BC Acts)		•				•
	<i>Ningauai timealeyi</i>	Pilbara Ningauai			•				
	<i>Planigale ingrami</i>	Long-tailed Planigale			•				
	<i>Pseudantechinus woolleyae</i>	Woolley's Pseudantechinus			•				
	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart			•				
	<i>Sminthopsis youngsoni</i>	Lesser Hairy-footed Dunnart			•	•			•
Thylacomyidae	<i>Macrotis lagotis</i>	Greater Bilby	VU (EPBC & BC Acts)		•	•			•
Macropodidae	<i>Lagostrophus fasciatus fasciatus</i>	Banded Hare-wallaby, Mernine	VU (EPBC & BC Acts), extinct on mainland						•
	<i>Osphranter robustus</i>	Euro			•				•
	<i>Osphranter rufus</i>	Red Kangaroo							•
	<i>Petrogale rothschildi</i>	Rothschild's Rock-wallaby			•				
Muridae	<i>Mus musculus</i>	House Mouse		*	•				•
	<i>Notomys alexis</i>	Spinifex Hopping-mouse			•	•			•
	<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	P4 (DBCA list)		•				•
	<i>Pseudomys delicatulus</i>	Delicate Mouse			•				
	<i>Pseudomys desertor</i>	Desert Mouse			•				
	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse			•	•			•
	<i>Pseudomys nanus</i>	Western Chestnut Mouse			•				•
	<i>Rattus rattus</i>	Black Rat		*	•				
	<i>Zyzomys argurus</i>	Common Rock-rat			•				•
Leporidae	<i>Oryctolagus cuniculus</i>	Rabbit		*	•				•
Pteropodidae	<i>Pteropus scapulatus</i>	Little Red Flying-fox			•				•
Rhinyoncteridae	<i>Rhinyoncteris aurantia</i> (Pilbara)	Pilbara Leaf-nosed Bat	VU (EPBC & BC Acts)		•				•
Megadermatidae	<i>Macroderma gigas</i>	Ghost Bat	VU (EPBC & BC Acts)		•				•

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Emballonuridae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tailed Bat								
	<i>Taphozous georgianus</i>	Common Sheath-tailed Bat								
Molossidae	<i>Chaerephon jobensis</i>	Greater Northern Freetail-bat								
	<i>Ozimops cobourgianus</i>	North-western Free-tailed Bat	P1 (DBCA list)							
	<i>Ozimops lumsdenae</i>	Northern Free-tailed Bat								
	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat								
Vespertilionidae	<i>Nyctophilus arnhemensis</i>	Arnhem Land Long-eared Bat								
	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat								
	<i>Scotorepens greyii</i>	Little Broad-nosed Bat								
	<i>Vespadelus finlaysoni</i>	Finlayson's Cave Bat								
	<i>Canis familiaris</i>	Dog		*						
Canidae	<i>Vulpes vulpes</i>	Red Fox		*						
	<i>Felis catus</i>	Cat		*						
Felidae	<i>Equus asinus</i>	Donkey		*						
	<i>Equus caballus</i>	Horse		*						
Bovidae	<i>Bos taurus</i>	European Cattle		*						
	<i>Capra hircus</i>	Goat		*						
Camelidae	<i>Camelus dromedarius</i>	Dromedary camel		*						

Appendix 4 SRE invertebrate desktop results

Higher taxon, family	Species	SRE category	Nearest record (km)	Habitat records
Class Arachnida, infraorder Araneomorphae (Selenopid spiders) (4)				
Selenopidae	<i>Karaops`aurizon`</i>	Potential	71.5	Footslope
	<i>Karaops`sp. indet.`</i>	Uncertain	50.0	
	<i>Karaops kariyarra</i>	Confirmed	38.0	Breakaway, ridge
	<i>Karaops nyiyaparli</i>	Widespread	50.8	East facing ridge
Class Arachnida, infraorder Mygalomorphae (trapdoor spiders) (38)				
Actinopodidae	<i>Missulena`sp. 8`</i>	Potential	45.3	
	<i>Missulena`sp. indet.`</i>	Uncertain	7.3	
	<i>Missulena rutraspina</i>	Widespread	61.2	
Anamidae	<i>`MYGAAB`sp. indet.`</i>	Uncertain	40.3	
	<i>Aname`mainae`</i>	Widespread	80.2	
	<i>Aname`MYG001 group, mellosa?`</i>	Potential	68.7	
	<i>Aname`MYG372`</i>	Potential	74.9	Drainage line
	<i>Aname`MYG373`</i>	Potential	0.7	Sandplain
	<i>Aname`MYG682`</i>	Potential	73.4	
	<i>Aname`MYG770`</i>	Potential	86.6	
	<i>Aname`sp. indet.`</i>	Uncertain	1.8	Sandplain, drainage line
	<i>Aname baileyorum</i>	Widespread	55.3	Drainage line
	<i>Aname ellenae</i>	Widespread	35.6	
	<i>Aname frostorum</i>	Confirmed	84.8	
	<i>Aname mcalpinei</i>	Confirmed	0.2	Shrubland on sandplain
	<i>Aname mellosa</i>	Widespread	73.6	Drainage line, breakaway
	<i>Aname sinuata</i>	Widespread	2.2	
	<i>Anamidae`sp. indet.`</i>	Uncertain	40.3	
	<i>Kwonkan`MYG007`</i>	Potential	0.7	Acacia shrubland on sandplain
	<i>Kwonkan`MYG089`</i>	Potential	48.3	
	<i>Kwonkan`MYG092`</i>	Potential	80.9	
	<i>Kwonkan`MYG209`</i>	Potential	8.5	Acacia shrubland on sandplain
	<i>Kwonkan`sp. indet.`</i>	Uncertain	38.8	
Barychelidae	<i>Aureocrypta`chichester`</i>	Widespread	94.8	
	<i>Aureocrypta`MYG318`</i>	Potential	93.9	East facing ridge
	<i>Barychelidae`sp. indet.`</i>	Uncertain	73.4	
	<i>Synothele`MYG115`</i>	Potential	91.3	
	<i>Synothele`MYG127`</i>	Widespread	95.1	Gully
	<i>Synothele`MYG334`</i>	Potential	94.9	
	<i>Synothele`sp. indet.`</i>	Uncertain	41.7	Ironstone gorge
	<i>Synothele`xkarara`</i>	Potential	81.2	
Halonoproctidae	<i>Conothele`MYG541`</i>	Potential	6.8	Hummock grassland
	<i>Conothele`MYG607`</i>	Potential	71.6	
	<i>Conothele`sp. indet.`</i>	Uncertain	94.1	

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Idiopidae	`Aganippe` `MYG084`	Potential	8.5	Acacia, spinifex on sandplain
	`Aganippe` `sp. indet.`	Uncertain	68.5	
	`Aganippe` `occidentale`	Potential	38.9	
	Idiopidae `sp. indet.`	Uncertain	17.4	
Class Arachnida, order Opiliones (Harvestmen spiders) (2)				
Assamiidae	Assamiidae `sp. indet.`	Uncertain	34.9	
	<i>Dampetrus</i> `sp. indet.`	Uncertain	34.0	
Class Arachnida, order Pseudoscorpiones (Pseudoscorpions) (39)				
Atemnidae	<i>Anatemnus</i> `sp. indet.`	Uncertain	103.4	
	<i>Oratemnus</i> `PSE060`	Potential	65.5	
	<i>Oratemnus</i> `sp. indet.`	Uncertain	20.0	Drainage line, breakaway, under Ficus
Cheiridiidae	`PSEAAB` `sp. indet.`	Uncertain	75.3	Ficus on ridge
	<i>Apocheiridium</i> `sp. indet.`	Uncertain	53.1	Granite outcrop
	Cheiridiidae `sp. indet.`	Uncertain	79.4	Gully
Chernetidae	`PSEAAF` `PSE-A`	Potential	67.3	Under eucalyptus bark
	`PSEAAF` `sp. indet.`	Uncertain	89.1	Under bark of <i>Corymbia hamersleyana</i>
	<i>Austrochernes</i> `sp. nov. 001`	Potential	50.8	South facing ridge
	<i>Sundochernes</i> `PSE021`	Potential	53.1	Granite outcrop
	<i>Austrochthonius</i> `PSE135, pilbara`	Widespread	50.0	Under Ficus
	<i>Austrochthonius</i> `sp. indet.`	Uncertain	94.1	Gorge, gully
	<i>Tyrannochthonius</i> `sp. nov. near aridus`	Potential	52.4	Gorge, gully
	<i>Tyrannochthonius aridus</i>	Widespread	1.9	Under Ficus on ridge
Feaellidae	<i>Feaella tealei</i>	Confirmed	100.5	Under rocks
Garypidae	<i>Synsphyronus</i> `PSE008`	Potential	86.0	Granite outcrop
	<i>Synsphyronus</i> `PSE012`	Potential	82.2	Under Ficus
	<i>Synsphyronus</i> `PSE094, long chelal hand`	Potential	38.0	Low ridge
	<i>Synsphyronus</i> `PSE128`	Potential	63.1	Ficus on ridge, in gully
	<i>Synsphyronus</i> `sp. indet.`	Uncertain	81.4	Under bark and rocks
	<i>Synsphyronus heptatrachus</i>	Widespread	63.1	Ficus on ridge
	<i>Synsphyronus xynus</i>	Widespread	88.2	Under bark of <i>Corymbia hamersleyana</i>
Garypinidae	<i>Solinus</i> `PSE222`	Potential	87.6	Under eucalyptus bark
Hyidae	<i>Indohya</i> `PSE002`	Potential	50.6	Drainage line, gorge, ridge
Olpiidae	`Genus 7/4` `sp. indet.`	Uncertain	11.9	Shrubland on sandplain
	`PSEAAA` `sp. indet.`	Uncertain	50.6	Under Ficus
	<i>Austrohorus</i> `sp. indet.`	Uncertain	1.8	Under Ficus, ridge
	<i>Beierolpium</i> `sp. 8/2`	Widespread	26.9	Under Ficus, outcrop
	<i>Beierolpium</i> `sp. 8/3`	Widespread	0.7	Drainage line, breakaway, sandplain
	<i>Beierolpium</i> `sp. 8/4 lge`	Potential	8.9	Under Ficus, eucalyptus woodland
	<i>Beierolpium</i> `sp. 8/4 small`	Potential	8.6	<i>Melaleuca</i> sandplain

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	<i>Beierolpium</i> `sp. 8/4`	Potential	50.7	South facing ridge
	<i>Beierolpium</i> `sp. indet.`	Uncertain	2.7	Drainage depression
	<i>Indolpium</i> `long chelal hand`	Potential	77.0	Under rocks beneath Ficus tree
	<i>Indolpium</i> `sp. indet.`	Uncertain	0.7	Gully, ridge, sandplain
	<i>Linnaeolpium</i> `sp. indet.`	Uncertain	76.5	Under Ficus
	Olpiidae `sp. indet.`	Uncertain	7.3	Shrubland on sandplain
Sternophoridae	<i>Afrosterophorus</i> `sp. indet.`	Uncertain	34.0	Outcrop, gully
Syarinidae	<i>Ideoblothrus</i> `sp. Ord Ranges`	Potential	61.5	
Class Arachnida, order Scorpiones (Scorpions) (42)				
Buthidae	Buthidae `sp. indet.`	Uncertain	2.2	
	<i>Isometroides</i> `sp. 2`	Potential	87.7	
	<i>Lychas</i> `adonis`	Widespread	2.2	<i>Melaleuca</i> sandplain
	<i>Lychas</i> `annulatus complex`	Potential	88.3	Drainage line
	<i>Lychas</i> `bituberculatus complex`	Potential	53.1	Granite outcrop, Ficus on ridge
	<i>Lychas</i> `bituberculatus group`	Potential	79.4	
	<i>Lychas</i> `gracilimanus`	Potential	90.0	
	<i>Lychas</i> `hairy tail complex`	Potential	56.0	Granite outcrop
	<i>Lychas</i> `hairy tail group`	Potential	81.2	
	<i>Lychas</i> `hairy tail`	Potential	64.0	Under Ficus
	<i>Lychas</i> `harveyi`	Widespread	74.9	Drainage line
	<i>Lychas</i> `macleod`	Potential	94.3	
	<i>Lychas</i> `multipunctatus complex`	Potential	91.4	
	<i>Lychas</i> `multipunctatus`	Widespread	1.8	Drainage line, breakaway
	<i>Lychas</i> `pilbara 1`	Widespread	94.1	
	<i>Lychas</i> `sp. 1`	Widespread	72.5	
	<i>Lychas</i> `sp. 2`	Widespread	38.5	
	<i>Lychas</i> `sp. 3`	Potential	113.9	
	<i>Lychas</i> `sp. 4`	Widespread	61.2	
	<i>Lychas</i> `sp. 5`	Potential	52.9	
	<i>Lychas</i> `sp. 6`	Widespread	75.5	
	<i>Lychas</i> `sp. indet.`	Uncertain	8.5	Drainage line, breakaway, ridge
	<i>Lychas annulatus</i>	Widespread	48.4	
	<i>Lychas bituberculatus</i>	Widespread	23.3	Plain, drainage depression
Urodacidae	<i>Urodacus</i> `armatus`	Potential	5.9	
	<i>Urodacus</i> `pilbara 13`	Widespread	1.8	Sandplain with low <i>Acacia</i> /grasses
	<i>Urodacus</i> `pilbara 4`	Widespread	81.4	
	<i>Urodacus</i> `Pilbara 5`	Widespread	56.0	Drainage line
	<i>Urodacus</i> `pilbara 8`	Widespread	93.3	
	<i>Urodacus</i> `SCO010, pearcei`	Potential	94.3	
	<i>Urodacus</i> `SCO028`	Potential	95.5	
	<i>Urodacus</i> `SCO034, Pilbara sp. 2`	Potential	77.6	

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	<i>Urodacus</i> `SCO035, pilbara sp. 2`	Potential	70.6	Drainage line
	<i>Urodacus</i> `SCO057, Pilbara sp. 2`	Potential	73.6	
	<i>Urodacus</i> `sp. 5`	Widespread	123.8	
	<i>Urodacus</i> `sp. 6`	Widespread	91.3	
	<i>Urodacus</i> `sp. 7`	Widespread	45.5	
	<i>Urodacus</i> `sp. indet.`	Uncertain	2.7	
	<i>Urodacus</i> `sp. Pilbara 3`	Widespread	80.9	
	<i>Urodacus</i> `sp. Pilbara 8`	Widespread	94.9	
	<i>Urodacus hoplurus</i>	Widespread	7.3	
	<i>Urodacus varians</i>	Widespread	26.7	Eucalypt over <i>Triodia pungens</i>
Class Chilopoda (Centipedes) (4)				
Chilenophilidae	<i>Sepedonophilus</i> `sp. indet.`	Uncertain	106.1	
Geophilidae	Geophilidae `sp. indet.`	Uncertain	98.3	
Scutigerae	<i>Pilbarascutigera</i> `sp. indet.`	Uncertain	74.0	
	<i>Pilbarascutigera incola</i>	Widespread	15.3	
Class Diplopoda (Millipedes) (18)				
Paradoxosomatidae	`DIPAAAC` `DIP030`	Potential	80.9	
	<i>Antichiropus</i> `DIP005, abydos`	Potential	93.9	Drainage line
	<i>Antichiropus</i> `DIP033, wodgina`	Potential	64.4	Under Ficus
	<i>Antichiropus</i> `DIP037, balfour1`	Potential	113.9	
	<i>Antichiropus</i> `sp. indet.`	Uncertain	38.3	North facing gully
	<i>Antichiropus apricus</i>	Confirmed	96.6	
	<i>Antichiropus forcipatus</i>	Confirmed	72.6	Gully, drainage line, sandstone gorge
	<i>Antichiropus patriciae</i>	Widespread	45.3	
	<i>Antichiropus salutus</i>	Potential	80.9	
	<i>Antichiropus simmonsii</i>	Confirmed	61.2	
	<i>Orthomorpha coarctata</i>	Widespread	10.6	In & under pot plants
	Paradoxosomatidae `sp. indet.`	Uncertain	57.0	Under Ficus
Polyxenidae	Polyxenidae `sp. indet.`	Uncertain	81.0	
	<i>Unixenus</i> `mjoebergi complex`	Potential	50.9	
	<i>Unixenus mjoebergi</i>	Potential	7.3	Under stones on beach
Synxenidae	Synxenidae `sp. indet.`	Uncertain	13.4	
Trigoniulidae	<i>Austrostrophus</i> `sp. indet.`	Uncertain	93.9	Ironstone/sandstone gorge, gully
	<i>Austrostrophus stictopygus</i>	Widespread	93.9	Ironstone/sandstone gorge, gully
Class Malacostraca, order Isopoda (Isopods) (18)				
Armadillidae	<i>Acanthodillo</i> `sp. indet.`	Uncertain	8.5	
	<i>Buddelundia</i> `sp. 10`	Widespread	0.8	<i>Acacia spinifex</i> sandplain, minor drainage line
	<i>Buddelundia</i> `sp. 11`	Potential	93.6	Gully, gorge
	<i>Buddelundia</i> `sp. 13`	Widespread	74.9	Drainage line
	<i>Buddelundia</i> `sp. 14`	Widespread	8.6	Ficus on ridge, outcrop, drainage line

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Higher taxon, family	Species	SRE category	Nearest record (km)	Habitat records
	<i>Buddelundia</i> `sp. 14re`	Potential	53.1	Granite outcrop
	<i>Buddelundia</i> `sp. 17`	Potential	8.5	Sandplain, ridge
	<i>Buddelundia</i> `sp. 18`	Widespread	88.3	Sandstone/ironstone gorge, ridge
	<i>Buddelundia</i> `sp. 19`	Potential	2.3	Sandplain, drainage line
	<i>Buddelundia</i> `sp. 21`	Potential	50.6	Under Ficus, south facing ridge
	<i>Buddelundia</i> `sp. 31`	Potential	53.1	Ridge, granite outcrop
	<i>Buddelundia</i> `sp. 36`	Widespread	64.0	Ficus on ridge
	<i>Buddelundia</i> `sp. indet.`	Uncertain	76.7	
	<i>Buddelundiinae</i> `sp. indet.`	Uncertain	52.4	
	<i>Buddelundiinae abydos</i>	Widespread	94.0	Gorge, gully
	<i>Spherillo</i> `sp. indet.`	Uncertain	88.3	Drainage line
	<i>Spherillo wodgina</i>	Potential	8.6	Outcrop, drainage line
Philosciidae	<i>Laevophiloscia</i> `sp. indet.`	Uncertain	76.2	Breakaway
Class Gastropoda (Land snails) (40)				
Camaenidae	Camaenidae `sp. indet.`	Uncertain	7.9	
	Camaenidae cf. `Mount Robinson` n.sp.	Potential	64.0	Under rocks and leaf litter on outcrop
	Camaenidae cf. `Z` n.sp.	Potential	81.5	Under rocks and leaf litter on ridge
	Camaenidae n.sp.	Potential	63.6	Under Ficus, outcrop, ridge
	<i>Quistrachia</i> `Depuch Island` n.sp.	Potential	84.7	
	<i>Quistrachia herberti</i>	Potential	102.3	
	<i>Quistrachia turneri</i>	Potential	91.0	Granite outcrop
	<i>Rhagada</i> `sp. indet.`	Uncertain	0.0	
	<i>Rhagada</i> aff. <i>Richardsonii</i>	Potential	95.9	Drainage line
	<i>Rhagada</i> cf. <i>convicta</i>	Widespread	42.6	Limestone ridge, ancient sand dune
	<i>Rhagada</i> cf. <i>richardsonii</i>	Widespread	27.5	Drainage line
	<i>Rhagada convicta</i>	Widespread	46.3	Under and among roots of <i>Triodia</i>
	<i>Rhagada radleyi</i>	Widespread	95.6	
	<i>Rhagada richardsonii</i>	Widespread	15.1	Under green <i>Triodia</i>
	<i>Rhagada</i> sp. `med banded`	Potential	103.1	
	<i>Rhagada</i> sp. `Sulpher Springs`	Potential	99.8	
<i>Rhagada tescorum</i>	Widespread	46.3		
Geomitridae	<i>Cochlicella acuta</i>	Widespread	89.8	Spinifex plain
Helicidae	<i>Theba pisana</i>	Potential	92.9	Shrubland
Helicodiscidae	<i>Stenopylis</i> cf. <i>coarctata</i>	Potential	94.8	Drainage line
	<i>Stenopylis coarctata</i>	Widespread	35.3	Drainage line
Pupillidae	<i>Gastrocopta</i> `sp. indet.`	Uncertain	96.5	Sandstone gorge
	<i>Gastrocopta</i> cf. <i>larapinta</i>	Widespread	35.3	Drainage line
	<i>Gastrocopta</i> cf. <i>mussoni</i>	Widespread	7.3	
	<i>Gastrocopta hedleyi</i>	Widespread	84.6	
	<i>Gastrocopta larapinta</i>	Widespread	62.8	Breakaway, drainage line

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	<i>Gastrocopta mussoni</i>	Widespread	20.0	Ridge, gully, drainage line
	<i>Pupoides</i> `sp. indet.`	Uncertain	35.3	
	<i>Pupoides beltianus</i>	Widespread	2.3	
	<i>Pupoides</i> cf. <i>beltianus</i>	Widespread	2.3	Outcrop, under Ficus
	<i>Pupoides</i> cf. <i>contrarius</i>	Widespread	7.3	
	<i>Pupoides</i> cf. <i>eremicolus</i>	Widespread	2.9	
	<i>Pupoides</i> cf. <i>lepidulus</i>	Widespread	7.3	
	<i>Pupoides</i> cf. <i>pacificus</i>	Widespread	64.4	Ficus on ridge
	<i>Pupoides contrarius</i>	Widespread	2.9	Limestone
	<i>Pupoides eremicolus</i>	Widespread	88.5	Breakaway
	<i>Pupoides lepidulus</i>	Widespread	2.9	Red soil, spinifex
	<i>Pupoides pacificus</i>	Widespread	2.3	Drainage line, gorge
Subulinidae	<i>Eremopeas interioris</i>	Widespread	23.3	Drainage line, breakaway
	<i>Succinea</i> `sp. indet.`	Uncertain	8.0	Drainage

Appendix 5 Exhaustive likelihood of occurrence list including rationale behind categorisation

Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
Reptiles (5)										
<i>Chelonia mydas</i> Green Turtle	VU/Mig. /VU (EPBC Act; BC Act)	Historical written record	6.0 km NNE	Marine	Marine environments	Unlikely	Historic records may not represent current species distribution	The location is close, but the habitats vary considerably, and no connecting suitable habitat exists	This species is marine and only found on beaches near marine environments	It would be extremely difficult for this species to disperse to any habitat within the study area
<i>Ctenotus angusticeps</i> Airlie Island Ctenotus	P3 (DBCA list)	2012	2.7 km NNW	grassland	The Airlie Island Ctenotus is known from approximately 12 locations in north-west WA (DoEE 2018b). On the mainland it generally inhabits the landward fringe of salt marsh communities in samphire shrubland or marine couch grassland (Maryan <i>et al.</i> 2013) in the intertidal zone along mangrove (Grey Mangrove (Avicennia marina) with occasional Red Mangrove (<i>Rhizophora stylosa</i>)) margins, however, subtle differences in vegetation/topography exist among sites where the species has been recorded (Biologic 2012). The Airlie Island Ctenotus is strongly associated with samphire species <i>Tectornia halocnemoides subsp.tenuis</i> and <i>Suaeda</i>	Unlikely	The record is not considered recent	There are records close to the study area	Limited corridors are available to facilitate dispersal into the study area, although it is unlikely, they would occur in significant proportions for important life history stages	The Project is unlikely to significantly impact populations nearby and this species may only be detected in low abundance (if detected at all)

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Eretmochelys imbricata</i> Hawksbill Turtle	VU/Mig. /VU (EPBC Act; BC Act)	Historical written record	7.9 km NNE	Marine	<i>arbusculoides</i> , which occur on clayey soils, and mixed herb and grass cover of <i>Muellerolimon salicorniaceum</i> and <i>Sporobolus virginicus</i> , which occur on sandy soils (Maryan <i>et al.</i> 2013) Marine environments.	Unlikely	Historic records may not represent current species distribution	The location is close, but the habitats vary considerably, and no connecting suitable habitat exists	This species is marine and only found on beaches near marine environments	it would be extremely difficult for this species to disperse to any habitat within the study area
<i>Liasis olivaceus barroni</i> Pilbara Olive Python	VU (EPBC & BC Acts)	2012	26.4 km SSE	Rocky areas near water	It is commonly found in rocky areas in association with watercourses and pools and often associated with areas of permanent pooling water near rocky habitats, such as gullies, gorges and rocky ranges or boulder sites.	Unlikely	The record is not considered recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Limited suitable habitat is available within the study area, although it is considered possible that this species may infrequent the study area and make use of the available habitats	Given the lack of recent records and the wide available habitats outside the study area, it is unlikely that the study area supports a significant number of this species or provides important resources for

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Liopholis kintorei</i> Great Desert Skink	VU (EPBC Act; BC Act)	N/A	Projected distribution	Central deserts	Arid sand flats and clay-based or loamy soils with spinifex	Unlikely	Never recorded within desktop search area	Never recorded in Pilbara IBRA region	Despite structurally similar habitat, actual distribution is remote from the study area	significant life history stages Not capable of long-distance dispersal
<i>Natator depressus</i> Flatback Turtle	VU/Mig. /VU (EPBC Act; BC Act)	Historical written record	1.7 km W	Marine	Marine environments	Unlikely	Historic records may not represent current species distribution	The location is close, but the habitats vary considerably, and no connecting suitable habitat exists	This species is marine and only found on beaches near marine environments	it would be extremely difficult for this species to disperse to any habitat within the study area
Non-migratory Birds (5)										
<i>Falco hypoleucos</i> Grey Falcon	VU (BC Act)	2017	6.7 km SW	Cosmopolitan	It uses a large variety of habitats such as timbered plains, creeklines, shrublands and open grasslands.	Recorded				
<i>Falco peregrinus</i> Peregrine Falcon	OS (BC Act)	2012	1.4 km NNW	Rocky areas near water	The Peregrine Falcon's preferred habitat includes cliffs and wooded watercourses. Nesting occurs mainly on cliff ledges, granite outcrops, quarries and in trees with old raven or Wedge-tailed Eagle nests.	Unlikely	The record is not considered recent	Records are located relatively close to the study area and this species has a high potential dispersal rate	Limited suitable habitat is available within the study area, although it is considered possible that this species	Given the lack of recent records and the wide available habitats outside the study area, it is unlikely that the study area

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Pezoporus occidentalis</i> Night Parrot	EN/CR (EPBC Act; BC Act)	N/A	Projected distribution	Spinifex	Appears to favour areas of dense vegetation comprising old-growth (often > 50 years unburnt) spinifex (<i>Triodia</i> spp.) especially hummocks that are ring-forming for roosting and nesting. Such areas may also be associated with dense chenopod shrubs. It is thought that spinifex hummocks that are <40-50 cm in height are not likely to provide adequate shelter for roosting and nesting.	Unlikely	The record date is not available, but not likely to be recent, given the lack of information available	Projected distribution is not as accurate as locational data but possible could occur in the study area	Some suitable habitat may be located within the study area. However; the study area is surrounded by disturbances (current operations, urbanisation, roads etc.)	Due to a lack of record specificity and the potential of feral pests and disturbance to this area, it is unlikely that a significant proportion or significant life history stages for this species is supported within the study area
<i>Rostratula australis</i> Australian Painted Snipe	EN (EPBC & BC Acts)	N/A	Projected distribution	Wetland	Inhabits shallow terrestrial fresh-brackish wetlands, including temporary and permanent lakes, swamps and claypans, waterlogged grassland or saltmarsh, dams,	Unlikely	The record date is not available, but not likely to be recent, given the lack of	Projected distribution is not as accurate as locational data but possible to	Suitable habitat is not available within the study area, potential suitable	It is unlikely the Project would provide suitable habitat in sufficient magnitude for

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Sternula nereis nereis</i> Fairy Tern	VU (EPBC & BC Acts)	2008	6.7 km N of study area	Wetland	rice crops, sewage farms and bore drains. They nest on sheltered, sandy beaches. They have also been known to occur on the edges of offshore, estuaries, islands, wetlands and other areas of the mainland coastline (DCCEEW 2023b)	Unlikely	The record is not considered recent	Records are within 10 km of the study area and this species is capable of wide dispersal	The study area is in proximity to suitable habitat although there is no suitable habitat within the study area	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages
Migratory Birds (52)										
<i>Apus pacificus</i> Fork-tailed Swift	Mig. (EPBC & BC Acts)	2012	8.8 km NE	Open grasslands	Occurs in a wide range of dry or open habitats, including riparian woodlands, tea-tree swamps, low scrub, heathland, Saltmarsh, grassland and spinifex sandplains, open farmland and inland and	Recorded				

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<i>Pandion cristatus</i> Osprey	Mig. (EPBC & BC Acts)	2016	975 m N	Coastal	coastal sand dunes (DSEWPac 2011). <i>P. cristatus</i> is present across most of coastal Australia but is absent from Tasmania and Victoria. In south coastal WA, the species extends as far east as Esperance (Johnstone & Storr 1998; Poole <i>et al.</i> 2002).	Recorded				
<i>Xenus cinereus</i> Terek Sandpiper	Mig. (EPBC & BC Acts)	2015	3.4 km WSW	Wetland	Found primarily in coastal areas and inland wetlands of the Pilbara and Kimberley regions (DCCEEW 2023b)	Unlikely	The record is relatively recent	Records are within 10 km of the study area and species is capable of wide dispersal	The study area is in proximity to suitable habitat although there is no suitable habitat within the study area	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages
<i>Tringa stagnatilis</i> Marsh Sandpiper	Mig. (EPBC & BC Acts)	2015	6.4 km NNE	Wetland	The Marsh Sandpiper occurs along the WA coast and throughout parts of eastern Australia. It inhabits coastal and inland wetlands, estuarine	Unlikely	The record is relatively recent	Records are within 10 km of the study area and species is	The study area is in proximity to suitable habitat although there	Suitable habitat is not available within the study area.

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<i>Tringa nebularia</i> Common Greenshank	Mig. (EPBC & BC Acts)	2015	1.9 km ENE	Wetland	and mangrove mudflats, beaches, swamps, lakes and several other types of wetlands (Morcombe 2004). They prefer coastal open mudflats.	Unlikely	The record is relatively recent	Records are within 10 km of the study area and species is capable of wide dispersal	The study area is in proximity to suitable habitat although there is no suitable habitat within the study area	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages

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<i>Tringa glareola</i> Wood Sandpiper	Mig. (EPBC & BC Acts)	2014	1.9 km ENE	Wetland	The Wood Sandpiper uses well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes (DoEE 2018b).	Unlikely	The record is relatively recent	Records are within 10 km of the study area and species is capable of wide dispersal	The study area is in proximity to suitable habitat although there is no suitable habitat within the study area	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages
<i>Tringa brevipes</i> Grey-tailed Tattler	Mig. EPBC and BC Acts; P4 DBCA list	2015	606 m ESE	Wetland	Prefers sheltered coasts and intertidal mudflats. They have also been known to utilise reefs, rock platforms and intertidal areas that are exposed intertidal areas. They are commonly found in various waterbodies including mudflats, estuaries, lagoons and mangrove areas (DCCEEW 2023b)	Unlikely	The record is relatively recent	Record are within 10 km of the study area and species is capable of wide dispersal	The study area is in proximity to suitable habitat although there is no suitable habitat within the study area	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant

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<i>Thalasseus bergii</i> Crested Tern	Mig. (BC Act)	2015	3.3 km ENE	Wetland	Occurs in temperate and tropical environments in South Africa and Australia. They are found in coastal areas including low-lying rocky, sandy and coral islands. Many of the areas they occur have a distinct lack of shelter. They are often found on open shores and less often found in tidal creeks and inland waterbodies (ALA 2023)	Unlikely	The record is relatively recent	Record are within 10 km of the study area and species is capable of wide dispersal	The study area is in proximity to suitable habitat although there is no suitable habitat within the study area	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages
<i>Sula leucogaster</i> Brown Booby	Mig. (EPBC & BC Acts)	1979	13.3 km NNE	Wetland	In WA, the Brown Booby is found from Bedout Island and near Onslow, and north to Bunker Group of islands in Queensland Off north-west WA, Brown Boobies are most abundant 18–36 km from land, but also occur inside and outside these limits (DoEE 2018b). It uses both marine	Unlikely	The record is not considered recent	Records are within 10 to 50 km of the study area and species is capable of wide dispersal	The study area is in proximity to suitable habitat although there is no suitable habitat within the study area	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable

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<i>Sterna albifrons</i> Little Tern	Mig. (EPBC & BC Acts)	2015	6.4 km N	Wetland	and terrestrial habitats but tends to stay close to breeding sites, such as tropical islands, continental islands, sand cays and atolls for breeding. It is known to approach mainland coastlines more than other boobies and has been recorded in coastal waters, harbours and estuaries and near offshore islands but seldom flying over land (DoEE 2018b). Occur in coastal areas and waterbodies including harbours, inlets, lagoons, estuaries and bays, particularly those with sandbanks and exposure to ocean beaches (DCCEE 2023b)	Unlikely	The record is considered recent	Records are within 10 km of the study area and species is capable of wide dispersal	The study area is in proximity to suitable habitat although there is no suitable habitat within the study area	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages

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<i>Sterna hirundo</i> Common Tern	Mig. (EPBC & BC Acts)	2015	6.4 km NNE	Wetland	They occur in marine, coastal and pelagic environments and are usually observed in coastal waters in beaches, platforms and sheltered areas including harbours and estuaries (DCCEE 2023b)	Unlikely	The record is relatively recent	Records are within 10 km of the study area and species is capable of wide dispersal	The study area is in proximity to suitable habitat although there is no suitable habitat within the study area	Suitable habitat is not available within the study area. Individuals can move through the study area in search of other suitable habitats. This species is unlikely to occur in significant numbers or undertake important life history stages
<i>Pluvialis squatarola</i> Grey Plover	Mig. (EPBC & BC Acts)	2015	3.3 km ENE	Wetland	Inhabits coastal areas, typically those sheltered such as embayments and estuaries, although they are also known to occupy rocky coasts and platforms. Occasionally they are found in inland waterbodies (DCCEE 2023b)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely

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<i>Pluvialis fulva</i> Pacific Golden Plover	Mig. (EPBC & BC Acts)	2015	7.3 km NE	Wetland	Typically inhabits coastal environments and occasionally can be found in wetlands, mudflats and sandflats in sheltered areas. They have been found on islands, sand and coral cays. They have been recorded in terrestrial environments, usually near waterbodies and paddocks areas (DCCEEW 2023b)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Plegadis falcinellus</i> Glossy Ibis	Mig. (EPBC & BC Acts)	2013	1.9 km ENE of study area	Wetland	Inland, freshwater wetlands are preferred, in particular, permanent or ephemeral waterbodies on floodplains and shallow swamps with abundant aquatic flora.	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Philomachus pugnax</i> Ruff	Mig. (EPBC & BC Acts)	1979	3.4 km WSW of study area	Wetland	Typically occupies saline and brackish wetlands with mudflats. They have been found in a range of wetlands including lakes, swamps, tidal rivers, and floodlands. There are some records of them	Unlikely	The record is not considered recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for

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<i>Phalaropus lobatus</i> Red-necked Phalarope	Mar/Mi g. (EPBC Act; BC Act)	1981	34.2 km E	Wetland	occupying sheltered coastal areas such as harbours and estuaries and wetlands surrounded by dense vegetation (DCCEEW 2023b) Records indicate their preference for occurring at sea during non-breeding periods. They have been recorded in inland coastal areas, highly saline water bodies including lakes, swamps and wetlands in Australia (DCCEEW 2023b)	Unlikely	The record is not considered recent	The record is relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Onychoprion anaethetus</i> Bridled Tern	Mig. (EPBC & BC Acts)	1995	6.8 km NW	Coastal/ Wetland	They occupy subtropical and tropical sea environments including islands, coral cays with adequate vegetation, and continental islands but are rarely recorded on inshore continental waters, although they have been reported breeding on mainland WA (DCCEEW 2023b)	Unlikely	The record is not considered recent	The record is relatively close to the study area and this species has a high potential for dispersal	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	Given the age of this record as well as the species' habitat preferences, it is unlikely that this species will be occupying habitats within the study area and even less likely to be

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<i>Oceanites oceanicus</i> Wilson's Storm Petrel	Mig. (EPBC & BC Acts)	2015	7.9 km NNE	Wetland	This species spends most of its life at sea, although during the non-breeding season, they can occur in tropical and subtropical waters (DCCEEW 2023b)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Numenius phaeopus</i> Whimbrel	Mig. (EPBC & BC Acts)	2017	606 m ESE	Wetland	Usually found on intertidal mudflats and sheltered coastal areas. They have also been found in other waterbodies including harbours, lagoons, estuaries, rivers and mangroves. Occasionally they are found in sandy and rocky beaches or intertidal areas (DCCEEW 2023b)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Numenius minutus</i> Little Curlew	Mig. (EPBC & BC Acts)	2016	1.9 km ENE of study area	Wetland	They spend the non-breeding season in northern Australia from Port Hedland to the	Unlikely	The record is relatively recent	Records are relatively close to the study	Suitable habitat is not available	It is unlikely the Project would provide

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<i>Numenius madagascariensis</i> Eastern Curlew	CR/Mig. /CR (EPBC Act; BC Act)	2022	3.3 km ENE	Wetland	Queensland coast (DoEE 2018b). The Little Curlew is most often found feeding in grassland and sedgeland with scattered, shallow freshwater pools or areas seasonally inundated. It will also use open woodlands with a grassy or burnt understorey, dry saltmarshes, coastal swamps, mudflats or sandflats of estuaries or beaches on sheltered coasts. Mown lawns, gardens, recreational areas, ovals, racecourses and verges of roads and airstrips are also used (Higgins & Davies 1996)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Motacilla flava</i> Yellow Wagtail	Mig. (EPBC & BC Acts)	1982	7.3 km NE	Cosmopolitan	Uses a large variety of habitats.	Unlikely	The record is not considered recent	Records are located relatively close	Potential suitable habitat may be	Given the lack of recent records and

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<i>Motacilla cinerea</i> Grey Wagtail	Mig. (EPBC & BC Acts)	N/A	Projected distribution	Cosmopolitan	Uses a large array of habitats. A small wagtail that is a vagrant visitor to Australia that inhabits fast-flowing streams and rivers (IUCN 2019).	Unlikely	The record date is not available, but likely to be recent	Projected distribution is not as accurate as locational data but possible could occur in the study area	No suitable habitat is present within the study area	Given the lack of recent records and the wide available habitats outside the study area, it is unlikely that the study area supports a significant number of this species or provides important resources for
								to the study area and this species has a high potential dispersal rate	available within the study area	the wide available habitats outside the study area, it is unlikely that the study area supports a significant number of this species or provides important resources for

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<i>Macronectes giganteus</i> Southern Giant Petrel	EN/Mig. /Mig. (EPBC Act; BC Act)	N/A	Projected distribution	Wetland	Pelagic. Breeds on 6 subantarctic and Antarctic islands in Australian territory (DoEE 2018b).	Unlikely	The record date is not available, but likely to be recent	Projected distribution is not as accurate as locational data but possible to extend to the study area	No suitable habitats available within the study area	It is very unlikely this species will occupy the study area and if found inside or nearby, will likely be passing through and not reliant on the habitat available within the study area in significant proportions or during important life history stages
<i>Limosa limosa</i> Black-tailed Godwit	Mig. (BC Act)	2012	1.9 km ENE	Wetland	Typically found in coastal environments with sheltered bays, estuaries and lagoons. Habitat use is dictated by the tides. They are also found in shallow and sparsely vegetated near-coastal wetlands (DCCEE 2023b)	Unlikely	The record is not considered recent	Records are located relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the

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<i>Limosa lapponica</i> Bar-tailed Godwit	Mig. (EPBC & BC Acts)	2015	3.3 km ENE	Wetland	Occupies a variety of aquatic habitats such as intertidal sandflats, banks, mudflats, estuaries coastal lagoons and harbours. They have also been found in saltmarshes and brackish coastal wetlands (DCCEEW 2023b)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	outcome is unlikely It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Limnodromus semipalmatus</i> Asian Dowitcher	Mig. (EPBC & BC Acts)	2015	7.3 km NE of study area	Wetland	Inhabits sheltered coastal habitats including tidal creeks, coastal lagoons and estuaries. There are many records utilising mudflats and sandflats. They are also known to occupy ponds, saltworks and sewage farms (DCCEEW 2023b)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Limicola falcinellus</i> Broad-billed Sandpiper	Mig. (BC Act)	2015	7.3 km NE	Wetland	Found in sheltered coastal environments, mudflats and favours estuarine habitats. Occasionally they have been found occupying saltmarshes,	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a	Suitable habitat is not available within the study area,	It is unlikely the Project would provide suitable habitat in

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<i>Hydroprogne caspia</i> Caspian Tern	Mig. (EPBC & BC Acts)	2015	2.3 km ENE	Wetland	freshwater lagoons, saltworks and sewage farms. They have also been known to occupy creeks, swamps and lakes near the coast, favouring those with mudflats and exposed sands with receding tides (DCCEEW 2023b) Found in sheltered coastal habitats and near-coastal terrestrial wetlands (DAWE 2022)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Hirundo rustica</i> Barn Swallow	Mig. (EPBC & BC Acts)	2015	2.2 km ENE	Coastal	Inhabits open country in coastal lowlands and, in or over freshwater wetlands, woodland, shrublands and tussock grassland.	Unlikely		Infrequent migratory visitor to Australia	Habitats in the study area low value to species foraging compared to nearby coastal and wetland habitats	Recency and proximity of desktop record unrelated to the habitats within the study area. Moreover, these habitats are not restricted or isolated

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<i>Glaucopis maldivarum</i> Oriental Pratincole	Mig. (EPBC & BC Acts)	2015	1.1 km E	Wetland	Inhabits open plains, floodplains or short grassland, wetlands, saltworks and sewage farms. May also occur along the coast, inhabiting beaches, mudflats and islands, or around coastal lagoons.	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Gelochelidon nilotica</i> Gull-billed Tern	Mig. (BC Act)	2012	1.1 km E	Wetland	Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands. They are only rarely found over the ocean.	Unlikely	The record is not considered recent	Records are located relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Gallinago stenura</i> Pin-tailed Snipe	Mig. (EPBC & BC Acts)	2014	4.7 km E	Wetland	Usually found on the edges of swamps, ponds and lakes with vegetation available. They have also been found in open claypans and arid parts of the overall species range. They have been recorded in sewage	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for

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<i>Fregata minor</i> Greater Frigatebird	Mig. (EPBC & BC Acts)	N/A	Projected distribution	Marine	<p>ponds and less often in intertidal wetlands (DCCEEW 2023b)</p> <p>This species has a wide distribution, moving between countries along the equator during the non-breeding season, including the northern parts of Australia (BirdLife International 2023)</p>	Unlikely	<p>The date is not available for this record, therefore it is unlikely to be very recent</p>	<p>Distribution is not based on location evidence and is inferred. Therefore less likely to represent the entire population although, possible</p>	<p>habitat is located nearby</p> <p>No habitat information regarding terrestrial environments. Meaning it is either not well understood and unlikely to favour those habitats</p>	<p>a significant number of individuals and therefore, the outcome is unlikely</p> <p>Coastal environments are marginally available within the study area but prone to disturbance. While technically possible due to dispersal potential, habitat preferences and lack of evidence mean it is unlikely for this species to occupy the study area in significant numbers or for significant life history stages</p>

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Fregata ariel</i> Lesser Frigatebird	Mig. (EPBC & BC Acts)	2016	6.4 km NNE	Wetland	It is usually seen in tropical or warmer waters off northern WA, Northern Territory, Queensland and northern New South Wales. The species is usually pelagic and often found far from land but is also found over shelf waters, in inshore areas, and inland over continental coastlines (Marchant & Higgins 1990).	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Chlidonias leucopterus</i> White-winged Black Tern	Mig. (EPBC & BC Acts)	2015	2.2 km NE	Wetland	Typically occurs in wetland environments such as brackish, saline and coastal areas. They are also known to occupy sheltered areas such as estuaries, harbours and lagoons particularly those with sandflats and mudflats (DCCEEW 2023b)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Charadrius veredus</i> Oriental Plover	Mig. (EPBC & BC Acts)	2016	6.7 km N	Wetland	Oriental Plovers spend a few weeks in coastal habitats such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Charadrius mongolus</i> Lesser Sand Plover	EN/Mig. (EPBC & BC Acts)	2015	3.4 km WSW	Wetland	inland, where they are found in sparsely vegetated plains or recently burnt open areas. Typically found in coastal and estuarine environments. They are known to utilise intertidal mudflats and sandflats, as well as sheltered harbours. They are known to occasionally occupy sandy beaches and rock platforms. There are records of this species utilising saltmarshes, mangrove saltworks, brackish swamps and silt islands (DCCEEW 2023b)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Charadrius leschenaultii</i> Greater Sand Plover	VU/Mig. /VU (EPBC Act; BC Act)	2015	3.4 km WSW	Wetland	Utilises coastal and estuarine environments. They typically occupy sheltered sandy or muddy beaches as well as intertidal sandbanks and mudflats, reefs and rock platforms. They have occasional records occupying saltworks, saltlakes and marginal saltmarshes and brackish swamps (DCCEEW 2023b)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Calonectris leucomelas</i> Streaked Shearwater	Mig. (EPBC & BC Acts)	N/A	Projected distribution	Marine	It occurs frequently in northern Australia, with records from central WA, around the north coast, and south to central New South Wales (Marchant & Higgins 1990). The species occurs over pelagic and inshore waters. In northern Australia, the streaked shearwater is usually found in offshore waters more than 18 kilometres from the mainland coast (Marchant & Higgins 1990).	Unlikely	The date not available for this record is unlikely to be very recent	Distribution is not based on location evidence and is inferred. Therefore less likely to represent the entire population although, possible	No habitat information regarding terrestrial environments. Meaning it is either not well understood and unlikely to favour those habitats	Coastal environments are marginally available within the study area but prone to disturbance. While technically possible due to dispersal potential, habitat preferences and lack of evidence mean it is unlikely for this species to occupy the study area in significant numbers or for significant life history stages
<i>Calidris tenuirostris</i> Great Knot	CR/Mig. /CR (EPBC Act; BC Act)	2015	3.4 km WSW	Wetland	They usually occupy sheltered coastal habitats as well as mudflats and sandflats such as inlets, bays, harbours, estuaries and lagoons. They have been known to occupy reefs and rock platforms as well as shorelines and mangroves. There are also records in	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Calidris subminuta</i> Long-toed Stint	Mig. (EPBC & BC Acts)	2015	1.9 km ENE	Wetland	swamps near the coast, saltlakes and non-tidal lagoons (DCCEEW 2023b) They occupy a variety of wetlands. They appear to favour shallow, freshwater and brackish wetlands including river floodplains, sewage ponds, swamps and lagoons. They are also known to occur on muddy shorelines, weeds and sedges and occasionally stunted samphire. They are known to occupy permanent wetlands and artificial lakes (DCCEEW 2023b)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	habitats are located nearby It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Calidris ruficollis</i> Red-necked Stint	Mig. (EPBC & BC Acts)	2015	1.9 km ENE	Wetland	They are found across a wide range of open mudflat-like habitats in salt as well as freshwater systems.	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Calidris melanotos</i> Pectoral Sandpiper	Mig. (EPBC & BC Acts)	2014	8.9 km E	Wetland	Shallow fresh to saline wetlands such as coastal lagoons, estuaries, bays,	Unlikely	The record is relatively recent	Records are relatively close to the study	Suitable habitat is not available	It is unlikely the Project would provide

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Calidris ferruginea</i> Curlew Sandpiper	CR/Mig. /CR (EPBC Act; BC Act)	2015	2.3 km ENE	Wetland	swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.			area and this species has a high potential dispersal rate	within the study area, potential suitable habitat is located nearby	suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Calidris canutus</i> Red Knot	EN/Mig. /EN (EPBC Act; BC Act)	2015	1.9 km ENE	Wetland	Occurs on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand.	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Calidris canutus</i> Red Knot	EN/Mig. /EN (EPBC Act; BC Act)	2015	1.9 km ENE	Wetland	Typically occupying intertidal mudflats, sandflats and sheltered coasts. They are also known to occupy beaches, lagoons, harbours and sandy beaches. They have also been recorded occupying saline terrestrial wetlands and sewage ponds and are rarely	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Calidris alba</i> Sanderling	Mig. (EPBC & BC Acts)	2014	3.4 km WSW	Wetland	found in freshwater swamps (DCCEEW 2023b) Found utilising coastal environments open to sea swell as well as sandbars and spits and shingle banks. They also occur on wave-washed rock outcrops. They are also less frequently found in estuaries and inlet harbours and near-coastal inland wetlands (DCCEEW 2023b)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Calidris acuminata</i> Sharp-tailed Sandpiper	Mig. (EPBC & BC Acts)	2015	1.9 km ENE	Wetland	Muddy edges of shallow fresh or brackish vegetated wetlands, including lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland (DoEE 2018b)	Unlikely	The record is relatively recent	Records are relatively close to the study area and this species has a high potential dispersal rate	Suitable habitat is not available within the study area, potential suitable habitat is located nearby	It is unlikely the Project would provide suitable habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Arenaria interpres</i> Ruddy Turnstone	Mig. (EPBC & BC Acts)	2015	2.3 km ENE	Wetland	Usually found in coastal regions containing exposed rocks. They are also found in tidal pools	Unlikely	The record is relatively recent	Records are relatively close to the study	Suitable habitat is not available	It is unlikely the Project would provide

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Anous stolidus</i> Common Noddy	Mig. (EPBC & BC Acts)	N/A	Projected distribution	Coastal Areas	and beaches. They are also known to be found on sandy beaches, clay ridges and occasionally in estuaries, harbours and lagoons. They have been recorded on sewage ponds and mudflats (DCCEEW 2023b)	Unlikely	The date is not available for this record therefore it is unlikely to be a very recent	Distribution is not based on location evidence and is inferred. Therefore, less likely to represent the entire population although, possible	The study area has limited available habitat to support this species' habitat preferences	Given the lack of recent records and the wide available habitats outside the study area, it is unlikely that the study area supports a significant number of this species or provides important resources for significant life history stages
<i>Actitis hypoleucos</i> Common Sandpiper	Mig. (EPBC & BC Acts)	2017	1.9 km ENE	Wetland	Small ponds, large inlets, and mudflats where they forage on the shore usually close to the vegetation.	Unlikely	The record is relatively recent	Records are relatively close to the study area and this	Suitable habitat is not available within the	It is unlikely the Project would provide suitable

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Cuculus optatus</i> Oriental Cuckoo								species has a high potential dispersal rate	study area, potential suitable habitat is located nearby	habitat in sufficient magnitude for a significant number of individuals and therefore, the outcome is unlikely
<i>Cuculus optatus</i> Oriental Cuckoo	Mig. (EPBC & BC Acts)	N/A	Projected distribution	Tropical forest margins	Rainforest margin, monsoon forest, vine scrub, riverine thicket, wet eucalypt forest, swamps, mangroves	Unlikely	Never recorded in desktop search extent	Occurs in Pilbara only as rare visitor	No suitable forest habitat within study area	
<i>Sterna dougallii</i> Roseate Tern	Mig. (EPBC & BC Acts)	2022	9 km NE	Marine	Coastal and offshore blue water, coral reefs, lagoons	Unlikely	Not recorded in terrestrial habitats		Suitable marine habitat not present within study area	
<i>Phaethon lepturus</i> White-tailed Tropicbird	Mig. (EPBC & BC Acts)	N/A	Projected distribution	Marine	Pelagic, aerial, tropical and subtropical coasts	Unlikely	Never recorded in desktop search extent	Occurs in Pilbara only as rare visitor	Suitable marine habitat not present within study area	
<i>Ardenna pacifica</i> Wedge-tailed Shearwater	Mig. (EPBC & BC Acts)	N/A	Projected distribution	Marine	Pelagic, aerial, coastal and oceanic waters, breeds on offshore islands	Unlikely	Recorded in desktop search area (NatureMap only)	Common breeding visitor to Pilbara waters and islands	Suitable marine habitat not present within study area	
Mammals (11)										
<i>Macrotis lagotis</i> Greater Bilby	VU (EPBC & BC Acts)	2019	Within study area	Grassland	Prefers hummock grassland in plains and alluvial areas, open tussock grassland on uplands	Recorded				

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Dasyercus blythi</i> Brush-tailed Mulgara	P4 (DBCA list)	2019	Within study area	Spinifex	Occurs in spinifex grasslands throughout much of the arid zone, digging their burrows in the flats between low dunes.	Recorded				
<i>Pseudomys chapmani</i> Western Pebble-mound Mouse	P4 (DBCA list)	2015	27.7 km E	Spinifex	The mounds are located on the gentle slopes of rocky ranges covered in rocky mulch, hard spinifex and sparse trees and shrubs (Eucalyptus, Senna, Acacia and Ptilotus). They are also often found near Acacia-dominated drainage lines.	Unlikely			Record from habitat type not present within the study area approximately 30 km away	No suitable habitat to support populations within the study area – lower slopes and plains with abundant gravel and pebbles.
<i>Dasyurus hallucatus</i> Northern Quoll	EN (EPBC & BC Acts)	2018	4.0 km WNW	Rocky, Grassland, drainage	Found in a variety of habitats; however, rocky areas provide important denning habitat, while they forage in nearby grasslands and creeklines.	Possible	The record is relatively recent	Closest record approximately 4.5 km. species capable of dispersing large distances, particularly males during the breeding season (July – September)	No critical denning or highly productive foraging habitat (complex rocky habitats) present in the study area. No high value dispersal habitat – drainage lines	Species is likely to disperse via large drainage line (South-west Creek) to the east, outside the study area. May forage in adjacent sandplain where spinifex and shrubs provide

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<i>Sousa sahulensis</i> Australian humpback dolphin	P4 (DBCA list)	Historical written record	7.9 km NNE	Marine	Marine environments	Unlikely	Historic records may not represent current species distribution	The location is close, but the habitats vary considerably, and no connecting suitable habitat exists	This species is exclusively marine and very rarely inhabits waters of relatively low depth	It is extremely difficult for this species to disperse to any habitat within the study area
<i>Rhinonicteris aurantia</i> Pilbara Leaf-nosed Bat	VU (EPBC & BC Acts)	2018	27.4 km E	Caves	Roosts in caves and mines with stable, warm and humid microclimates in the Hamersley and Chichester Ranges.	Unlikely	The record is considered recent	Records are relatively close to the study area and this species has a high potential dispersal rate	While possible for this species to be detected within the study area. No roosting habitat is available within the study area. Some areas may be potential foraging habitats, however, the distance to what is likely roosting locations on the map is	Given the distance to travel and forage within the study area, it is unlikely that the study area provides significant resources to this species

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Mormopterus cobourgianus</i> North-western Free-tailed Bat	P1 (DBCA list)	2009	3.1 km NNE	Caves	This species has a restricted range and appears to favour mangroves and adjoining areas in small spouts, crevices and dead branches of mangroves. This species is relatively data deficient (Australian Museum 2020).	Unlikely	The record is not considered recent	Records are located relatively close to the study area and this species has a high potential dispersal rate	Possibly suitable foraging habitat available within the study area. No available caves or disused mines for roosting and breeding habitats	Unlikely for this species to occupy the study area for important life history stages. Possible for them to infrequently use the habitat for foraging, although abundant foraging habitat is available outside the study area. Therefore it is unlikely the study area supports this population significantly
<i>Macroderma gigas</i> Ghost Bat	VU (EPBC & BC Acts)	2017	25.0 km SSE	Caves	Prefers to roost in caves beneath bluffs of low, rounded hills composed of Marra Mamba geology, granite rock piles in the Pilbara and sandstone elsewhere, as well as adits (abandoned mines).	Unlikely	The record is relatively recent	Records are located relatively close to the study area and this species has a	Possibly suitable foraging habitat available within the study area. No	No critical roost, large drainages or permanent pools within the study area. Unlikely to

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Species	Status	Most recent record	Proximity to study area	Broad habitat label	Habitats (Breeding, foraging and dispersal)	Likelihood	Rationale 1	Rationale 2	Rationale 3	Rationale 4
<i>Lagostraphus fasciatus</i> Banded Hare-wallaby, Mernine	VU (EPBC & BC Acts)	Historical written record	8.1 km E (low spatial accuracy)	Cosmopolitan	This species utilises a variety of habitats such as grasslands, heathlands and dunes. They typically occur in dense vegetation and utilises shrubs for shelter. Runways are produced beneath shrubs to allow efficient movement. These runways in dense vegetation are important for predator evasion (DCCEEW 2023b)	Unlikely		Extinct on the mainland.	Record in study area is historic > 50 years ago and not representative of the species current distribution	Natural populations restricted to Bernier and Dorre Islands in Shark Bay, WA.
<i>Dugong dugon</i> Dugong	OS (BC Act)	Historical written record	7.9 km NNE	Marine	Marine environments	Unlikely	Historic records may not represent current species distribution	The location is close, but the habitats vary considerably, and no connecting suitable habitat exists	This species is exclusively marine and very rarely inhabits waters of relatively low depth	This species cannot disperse to any habitat within the study area

Rows coloured grey indicated species recorded during survey

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Appendix 6 Fauna species by site matrix

Family	Species	Common	BIE001	BIE002	BIE003	BIE004	BIE005	BIE006	BIE007	BIE008	BIE009	BIE010	BP004	BT001-007	BP001-025	Opp001-016
Amphibians (2)																
Hyllidae	<i>Litoria rubella</i>	Little Red Tree Frog					1	1								
Limnodynastidae	<i>Notaden nichollsi</i>	Desert Spadefoot		1	4											
Birds (48)																
Accipitridae	<i>Aquila audax</i>	Wedge-tailed Eagle			1											
	<i>Circus assimilis</i>	Spotted Harrier		1	1					1						
	<i>Elanus caeruleus</i>	Black-shouldered Kite														1
	<i>Haliastur indus</i>	Brahminy Kite						1	1							1
	<i>Haliastur sphenurus</i>	Whistling Kite			1											
	<i>Pandion cristatus</i>	Osprey														1
	<i>Aegotheles cristatus</i>	Australian Owllet-nightjar														1
	<i>Mirafrja javanica</i>	Horsfield's Bushlark			1	2										5
Apodidae	<i>Apus pacificus</i>	Fork-tailed Swift			2											
	<i>Artamus cinereus</i>	Black-faced Woodswallow	1		2		20									
Artamidae	<i>Artamus personatus</i>	Masked Woodswallow	51		45	6										5
	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	2	1	1	5	9			1						1
Campephagidae	<i>Lalage tricolor</i>	White-winged Triller					1	10								
	<i>Eurostopodus argus</i>	Spotted Nightjar					3									1
Columbidae	<i>Geopelia cuneata</i>	Diamond Dove						5								
	<i>Geopelia striata</i>	Zebra Dove						3								
	<i>Ocyphaps lophotes</i>	Crested Pigeon	16					2								
	<i>Phaps histrionica</i>	Flock Bronzewing														1

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Family	Species	Common	BI001	BI002	BI003	BI004	BI005	BI006	BI007	BI008	BI009	BI010	BP004	BT001-007	BP001-025	Opp001-016
Corvidae	<i>Corvus orru</i>	Torresian Crow		1	2	1		3	2							
Cuculidae	<i>Heteroscenes pallidus</i>	Pallid Cuckoo						1								
	<i>Chalcites basalus</i>	Horsfield's Bronze Cuckoo			1											
Dicruridae	<i>Grallina cyanoleuca</i>	Magpie-lark					1	5								
	<i>Rhipidura albiscapa</i>	Grey Fantail						1		1						
	<i>Rhipidura leucophrys</i>	Willie Wagtail	1		1		1	1								
Estrilidae	<i>Taeniopygia castanotis</i>	Zebra Finch	1	3	4	10	1	75		35						5
Falconidae	<i>Falco berigora</i>	Brown Falcon	1		1				1							
	<i>Falco cenchroides</i>	Australian Kestrel	1		1	2		1	1							
	<i>Falco hypoleucos</i>	Grey Falcon	2													3
	<i>Falco subniger</i>	Black Falcon			1											
Halcyonidae	<i>Dacelo leachii</i>	Blue-winged Kookaburra					1									
	<i>Todiramphus pyrrophygus</i>	Red-backed Kingfisher			1		3	5								1
Hirundinidae	<i>Hirundo neoxena</i>	Welcome Swallow							1							
	<i>Petrochelidon nigricans</i>	Tree Martin	3		10			21		5						
Maluridae	<i>Malurus assimilis</i>	Purple-backed Fairy-wren	1													4
	<i>Malurus leucopterus</i>	White-winged Fairy-wren		1	7	1			3							
Meliphagidae	<i>Gavicalis virescens</i>	Singing Honeyeater	5	1	4	2	1	3		1						
	<i>Manorina flavigula</i>	Yellow-throated Miner						11								
	<i>Ptilotula penicillata</i>	White-plumed Honeyeater					1	8								
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater			2	3	2	9								1
Motacillidae	<i>Anthus australis</i>	Australian Pipit		1	1											
Otididae	<i>Ardeotis australis</i>	Australian Bustard			1											

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Family	Species	Common	BI E001	BI E002	BI E003	BI E004	BI E005	BI E006	BI E007	BI E008	BI E009	BI E010	BP004	BT001-007	BP001-025	Opp001-016
Pardalotidae	<i>Pardalotus rubricatus</i>	Red-browed Pardalote						7								
Psittacidae	<i>Cacatua sanguinea</i>	Little Corella	1													
	<i>Melopsittacus undulatus</i>	Budgerigar	30	57	1	45	1	37		18						16
	<i>Nymphicus hollandicus</i>	Cockatiel	41			1	29									
Sylviidae	<i>Megalurus cruralis</i>	Brown Songlark			3	2		1								7
Turnicidae	<i>Turnix velox</i>	Little Button-quail	2	1	4	2			1	1						
Tytonidae	<i>Tyto alba</i>	Barn Owl						2								
Mammals (15)																
Canidae	<i>Vulpes vulpes</i>	Red Fox						✓								
Dasyuridae	<i>Dasyercus blythi</i>	Brush-tailed Mulgara								✓		✓				✓
	<i>Dasykaluta rosamondae</i>	Little Red Kaluta	9	6	1											
	<i>Sminthopsis youngsoni</i>	Lesser Hairy-footed Dunnart	1			2	1									
Felidae	<i>Felis catus</i>	Cat		✓			✓	✓								✓
Macropodidae	<i>Osphranter rufus</i>	Red Kangaroo	✓	✓	✓	✓	✓	✓		✓						
Molossidae	<i>Chaerephon jobensis</i>	Greater Northern Freetail-bat	✓	✓			✓	✓								
Muridae	<i>Notomys alexis</i>	Spinifex Hopping-mouse				✓		✓								✓
	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse			2											
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna														✓
Thylacomyidae	<i>Macrotis lagotis</i>	Greater Bilby	✓	✓									✓	✓		
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	✓	✓			✓	✓								
	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	✓													
	<i>Scotorepens greyii</i>	Little Broad-nosed Bat	✓	✓			✓	✓								
	<i>Vespardelus finlaysoni</i>	Finlayson's Cave Bat	✓	✓			✓	✓								

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Family	Species	Common	BE001	BE002	BE003	BE004	BE005	BE006	BE007	BE008	BE009	BE010	BP004	BT001-007	BP001-025	Opp001-016
Reptiles (38)																
Agamidae	<i>Ctenophorus isolepis</i>	Central Military Dragon	2	2	8	11	1	20		23						
	<i>Ctenophorus nuchalis</i>	Central Notted Dragon					1									
	<i>Gowidon longirostris</i>	Long-nosed Dragon	2			1	12	18		2						1
Diplodactylidae	<i>Nephrurus levis</i>	Smooth Knob-tailed Gecko		4	3	1										
	<i>Diplodactylus bilybara</i>	Western Fat-tailed Gecko	3	2	1											
	<i>Lucasium stenodactylus</i>	Sandplain Gecko	2	5	2	2	1									
	<i>Strophurus ciliaris</i>	Northern Spiny-tailed Gecko				3	1	1								
	<i>Strophurus jeanae</i>	Southern Phasmid Gecko				1										
	<i>Demansia reticulata</i>	Reticulated Whipsnake	3													
	<i>Demansia rufescens</i>	Rufous Whipsnake		2			1									1
Elapidae	<i>Pseudechis australis</i>	Mulga Snake														
	<i>Simoselops anomalus</i>	Desert Banded Snake							2							
	<i>Gehyra variegata</i>	Variegated Dtella	6	1	4		16	28		3						
Pygopodidae	<i>Delma butleri</i>	Unbanded Delma	2	1	1	3										
	<i>Delma nasuta</i>	Sharp-snouted Delma					1									
	<i>Delma pax</i>	Peaceful Delma	1													
	<i>Delma tincta</i>	Excitable Delma		1												
	<i>Carlia triacantha</i>	Desert Rainbow Skink	3	1			1									
Scincidae	<i>Cryptoblepharus plagiocephalus</i>	Peron's Snake-eyed Skink					2	1								
	<i>Ctenotus duricola</i>	Eastern Pilbara Lined Ctenotus	10	4	1	3	1	3								
	<i>Ctenotus grandis</i>	Grand Ctenotus	4	5	5	3	3	3								
	<i>Ctenotus haneloni</i>	Nimble Ctenotus	1			2	8	9								

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Family	Species	Common	BI E001	BI E002	BI E003	BI E004	BI E005	BI E006	BI E007	BI E008	BI E009	BI E010	BP004	BT001-007	BP001-025	Opp001-016
	<i>Ctenotus pantherinus</i>	Leopard Ctenotus	8	2	1	5										
	<i>Ctenotus piankai</i>	Pianka's Ctenotus	1	1												
	<i>Ctenotus rufescens</i>	Rufous Fine-snout Ctenotus	1		5	6										
	<i>Ctenotus saxatilis</i>	Rock Ctenotus	23	6	2	1	4									
	<i>Ctenotus serventyi</i>	North-western Sandy-loam Ctenotus	7	3	10	12	1	4								
	<i>Eremiascincus musivus</i>	Mosaic Desert Skink	2					1								
	<i>Lerista bipes</i>	North-western Sandslider	14	5	30	21	26	9								
	<i>Lerista clara</i>	Sharp-blazed Three-toed Slider					1	1								
	<i>Menetia greyii</i>	Common Dwarf Skink	3	2			2									
	<i>Notoscincus ornatus</i>	Ornate Snake-eyed Skink			1											
	<i>Tiliqua multifasciata</i>	Central Blue-tongue		1	2			1								
Typhlopidae	<i>Anilius ammodytes</i>	Sand-diving Blind Snake		1	1											
Varanidae	<i>Varanus acanthurus</i>	Spiny-tailed Monitor	1					1								1
	<i>Varanus brevicauda</i>	Short-tailed Pygmy Monitor		2		1										
	<i>Varanus eremius</i>	Pygmy Desert Monitor		2	2	1										
	<i>Varanus gouldii</i>	Sand Monitor			✓			✓								✓
Species richness			46	39	42	36	39	49								

Species records indicate with a tick (✓) indicate the species was recorded but abundance data was not recorded. Systematic sites are highlighted in grey.

Appendix 8 **Maximum and minimum temperatures (°C) and rainfall (mm) recorded at Port Hedland Airport (no. 004032) during the field survey (BoM 2023)**

Date (2023)	Max. temp (°C)	Min. temp (°C)	Rainfall (mm)
17 April	31.9	15.6	0
18 April	33.2	16.9	0
19 April	33.6	16.3	0
20 April	32.1	18.4	0
21 April	32.2	21	0
22 April	34.3	19.8	0
23 April	34.6	23.5	0
24 April	32.5	22.1	0
25 April	31.7	22.7	0
26 April	32.5	24.5	0
27 April	32.6	23.9	0
28 April	34.9	22.8	0
29 April	33.5	25.4	0
30 April	31.8	16.4	0

