Jinidi Rail Corridor and Borrow Pit
Targeted Significant Vertebrate Fauna Survey
July 2024

Prepared for
BHP Western Australian Iron Ore



astron
an ecocene company

Report Reference: 2400-015-23-BISR-1Rev0_251125

This page has been left blank intentionally.

Jinidi Rail Corridor and Borrow Pit
Targeted Significant Vertebrate Fauna Survey

Prepared for
BHP Western Australian Iron Ore

Job Number: 2400-015-23

Reference: 2400-015-23-BISR-1Rev0_251125

Revision Status

Rev	Date	Description	Author(s)	Reviewer
A	[redacted]			
B				
C				
0				

Approval

Rev	Date	Issued to	Authorised by	
			Name	Signature
A	[redacted]			
B				
C				
0				

an ecocene company

© Copyright 2022 Astron Environmental Services Pty Ltd. All rights reserved.
This document and information contained in it has been prepared by Astron Environmental Services under the terms and conditions of its contract with its client. The report is for the clients use only and may not be used, exploited, copied, duplicated or reproduced in any form or medium whatsoever without the prior written permission of Astron Environmental Services or its client.

Abbreviations

Abbreviation	Definition
ALA	Atlas of Living Australia
ARU	Autonomous Recording Unit
Astron	Astron Environmental Services
BC Act	*Biodiversity and Conservation Act 2016*
BHP WAIO	BHP Western Australia Iron Ore
BOM	Bureau of Meteorology
CR	Critically Endangered Community or Species
DBCA	Department of Biodiversity, Conservation and Attractions
DEHWA	Department of Water, Heritage and the Arts
DSWEPaC	Department of Sustainability, Water, Environment, Population and Communities
EN	Endangered Community or Species
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Area
GPS	Geographical Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
Mi	Migratory Species
MNES	Matters of National Environmental Significance
OS	Other Specially Protected Species
P	Priority Community or Species
PMST	Protected Matters Search Tool
SM	SongMeter
T	Threatened Community or Species
VHF	Very High Frequency
VU	Vulnerable Community or Species

Executive Summary

Astron Environmental Services was commissioned by BHP Western Australian Iron Ore to undertake a targeted significant vertebrate fauna survey covering the Jinidi Rail Corridor and Borrow Pit Survey Area (hereafter referred to as the Survey Area). The Survey Area is located approximately 70 kilometres north-west of Newman and covers an area of approximately 24,952 hectares. The fauna assessment was conducted from 4 to 16 May 2024.

A total of 102 fauna species, comprising one amphibian, 14 reptiles, 62 birds, and 25 mammals (including five introduced species) were recorded within the Survey Area during the current survey. The fauna assemblage recorded during the survey is considered typical of the Pilbara bioregion.

Three federally listed Matters of National Environmental Significance species, Pilbara olive python (scat), bilby (burrows, diggings and scat) and ghost bat (ARU recording and scat) were recorded during the current survey. The Pilbara olive python and ghost bat records were detected in Gorge/ Gully habitat, and the bilby records were recorded in Sand Plain and Sand Dune habitats. Two federally listed species not detected during the survey were considered to have a 'high' post-survey likelihood of occurrence; northern quoll and Pilbara leaf-nosed bat. These species have been recorded proximate to the Survey Area on previous surveys, and critical and/or supporting habitat is present throughout the Survey Area. The likelihood of occurrence for the grey falcon was assessed as 'moderate' due to the presence of critical and supporting habitat across the Survey Area, but with a lack of nearby records.

Two additional species of significance were recorded during the current survey: western pebble-mound mouse (*Pseudomys chapmani*) (Priority 4) and brush-tailed mulgara (*Dasycerus blythi*) (Priority 4) (burrows and scat) in Hillcrest/ Hillslope and Sand Plain habitats, respectively.

Eleven broad fauna habitat types were recorded and mapped in the Survey Area: Major Drainage Line, Medium Drainage Line, Minor Drainage Line, Drainage Area/ Floodplain, Stony Plain, Sand Plain, Sand Dune, Mulga Woodland, Hillcrest/ Hillslope, Breakaway/ Cliff and Gorge/ Gully. Most of these fauna habitat types within the Survey Area have the potential to support significant species to varying extents, with all habitat types well-represented in surrounding areas and none restricted at a local or sub-regional scale.

With regard to federally listed Matters of National Environmental Significance fauna species, the Gorge/ Gully habitat provides critical (denning) habitat for Pilbara olive python (*Liasis olivaceus barroni*) (Vulnerable; scat record within Survey Area) and northern quoll (*Dasyurus hallucatus*) (Endangered), and supporting habitat (foraging) for ghost bat (*Macroderma gigas*) (Vulnerable; scat and acoustic call records within Survey Area) and Pilbara leaf-nosed bat (*Rhinonicteris aurantia*) (Vulnerable) in the absence of significant roost caves. Twelve caves recorded in the Gorge/Gully habitat were of minor significance, all classified as Category 4 potential feed caves. These caves were generally open and shallow. Therefore, these caves were considered unlikely to support significant diurnal roosting opportunities for either bat species. Eleven significant pools were recorded in the Gorge/ Gully habitat type.

The Major Drainage Line habitat, represented by Weeli Wolli Creek, provides critical (denning, foraging and dispersal) habitat for Pilbara olive python, northern quoll and potential critical nesting habitat for grey falcon (*Falco hypoleucos*) (Vulnerable). Weeli Wolli Creek contained flowing surface water, and one significant pool was recorded at the time of survey.

The Sand Plain, Stony Plain and Sand Dune habitats provide critical habitat for bilby (*Macrotis lagotis*) (Vulnerable; scat, old burrow and digging records within Survey Area), which utilise these habitats for burrowing and active foraging. These habitats also provide supporting foraging habitat to ghost bat, Pilbara leaf-nosed bat and grey falcon.

The Breakaway/ Cliff habitat present is considered critical (denning and foraging) habitat for the northern quoll and supporting (foraging) habitat for ghost bat and Pilbara leaf-nosed bat.

The Hillcrest/ Hillslope, Mulga Woodland, Drainage Area/ Floodplain, Minor Drainage Line and Medium Drainage Line habitats in the Survey Area were considered to be of lesser value to Matters of National Environmental Significance fauna species. However, these habitats were still considered to provide supporting value to a number of species including, ghost and Pilbara leaf-nosed bats (foraging over mentioned habitats), grey falcon (foraging over Drainage Area/ Floodplain, Minor Drainage Line and Medium Drainage Lines) and bilby (foraging over Drainage Area/ Floodplain).

Table of Contents

1 Introduction 1
1.1 Project Background 1
1.2 Scope and Objectives 1
2 Environmental Context 5
2.1 Physical Environment 5
2.1.1 Climate 5
2.1.2 Geology and Soils 6
2.1.3 Surface Water and Hydrology 6
2.2 Biological Environment 7
2.2.1 Interim Biogeographic Regionalisation of Australia 7
2.2.2 Land Systems 7
2.2.3 Pre-European Vegetation 8
2.3 Conservation Categories and Management 10
2.4 Land Use and Tenure 10
3 Methods 10
3.1 Desktop Assessment 10
3.1.1 Database Searches 10
3.1.2 Literature Review 11
3.2 Field Survey 14
3.2.1 Survey Timing and Personnel 14
3.2.2 Weather 14
3.2.3 Vertebrate Fauna 15
3.2.3.1 Habitat Assessment and Mapping 15
3.2.3.2 Motion Sensitive Cameras 18
3.2.3.3 Acoustic Bat Surveys 18
3.2.3.4 Cave Assessments 18
3.2.3.5 Night Parrot Surveys 19
3.2.3.6 Targeted Bilby Searches 19
3.2.3.7 Targeted Searching (All MNES and Priority Species) 19

3.3 Taxonomy and Nomenclature 20
3.4 Limitations 20
4 Results 23
4.1 Desktop Assessment 23
4.1.1 Environmentally Sensitive Areas 23
4.1.2 Vertebrate Fauna 23
4.2 Field Survey 39
4.2.1 Vertebrate Fauna Habitats 39
4.2.1.1 Habitat Features 51
4.2.2 Vertebrate Fauna Species 51
4.2.2.1 Herpetofauna 52
4.2.2.2 Birds 52
4.2.2.3 Mammals 52
4.2.3 Significant Species Recorded 53
4.2.4 Significant Species Possibly Occurring in the Survey Area 66
5 Discussion 75
5.1 Fauna Habitats 75
5.2 Vertebrate Fauna Species 76
5.2.1 Significant Species 76
5.2.1.1 Target MNES Species 76
5.2.1.2 Other Significant Species 80
6 References 81

List of Figures

Figure 1: Survey area location. 4

Figure 2: Climate data for Newman Aero Station (007176). Mean annual rainfall data has been calculated from 1971-2024 and mean maximum temperature has been calculated from 1996-2024 (Bureau of Meteorology 2024). 5

Figure 3: Previous fauna surveys conducted in the vicinity of the Survey Area. 13

Figure 4 : Newman Aero (station 007176) long term mean monthly rainfall (1971 - 2024), total monthly recorded rainfall (May 2023 – April 2024), long-term mean monthly maximum

temperatures (1996-2024), and mean monthly maximum temperatures (May 2023 – April 2024). The green arrow indicates the field survey timing. 15

Figure 5: Fauna sampling locations within the Survey Area. 17

Figure 6: Previous significant vertebrate fauna locations in proximity to the Survey Area. 38

Figure 7: Fauna habitat and significant areas mapping within the Survey Area 49

Figure 8: Significant vertebrate fauna recorded within the Survey Area. 54

List of Plates

Plate 1: Pilbara olive python scat. 55

Plate 2: Cave where scat was recorded. 55

Plate 3: Recent digging. 57

Plate 4: Bilby scat. 57

Plate 5: Possible bilby diggings. 58

Plate 6: Recent digging. 58

Plate 7: Potential old bilby burrow. 59

Plate 8: Old digging. 59

Plate 9: Potential old bilby burrow and diggings. 60

Plate 10: Recent digging. 60

Plate 11: Old digging. 61

Plate 12: Possible old bilby burrow. 61

Plate 13: Recent Varanid digging likely. 62

Plate 14: Approx. 20 ghost bat scats (old). 64

Plate 15: CAVE-08 entrance. 64

Plate 16: Approx. 20 ghost bat scats (recent). 64

Plate 17: CAVE-11 entrance. 64

Plate 18: Brush-tailed mulgara scat. 65

Plate 19: Recently inactive brush-tailed mulgara burrows. 65

Plate 20: Mound of a western pebble-mound mouse. 66

Plate 21: Mound of a western pebble-mound mouse. 66

List of Tables

Table 1: Summary of regulatory guidance documents pertinent to the Jinidi Rail Corridor and Borrow Pit targeted vertebrate fauna assessment. 2

Table 2: Geological units of the Survey Area (Stewart et al. 2008). 6

Table 3: Distribution of land systems within the Survey Area. 7

Table 4: Extent of pre-European vegetation within the Survey Area and within the Pilbara bioregion (Government of Western Australia 2018). 9

Table 5: List of databases reviewed for the desktop assessment. 10

Table 6: Statement of limitations for the targeted vertebrate fauna assessment. 21

Table 7: Summary of literature review results from surveys conducted within the vicinity of the Survey Area. 24

Table 8: Fauna habitats described within the Survey Area. 40

Table 9: Number of vertebrate fauna species recorded during the survey. 52

Table 10: Pilbara olive python recorded during the survey. 55

Table 11: Bilby recorded during the survey. 57

Table 12: Ghost bat scats recorded during the survey. 64

Table 13: Comparison of home range, habitat availability and likelihood of occurrence for Matters of National Environmental Significance (MNES) species identified in the desktop analysis for the Survey Area. 71

List of Appendices

Appendix A: Environmental Context Mapping

Appendix B: Conservation Fauna Categories, Habitat Condition Scales and Significant Species Suitability Criteria

Appendix C: Survey Sampling Sites

Appendix D: Fauna Species Lists

Appendix E: Significant Fauna Species Likelihood of Occurrence

Appendix F: Fauna Habitat Mapping

Appendix G: Significant Features for MNES Vertebrate Species

Appendix H: MNES Habitat Suitability Mapping

1 Introduction

1.1 Project Background

Astron Environmental Services was commissioned by BHP Western Australian Iron Ore (BHP WAIO) to undertake a single season targeted significant vertebrate fauna survey, specifically targeting the presence of Matters of National Environmental Significance (MNES) and other significant vertebrate fauna, covering the Jinidi Rail Corridor and Borrow Pit potential alignments, rail borrow area and construction camp options (hereafter referred to as the Survey Area). The Survey Area is located approximately 70 kilometres (km) north-west of Newman and covers an area of approximately 24,952 hectares (ha) (Figure 1). The Survey Area covers potential options for new rail corridor alignments, duplication of the existing mainline and a potential rail borrow area to the east. This targeted significant vertebrate fauna assessment may be used to inform future environmental approvals across the area; however, this survey report is of a general nature not assessing any specific development proposed by BHP WAIO.

1.2 Scope and Objectives

The objective was to undertake a targeted vertebrate fauna assessment, with a specific focus on MNES and other significant fauna species, through a desktop assessment and field survey. The desktop assessment included a comprehensive database and literature review and was intended to inform the field survey for potentially occurring MNES species in the Survey Area.

The scope of work, as guided by regulatory documents specified in Table 1, was to undertake:

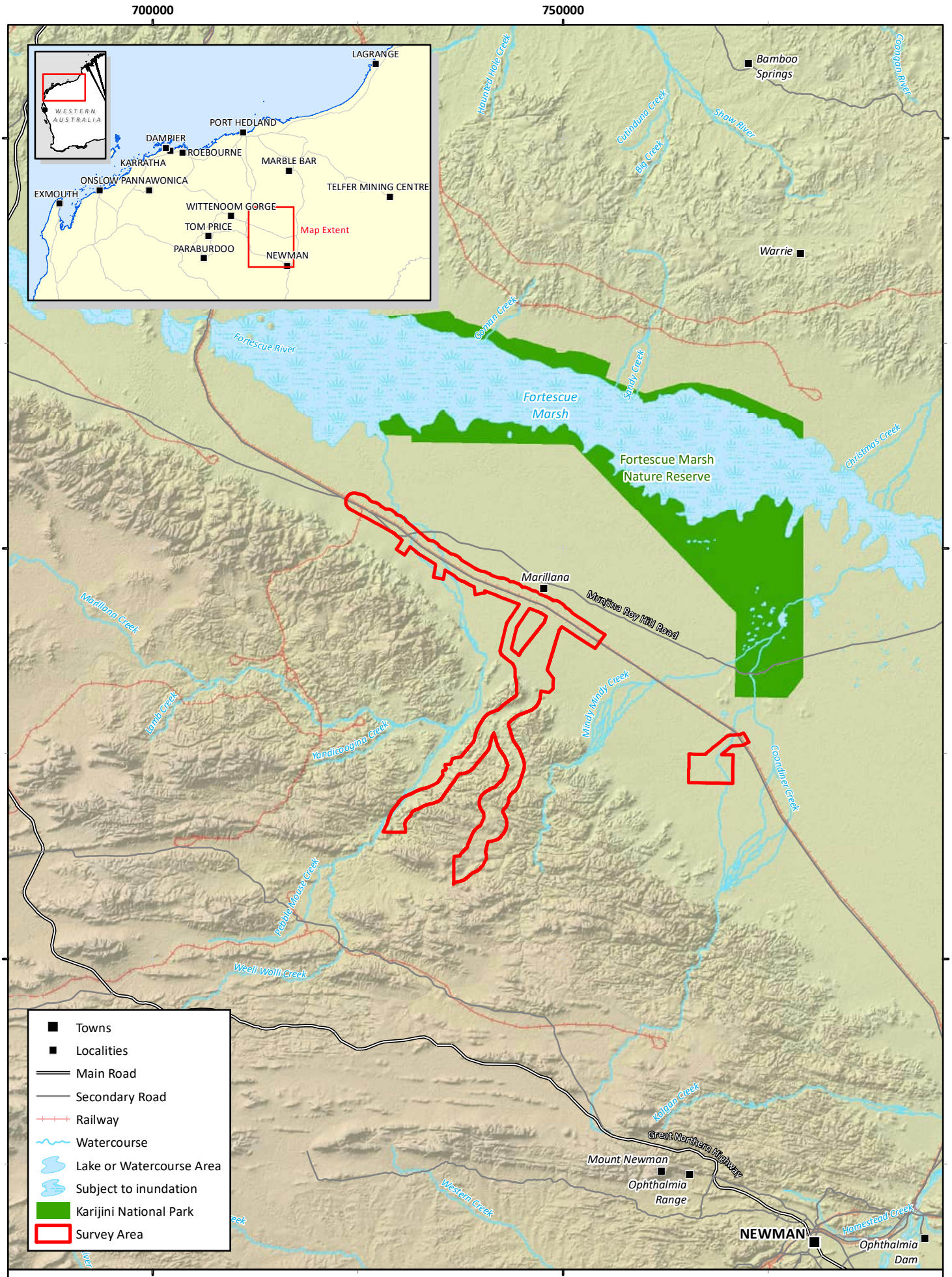
- A desktop assessment, including a comprehensive database and literature review for the presence, or likely presence, of significant vertebrate fauna species and communities.
- A targeted vertebrate fauna field survey, including:
  - targeted MNES species sampling and searches
  - other fauna species sampling and searches, particularly other significant fauna
  - fauna habitat assessments and mapping.

Astron conducted the fauna survey in accordance with the regulatory guidance detailed in Table 1 and BHP WAIO's internal guidance document (BHP 2023).

Table 1: Summary of regulatory guidance documents pertinent to the Jinidi Rail Corridor and Borrow Pit targeted vertebrate fauna assessment.

Level of survey	Survey Area size	Survey timing	Relevant regulatory guidance documents
Targeted vertebrate fauna assessment (specifically Matters of National Environmental Significance and other significant fauna species)	24,952 ha	May 2024	• Environmental Protection Authority (EPA) (2023) Statement of Environmental Principles, Factors and Objectives (Environmental Protection Authority 2023) • EPA (2016) Environmental Factor Guideline – Terrestrial Fauna (Environmental Protection Authority 2016) • EPA (2020) Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (Environmental Protection Authority 2020) • Department of the Environment, Water, Heritage and the Arts (DEWHA) (2013) Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (Department of Environment 2013) • DEWHA (2010) Survey Guidelines for Australia's Threatened Bats (Department of the Environment, Water, Heritage and the Arts 2010a) • DEHWA (2010) Survey Guidelines for Australia's Threatened Birds (Department of the Environment, Water, Heritage and the Arts 2010b) • DEHWA (2010) Survey Guidelines for Australia's Threatened Frogs (Department of the Environment, Water, Heritage and the Arts 2010c) • Department of Sustainability, Environment, Water, Population, and Communities (DSWEPaC) (2011) Survey Guidelines for Australia's Threatened Mammals (Department of Sustainability Environment Water Population and Communities 2011a) • DSWEPaC (2011) Survey Guidelines for Australia's Threatened Reptiles (Department of Sustainability Environment Water Population and Communities 2011b) • Department of the Environment and Energy (2016) Referral Guideline for the Endangered Northern Quoll *Dasyurus hallucatus* (Department of the Environment 2016) • Department of Biodiversity, Conservation and Attractions (DBCA) (2017) Guidelines for Surveys to Detect the Presence of Bilbies, and Assess the Importance of Habitat in Western Australia (Department of Biodiversity Conservation and Attractions 2017) • DBCA (2024) Guidelines for determining the likely presence and habitat usage of night parrot (*Pezoporus occidentalis*) in Western Australia (Department of Biodiversity, Conservation and Attractions 2024) • Bat Call WA (2021) A Review of Pilbara Leaf-nosed Bat Ecology, Threats and Survey Requirements (Bat Call WA 2021a) • Bat Call WA (2021) A Review of Ghost Bat Ecology, Threats and Survey Requirements (Bat Call WA 2021b) • Threatened Species Scientific Committee (TSCC) (2016) Approved Conservation Advice for *Rhinonicteris aurantia* (Pilbara form) (Pilbara leaf-nosed bat) (Threatened Species Scientific Committee 2016a)

Level of survey	Survey Area size	Survey timing	Relevant regulatory guidance documents
			• TSSC (2016) Approved Conservation Advice for *Macroderma gigas* (ghost bat) (Threatened Species Scientific Committee 2016b) • TSCC (2008) Approved Conservation Advice for *Liasis olivaceus barroni* (olive python – Pilbara subspecies) (Threatened Species Scientific Committee 2008) • Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023a) Conservation Advice for *Aphelocephala leucopsis* (southern whiteface) • BHP WAIO's (2023) Guidance for Vertebrate Fauna Surveys in the Pilbara (SPR-IEN-EMS-012)



BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure 1: Survey area location

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_Fig01_Locn

Datum: GDA 1994 - Projection: MGA Zone 50

0 5 10 15 20 25 30 Km

N

2 Environmental Context

2.1 Physical Environment

2.1.1 Climate

The climate of the Pilbara region of Western Australia is classified as arid tropical with two distinct seasons: a hot, wet summer (October – April) and a mild, dry winter (May – September) (Bureau of Meteorology 2024).

Based on long-term climatic data from the nearest Bureau of Meteorology (BOM) weather station at Newman Aero (Station 007176) (approximately 9 km south-east of the Survey Area) the mean annual rainfall since 1971 is 318.5 millimetres (mm). The mean maximum daily temperatures ranges between 23°C and 39.4°C, and ranges above 30°C for much of the year (Bureau of Meteorology 2024).

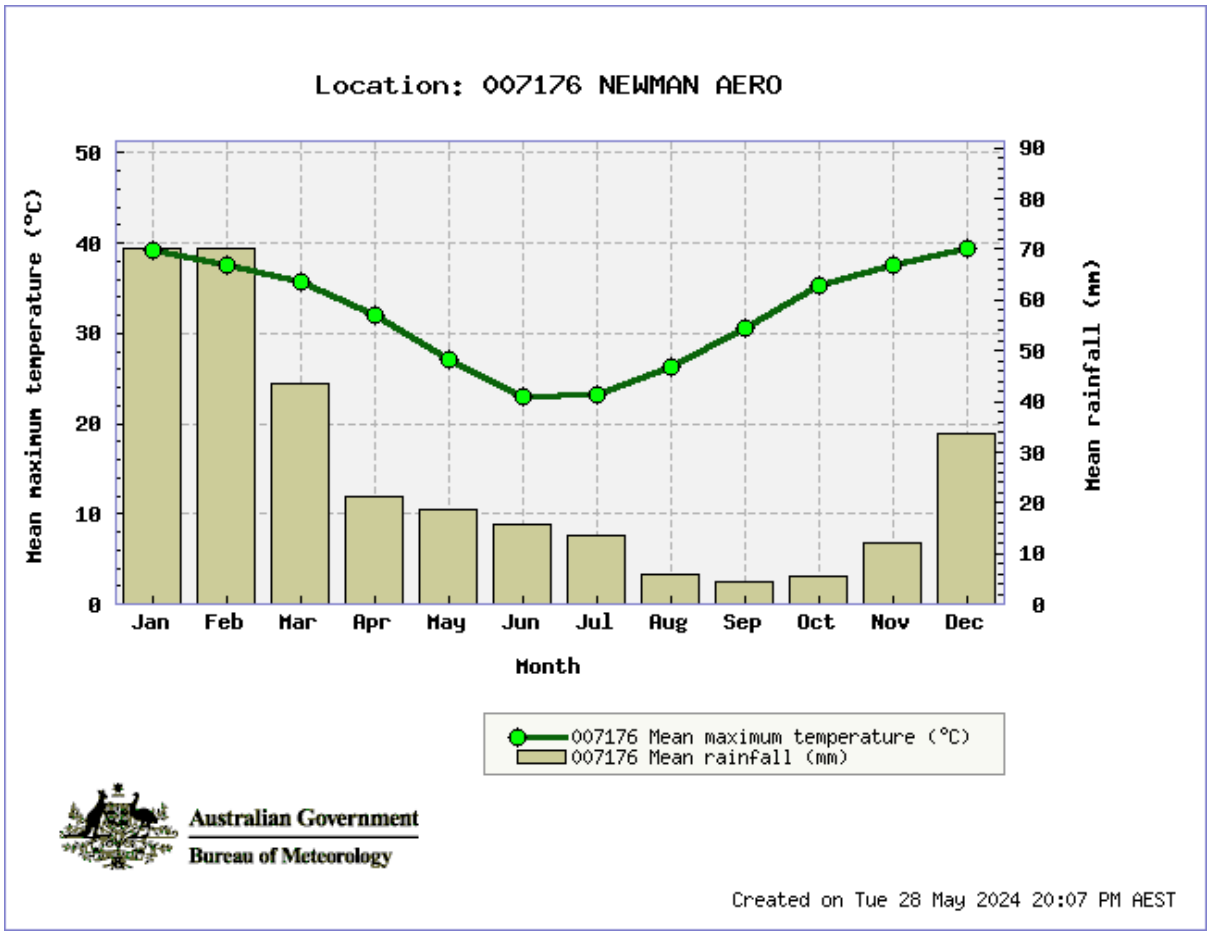


Figure 2: Climate data for Newman Aero Station (007176). Mean annual rainfall data has been calculated from 1971-2024 and mean maximum temperature has been calculated from 1996-2024 (Bureau of Meteorology 2024).

2.1.2 Geology and Soils

The surface geology of the Survey Area is comprised of nine units (Geoscience Australia 2008, Stewart et al. 2008), with colluvium 38491 the most dominant (Table 2). Geological mapping of the Survey Area is presented in Figure A.1 (Appendix A).

Table 2: Geological units of the Survey Area (Stewart et al. 2008).

Geological name	Label	Area within Survey Area (proportion of Survey Area)
colluvium 38491: Colluvium, sheetwash, talus; gravel piedmonts and aprons over and around bedrock; clay-silt-sand with sheet and nodular kankar; alluvial and aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin; local calcrete, reworked laterite	Qrc	11,031.9 ha (48.1%)
Weeli Wolli Formation: Banded iron-formation (commonly jaspilitic), mudstone, siltstone; common interlayered metadoleritic sills	Lchw	5,986.3 ha (26.1%)
Brockman Iron Formation: Banded iron-formation, chert, mudstone and siltstone	Lchk	2,676.8 ha (11.7%)
sand plain 38499: Sand or gravel plains; quartz sand sheets commonly with ferruginous pisoliths or pebbles, minor clay; local calcrete, laterite, silcrete, silt, clay, alluvium, colluvium, aeolian sand	Czs	3,886.2 ha (16.9%)
alluvium 38485: Channel and flood plain alluvium; gravel, sand, silt, clay, locally calcreted	Qa	923.3 ha (4.0%)
ferruginous duricrust 38498: Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite	Czl	243.7 ha (1.1%)
mafic, ultramafic, intermediate intrusions 74431: Dolerite, gabbro, norite, pyroxenite, peridotite, diorite, tonalite; locally metamorphosed; rare biotite rock, amphibolite	-Pd	107.9 ha (0.5%)
silcrete 42026: Silcrete, siliceous duricrust, siliceous breccia; opaline silica, jasperoidal chalcedony, and local chrysoprase caprock over ultramafic rocks	Czz	30.4 ha (0.1%)
dunes 38496: Dunes, sandplain with dunes and swales; may include numerous interdune claypans; residual and aeolian sand with minor silt and clay; aeolian red quartz sand, clay and silt, in places gypsiferous; yellow hummocky	Qd	65.2 ha (0.3%)

2.1.3 Surface Water and Hydrology

The Survey Area occurs within the 'Fortescue River Upper' catchment. No Wetlands of International Importance (i.e. Ramsar wetlands) or Nationally Important Wetlands occur within the Survey Area (Department of the Environment and Energy 2020a, 2020b). The nearest Nationally Important Wetland is Fortescue Marshes, located approximately 9 km from the Survey Area. Weeli Wolli creek intersects the Survey Area.

2.2 Biological Environment

2.2.1 Interim Biogeographic Regionalisation of Australia

The Interim Biogeographic Regionalisation for Australia (IBRA; Version 7) divides the Australian continent into 89 bioregions and 419 subregions (Department of Agriculture, Water and the Environment 2021). The IBRA regions represent a landscape-based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna. The Survey Area is situated in the Pilbara Bioregion, of which 5-10% is represented in the national reserve system (Department of the Environment and Energy 2021).

The biodiversity of the 53 subregions recognised in Western Australia was documented as part of a national audit to provide priorities for conservation action (Department of Conservation and Land Management 2002). The Survey Area occurs within both Fortescue (15,889.50 ha, or 63.7% of the Survey Area) and Hamersley (9,062.24 ha, or 36.3% of the Survey Area) subregions, described as:

- Fortescue PIL02 – Alluvial plains and river frontage. Mulga-bunch grass and short grass communities on alluvial plains in the east. Deeply incised gorge systems in the western part of the drainage. River gum woodlands fringe the drainage lines (Kendrick 2001a).
- Hamersley PIL03 – Mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by gorges (basalt, shale, and dolerite). Mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges (Kendrick 2001b).

2.2.2 Land Systems

Land systems of the Western Australian rangelands have been mapped and described by the Department of Primary Industries and Regional Development (previously named Department of Agriculture and Food Western Australia) with the aim of providing comprehensive descriptions of biophysical resources, including the condition of soils, landforms, vegetation, habitat and the presence of declared plants and animals. A total of 102 land systems occurs in the Pilbara bioregion, covering 181,723 km^2. Nine land systems occur in the Survey Area (Table 3). The distribution of these land systems within the Survey Area is shown in Figure A.2 (Appendix A).

Table 3: Distribution of land systems within the Survey Area.

Land system	Total area within bioregion (ha)	Total area within Survey Area (ha)	Proportion within Survey Area (%)
Newman (NEW) - Rugged jaspilite plateaux, ridges, and mountains, supporting hard spinifex grasslands.	1,996,418.92	8,644.70	0.45
Fan (FAN) - Washplains and gilgai plains supporting groved mulga tall shrublands and minor tussock grasslands.	148,027.75	4,757.50	3.21
Urandy (URY) - Stony plains, alluvial plains and drainage lines supporting shrubby soft spinifex grasslands.	132,542.34	3,032.88	2.29
Fortescue (FTC) - Alluvial plains and flood plains supporting patchy grassy eucalypt and acacia woodlands and shrublands and tussock grasslands.	48,940.92	1,996.09	4.50

Land system	Total area within bioregion (ha)	Total area within Survey Area (ha)	Proportion within Survey Area (%)
Divide (DIV) - Gently undulating sandplains with minor dunes, supporting hard spinifex hummock grasslands with numerous shrubs.	436,649.21	4,301.36	0.99
Boolgeeda (BGD) - Stony lower slopes and plains below hill systems, supporting hard and soft spinifex grasslands or mulga shrublands.	962,140.81	1,810.69	0.16
Rocklea (ROC) - Basalt hills, plateaux, lower slopes, and minor stony plains, supporting hard spinifex and occasionally soft spinifex grasslands with scattered shrubs.	2,880,023.40	97.18	<0.1
River (RIV) - Narrow, seasonally active flood plains and major river channels supporting moderately close, tall shrublands or woodlands of acacias and fringing communities of eucalypts sometimes with tussock grasses or spinifex.	497,230.19	92.21	<0.1
Adrian – Stony plains and low silcrete hills supporting hard spinifex grasslands	22,332.65	14.16	<0.1

2.2.3 Pre-European Vegetation

Beard (1975) completed broad-scale (1:1,000,000) pre-European vegetation mapping at an association level. The Beard mapping was later used by the former Department of Agriculture and Food Western Australia (Shepherd et al. 2002) to compile vegetation units that assisted with identifying pre-European and current extents of vegetation throughout Western Australia.

Three pre-European vegetation units, 29 and 111 (Fortescue Valley PIL02 subregion only) and 82 (PIL02 and Hammersley PIL03 subregions) (Shepherd et al. 2002, Department of Primary Industries and Regional Development 2019), are associated with the Survey Area (Figure A.3, Appendix A). Table 4 summarises the current and pre-European extent of these three vegetation units in the Pilbara bioregion and the Survey Area.

Table 4: Extent of pre-European vegetation within the Survey Area and within the Pilbara bioregion (Government of Western Australia 2018).

Vegetation unit	Mapping unit (Beard 1975)	Description	Extent in Survey Area (ha)	Pre-European extent (ha)	Current extent in bioregion (ha)*	Proportion of pre-European extent remaining (%)	Pre-European extent with formal protection (%)
29	a1Lp	Low woodland, open low woodland or sparse woodland: Mulga *Acacia aneura* and associated species.	9898.72	1,133,219.76	1,131,712.01	99.87	1.91
82	e16Lr t3Hi	Low tree-steppe: Hummock grassland with scattered bloodwoods & snappy gum Triodia spp., *Corymbia dichromophloia*, *Eucalyptus leucophloia.*	9331.70	2,563,583.23	2,550,888.14	99.50	10.26
111	e25Sr t2Hi	Shrub-steppe: Hummock grassland with scattered shrubs or mallee *Triodia* spp. *Acacia* spp., *Grevillea* spp., *Eucalyptus* spp..	5721.32	550,286.99	550,232.45	99.99	1.29

*Data sourced from the '2018 Statewide Vegetation Statistics – Full report'; please note, the statistics now presented may be out of date.

2.3 Conservation Categories and Management

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provide a legal framework to protect and manage MNES, including listed flora, fauna, and ecological communities. These listed flora, fauna, and ecological communities are allocated a conservation category, which are outlined in Tables B.1 and B.2 (Appendix B).

An ecological community may be subject to processes that threaten to destroy or significantly modify it across much of its range. Such communities are identified as threatened ecological communities that are listed at the Commonwealth level under the EPBC Act and at a state level under the *Biodiversity Conservation Act 2016* (BC Act) (Tables B.2 and B.3, Appendix B).

Under Western Australian legislation, all native fauna is protected, and it is an offence to 'take' protected fauna. The *Biodiversity Conservation Act 2016* (BC Act) also provides for native fauna species to be specially protected when they are considered rare, threatened with extinction, or have a high conservation value (Table B.4, Appendix B). In addition, due to the diversity of Western Australia's fauna, many species are known from only a few collections or locations but have not been adequately surveyed. Such fauna may be rare or threatened but cannot be considered for declaration as 'Threatened fauna' until adequate surveys have been undertaken. These fauna species are included on a supplementary conservation list managed by the Department of Biodiversity, Conservation and Attractions (DBCA) called the *Priority Fauna List*. Priority fauna species are categorised according to level of threat and other information; the conservation categories are described in Table B.5 (Appendix B).

2.4 Land Use and Tenure

The Survey Area is located within the Shire of East Pilbara and intersects with land used for transport (airports and roads), water, pastoralism (Marillana Station) and other minimal use. The local area is used for mineral exploration, mining activity, and pastoralism.

The Fortescue Marsh Nature Reserve is the closest conservation reserve, located within 10 km to the north of the Survey Area.

3 Methods

3.1 Desktop Assessment

3.1.1 Database Searches

The desktop assessment focused on key habitats for MNES species that occur in the Pilbara bioregion. The database searches conducted are summarised in Table 5.

Table 5: List of databases reviewed for the desktop assessment.

Database name	Date search results received	Search focus	Search area
Threatened and Priority Fauna Database (Department of Biodiversity, Conservation and Attractions 2023a)	23 August 2023	Threatened and Priority fauna species	40 km buffer from the Survey Area boundary

Database name	Date search results received	Search focus	Search area
NatureMap (Department of Biodiversity, Conservation and Attractions 2023b)	21 August 2023	Terrestrial vertebrate fauna and fauna of significance	40 km buffer from the Survey Area boundary
Protected Matters Search Tool (Department of Climate Change, Energy, the Environment and Water 2023b)	15 November 2023	Matters of National Environmental Significance	40 km buffer from the Survey Area boundary
Birdlife Australia Birdata (Birdlife Australia 2023)	17 August 2023	Bird species	40 km buffer from the Survey Area boundary
Atlas of Living Australia (Atlas of Living Australia 2023)	21 August 2023	Terrestrial vertebrate fauna and fauna of significance	40 km buffer from the Survey Area boundary
Index of Biodiversity Surveys for Assessment (Department of Water and Environmental Regulation 2023)	15 November 2023	Review of reports relevant to the Survey Area	Surveys overlapping and/or within 15 km of the Survey Arean

3.1.2 Literature Review

Numerous fauna surveys have been previously commissioned by BHP WAIO overlapping and/or within proximity to the Survey Area and were supplied to Astron for the desktop assessment. Previous survey reports reviewed are outlined below. Additional fauna records provided from the BHP WAIO database gave details of fauna records from additional surveys. All surveys reviewed in relation to the current survey are shown in Figure 3.

- Jinidi Targeted Vertebrate Fauna Survey (Biologic Environmental Survey 2024)
- Yandi 45C Targeted Significant Vertebrate Fauna Survey (Astron Environmental Service 2023)
- Central Pilbara Hub Targeted Matters of National Environmental Significance Vertebrate Fauna Survey (Biologic Environmental Survey 2023a)
- Targeted Pilbara Olive Python Survey: South Flank and Mining Area C (Biologic Environmental Survey 2023b)
- Fortescue Valley Targeted Bilby Survey (GHD Pty Ltd 2020)
- Ministers North to Yandi Corridor Single Phase Level 2 Fauna and Detailed Vegetation Survey (Biologic Environmental Survey 2017a)

- Ministers North Level 2 Vertebrate Fauna Survey (Biologic Environmental Survey 2017b)
- Central Pilbara Ghost Bat Population and Roost Assessment (Biologic Environmental Survey 2015)
- Pilbara Regional Ghost Bat Review (Biologic Environmental Survey 2014)
- South Flank Targeted Northern Quoll Survey (Biologic Environmental Survey 2013a)
- South Parmelia Level 2 Vertebrate Fauna Survey (Biota Environmental Sciences 2013)
- Marillana and Surrounds Targeted Mulgara Survey (Biologic Environmental Survey 2013b)
- Jinidi to Mainline Vertebrate Fauna Survey (Biologic Environmental Survey 2012a)
- Jinidi to Mindy Level 1 Fauna Survey (Biota Environmental Sciences 2012a)
- South Flank to Jinidi Level 2 Vertebrate Fauna Survey (Biota Environmental Sciences 2012b)
- Area C and Surrounds Vertebrate Fauna Survey (Biologic Environmental Survey 2011a)
- Jinidi Mine Access Road Infrastructure Corridor – Flora and Fauna Values (Biota Environmental Sciences 2011)
- Yandi Vertebrate Fauna Review (Biologic Environmental Survey 2011b)
- Jinidi Vertebrate Fauna Survey (Biologic Environmental Survey 2011c)
- Area C to Yandi Fauna Survey (Biologic Environmental Survey 2011d)
- Jinayri to Area C Access Corridor Vertebrate Fauna Assessment (ENV Australia 2010a)
- Area C to Jinayri to Mount Newman Railway Terrestrial Vertebrate Fauna Survey (Outback Ecology 2010)
- Jinayri Mining Lease Vertebrate Fauna Survey (ENV Australia 2010b)
- Munjina and Minsters North (Yandi Hub) Fauna Assessment (ENV Australia 2009)
- Biological Survey South Parmelia Exploration Leases (Onshore Environmental Consultants 2009)
- Area C Mining Operation Environmental Management Plan (Revision 4) A, D, P1 and P3 Deposits Terrestrial Vertebrate Fauna Assessment (Outback Ecology Services 2008)
- Rapid Growth Project 5: Quarry 6 Fauna Assessment (ENV Australia 2008)
- Area C R-Deposit Fauna Assessment (ENV Australia 2007)
- Ministers North Biological Survey (Ecologia Environment 2006a)
- Jirridi Biological Survey Summary Report (Ecologia Environment 2006b).

680000 700000 720000 740000 760000 780000

7500000 7480000 7460000 7440000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Previous Surveys (pre-2014)

- Area C Deposit A, D, P1 and P3 Vertebrate Fauna Survey Outback Ecology (Outback Ecology Services, 2008)
- Area C Deposit R Fauna Assessment (ENV Australia, 2007)
- Area C and Surrounds Vertebrate Fauna Survey (Biologic Environmental Survey, 2011)
- Area C to Jinayri to Mount Newman Railway Terrestrial Vertebrate Fauna Survey (Outback Ecology Services, 2009)
- Area C to Yandi Fauna Survey Biologic 16082011 (Biologic Environmental Survey, 2010)
- Biological Survey South Parmelia Exploration Leases (Onshore Environmental Consultants, Biologic Environmental Survey, 2009)
- Jinayri Access Road Vertebrate Fauna Survey (ENV Australia, 2010)
- Jinayri Vertebrate Fauna Assessment (ENV Australia, 2008)
- Jinidi Vertabrate Fauna Survey (Biologic Environmental Survey, 2011)
- Jinidi to Mainline Vertebrate Fauna Survey (Biologic Environmental Survey, 2011)
- Jinidi to Mindy Level 1 Fauna Survey (Biota Environmental Sciences, 2012)
- Jirridi Terrestrial Fauna Survey (Ecologia Environment, 2006)
- Marillana and Surrounds Targeted Mulgara Survey (Biologic Environmental Survey, 2013)
- Minsters North Biological Survey (Ecologia Environment, 2006)
- Munjina and Minsters North (Yandi Hub) Fauna Assessment (ENV Australia, 2009)
- Rapid Growth Project 5: M270SA Fauna Assessment (ENV Australia, 2008)
- South Flank Targeted Northern Quoll Survey (Biologic Environmental Survey, 2013)
- South Flank to Jinidi Level 2 Vertebrate Fauna Survey (Biota Environmental Sciences, 2012)
- South Parmelia Level 2 Vertebrate Fauna survey (Biota Environmental Sciences, 2013)
- Yandi Vertebrate Fauna Review (Biologic Environmental Survey, 2011)

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure 3.A: Previous fauna surveys conducted in the vicinity of the Survey Area (pre-2014)

Scale: 1:300,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 5 10 15 20 Kilometres

N

astron an ecocene company

Author: [redacted] Drawn: [redacted] Date: 25-08-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250825_Fig03A_PrevSurv_Pre2014

680000 700000 720000 740000 760000

7500000 7480000 7460000 7440000

Survey Area

Previous Surveys (2014-2024)

- BHP Fortescue Valley Targeted Bilby Survey (GHD Australia, 2020)
- Central Pilbara Ghost Bat Population and Roost Assessment: 2014 (Biologic Environmental Survey, 2015)
- Central Pilbara Hub Targeted Matters of National Environmental Significance Vertebrate Fauna Survey (Biologic Environmental Survey, 2022)
- Jinidi Targeted Matters of Environmental Significance Vertebrate Fauna Survey (Biologic Environmental Survey, 2024)
- Ministers North Level 2 Vertebrate Fauna Survey (Biologic Environmental Survey, 2017)
- Ministers North to Yandi Corridor Level 2 Vertebrate Fauna survey (Biologic Environmental Survey, 2017)
- Pilbara Regional Ghost Bat Review (Biologic Environmental Survey, 2014)
- Targeted Vertebrate Fauna Survey: Pilbara olive python South Flank and Mining Area C (Biologic Environmental Survey, 2023)
- Yandi 45C Targeted Significant Vertebrate Fauna Survey (Astron Environmental Services, 2023)

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure 3.B: Previous fauna surveys conducted in the vicinity of the Survey Area (2014-2024)

Scale: 1:300,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 5 10 15 20 Kilometres

N

astron an ecocene company

Author: [redacted] Drawn: [redacted] Date: 25-08-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250825_Fig03B_PrevSurv2014_2024

3.1.3 Significant Fauna Likelihood of Occurrence Assessment

Significant vertebrate fauna species (inclusive of Threatened and Migratory MNES listed fauna, and DBCA Priority and Other Specially Protected fauna species) that were returned from the database searches and literature review were categorised for likelihood of occurrence within the Survey Area according to the criteria listed in Table B.6 (Appendix B). Post-survey, the likelihood table was re-assessed utilising the information obtained during the field visit and additional criteria outlined in Table B.7 (Appendix B). The likelihood table was then updated to reflect an improved understanding of the likelihood that a species would actually occur in the Survey Area.

3.2 Field Survey

3.2.1 Survey Timing and Personnel

The field survey was undertaken by Principal Zoologist David Keirle, Senior Zoologists Andrew McCreery, Sean Smithies and Lucy Dadour, and Environmental Scientists Solomon French and Adam Davis, for 13 days from 4 to 16 May 2024. David Keirle and Andrew McCreery both have over 10 years, and Sean Smithies and Lucy Dadour have over six years of experience conducting vertebrate fauna surveys, specifically within the Pilbara region of Western Australia.

The survey was conducted under DBCA Authorisation to Take or Disturb Threatened Species (Section 40 of the BC Act) (TFA_2324-0217), Regulation 27 Biological Assessment Licence BA27001033, and under the Department of Primary Industries and Regional Development Scientific Use Licence U279/2023 and Wildlife Animal Ethics Committee approval (WAEC 22-08-86).

Survey timing was marginally outside the optimal time for reptiles and mammals in general (September – April); although, due to warm daytime temperatures and large rainfall events in January and March 2024, conditions were considered suitable. The survey was conducted during months that are considered optimal for the target bird species.

3.2.2 Weather

Daily weather observations recorded from Newman Aero (station 007176) were used to describe local rainfall and temperature preceding the survey (Figure 4). The annual rainfall recorded preceding the survey (306.6 mm) was slightly below the long-term mean of 314.8 mm recorded at Newman (Bureau of Meteorology 2024). Rainfall in the four months preceding the field survey was above the long term mean (291.4 mm versus 205.0 mm) (Bureau of Meteorology 2024). The maximum daily temperatures during the field survey period ranged from 28.0°C and 31.4°C (Bureau of Meteorology 2024).

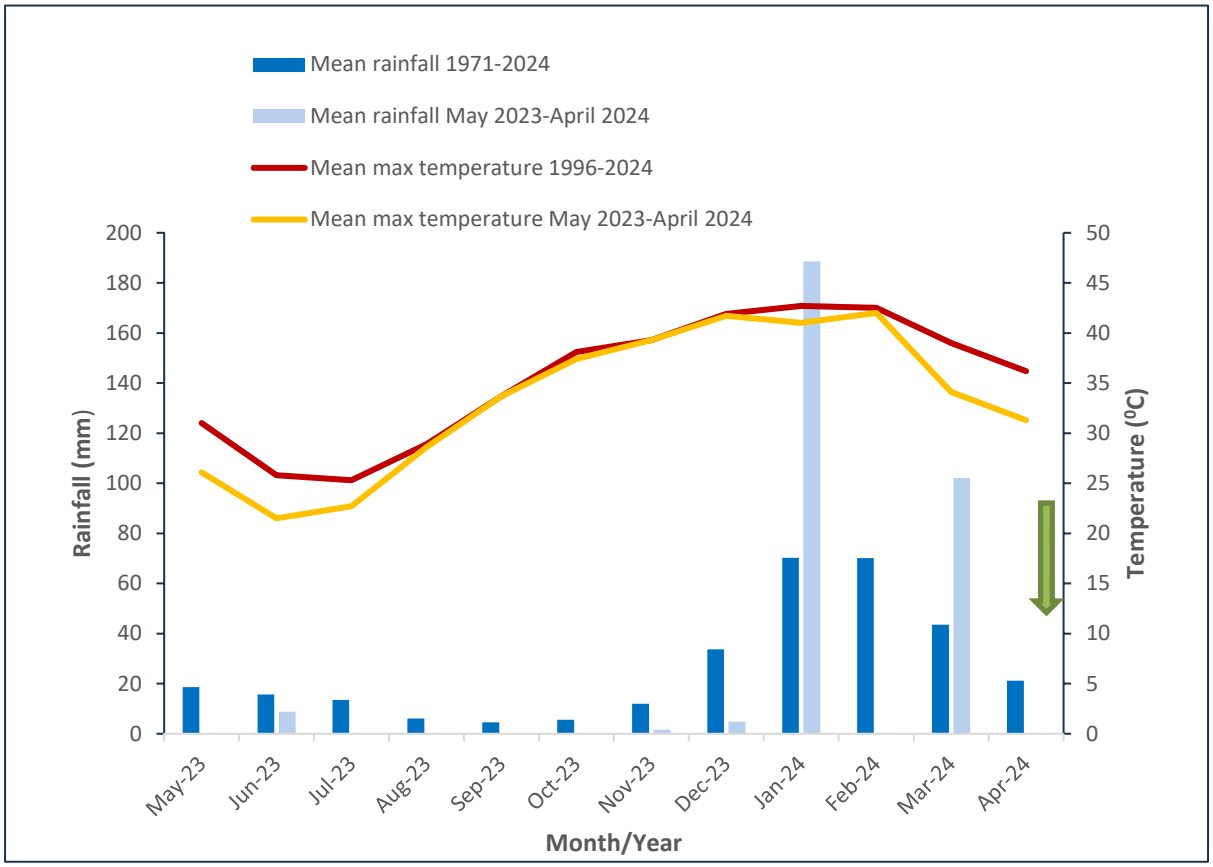


Figure 4 : Newman Aero (station 007176) long term mean monthly rainfall (1971 - 2024), total monthly recorded rainfall (May 2023 – April 2024), long-term mean monthly maximum temperatures (1996-2024), and mean monthly maximum temperatures (May 2023 – April 2024). The green arrow indicates the field survey timing.

3.2.3 Vertebrate Fauna

3.2.3.1 Habitat Assessment and Mapping

Eighty-nine fauna habitat assessments were conducted within the fauna habitats (excluding Cleared/ Disturbed) present within the Survey Area. This included 17 habitat-only assessment sites, and 71 habitat assessments completed at targeted fauna sampling sites (Figure 5). The following information was collected at each site:

- Location – coordinates measured using a handheld Geographical Positioning System (GPS) (Geocentric Data of Australia (GDA) 94)
- Recorder and date – personnel involved in undertaking the fauna habitat assessment and the survey date
- Habitat/landform – position in the landscape – major fauna habitat types were described based on the landform and vegetation
- Vegetation type – a broad description of vegetation type and structure
- Soils – a brief description of soil type

- Microhabitat – presence of specific microhabitat features; for example, leaf litter, logs, burrows, rocky outcrops, rock crevices, hollows, permanent, or semi-permanent water features
- Condition – habitat condition was assessed based on the presence of anthropogenic (human-induced) disturbances, and using the conditions ratings suggested by Thompson and Thompson (2010) (Table B.8 Appendix B)
- Disturbance – any disturbance, such as clearing, fire, weeds, flooding, vehicular, machinery, tracks, or grazing
- Photographs – a representative photograph was taken of each habitat assessment/sampling site.

The information derived from the fauna habitat assessments, available imagery, and on-ground traversal of the Survey Area, was used to delineate fauna habitats throughout the Survey Area, which were then mapped accordingly.

The potential for the habitats to provide critical or supporting habitat for MNES species known or likely to occur: northern quoll (*Dasyurus hallucatus*) (Endangered (EN), EPBC Act; EN, BC Act), Pilbara olive python (*Liasis olivaceus barroni*) (Vulnerable (VU); VU), ghost bat (*Macroderma gigas*) (VU; VU), Pilbara leaf-nosed bat (*Rhinonicteris aurantia*) (VU; VU), grey falcon (*Falco hypoleucos*) (VU; VU), southern whiteface (*Aphelocephala leucopsis castaneiventris*) (VU), night parrot (*Pezoporus occidentallis*) (EN; Critically Endangered (CR)), bilby (*Macrotis lagotis*) (VU; VU), princess parrot (*Polytelis alexandrae*) (VU; Priority (P)4), red goshawk (*Erythrotriorchis radiatus*) (VU; VU), great desert skink (*Liopholis kintorei*) (VU; VU), and Australian painted snipe (*Rostratula australis*) (EN; EN) (Department of Climate Change, Energy, the Environment and Water 2024), were ranked. In the case of the first eight species mentioned, this was undertaken according to the guidance criteria listed in Table B.7 (Appendix B). For the remaining species, specific guidance information on critical and supporting habitat is unavailable.

740000
760000
7500000
7480000
7460000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

HA-02
TBS-05
TBS-11
HA-13
TBS-15
AUD-04
TBS-16
TBS-12
TBS-13
TBS-06
HA-12
TBS-09
TBS-03
AUD-02
HA-01
TBS-14
TBS-17
AUD-01
TBS-04
CAM-01
HA-17
NQ6-01
NQ6-02
NQ6-04
HA-16
NQ6-05
HA-05
HA-08
BAT-10
HA-07
HA-06
CAM-03
AUD-03
TBS-08
TBS-07
NQ6-02
NQ6-01
NQ6-03
NQ6-04
NQ6-05
BAT-10
HA-08
HA-06
BAT-09
HA-04
CAM-02
BAT-07
BAT-05
HA-10
TBS-10
TBS-01
TBS-02
TBS-03
TBS-09
AUD-02
TBS-14
TBS-17
AUD-01
TBS-04
CAM-01
HA-17
NQ5-03
NQ5-01
NQ5-04
NQ5-02
BAT-05
CAM-02
BAT-07
HA-10
NQ4-03
eDNA-04
eDNA-03
HA-14
CAM-04
BAT-08
BAT-06
BAT-01
eDNA-05
BAT-02
NQ2-04
NQ2-02
NQ2-05
NQ2-03
BAT-03
NQ1-01
eDNA-01
eDNA-65
NQ2-06
BAT-02
NQ2-05
NQ2-04
HA-03
NQ2-03
NQ2-02
NQ2-01
NQ1-05
NQ1-03
NQ1-01
NQ1-02
eDNA-05
NQ1-04
BAT-03
eDNA-01
NQ3-03
BAT-04
eDNA-02
eDNA-04
HA-11
NQ4-03
eDNA-03
NQ4-02
HA-09
CAM-04
BAT-08
NQ4-05
BAT-06
BAT-01
NQ4-01
NQ4-04
eDNA-06
NQ3-03
BAT-04
eDNA-02
NQ3-02
NQ3-01
NQ3-04
NQ3-05

Survey Area

Sampling Site

- ARU
- Bat Detector
- Bilby Plot
- Camera
- eDNA Sampling Site
- Habitat Assessment Only

GPS Tracklog

- Ground Survey
- Helicopter Survey

BHP Western Australian Iron Ore
Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure 5: Fauna sampling locations within the Survey Area

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:180,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 0 2 4 6 8 10 Kilometres N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_Fig05_Sample	

3.2.3.2 Motion Sensitive Cameras

Thirty motion sensitive cameras (Browning, Bushnell, Moultrie and Reconyx) across six transects were deployed within the Survey Area for between six or seven nights, with a combined trapping effort of 206 camera trap nights. Transect sites consisted of five cameras, spaced approximately 100 m apart, and placed within suitable habitat such as caves, overhangs, crevices, drainage lines and water pools. The Department of the Environment (2016) guidelines recommend transects of 10 baited cameras. However, more recent studies (Dunlop et al. 2021) have found that northern quoll are highly detectable, with 95% confidence in detection after 12.5 camera nights (five cameras for 2.5 nights). The minimum camera nights per transect during the current survey was 30 nights (five cameras for six nights). Cameras were baited with a non-reward scent lure. Camera locations are shown in Figure 5.

An additional four cameras were deployed at opportunistic locations targeting significant species or features; one on an old bilby burrow with scats present (unbaited); one on a potential brush-tailed mulgara (*Dasycercus blythi*) (P4) burrow (unbaited); one in Gorge/ Gully habitat targeting northern quoll (baited); and one on a pool within Major Drainage Line habitat (baited). Survey effort focussed on Gorge/ Gully habitat and the major drainage line (Weeli Wolli Creek) where it intersected the southwestern edge of the Survey Area. Drainage lines function as dispersal and foraging habitat for both northern quoll and Pilbara olive python. Opportunistic cameras were deployed for between three and 10 nights resulting in 23 trapping nights.

Camera locations are shown in Figure 5 and detailed in Table C.1 (Appendix C).

3.2.3.3 Acoustic Bat Surveys

Acoustic ultra-high frequency recording equipment was used to record the presence of bats, in particular the Pilbara leaf-nosed bat and ghost bat. Bat detector recording devices (Song Meter 4 (SM4)) were positioned in a total of ten locations to achieve a broad coverage of the Survey Area. These locations were also designed to target potential foraging sites, waterbodies, and if present, potential maternal and breeding roosts. The bat detectors were set for between two (BAT09 and BAT10) and four nights (BAT06), resulting in a total of 29 recording nights. The locations are depicted in Figure 5 and detailed in Table C.1 (Appendix C). The bat echolocation data collected in the field was analysed by Robert Bullen (Bat Call WA) for presence of all bat species.

3.2.3.4 Cave Assessments

Searches for roost caves and manual cave assessments are the best method for identifying candidate roost caves and provide a more accurate assessment of ghost bat and Pilbara leaf-nosed bat presence and area usage than acoustic bat surveys (Bat Call WA 2021b). Ghost bats are notoriously difficult to detect as their echolocation calls show wide variation, and acoustic recording devices are not always successful in picking up vocal calls (audible sound) when ghost bats utilise certain feeding strategies (McKenzie and Bullen 2009, Bat Call WA 2021b, Ruykys et al. 2024).

In addition, the discovery of roost sites for ghost bats and Pilbara leaf-nosed bats within a project area represents the best assessment of whether the species will be affected by a development, given that suitable roost sites are known to be critical habitat (Bat Call WA 2021a, 2021b).

Any potential roost caves identified within the Survey Area were assessed for suitability to provide roosting opportunities for the ghost bat and Pilbara leaf-nosed bat.

Caves were categorised as per definitions for ghost bat usage according to (Bat Call WA 2021b):

- Category 1 – Maternity/diurnal roost sites with permanent ghost bat occupancy
- Category 2 – Maternity/diurnal roost cave with regular occupancy
- Category 3 – Diurnal roost caves with occasional occupancy
- Category 4 – Nocturnal roost cave with opportunistic usage
- Category 5 – Cave with characteristics unsuitable for ghost bat usage.

Caves were also categorised for Pilbara leaf-nosed bat usage according to Bat Call WA (2021a):

- Category 1 – Permanent maternity/diurnal roosts where seasonal presence of young is proven
- Category 2 – Permanent diurnal roosts occupied year-round without the proven presence of young
- Category 3 – Semi-permanent diurnal roosts
- Category 4 – Nocturnal refuge (resting, feeding or other purposes).

3.2.3.5 Night Parrot Surveys

Following the recent rediscovery of night parrot populations in Western Australia, the Survey Area falls within the area mapped as 'high priority for survey' according to DBCA (2024) Guidelines for determining the likely presence and habitat usage of night parrot (*Pezoporus occidentalis*) in Western Australia.

Passive acoustic surveys using Autonomous Recording Units (ARUs) were undertaken in the most prospective habitats available within the Survey Area (Sand Plain and Sand Dune habitat containing moderately mature *Triodia*).

Four ARUs (SM4 detector units) were placed in the Survey Area for between five and six nights, with a total effort of 22 survey nights. The recording devices were set to record from one hour pre-sunset to one-hour post-dawn. The recordings are CD quality, recorded at 44.1 kHz, and covered the frequency range 100 kHz to 21,000 kHz that brackets the night parrot call frequency range of 1,500 kHz to 3,500 kHz. Locations of the ARUs are shown in Figure 5. The audio data collected in the field was analysed by Robert Bullen (Bat Call WA) for the presence of the night parrot.

3.2.3.6 Targeted Bilby Searches

Targeted searches for signs of bilby were conducted using a combination of the 2 ha plot protocol and linear survey methods as outlined in DBCA's guidelines for survey to detect the presence of bilbies and assess the importance of habitat in Western Australia (Department of Biodiversity Conservation and Attractions 2017). Seventeen 2 ha plots of either 50 m x 400 m or 100 m x 200 m, were traversed on foot for approximately 3 person-hours per plot (51 person-hours total), with track logs recorded on a handheld GPS unit. All targeted bilby searches were conducted on habitats considered critical or supporting. Any evidence of bilby, including burrows, tracks, foraging signs, and scats were recorded, photographed and GPS located. The bilby plot search locations are depicted in Figure 5.

3.2.3.7 Targeted Searching (All MNES and Priority Species)

The aim of targeted searches was to identify areas of potentially suitable habitat for all significant fauna, such as caves and water sources, as well as to record any secondary signs including tracks, scats,

diggings, and burrows. Visual observations for significant fauna and opportunistic bird recordings were ongoing whilst moving through the Survey Area.

Targeted searching for other MNES species such as the Pilbara olive python and northern quoll was undertaken, including searching and recording scats, tracks, and other traces, and searching rocky habitats in cracks and caves, around water bodies, and holes in fence posts.

Targeted searches for great desert skink and brush-tailed mulgara ran concurrently with the bilby linear searches. All three species utilise similar habitats and searches focussed on areas of suitable open spinifex sandplains, and the identification of their distinct burrow systems.

Observations for western pebble-mound mouse (*Pseudomys chapmani*) (P4) were conducted within suitable Hillcrest/ Hillslope and Stony Plain habitats and focused on the identification of their distinctive pebble mounds.

Opportunistic bird recordings were undertaken throughout the fauna survey. All species were recorded through visual identification and/or from species-specific vocal calls and signs. Suitable habitats such as drainage lines and areas of standing water were prioritised for survey effort in conjunction with opportunistic observations. Significant bird species such as southern whiteface, peregrine falcon (*Falco peregrinus*) (Specially Protected (OS)) and grey falcon were targeted opportunistically while traversing though the Survey Area.

Track logs were recorded using a handheld GPS and are shown in Figure 5.

3.3 Taxonomy and Nomenclature

For species identified in the desktop assessment and literature review, every effort was made to determine the current scientific name for each taxon, including wherever there was doubt as to their true taxonomy (through subsequent name changes).

In accordance with the Environmental Protection Authority (EPA) technical guidance (Environmental Protection Authority 2020), nomenclature for herpetofauna and mammals follows that of the Western Australian Museum Checklist of the Vertebrates of Western Australia (Western Australian Museum 2023) and birds follows the Australian Faunal Directory (Department of the Agriculture, Water and the Environment 2022).

3.4 Limitations

Following the completion of the desktop review and field survey, a review of any limitations that may affect a complete assessment of the data collected was conducted. The limitations listed in Table 6 are based on those suggested for consideration in the EPA technical guidance (Environmental Protection Authority 2020).

Table 6: Statement of limitations for the targeted vertebrate fauna assessment.

Potential limitation	Degree of limitation	Statement regarding potential limitation
(i) Competency/experience	No limitation	The zoologists responsible for conducting the survey have extensive experience in conducting vertebrate fauna surveys in the Pilbara region. David Keirle and Andrew McCreery each have over 10 years of relevant fauna surveying experience.
(ii) Scope What faunal groups were sampled and were some sampling methods not able to be employed because of constraints such as weather conditions?	Minor limitation	All sampling methods were adequately employed for a Targeted significant vertebrate fauna survey. Due to access issues, caused by unavoidable helicopter maintenance requirements, early in the survey, the number of sites for ultrasonic bat detectors were decreased from 12 to 10 sites with two sites decreased from the recommended minimum number of nights from three to two (with one site deployed for four nights). Resulting in a total number of 29 survey nights for ultrasonic detectors, down from a proposed 36 survey nights. This is not considered a major limitation due to the adequacy of survey nights undertaken, the spread of ultrasonic units across the survey area and the low number of roosting caves found in the Survey Area. This is a minor limitation. The fauna observed and identified are likely to represent a portion of the suite of species that utilise the Survey Area.
(iii) Proportion of fauna identified, recorded and/or collected	No limitation	The survey effort was targeted towards MNES (Matters of National Environmental Significance) species and other significant species and focused on habitats considered suitable for these species within the Survey Area. The use of motion sensitive cameras and ultrasonic recorders were employed to identify species that are cryptic or nocturnal. Given the nature of the survey (single-phase Targeted), the fauna observed and identified are likely to represent a portion of the suite of species that utilise the Survey Area; however, the substantial level of desktop information available is sufficient to offset this as a potential limitation.
(iv) Sources of information Previously available information (whether historic or recent) as distinct from new data.	No limitation	Numerous biological surveys have been previously conducted in the broader area. Thirty-one previous biological reports within close proximity to or overlapping the Survey Area were specifically reviewed for context. Adequate information was available from database searches and previous studies in the Survey Area and surrounding region.
(v) Proportion of task achieved Further work which might be needed.	No Limitation	As mentioned in point (ii) Scope, the survey scope was not significantly impacted, and survey tasks were all considered to be achieved. Astron does not feel further survey work is warranted to complete this scope.

Potential limitation	Degree of limitation	Statement regarding potential limitation
(vi) Timing/weather/season/cycle	No limitation	Rainfall in the three months preceding the field survey was slightly below the long-term average for the corresponding timeframe. Survey timing was marginally outside the optimal time for reptiles and mammals (September – April); although, due to warm daytime temperatures and large rainfall events in January and March 2024, conditions were considered suitable. The survey was conducted during months that are considered optimal for target bird species.
(vii) Disturbances For example, fire, flood, accidental human intervention which affected results of survey.	No limitation	No major disturbances were recorded in the Survey Area that would have affected the survey results.
(viii) Intensity In retrospect, was the intensity adequate?	No limitation	The intensity of the survey was considered adequate for a targeted vertebrate fauna assessment.
(xi) Completeness Was the relevant area fully surveyed?	No limitation	All target habitats considered suitable for MNES and other significant vertebrate fauna species within the Survey Area were adequately surveyed.
(x) Resources Degree of expertise available in animal identification to taxon level.	No limitation	Adequate resources were available to identify fauna species. All technical personnel involved in identification have extensive experience in conducting vertebrate fauna surveys.
(xi) Remoteness and/or access problems	Minor limitation	There were minor access problems, with helicopter maintenance issues, which meant access to the southern half of the Survey Area was not possible for the first three days of the survey. However, the northern half and borrow area were accessible by vehicle for these days. The resultant reduced effort in the southern half is considered a minor limitation.
(xii) Availability of contextual information For example, biogeographical information on the region.	No limitation	Database searches and previous fauna surveys within and in the vicinity of the Survey Area provided contextual information.

4 Results

4.1 Desktop Assessment

4.1.1 Environmentally Sensitive Areas

No Environmentally Sensitive Areas (ESAs), Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) intersected or occur within the Survey Area. The nearest ESA likely of interest is the Fortescue Marshes, located approximately 4.6 km from the Survey Area (Department of the Environment and Energy 2020a).

4.1.2 Vertebrate Fauna

The database searches indicated that 413 vertebrate fauna occur, or potentially occur, within a 40 km radius from the centre of the Survey Area, including nine amphibian species, 140 reptile species, 208 bird species, and 56 mammal species (including nine introduced mammal species) (Table D.1 – D.4, Appendix D) (Birdlife Australia 2024, Department of Biodiversity, Conservation and Attractions 2024b, 2024a, Department of Climate Change, Energy, the Environment and Water 2024).

Of these, 32 species are listed as MNES (specifically those listed as Threatened and Migratory species) occurring, or potentially occurring, within the Survey Area, including two reptiles, 25 birds and five mammals (Table E.1, Appendix E). This comprised 15 species listed as Threatened (five mammals, eight birds, two reptiles) and 19 listed as Migratory under the EPBC Act and/ or BC Act. A further 11 species, including four reptiles, four birds and three mammals, are State-listed, Priority (P) or Other Specially Protected (OS) species (Table E.1, Appendix E).

Of the 43 significant fauna species identified in the desktop assessment, seven species have previously been recorded within the Survey Area prior to the current survey: Pilbara olive python , Gane's blind snake (Pilbara) (*Anilios ganei*) (P1), eastern osprey (*Pandion haliaetus*) (Migratory (MI); MI), fork-tailed swift (*Apus pacificus*) (MI; MI), brush-tailed mulgara , bilby and western pebble-mound mouse. A further six species were considered to have a 'high' pre-survey likelihood of occurrence within the Survey Area, ten species were considered to have a 'moderate' pre-survey likelihood of occurrence, and 20 species were considered to have a 'low' pre-survey likelihood of occurrence (Table E.1, Appendix E). This is based on their respective ecology, habitats considered likely to be present, and any previous records from historic survey and database records.

Previous surveys undertaken for BHP WAIO within the Survey Area recorded five MNES species; ghost bat, Pilbara olive python, bilby, fork-tailed swift, and eastern osprey, and an additional three species of significance: brush-tailed mulgara, western pebble-mound mouse, and Gane's blind snake (Pilbara) (Table 7).

Review of the literature also found that previous surveys had recorded three MNES species from near to the Survey Area: Pilbara leaf-nosed bat, northern quoll, common sandpiper (*Actitis hypocleucos*) (MI; MI); and an additional two species of significance, Pilbara barking gecko (*Underwoodisaurus seorsus)* (P2) and peregrine falcon (Table 7).

Previous significant vertebrate fauna locations in proximity to the Survey Area are shown in Figure 6.

Table 7: Summary of literature review results from surveys conducted within the vicinity of the Survey Area.

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
Biologic (2024) Jinidi Targeted Vertebrate Fauna Survey	Jinidi, Northeast Corner and South Parmelia project areas 21,607 ha	Targeted Vertebrate Fauna Survey	March, May and September – October 2023	Habitat assessments, motion sensitive cameras, SM4 echolocation recorders, night parrot surveys, targeted bilby plot searches, eDNA sampling, targeted searches for conservation significant species habitats and secondary signs of presence	**MNES Fauna** **Northern quoll (*Dasyurus hallucatus*) 1.0 km south** **Pilbara olive python (*Liasis olivaceus barroni*) 2.1 km southwest** **Ghost bat (*Macroderma gigas*) 0.9 km west** Other Significant Fauna Brush-tailed mulgara (*Dasycercus blythi*) 4.8 km south Western pebble-mound mouse (*Pseudomys chapmani*) 0.8 km west
Astron (2023) Yandi 45C Targeted Significant Vertebrate Fauna Survey	BHP Yandi Operations 1,600 ha	Targeted Vertebrate Fauna Survey	September 2022	Habitat assessments, motion sensitive cameras, SM4 echolocation recorders, night parrot surveys, targeted bilby plot searches, targeted searches for conservation significant species habitats and secondary signs of presence	**MNES Fauna** **Common sandpiper (*Actitis hypocleucos*) 27.1 km northwest** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 18.3 km north

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
Biologic (2023) Central Pilbara Hub Targeted Matters of National Environmental Significance Vertebrate Fauna Survey	BHP Central Pilbara Hub 60,000 ha	Targeted Vertebrate Fauna Survey	November 2021, April & May 2022	Habitat assessments, northern quoll camera traps and scat searches, Pilbara leaf-nosed bat and ghost bat ultrasonic recorders and roost searches, targeted bilby plot searches, night parrot acoustic recorders, Pilbara olive python searches	**MNES Fauna** **Ghost bat (*Macroderma gigas*) 27.3 km west** **Pilbara leaf-nosed bat (*Rhinonicteris aurantia*) 26.8 km west** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapman*i) 11.7 km north
Biologic (2023b) Targeted Pilbara Olive Python Survey: South Flank and Mining Area C	BHP South Flank and Mining Area C; area size not stated	Targeted Pilbara olive python Fauna Survey	March 2023	Diurnal and nocturnal targeted searches, nocturnal vehicle transects, eDNA sampling	**MNES Fauna** **Pilbara olive python (*Liasis olivaceus barroni*) 19.5 km west** Other Significant Fauna None detected

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
GHD Pty Ltd (2020) Fortescue Valley Targeted Bilby Survey	BHP Fortescue Valley Exploration tenement, 11, 038 ha	Targeted Fauna Survey	February 2020	Desktop assessment, habitat assessment, targeted survey including 15 bilby transects and 23 Bilby Plots, opportunistic searches, drone and aerial survey	**MNES Fauna** **Bilby *(Macrotis lagotis)*** Evidence recorded of old bilby burrows and foraging digs within the survey area. Evidence of old and fresh digs, scats and burrow recorded outside of survey area Other Significant Fauna None recorded
Biologic (2017a) Ministers North to Yandi Corridor Single Phase Level 2 Fauna and Detailed Vegetation Survey	BHP Ministers North to Yandi Corridor; area size not stated	Single-season Level 2 Fauna Survey	October 2017	Motion cameras, SM2 and SM4 acoustic recorders, habitat assessments, targeted searches	**MNES Fauna** **None recorded** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 12.0 km north
Biologic (2017b) Ministers North Level 2 Vertebrate Fauna Survey	BHP Ministers North 3,028 ha	Dual-season Level 2 Fauna Survey	October 2016, April 2017	Habitat assessments, targeted nocturnal searches, dry pitfall and Elliott traps, SM2 bat detectors, motion sensitive cameras	**MNES Fauna** **None recorded** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 10.1 km north

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
Biologic (2014) Pilbara Regional Ghost Bat Review	Pilbara bioregion	Desktop Assessment	N/A	Literature review detailing ghost bat occurrence within the Pilbara region	**MNES Fauna** **N/A** Other Significant Fauna N/A
Biologic (2013a) Central Pilbara Ghost Bat Population and Roost Assessment	Packsaddle and South Flank project areas; size not stated	Targeted ghost bat roost assessment	November 2012	Visual inspection of caves, nocturnal observations, SM2 bat detectors, scat collection sheets and infrared video recorders	**MNES Fauna** **Ghost bat (*Macroderma gigas*) 0.6 km west** Other Significant Fauna None recorded
Biologic (2013b) South Flank Targeted Northern Quoll Survey	BHP South Flank 3,200 ha	Single-season Targeted Northen Quoll Survey	June & July 2012	Targeted searches for latrines, motion cameras, Elliott traps, cage traps	**MNES Fauna** **Ghost bat (*Macroderma gigas*) 19.0 km west** **Pilbara olive python (*Liasis olivaceus barroni*) 24.0 km west** Other Significant Fauna None recorded

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
Biota (2013) South Parmelia Level 2 Vertebrate Fauna Survey	BHP South Parmelia 4,855 ha	Three-phase Level 2 and Targeted Fauna Survey	April 2011, November 2011, February 2012	Pit, Elliott and funnel traps, harp trapping, SM2 and Anabat SD2 echolocation recorders, targeted fauna searches, habitat assessments	**MNES Fauna** **Ghost bat (*Macroderma gigas*) 4.1 km south** **Pilbara olive python (*Liasis olivaceus barroni*) 4.5 km south** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 4.5 km south
Biologic (2013) Marillana and Surrounds Targeted Mulgara Survey	Marillana and surrounds; 60.5 km^2 covered using transects	Targeted mulgara survey	June 2012	Elliott trapping, motion sensitive cameras and targeted mulgara searches	**MNES Fauna** **None recorded** Other Significant Fauna Brush-tailed mulgara (*Dasycercus blythi*) 22.4 km northeast
Onshore (2013) Flora & Vegetation and Vertebrate Fauna Review Mt Whaleback AML 7/244	BHP Mt Whaleback 6,650 ha	Desktop Assessment	N/A	Literature review of previous flora and fauna surveys and habitat assessments completed at the Mt Whaleback survey area	**MNES Fauna** **N/A** Other Significant Fauna N/A

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
Biologic (2012) Jinidi to Mainline Vertebrate Fauna Survey	BHP Jinidi Corridor to Mainline 39,330 ha	Two-season Level 2 Fauna Survey	March – April 2011 (Wet Season) August – September 2011 (Dry Season)	Systematic trapping sites consisting of pitfall, Elliott, funnel and cage traps, active hand searching, spotlight searches, habitat assessments, motion sensitive cameras, Anabat bat detectors, fixed time bird surveys and targeted searches for conservation significant species	**MNES Fauna** **Ghost bat (*Macroderma gigas*) 8.0 km northeast** **Pilbara olive python (*Liasis olivaceus barroni*) 8.2 km northeast** **Eastern osprey (*Pandion haliaetus*) 4.2 km northeast** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 0.9 km northeast Gane's blind snake (Pilbara) (*Anilios ganei*) 24.0 km northeast
Biota (2012a) Jinidi to Mindy Level 1 Fauna Survey	BHP Jinidi to Mindy 454 ha	Level 1 fauna assessment	March 2011	Foot traverses, habitat assessments, opportunistic fauna observations	**MNES Fauna** **None recorded** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 8.8 km east

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
Biota (2012b) South Flank to Jinidi Level 2 Vertebrate Fauna Survey	BHP South Flank to Jinidi 8,588 ha	Three-phase Level 2 Fauna Survey	April 2011, November 2011, February 2012	Pitfall, Elliott and funnel traps, avifauna surveys, harp trapping, SM2 and Anabat SD2 recorders, nocturnal surveys	**MNES Fauna** **Ghost bat (*Macroderma gigas*) 7.5 km west** **Northern quoll (*Dasyurus hallucatus*) 9.4 km west** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) **within Survey Area** Pilbara barking gecko (*Underwoodisaurus seorsus)* 8.7 km west

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
Biologic (2011a) Area C and Surrounds Vertebrate Fauna Survey	BHP Area C and Surrounds 10,000 ha approx.	Two-season Level 2 Fauna Survey	October 2009, March 2010	Pitfall, Elliott, cage and funnel trapping, timed bird surveys, general bat surveys, motion sensitive cameras, hair funnels, opportunistic searches, nocturnal surveys, incidental recordings, targeted surveys for conservation significant fauna	**MNES Fauna** **Ghost bat (*Macroderma gigas*) 7.0 km west** **Eastern osprey (*Pandion haliaetus*) 4.0 km northeast** **Fork-tailed swift (*Apus pacificus*) 8.7 km west** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) **within Survey Area** Gane's blind snake (Pilbara) (*Anilios ganei*) 11.1 km west Pilbara barking gecko (*Underwoodisaurus seorsus)* 2.1 km west Peregrine falcon (*Falco peregrinus*) 1.6 km northeast
Biota (2011) Jinidi Mine Access Road Infrastructure Corridor – Flora and Fauna Values	BHP Jinidi mine access road infrastructure corridor	Desktop Assessment	N/A	Overview of previous fauna studies, fauna habitats and potential impacts of development	**MNES Fauna** **N/A** Other Significant Fauna N/A

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
Biologic (2011e) Yandi Vertebrate Fauna Review	Yandi Mine 13,209 ha	Level 1 and Targeted MNES Fauna Survey	December 2010	Habitat assessment, avifauna census, motion sensitive cameras, echolocation recorders to detect presence of bats, targeted searches, active foraging	**MNES Fauna** **Pilbara olive python (*Liasis olivaceus barroni*) 14.6 km north** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 16.3 km north
Biologic (2011c) Jinidi Vertebrate Fauna Survey	Jinidi Mining Lease, central Pilbara	Level 1 Fauna Survey and literature review	March-April 2011	Desktop review, habitat assessment, walking transects, opportunistic searches, bat recordings using Anabat and acoustic Song Meter	**MNES Fauna** **Pilbara olive python (Liasis olivaceus barroni) 4.0 km east** **Ghost bat (*Macroderma gigas*) 1.5 km east** **Pilbara leaf-nosed bat (*Rhinonicteris aurantia*) 1.8 km east** **Fork-tailed swift (*Apus pacificus*) 2.0 km east** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 0.6 km east

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
Biologic (2011d) Area C to Yandi Fauna Survey	BHP Area C to Yandi 2,182 ha	Targeted survey	September 2010	Opportunistic surveys, bird surveys, ANABAT recorders, motion sensitive cameras, targeted searches for conservation significant species	**MNES Fauna** **Ghost bat (*Macroderma gigas*) 7.5 km northwest** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani)* 8.3km northwest
ENV Australia (2010) Jinayri to Area C Access Corridor Vertebrate Fauna Assessment	Rapid Rail Group Jinayri Area C Access Corridor 2,555 ha	Desktop assessment	N/A	Literature review of habitats and terrestrial fauna likely to occur in project area based on habitats present	**MNES Fauna** **N/A** Other Significant Fauna N/A
Outback Ecology (2010) Area C to Jinayri to Mount Newman Railway Terrestrial Vertebrate Fauna Survey	Jinayri and surrounding area; size not stated	Dual-season Level 2 Fauna Survey	October – November 2008 (Dry Season) March 2009 (Wet Season)	Systematic trapping sites consisting of pitfall, Elliott, funnel and cage traps, active hand searching, spotlight searches, habitat assessments, Anabat bat detectors, fixed time bird surveys and targeted searches for conservation significant species	**MNES Fauna** **Ghost bat (*Macroderma gigas*) 8.0 km northeast** **Eastern osprey (*Pandion haliaetus*) 4.2 km northeast** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 0.9 km northeast Gane's blind snake (*Anilios ganei*) 24.0 km northeast

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
ENV Australia (2010c) Jinayri Mining Lease Vertebrate Fauna Survey	Jinayri Mining Lease M244SA, 53 km NW of Newman; size not stated	Single-season Level 2 Fauna Survey	March 2008	Systematic trapping sites consisting of pitfall, Elliott, funnel and cage traps, active hand searching, spotlight searches, habitat assessments, Anabat bat detectors, fixed time bird surveys and targeted searches for conservation significant species	**MNES Fauna** **Ghost bat (*Macroderma gigas*) 1.5 km east** **Pilbara leaf-nosed bat (*Rhinonicteris aurantia*) 1.8 km east** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 0.1 km east Gane's blind snake (*Anilios ganei*) 3.0 km east
ENV Australia (2009a) Munjina and Minsters North (Yandi Hub) Fauna Assessment	Munjina and Minsters North 2,800 ha	Level 2 Fauna Survey	November 2007	Five trapping sites comprising pitfalls, funnel traps, Elliott traps and cage traps. Echolocation recorders to detect presence of bats. Avifauna census, active foraging, nocturnal searches and targeted searches for western pebble-mound mouse mounds	**MNES Fauna** **None recorded** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 10.3 km north

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
Biologic & Onshore (2009) Biological Survey South Parmelia Exploration Leases	South Parmelia	Level 1 Fauna Survey and Level 2 flora/vegetation survey	January 2009	Opportunistic records of vertebrate species recorded during flora/vegetation survey, habitat assessment, desktop survey	**MNES Fauna** **Pilbara olive python (*Liasis olivaceus barroni*) 4.6 km south** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani),*
Outback Ecology (2008) Area C Mining Operation Environmental Management Plan (Revision 4) A, D, P1 and P3 Deposits Terrestrial Vertebrate Fauna Assessment	BHP Area C Mine	Level 2 Fauna Survey	January-February 2008	Systematic searching, spotlighting and opportunistic searching, but no trapping. Anabat bat recorders	**MNES Fauna** **Pilbara olive python (*Liasis olivaceus barroni*) 12.7 km west** **Fork-tailed swift (*Apus pacificus*) 9.6 km west** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 11.1 km west
ENV Australia (ENV Australia 2008) Rapid Growth Project 5: Quarry 6 Fauna Assessment	Quarry 6, 488 ha	Level 1 Fauna Survey	April 2008	Desktop assessment, habitat assessment, opportunistic diurnal searches, spotting, ornithological census	**MNES Fauna** **None recorded** Other Significant Fauna None recorded

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
ENV Australia (2007) Area C R-Deposit Fauna Assessment	Area C R-Deposit project area, Pilbara region	Level 2 Fauna Survey	November 2006	Trapping grids comprising Elliott traps, cage traps, funnel traps and pit traps, opportunistic fauna collecting techniques, Anabat bat recording units	**MNES Fauna** **Pilbara leaf-nosed bat (*Rhinonicteris aurantius)* opportunistic, location not stated** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 8.5 km west Gane's blind snake (*Ramphotyphlops ganei*) 9.3 km west
Ecologia Environment (2006) Ministers North Biological Survey	Ministers North; Size not stated	Level 1 Fauna Survey	May 2006	Habitat assessment, avifauna census and active foraging at twenty-three sites. Echolocation recorders to detect presence of bats and nocturnal searches at two sites	**MNES Fauna** **None recorded** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani)* 11.1 km north

Author (year) report title	Survey area; size (ha)	Survey level	Survey timing	Survey effort	Significant vertebrate fauna recorded [distance from current Survey Area]
Ecologia Environment (2006b) Jirridi Biological Survey Summary Report	Jirridi Project Area, Mineral Lease ML244SA; size not stated	Level 2 Fauna Survey	October 2005 March-April 2006	Systematic trapping sites consisting of pitfall, Elliott, funnel and cage traps, active hand searching, spotlight searches, habitat assessments, Anabat bat detectors, fixed time bird surveys and targeted searches for conservation significant species	**MNES Fauna** **Ghost bat (*Macroderma gigas*) 1.6 km east** Other Significant Fauna Western pebble-mound mouse (*Pseudomys chapmani*) 1.2 km east

Note: MNES = Matters of National Environmental Significance

700000 720000 740000 760000 780000

7540000 7520000 7500000 7480000 7460000 7440000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

BHP Database

- Common Greenshank (MI)
- Common Sandpiper (MI)
- Eastern Osprey (MI)
- Fork-tailed Swift (MI)
- Ghost Bat (VU)
- Greater Bilby (VU)
- Grey Falcon (VU)
- Gull-billed Tern (MI)
- Northern Quoll (EN)
- Pilbara Leaf-nosed Bat (VU)
- Pilbara Olive Python (VU)

DBCA Database

- Australian Painted Snipe (EN)
- Caspian Tern (MI)
- Common Greenshank (MI)
- Eastern Osprey (MI)
- Fork-tailed Swift (MI)
- Ghost Bat (VU)
- Glossy Ibis (MI)
- Greater Bilby (VU)
- Grey Falcon (VU)
- Gull-billed Tern (MI)
- Marsh Sandpiper (MI)
- Northern Quoll (EN)
- Oriental Plover (MI)
- Pilbara Leaf-nosed Bat (VU)
- Pilbara Olive Python (VU)

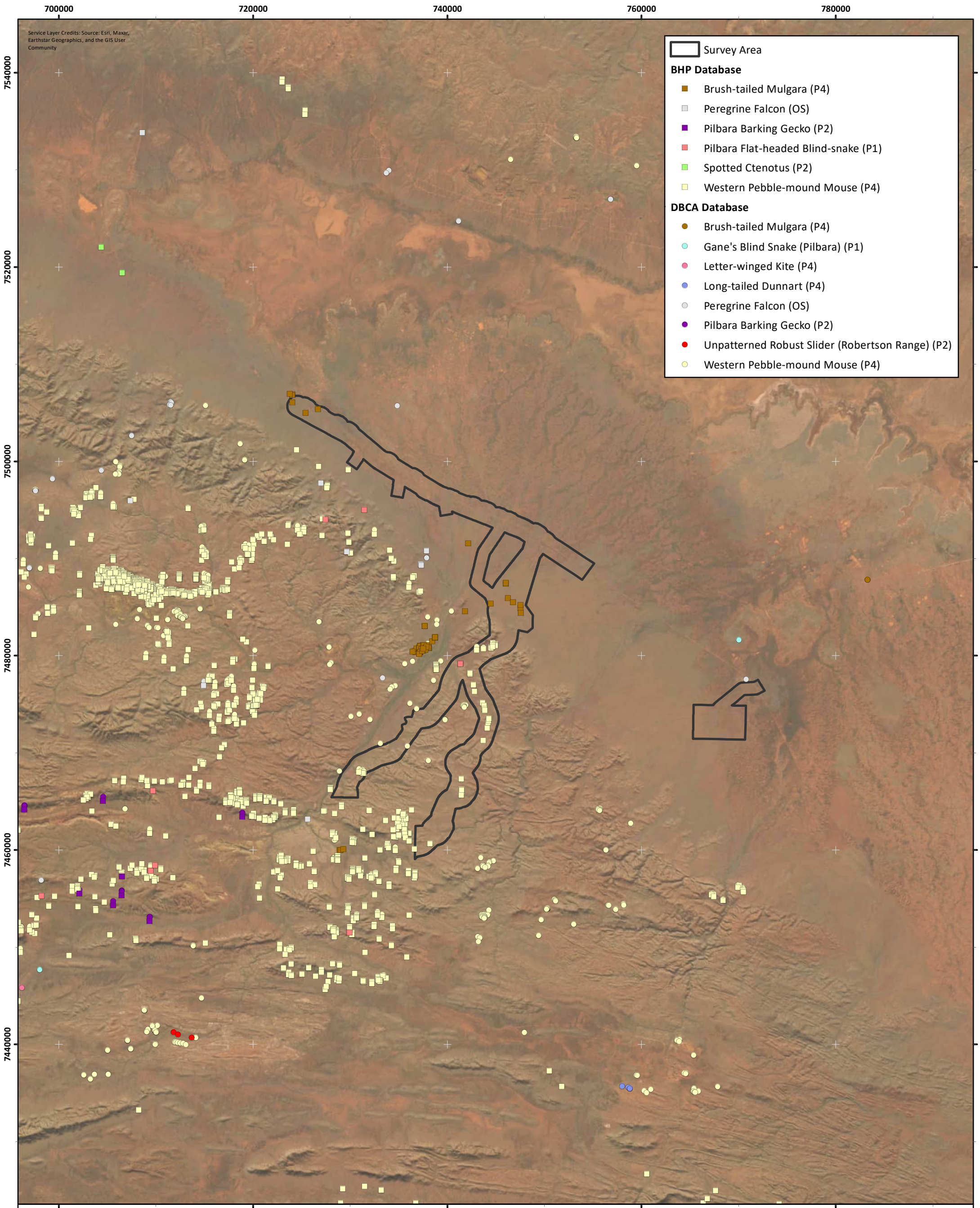
BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

6.1: Previous MNES Fauna Locations

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:350,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Kilometres 0 5 10 15 20 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_Fig06_1_PrevMNES	



BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

6.2: Previous Other Significant Fauna Locations

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:350,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Kilometres 0 5 10 15 20 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_Fig06_2_PrevPri	

4.2 Field Survey

4.2.1 Vertebrate Fauna Habitats

Eleven broad fauna habitat types were recorded in the Survey Area: Major Drainage Line, Medium Drainage Line, Minor Drainage Line, Drainage Area/ Floodplain, Stony Plain, Sand Plain, Sand Dune, Mulga Woodland, Hillcrest/ Hillslope, Breakaway/ Cliff and Gorge/ Gully. Fauna habitat types are summarised in Table 8, mapped broadly in Figure 7 and in more detail in Figures F.1 to F.54 (Appendix F). Areas of Cleared/ Disturbed habitat totalled 558.6 ha (2.2%) within the Survey Area. These areas were in Disturbed to Highly Degraded condition and are not considered further in terms of fauna habitat.

The majority of habitats were considered to be in 'Excellent' to 'Very Good' condition owing to minimal disturbances from fire, weeds and grazing. Areas within Major Drainage Line, Medium Drainage Line, Minor Drainage Line, Drainage Area/ Floodplain, Sandy Plain, Sand Dune and Stony Plain habitats were impacted by buffel grass (**Cenchrus ciliaris*) as well as grazing and erosion from livestock. The northern part of the Survey Area was most impacted, around the existing rail line and livestock water troughs.

Table 8: Fauna habitats described within the Survey Area.

Fauna habitat	Extent in Survey Area (proportion)	Broad habitat description	Microhabitats*	Sites	Habitat condition	Significant fauna habitat suitability for species recorded or considered highly likely to occur	Representative photo
Sand Plain	8,710.9 ha (34.9%)	Mix of hummock grassland, shrubland with a scattered eucalypt and *Acacia* overstory.	• Soft soil (burrows) • Old *Triodia* • Tree hollows • Thick undergrowth • Leaf litter • Termite mounds	• AUDIO02, 03, 04 • CAM01, 03 • TBS01,3, 4-8, 10, 12, 14, 15, 17	Very good	**MNES critical habitat** Bilby – denning and foraging **MNES supporting habitat** Ghost bat – foraging Grey falcon – foraging Pilbara leaf-nosed bat – foraging **Other significant species** Brush-tailed mulgara – denning and foraging	

Fauna habitat	Extent in Survey Area (proportion)	Broad habitat description	Microhabitats*	Sites	Habitat condition	Significant fauna habitat suitability for species recorded or considered highly likely to occur	Representative photo
Hillcrest/ Hillslope	7,474.3 ha (30%)	Characterised by large, open, rocky areas with open grasslands, predominantly *Triodia* hummock grasslands.	• Crevices • Logs • Tree hollows • Old *Triodia*	• HA03 • HA05 • HA09	Excellent	**MNES supporting habitat** Ghost bat – foraging Pilbara leaf-nosed bat – foraging **Other significant species** Western pebble-mound mouse – denning and foraging. Recently active mounds recorded within the Survey Area Peregrine falcon – foraging Gane's blind snake – foraging and shelter Pilbara barking gecko – foraging and shelter	

Fauna habitat	Extent in Survey Area (proportion)	Broad habitat description	Microhabitats*	Sites	Habitat condition	Significant fauna habitat suitability for species recorded or considered highly likely to occur	Representative photo
Mulga Woodland	3,639.5 ha (14.6%)	Stands of Mulga (*Acacia* spp.) vegetation over clay, stony or sandy substrates.	• Soft soil (burrows) • Logs • Old *Triodia* • Leaf litter • Thick undergrowth • Termite mounds • Tree hollow	• HA12 • TBS02 • TBS13 • TBS16	Very Good	**MNES supporting habitat** Bilby – foraging Ghost bat - foraging Pilbara leaf-nosed bat - foraging	
Stony Plain	1,728.9 ha (6.9%)	Consisting of low vegetation dominated by *Triodia sp.* with emergent shrubs and Mulga.	• Old *Triodia* • Soft soil (burrows) • Leaf litter • Logs	• TBS09 • TBS11	Poor-Excellent	**MNES critical habitat** Bilby – foraging **MNES supporting habitat** Grey falcon – foraging Pilbara leaf-nosed bat – foraging Ghost bat – foraging **Other significant species** Western pebble-mound mouse – denning and foraging Peregrine falcon – foraging	

Fauna habitat	Extent in Survey Area (proportion)	Broad habitat description	Microhabitats*	Sites	Habitat condition	Significant fauna habitat suitability for species recorded or considered highly likely to occur	Representative photo
Drainage Area/ Floodplain	1,636.3 (6.6%)	Consisting of hummock with emergent shrubs and sparse *Corymbia* trees on mostly stony and sandy soils in association with Weeli Wolli Creek and other tributaries.	• Logs • Tree hollows • Thick undergrowth • Soft soil (burrows) • Old *Triodia* • Leaf litter	• HA06 • HA07 • BAT09	Very good	**MNES supporting habitat** Bilby – foraging Northern quoll – dispersal Ghost bat – foraging Grey falcon – foraging Pilbara leaf-nosed bat – foraging **Other significant species** Peregrine falcon – foraging	

Fauna habitat	Extent in Survey Area (proportion)	Broad habitat description	Microhabitats*	Sites	Habitat condition	Significant fauna habitat suitability for species recorded or considered highly likely to occur	Representative photo
Gorge/ Gully	607.5 ha (2.4%)	Characterised by semi-enclosed rock formations with a high diversity of microhabitats present (caves, overhangs, crevices, pools, woody debris (logs and leaf litter), tree hollows and thick undergrowth).	• Caves • Overhangs • Logs • Tree hollows • Crevices • Thick undergrowth • Soft soil (burrows) • Rock piles • Old *Triodia* • Leaf litter • Permanent water • Semi-permanent water	• HA04 • HA14 • HA15 • BAT01-07 • CAM02 • NQ1-CAM01-04 • NQ2-CAM01-06 • NQ3-CAM01-05 • NQ4-CAM01-05 • NQ5-CAM01-05 • NQ6-CAM01-05	Excellent	**MNES critical habitat** Northern quoll – denning and foraging Pilbara olive python – denning and foraging **MNES supporting habitat** Ghost bat – foraging, shelter and dispersal Pilbara leaf-nosed bat – foraging, shelter and dispersal **Other significant species** Gane's blind snake – foraging and shelter Pilbara barking gecko – foraging and shelter	

Fauna habitat	Extent in Survey Area (proportion)	Broad habitat description	Microhabitats*	Sites	Habitat condition	Significant fauna habitat suitability for species recorded or considered highly likely to occur	Representative photo
Sand Dune	188.7 ha (0.8%)	Consisting of hummock grassland and scattered shrubland with a scattered eucalypt overstory.	• Thick undergrowth • Soft soil (burrows) • Termite mounds • Old *Triodia* • Leaf litter	• HA01 • HA02 • HA17 • AUDIO01	Good to Very Good	**MNES critical habitat** Bilby – denning and foraging **MNES supporting habitat** Ghost bat – foraging Grey falcon – foraging Pilbara leaf-nosed bat – foraging **Other significant species** Brush-tailed mulgara – denning and foraging	
Minor Drainage Line	173.0 ha (0.7%)	Consisting of small drainage channels less than 10 m wide, with fringing Eucalypt woodland, shrubland and grassland growth along the banks.	• Old *Triodia* • Tree hollows, • Soft soil (burrows) • Leaf litter	• HA08 • BAT10	Very good	**MNES supporting habitat** Ghost bat – foraging Grey falcon – foraging Pilbara leaf-nosed bat – foraging Pilbara olive python – dispersal Northern quoll - dispersal **Other significant species** Peregrine falcon – foraging	

Fauna habitat	Extent in Survey Area (proportion)	Broad habitat description	Microhabitats*	Sites	Habitat condition	Significant fauna habitat suitability for species recorded or considered highly likely to occur	Representative photo
Medium Drainage Line	146.1 ha (0.6%)	Consists of drainage channels with Eucalypt woodlands growing in the riparian zone but also patches of dense shrubland throughout the channel.	• Logs • Crevices • Thick undergrowth • Leaf litter • Tree hollows • Soft soil (burrows) • Old *Triodia*	• HA10 • HA13	Poor-Very good	**MNES supporting habitat** Ghost bat – foraging Grey falcon – foraging Pilbara leaf-nosed bat – foraging Pilbara olive python – foraging and dispersal Northern quoll – foraging and dispersal **Other significant species** Peregrine falcon – foraging	

Fauna habitat	Extent in Survey Area (proportion)	Broad habitat description	Microhabitats*	Sites	Habitat condition	Significant fauna habitat suitability for species recorded or considered highly likely to occur	Representative photo
Major Drainage Line	75.0 ha (0.3%)	Comprises large drainage channels, typically lined with mature *Eucalyptus*/*Corymbia* spp. Vegetation consists of tall Groundwater Dependant Vegetation (GDV) *Melaleuca argentea* and *Eucalyptus victrix* and/or *E. camaldulensis* trees that produce tree hollows and woody debris.	• Old *Triodia* • Overhangs, • Logs, • Tree hollows, • Crevices, • Thick undergrowth • Soft soil (burrows) • Permanent water • Pools • Semi-permanent water • Rock pile Leaf litter	• HA11 • BAT08 • CAM04	Very good	**MNES critical habitat** Pilbara olive python – foraging and dispersal Northern quoll – foraging and dispersal Grey falcon – nesting and foraging **MNES supporting habitat** Ghost bat – foraging Pilbara leaf-nosed bat – foraging **Other significant species** Gane's Blind Snake – foraging Peregrine falcon – foraging	

Fauna habitat	Extent in Survey Area (proportion)	Broad habitat description	Microhabitats*	Sites	Habitat condition	Significant fauna habitat suitability for species recorded or considered highly likely to occur	Representative photo
Breakaway/ Cliff	13.0 ha (0.1%)	Occurs at the interface between the crests of Hillcrest/ Hillslope habitat and Gorge/ Gully habitat and contains important microhabitats such as crevices and overhangs that may provide denning, roosting, and sheltering opportunities.	• Overhangs • Crevices • Rock pile	• HA16	Excellent	**MNES critical habitat** Northern quoll – denning **MNES supporting habitat** Pilbara leaf-nosed bat – foraging and shelter Ghost bat – foraging and shelter Pilbara olive python – denning **Other significant species** Peregrine falcon – nesting and foraging Gane's blind snake – foraging and shelter Pilbara barking gecko – foraging and shelter	
Cleared/ Disturbed	558.6 ha (2.2%)	Areas where the natural vegetation and microhabitats have been disrupted.	None present	No sites	Degraded to Highly Degraded	None	N/A

*Microhabitats present within the habitat type here are general in nature. Significant microhabitat locations (e.g. roost caves, water features) are detailed in Table G.1 and Table G.2, Appendix G.
Note: MNES = Matters of National Environmental Significance; N/A = not applicable.

740000

760000

7500000

7480000

7460000

Service Layer Credits: Source: Esri, Maxar,

Survey Area

Significant Area

Cave

Water Feature

Habitat Type

Breakaway/ Cliff

Hillcrest/ Hillslope

Gorge/ Gully

Drainage Area/ Floodplain

Minor Drainage Line

Medium Drainage Line

Major Drainage Line

Mulga Woodland

Sand Dune

Sand Plain

Stony Plain

Cleared/ Disturbed

WRCP-04 WRCP-10 CRCP-11 CRCP-12 WRCP-07 CRCP-08 CRCP-02 CRCP-07 CRCP-01 CRCP-06 WRCP-08

CRCP-04 CRCP-03 CRCP-10 CRCP-05

WRCP-11 WRCP-09

WRCP-12 CRCP-09 WRCP-06 WRCP-05

CRCP-03 CRCP-04 CRCP-10 CRCP-05

WRCP-10 WRCP-04 WRCP-03 WRCP-07 CRCP-01 CRCP-06 CRCP-07 CRCP-08 WRCP-02 CRCP-02 WRCP-01 WRCP-08 CRCP-11 CRCP-12

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure 7: Fauna habitat and significant areas mapping within the Survey Area

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:180,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Kilometres 0 2 4 6 8 10 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_Fig07_SigAreas	

Sand Plain habitat consisted of a mix of hummock grassland, shrubland with a scattered eucalypt and *Acacia* overstory. Microhabitats included soft substrates, old *Triodia,* thick undergrowth, leaf litter, termite mounds and some tree hollows. Cattle grazing, weed invasion, road/ access tracks and frequent fires were common throughout this habitat, particularly in the northern part of the survey area in proximity to the existing rail line and cattle troughs. Sand Plain was found in conjunction with Sand Dune, Stony Plain and Mulga Woodland in the northern half of the Survey Area and comprised approximately 34.9% (8,710.9 ha) of the Survey Area.

Hillcrest/Hillslope habitat consisted of hummock grassland with an overstory of scattered eucalypt and *Acacia* shrubs on stony soils. Microhabitats were limited with some old *Triodia*, crevices and occasional tree hollows and logs. Disturbances were absent from this habitat type. Hillcrest/ Hillslope habitat was common throughout the southern half of the Survey Area and found in conjunction with Gorge/ Gully and Drainage Area/ Floodplain habitats. This habitat comprised approximately 30% (7,474.3 ha) of the Survey Area.

Mulga Woodland habitat consisted of Mulga (*Acacia* spp.) stands with patchy hummock and tussock grassland over clay, stony or sandy substrates. This habitat exhibited a moderate diversity of microhabitats, with some logs, leaf litter, thick undergrowth, old *Triodia,* termite mounds and some soft soil. Mulga Woodland was interspersed with Sand Plain and Stony Plain in the northern part of the Survey Area. Disturbances include cattle grazing, weed invasion and road/ access tracks. Approximately 14.6% (3639.5 ha) of the Survey Area consisted of Mulga Woodland.

Stony Plain habitat consisted of low vegetation dominated by hummock grassland with patchy shrubland and Mulga stands occurring. This habitat generally had low vegetation complexity and microhabitat diversity. However, patchy soft soils occurred throughout. *Triodia* grassland was typically old, but hummock clumps were not large and leaf litter and logs were present where there were Mulga stands. Occurring throughout the northern half of the Survey Area, Stony Plain was associated with and interspersed with Sand Plain and Mulga Woodland habitats, where cattle grazing and weed invasion was prominent. Stony Plain habitat comprised approximately 6.9% (1728.9 ha) of the Survey Area.

Drainage Area/Floodplain habitat consisted of hummock grassland with emergent shrubs and sparse *Corymbia* trees on mostly stony and sandy soils in association with Weeli Wolli Creek and other tributaries. A moderate diversity of microhabitats occurred, with tree hollows, soft soil, old *Triodia* and leaf litter present. This habitat occurred in proximity to the Sand Plain, Stony Plain and Mulga Woodland habitats in the northern half of the Survey Area, and Hillcrest/ Hillslope and drainage line habitats in the southern half of the Survey Area. Disturbance included some cattle grazing and road/ track access. This habitat type comprised approximately 6.6% (1636.3 ha) of the Survey Area.

Gorge/Gully habitat was common throughout the southern half of the Survey Area and was characterised by semi-enclosed rock formations. A high diversity of microhabitats was exhibited, with caves, overhangs, crevices, pools, woody debris (logs and leaf litter), tree hollows and thick undergrowth. Most of the banded iron formation (BIF) geology lacked the structural stability to produce structurally complex caves and were generally open and shallow. Twelve caves and 11 surface water pools were recorded within this habitat type. This habitat was found in conjunction with Hillcrest/ Hillslope and Breakaway/ Cliff habitats, and no disturbance was observed. Gorge/ Gully habitat comprised approximately 2.4% (607.5 ha) of the Survey Area.

Sand Dune habitat was found in association with Sand Plain habitat but encompassed a much smaller area. This habitat consisted of hummock grassland and open shrubland vegetation with a scattered eucalypt overstory on soft substrates. Microhabitats present included old *Triodia* and leaf litter, while

disturbance in the form of cattle grazing, weed invasion and road/ access tracks was common. Sand Dune habitat comprised approximately 0.8% (188.7 ha) of the Survey Area.

Minor Drainage Line habitat consisted of small drainage channels less than 10 m wide, with mostly fringing eucalypt trees, shrubland and grassland along the banks. A moderate diversity of microhabitats were exhibited, with tree hollows, soft soil (burrows), old *Triodia* and leaf litter present. Cattle grazing and weed invasion was often present in the ground story vegetation. Minor Drainage Line habitat comprised approximately 0.7% (173.0 ha) of the Survey Area.

Medium Drainage habitat consisted of drainage channels with eucalypt trees growing in the riparian zone, and some patches of dense shrubland throughout the channel. A moderate diversity of microhabitats were present and included tree hollows, woody debris (logs and leaf litter), soft soil (burrows) and old *Triodia.* Cattle grazing and weeds were often present. Medium Drainage Line habitat comprised approximately 0.6% (146.1 ha) of the Survey Area.

Major Drainage Line habitat comprised large drainage channels, typically lined with large mature Eucalypt trees. Weeli Wolli Creek bisects the south-western part of the Survey Area and is flanked by Drainage Area/ Floodplain, Hillcrest/ Hillslope and Gorge/ Gully habitat. Vegetation consisted of tall Groundwater Dependant Vegetation (GDV) consisting of *Melaleuca argentea, Eucalyptus victrix* and/or *E. camaldulensis* trees that contribute to tree hollow and woody debris (logs and leaf litter) microhabitats. Other microhabitats included permanent water, thick undergrowth and crevices. Weeli Wolli Creek was flowing at the time of the survey due to a discharge water point upstream. Cattle grazing and weeds were common near to water bodies along Weeli Wolli Creek. Major Drainage Line habitat comprised approximately 0.3% (75.0 ha) of the Survey Area.

Breakaway/Cliff habitat occurred at the interface between the crests of Hillcrest/ Hillslope habitat and Gorge/ Gully habitat, and contained microhabitats such as cracks, crevices and overhangs along the BIF rock face. Caves were largely absent from this habitat type and no disturbance was observed. Breakaway/ Cliff habitat comprised approximately 0.1% (13.0 ha) of the Survey Area.

4.2.1.1 Habitat Features

Twelve natural caves were recorded within the Survey Area (Figure 7) within Gorge/ Gully habitat. All 12 caves were categorised as Category 4 (opportunistic use) for both the ghost bat and the Pilbara leaf-nosed bat (Table G.1, Appendix G).

Twelve significant water features were identified within the Survey Area at the time of survey (Figure 7). Eleven pools were recorded in Gorge/ Gully habitat and one permanent pool (POOL-10) within Weeli Wolli Creek (Major Drainage Line) (Table G.2, Appendix G). Weeli Wolli Creek was flowing at the time of the survey due to release from the surplus mine dewatering discharge station located upstream.

4.2.2 Vertebrate Fauna Species

A total of 102 vertebrate fauna species were recorded within the Survey Area during the current survey (Table 9). A complete list of recorded species is provided in Tables D.1 to D.4 (Appendix D). The following sections detail results for each major taxonomic group sampled.

Table 9: Number of vertebrate fauna species recorded during the survey.

Fauna taxonomic group	Total number of species recorded	Number of Matters of National Environmental Significance (MNES) species recorded	Number of Priority fauna species recorded	Number of introduced species recorded
Amphibians	1	0	0	0
Reptiles	14	1	0	0
Birds	62	0	0	0
Mammals	25	2	2	5
Total	**102**	**3**	**2**	**5**

4.2.2.1 Herpetofauna

One amphibian species, *Litoria rubella*, was recorded during the survey, persisting in a remnant pool within the Gorge/Gully habitat.

Fourteen reptile species were recorded during the survey. The most speciose families were Scincidae (skinks) with four species, followed by Pythonidae (pythons), Agamidae (dragons), Gekkonidae (gekkos) and Varanidae (monitors and goannas) each with two species. Elapidae (venomous land snakes) and Pygopodidae (legless lizards) were each represented by a singular species (Table D.2, Appendix D). The low number of reptiles is not unexpected given the survey focused on the presence/absence of MNES and other significant species without the use of pitfall trapping implemented in Detailed fauna assessments.

One MNES reptile species, Pilbara olive python, was recorded during the survey through secondary evidence (scat). This species is discussed further in Section 4.2.3.

4.2.2.2 Birds

Sixty-two bird species were recorded during the survey. The most speciose families were Meliphagidae (honeyeaters), Accipitridae (hawks, eagles) and Artamidae (woodswallows, butcherbirds) with six species each, followed by Columbidae (pigeons and doves) with four species, Acanthizidae (Australian warblers) and Maluridae (Australian wrens) with three species each (Table D.3, Appendix D). The limited surface water within the Survey Area restricted the bird diversity, with no waterfowl or wading species recorded.

No MNES or other significant bird species were recorded during the survey.

4.2.2.3 Mammals

Twenty-five species of mammal were recorded during the survey, including five introduced species: cat (**Felis catus*), dog/dingo (**Canis familiaris*), European rabbit (**Oryctolagus cuniculus*), camel (**Camelus dromedarius*) and European cattle (**Bos taurus*) (Table D.4, Appendix D). Nine bat species were identified from ultrasonic acoustic recordings within the Survey Area.

Four mammals of significance were recorded during the survey: ghost bat, bilby, brush-tailed mulgara and western pebble-mound mouse. These species are discussed further in Section 4.2.3.

4.2.3 Significant Species Recorded

Five vertebrate species of significance, including three MNES species, were recorded within the Survey Area during the current survey: Pilbara olive python (VU; VU), ghost bat (VU; VU), bilby (VU; VU), brush-tailed mulgara (P4) and western pebble-mound mouse (P4). The locations of these species' records from the current survey are shown in Figure 8.

740000

760000

7500000

7480000

7460000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Conservation Significant Fauna

- Brush-tailed Mulgara
- Ghost Bat
- Greater Bilby
- Pilbara Olive Python
- Western Pebble-mound Mouse

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure 8: Significant vertebrate fauna recorded within the Survey Area

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:180,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Kilometres 0 2 4 6 8 10 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_Fig08_Fauna	

Pilbara Olive Python (*Liasis olivaceus barroni*) (VU; VU)

Twenty-eight previous records of Pilbara olive python were detailed on the DBCA threatened and priority fauna database search result, within 40 km from the Survey Area (Department of Biodiversity, Conservation and Attractions 2023a). An additional 55 records have been recorded within the vicinity (60 km) of the Survey Area (BHP 2024), including four records from within the Survey Area; three within Gorge/Gully habitat adjacent to Weeli Wolli creek in the SW of the Survey Area (Biologic Environmental Survey 2012a), and one record along the existing rail corridor in the north-west of the Survey Area (Onshore Environmental 2013).

Evidence of Pilbara olive python occurrence, via one old scat, was recorded at an opportunistic location during the survey (Table 10, Plate 1). The scat was found at the back of a cave within Gorge/ Gully habitat. Three Pilbara olive python records were captured within the same gorge on a previous survey (BHP WAIO database; Biologic Environmental Survey 2012a). No individuals were captured on a motion sensitive camera deployed at the nearby pool to these previous records during the current survey, and no Pilbara olive python DNA was detected in the eDNA analysis of collected water samples (eDNA Frontiers 2023).

Table 10: Pilbara olive python recorded during the survey.

Species	Site ID	Location: Easting (mE); Northing (mN) (GDA 50)	Photos	
Pilbara olive python (*Liasis olivaceus barroni*)	CAVE-10	743070; 7470208	 Plate 1: Pilbara olive python scat.	 Plate 2: Cave where scat was recorded.

This species is likely to be found within Gorge/ Gully, Breakaway/ Cliff, and Major Drainage Line habitats, particularly around water sources and rocky outcrops that provide denning sites and ambush locations. The thick vegetation and log piles found in these areas act as refuges and provide shelter and ambush locations, particularly in areas containing permanent/semi-permanent water sources. Approximately 682 ha (2.7%) of the Survey Area, consisting of Gorge/ Gully and Major Drainage Line habitat, was considered critical habitat for the Pilbara olive python (Figure H.1, Appendix H).

Breakaway/ Cliff, Minor Drainage Line, Medium Drainage Line, covering approximately 322 ha (1.3%), were considered as supporting habitat (Table 13; Figure H.1, Appendix H). The remaining approximately 23,937 ha (95.9%) of the Survey Area, consisting of Hillcrest/ Hillslope, Stony Plain, Sand Plain, Sand Dune, Mulga Woodland and Drainage Area/Floodplain were considered to provide limited foraging and dispersal habitat (Figure H.1, Appendix H).

Bilby (*Macrotis lagotis*) (VU; VU)

Forty-six previous bilby records were detailed on the DBCA threatened and priority fauna database include six within the Survey Area (Department of Biodiversity, Conservation and Attractions 2023a).

Forty-three previous records were detailed on the BHP provided spatial dataset within 10 km of the Survey Area, including 33 records within the Borrow Pit area (GHD Pty Ltd 2020, BHP 2024).

Eleven locations of secondary bilby evidence were recorded during the current survey, mostly in the Sand Plain habitat, but also in transition zones with Mulga Woodland and Sand Dune habitats (Table 11). Five inactive burrows, one extinct burrow, five old diggings and one scat were recorded.

Table 11: Bilby recorded during the survey.

Record ID	Record type	Easting	Northing	Confidence in observation	Habitat type	Photos	Previous and current record comments
Bilby-01	Digging	769093	7475712	Moderate	Sand Plain	 **Plate 3: Recent digging.**	**Previous records** nearby (GHD Pty Ltd 2020): old diggings. **Current record**. Recent digging of potential bilby (moderate confidence). Shape would be unusual for *Varanus spp.*
Bilby-02	Burrow (inactive), scat	746822	7485215	High	Sand Plain	 **Plate 4: Bilby scat.**	**New record**. Scat collected. Raised mound under *E.? xerothermica* (mallee). One main burrow, potentially another three old burrows (high confidence). Varanid presence noted, not currently in use.

Record ID	Record type	Easting	Northing	Confidence in observation	Habitat type	Photos	Previous and current record comments
Bilby-03	Digging	752239	7489276	Low	Sand Plain	 Plate 5: Possible bilby diggings.	**New record**. Potential bilby digging (low confidence).
Bilby-04	Digging	769488	7474347	Low	Sand Plain	 Plate 6: Recent digging.	**Previous record.** (GHD Pty Ltd 2020): diggings below spiny *Acacia*. **Current record**. Recent diggings, potentially small Varanid (low confidence).

Record ID	Record type	Easting	Northing	Confidence in observation	Habitat type	Photos	Previous and current record comments
Bilby-05	Burrow (inactive)	769184	7476140	Low	Sand Plain	 Plate 7: Potential old bilby burrow.	**Previous record** nearby. (GHD Pty Ltd 2020): several recent diggings. **Current record**. Potential old bilby burrows (low confidence). Some recent varanid use.
Bilby-06	Burrow (inactive)	769890	7474285	Moderate	Sand Plain	 Plate 8: Old digging.	**Previous record** nearby. (GHD Pty Ltd 2020): old diggings. **Current record**. Old diggings and potential old burrow (moderate confidence). Possible varanid occupation.

Record ID	Record type	Easting	Northing	Confidence in observation	Habitat type	Photos	Previous and current record comments
Bilby-07	Burrow (inactive)	769889	7474314	High	Sand Plain	 Plate 9: Potential old bilby burrow and diggings.	**Previous record** nearby. (GHD Pty Ltd 2020): old diggings. **Current record**. Old diggings and potential old burrow at base of Mallee (high confidence). Buffel and early disturbance plants present and covering understory indicating old mammalian diggings. Heavily mounded, no signs of scats or tracks. Possible varanid occupation.
Bilby-08	Digging	769043	7475742	Low	Sand Plain	 Plate 10: Recent digging.	**Previous records** nearby. (GHD Pty Ltd 2020): old diggings. **Current record.** Recent digging (low confidence).

Record ID	Record type	Easting	Northing	Confidence in observation	Habitat type	Photos	Previous and current record comments
Bilby-09	Digging	769412	7474383	Moderate	Sand Plain	 Plate 11: Old digging.	**Previous record**: (GHD Pty Ltd 2020): several old foraging signs below Eremophila. **Current record.** Old digging (moderate confidence).
Bilby-10	Burrow (inactive)	769218	7475944	Low	Sand Plain	 Plate 12: Possible old bilby burrow.	**Previous record**. (GHD Pty Ltd 2020): possible very old burrow series. Recent diggings/ greater bilby scats found nearby. **Current record.** Old bilby burrow network (low confidence). Current occupation by varanids.

Record ID	Record type	Easting	Northing	Confidence in observation	Habitat type	Photos	Previous and current record comments
Bilby-11	Burrow (extinct)	768245	7474121	Low	Sand Dune	 Plate 13: Recent Varanid digging likely.	**Previous record**. (GHD Pty Ltd 2020): old diggings or burrow collapsed (5+ years old). No evidence of recent activity. **Current record**. Recent digging, likely varanid. No signs of collapsed burrow (low confidence).

Approximately 10,628 ha (42.6%) of the Survey Area, consisting of Sand Plain, Stony Plain and Sand Dune is considered critical habitat for denning and foraging (Figure H.2, Appendix H).

Approximately 5,275 ha (21.1%) of the Survey Area, consisting of Mulga Woodland and Drainage Area/ Floodplain was considered supporting foraging and dispersal habitat for the bilby. These areas contain soft soils for digging and opportunities to dig and forage at the base of termite mounds and *Acacia* roots for invertebrate grubs. The remaining 9047.5 ha (36.3%) of the Survey Area, was considered to provide limited foraging and dispersal habitat, consisting of Major Drainage Line, Medium Drainage Line, Minor Drainage Line, Breakaway/ Cliff, Hillcrest/Hillslope, Gorge/ Gully fauna habitats (Figure H.2, Appendix H)

Ghost Bat (*Macroderma gigas)* (VU; VU)

One-hundred and seventy-eight previous records of ghost bats were detailed on the DBCA threatened and priority fauna database result, including four records within 6 km of the Survey Area (Department of Biodiversity, Conservation and Attractions 2023a). The BHP WAIO database detailed 94 records within 40 km of the Survey Area, including several records from within the Survey Area (Outback Ecology 2010, Biologic Environmental Survey 2012b, BHP 2024).

An individual foraging ghost bat was detected by the bat detector at site Bat-05 in the Gorge/ Gully habitat. Ghost bat scats were recorded at two cave locations in the Gorge/ Gully habitat: 20 old (6 months to 3 years) scats (Plate 14 and Plate 15) were recorded in site CAVE-08 and 20 recent (one to six months) scats were found in site CAVE-11 (Plate 16 and Plate 17) (Table 12). Whilst no diurnal roost caves or critical habitat were recorded, six Category 4 caves (opportunistic usage) were identified during the survey (Table G.1, Appendix G). Ghost bats have relatively broad foraging habitats, ranging across tree-lined drainage lines, isolated trees on the outskirts of plains, and productive plains of thin woodland over clumped tussock or *Triodia* hummock grass (Bat Call WA 2021b, Bullen et al. 2023), and, as such, the majority of the Survey Area represents supporting foraging and dispersal habitat.

Approximately 24,393 ha (97.8%) of the Survey Area was identified as supporting habitat for the ghost bat, consisting of Gorge/ Gully, Breakaway/ Cliff, Major Drainage Line, Medium Drainage Line, Minor Drainage Line, Stony Plain, Sandy Plain, Sand Dune, Drainage Areas/ Floodplain, Hillcrest/ Hillslope and Mulga Woodland habitats (Figure H.3, Appendix H).

The remaining approximately 558 ha (2.2%) of the Survey Area was considered to provide limited foraging and dispersal habitat, consisting of Cleared/ Disturbed habitats (Figure H.3, Appendix H).

Table 12: Ghost bat scats recorded during the survey.

Site ID	Evidence	Location: Easting (mE); Northing (mN) (GDA 50)	Photos		Comments
CAVE-08	Scat (old)	731342; 7467892	 Plate 14: Approx. 20 ghost bat scats (old).	 Plate 15: CAVE-08 entrance.	Small piles of ghost bat scat. Cave infrequently used. Approx. 20 scats, aged between six months to three years.
CAVE-11	Scat (recent)	732740; 7468759	 Plate 16: Approx. 20 ghost bat scats (recent).	 Plate 17: CAVE-11 entrance.	One pile of ghost bat scat. Cave infrequently used. Approx. 20 scats, aged between one to six months.

Brush-tailed Mulgara (*Dasycercus blythi*) (P4)

Sixty-six previous records were detailed on the BHP WAIO database search, all within 6 km of the Survey Area (BHP 2024, Biologic Environmental Survey 2024). The DBCA threatened and Priority database search result detailed four previous records (Department of Biodiversity, Conservation and Attractions 2023a).

Secondary evidence (scats and burrows) of brush-tailed mulgara was found in five locations in the Survey Area. Three sites contained active burrows, and one site, with inactive burrows was observed during targeted searches in the Sand Plain habitat (Plate 18 and Plate 19). Suitable habitat occurred in Sand Plain and Sand Dune habitats in the Survey Area.



Plate 18: Brush-tailed mulgara scat.



Plate 19: Recently inactive brush-tailed mulgara burrows.

Western Pebble-mound Mouse (*Pseudomys chapmani*) (P4)

Five-hundred and seventy-seven previous records were detailed on the DBCA threatened and priority fauna database including seven within the Survey Area (Department of Biodiversity, Conservation and Attractions 2023a). BHP surveys have recorded an additional 35 records within the Survey Area (Outback Ecology 2010, Biologic Environmental Survey 2011c, 2012b, Biota Environmental Sciences 2012a, BHP 2024).

Nineteen western pebble-mound mouse mounds were recorded during the current survey, including: two active mounds, twelve recently inactive mounds (Plate 20 and Plate 21), and five inactive mounds. The Hillcrest/ Hillslope habitats support this species and are widespread throughout the Survey Area and broader Pilbara region.



Plate 20: Mound of a western pebble-mound mouse.



Plate 21: Mound of a western pebble-mound mouse.

4.2.4 Significant Species Possibly Occurring in the Survey Area

Six species not recorded in the Survey Area during the current survey are considered to have a high post-survey likelihood of occurrence, and a further six species were considered to have a moderate post -survey likelihood of occurrence (Table E.1, Appendix E). Table 13 provides additional summary of the home range, habitat availability and likelihood of occurrence for the MNES species identified as occurring, or potentially occurring, within the Survey Area.

Northern Quoll (*Dasyurus hallucatus*) (EN; EN)

Northern quoll is common in a range of habitats within its distribution, including rocky habitats and watercourses (Hill and Ward 2010). Critical habitat for northern quoll typically consists of rocky environments of high relief supporting diverse microhabitats for foraging and denning, including caves, crevices, and rock piles (Department of the Environment 2016). Five hundred and ten previous records were detailed on the DBCA threatened and priority fauna database search (Department of Biodiversity, Conservation and Attractions 2023a). Seventeen previous records were detailed on the BHP WAIO database search within 20 km of the Survey Area, with 24 records within 5 km from surveys conducted between 2010 and 2023 (BHP 2024), including three recent (2023) records from within 2 km of the Survey Area (Biologic Environmental Survey 2024). Recent regional assessment considers there is a general absence of reliable and/or recent records within the Newman area, and the few, isolated records were likely of transient or dispersing males.

Potential critical habitat for northern quoll was identified within the Survey Area, comprising Gorge/ Gully, Breakaway/ Cliff and Major Drainage Line habitats (395.5 ha; 2.8% of the Survey Area) (Table 13; Figure H.4, Appendix H). These habitats support foraging and denning microhabitats such as caves/overhangs, crevices, pools and rock piles. These habitats contain the rocky environments of high relief that are particularly important for northern quoll, as they provide denning sites for breeding and shelter, and diverse microhabitats for foraging, such as caves, crevices, and rock piles (Department of the Environment 2016).

Approximately 1,956 ha (7.8%) of the Survey Area, which consisted of Medium Drainage Line, Minor Drainage Line and Drainage Area/ Floodplain habitats, was considered supporting habitat. The

remaining area 22,300 ha (89.4%) was considered to provide limited foraging and dispersal habitat (Figure H.1, Appendix H).

Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) (VU; VU)

The Pilbara leaf-nosed bat roosts in deep, warm, humid caves or rock cracks near water pools, and forages in a range of habitats, including along watercourse and over *Triodia* grasslands (Churchill 1991, Armstrong 2001, Bat Call WA 2021a). Four-hundred and forty-seven previous records were detailed on the DBCA threatened and priority fauna database (Department of Biodiversity, Conservation and Attractions 2023a), with more than 95% (429) of records located from Gudai-darri, which has the nearest known significant diurnal roosts (approximately 13 km west) (Bat Call WA 2023).

No critical habitat was identified for this species within the Survey Area. The Pilbara leaf-nosed bat requires deep, humid, climatically stable caves for diurnal and maternal roost sites, which are typically associated with Gorge/ Gully and Breakaway/ Cliff habitats. While these habitat types were present within the Survey Area, no suitable (Category 1-3) caves were identified. All 12 identified caves within the Survey Area were considered Category 4 (potential nocturnal refuge) caves for this species (Table G.1, Appendix G).

The Pilbara leaf-nosed bat is known to forage across a wide variety of habitat, typically along vegetated gullies and ridgelines, water courses and drainage lines, and across plains and low hills with complex vegetation structure (Bat Call WA 2021a). As such, the entire Survey Area, excluding Cleared/ Disturbed areas (558.6 ha; 2.2%), was considered as supporting habitat for the Pilbara leaf-nosed bat (Table 13; Figure H.5, Appendix H). While diurnal roosts were not recorded, Gorge/ Gully and Breakaway/ Cliff habitats may provide some roosting value. Due to the proximate records and the presence of supporting foraging and dispersal habitat within the Survey Area, this species has a 'high' likelihood of occurrence.

Eastern Osprey (*Pandion haliaetus*) (MI)

Osprey is usually seen near water and common around northern coasts and islands but can also be found in major rivers, wetlands far inland, large river pools, pools that occur in gorges and large dams. One record was detailed on the DBCA threatened and priority fauna database search, approximately 1.2 km from the Survey Area (Department of Biodiversity, Conservation and Attractions 2023a). An additional record from within the Survey Area in 2011 (Biologic Environmental Survey 2011c) and an additional two records from 2011 within 1 km (Biologic Environmental Survey 2012a), located along Weeli Wolli Creek are detailed on BHP WAIO database search (BHP 2024). While few previous records occur, the presence of Weeli Wolli Creek (Major Drainage Line) in the Survey Area provides suitable habitat, therefore this species has a high likelihood of occurrence.

Peregrine Falcon (*Falco peregrinus*) (OS)

The peregrine falcon occurs throughout Australia and in most habitat types, with the exception of treeless and waterless desert and dense forests (Birdlife Australia 2012). The peregrine falcon utilises the ledges, cliff faces and large hollows/broken spouts of trees for nesting. It also occasionally uses the abandoned nests of other birds of prey (Johnstone and Storr 1998). Twenty-six previous records were detailed on the DBCA threatened and priority fauna database result (Department of Biodiversity, Conservation and Attractions 2023a). Suitable habitat in the Survey Area includes Major Drainage Line, Gorge/ Gully and Breakaway/ Cliff habitats. This species has a high likelihood of occurrence.

Gane's Blind Snake (*Anilios ganei*) (P1)

Gane's blind snake is often poorly collected in vertebrate fauna surveys. This species has been associated with moist gorges and gullies (Wilson and Swan 2017) but potentially occurs over a wide range of other stony habitats. Given its cryptic fossorial habit, this species is rarely encountered. Twenty-seven previous records were detailed on the DBCA threatened and priority fauna database result (Department of Biodiversity, Conservation and Attractions 2023a). One previous record was detailed within the Survey Area, and an additional 11 records within 35 km detailed on the BHP WAIO database (Biologic Environmental Survey 2011a, 2011c, 2012b, BHP 2024). Suitable habitat in the Survey Area includes Gorge/ Gully, Breakaway/ Cliff and Hillcrest/ Hillslope habitats. Given the presence of nearby historical records and suitable habitat, this species has a high likelihood of occurrence.

Pilbara Barking Gecko (*Underwoodisaurus seorsus*) (P2)

Pilbara barking gecko is confined to the Hamersley Ranges from Tom Price to Newman and occurs in rocky areas with spinifex and low tree cover. Eight previous records were detailed on the DBCA threatened and priority fauna database, as well as records on ALA and NatureMap search results (Department of Biodiversity, Conservation and Attractions 2023a). An additional eight records within 32 km (nearest at 9 km) were detailed on the BHP WAIO database search (Biologic Environmental Survey 2011a, Biota Environmental Sciences 2012b, BHP 2024). Suitable habitat is common throughout the Survey Area in the Hillcrest/ Hillslope and Gorge/ Gully habitats, therefore a high likelihood of occurrence is expected.

Six significant fauna species not found in the Survey Area were considered to have a moderate post-survey likelihood of occurrence (Table E.1, Appendix E).

Grey Falcon (*Falco hypoleucos*) (VU)

The Grey Falcon usually nests in the tallest trees along watercourses, particularly in river red gum (*Eucalyptus camaldulensis*) and coolibah (*E. coolabah*), but also in telecommunication towers (Marchant and Higgins 1993, Schoenjahn 2013, Schoenjahn 2018). The species frequents timbered lowland plains, particularly *Acacia* shrublands that are crossed by tree-lined water courses (Garnett et al. 2011, Watson 2011, Janse et al. 2015, Ley and Tynan 2016, Schoenjahn 2018).

Seven previous records were detailed on the DBCA threatened and priority fauna database result, with the nearest record approximately 12 km from the Survey Area (Department of Biodiversity, Conservation and Attractions 2023a). Four records, as recent as 2021, were detailed on BHP WAIO databases between 35 to 55 km from the Survey Area (GHD Pty Ltd 2022, BHP 2024).

Approximately 75 ha (0.3%) of the Survey Area, consisting of Major Drainage Line habitat, is considered critical habitat for the grey falcon (Table 13; Figure H.6, Appendix H). Drainage Area/ Floodplain, Medium Drainage Line, Minor Drainage Line, Sandy Plain, Stony Plain, habitat, covering approximately 7806.5 ha (31.3%) is considered supporting habitat (Table 13; Figure H.6, Appendix H). Due to this species' wide home range (~100 km^2) and the presence of critical and supporting habitat within the Survey Area, there is a moderate likelihood of occurrence for this species.

Glossy Ibis (*Plegadis falcinellus*) (MI; MI)

The glossy ibis is found in shallows of swamps, mudflats, floodwaters, sewage ponds, flooded or irrigated pastures, and occasionally feeds on moist pastures and sheltered marine habitats. One

previous record was detailed on the DBCA threatened and priority fauna database (Department of Biodiversity, Conservation and Attractions 2023a), as well as records in ALA, NatureMap and Birdata search results. Suitable habitat occurs within Weeli Wolli Creek (Major Drainage Line), and this species is expected to utilise this habitat on occasion. Glossy ibis has a moderate likelihood of occurrence.

Common Sandpiper (*Actitis hypoleucos*) (MI; MI)

The common sandpiper is a non-breeding migrant to a wide variety of habitats, such as riverbanks, estuaries, freshwater seeps on coastal shores, tidal creeks, mangrove swamps, and saltmarshes. One recent record (2023) was found 28 km west of the Survey Area (BHP 2024). Suitable habitat for this species occurs within the Major Drainage Line habitat where semi-permanent to permanent surface water occurs. Common sandpiper has a moderate likelihood of occurrence.

Fork-tailed swift (*Apus pacificus*) (MI)

The fork-tailed swift is a largely aerial species of unpredictable occurrence in Western Australia. Sparsely scattered inland records but more common in the north and north-west including much of the Pilbara Region (Higgins 1999; DCCEEW 2024). The BHP WAIO database identified 18 records, including two previous observations in the Survey Area (Biologic Environmental Survey 2011a, 2011c, BHP 2024). Three previous records were detailed on the DBCA threatened and priority fauna database (Department of Biodiversity, Conservation and Attractions 2023a). Suitable habitat for this species is present in the form of all habitats (excluding Cleared/ Disturbed), therefore a moderate likelihood of occurrence is expected in the Survey Area, however, it would not be reliant on any of the terrestrial habitats therein.

Unpatterned Robust Slider (*Lerista macropisthopus remota*) (P2)

This species shelters in loose soil under leaf litter at the base of shrubs, and occurs in the central interior of Western Australia (Cogger 2000). Three records were detailed on the DBCA threatened and priority fauna database search result from 28 to 32 km from the Survey Area (Department of Biodiversity, Conservation and Attractions 2023a). Suitable Mulga Woodland, Sand Plain and Sand Dune habitat exists within the Survey Area, and the species has a moderate likelihood of occurrence.

Long-tailed Dunnart (*Antechinomys longicaudata*) (P4)

Long-tailed dunnart is a specialist rock-dwelling species (Freeland et al. 1988) associated with rocky landscapes that support low, open, Mulga woodland or shrubland with a spinifex hummock understory (Pavey 2006a). Five previous records between 30 to 32 km from the Survey Area were detailed on the DBCA threatened and priority fauna database search (Department of Biodiversity, Conservation and Attractions 2023a). Suitable habitat occurs in the Hillcrest/ Hillslope habitat, and a moderate likelihood of occurrence is expected.

An additional 26 species were considered to have a low post-survey likelihood of occurrence due to a lack of historical records in the vicinity of the Survey Area and/or lack of suitable habitats, including 15 migratory birds (Table E.1, Appendix E).

MNES species, great desert skink (*Liopholis kintorei*) (VU; VU), red goshawk (*Erythrotiorchis radiatus*) (VU; VU), Australian painted snipe (*Rostratula australis*), princess parrot (*Polytelis alexandrae*) (VU; P4), southern whiteface (*Aphelocephala leucopsis*) (VU), and black-footed rock-wallaby (*Petrogale lateralis lateralis)* (EN; EN) were all considered to have a 'low' likelihood of occurrence, due to the lack

of historical records in the vicinity of the Survey Area and the lack of potential suitable habitat (Table E.1, Appendix E).

Table 13: Comparison of home range, habitat availability and likelihood of occurrence for Matters of National Environmental Significance (MNES) species identified in the desktop analysis for the Survey Area.

MNES species	Home range	Nearest record from Survey Area (km)	Critical habitat		Supporting habitat		Likelihood of occurrence	
			Type	Area within Survey Area (ha (%))	Type	Area within Survey Area (ha (%))	Pre-survey	Post-survey
Pilbara olive python (*Liasis olivaceus barroni*) (VU; VU)	88 to 450 ha	Previously recorded	Rocky outcrops in proximity to gorges and water holes. Such features are typically associated with Gorge/ Gully and Breakaway/ Cliff habitats (represented by Gorge/ Gully and Major Drainage Line habitats within the Survey Area).	682 ha (2.7%)	Gullies, drainage lines, and water courses (represented by Breakaway/ Cliff, Medium Drainage Line, Minor Drainage Line habitats within the Survey Area).	322 ha (1.3%)	Previously recorded	**Recorded**

MNES species	Home range	Nearest record from Survey Area (km)	Critical habitat		Supporting habitat		Likelihood of occurrence	
			Type	Area within Survey Area (ha (%))	Type	Area within Survey Area (ha (%))	Pre-survey	Post-survey
Grey falcon (*Falco hypoleucos*) (VU; VU)	Undetermined, but likely to be larger than that of the peregrine falcon in the temperate zone (i.e. more than 100 km2).	12 km	Major drainage habitats with suitably sized Eucalypts (E. camaldulensis, E. coolabah) as potential nesting habitat, often in the abandoned nest of a raptor or corvid in trees (represented by Major Drainage Line habitat within the Survey Area).	75 ha (0.3%)	Timbered, lowland plains, particularly Acacia shrublands that are crossed by tree-lined water courses. Hunting has been observed in treeless areas, and the species frequents tussock grassland and open woodland (represented by Medium Drainage Line, Minor Drainage Line, Drainage Area/ Floodplain, Stony Plain, Sand Plain and Sand Dune habitats within the Survey Area).	12,584 ha (50.4%)	High	Moderate
Northern quoll (*Dasyurus hallucatus*) (EN; EN)	35 ha, up to 100 ha during breeding season	1 km	Low, rocky hills, major drainage lines, and woodland within home ranges (represented by Gorge/ Gully, Breakaway/ Cliff and Major Drainage Line habitats within the Survey Area).	695.5 ha (2.8%)	Major drainage line systems and rocky habitats facilitating foraging and dispersal (represented within the Survey Area by Drainage Area/ Floodplain, Medium Drainage Line and Minor Drainage Line habitat).	1,955.5 ha (7.8%)	High	High

MNES species	Home range	Nearest record from Survey Area (km)	Critical habitat		Supporting habitat		Likelihood of occurrence	
			Type	Area within Survey Area (ha (%))	Type	Area within Survey Area (ha (%))	Pre-survey	Post-survey
Bilby (*Macrotis lagotis*) (VU; VU)	18 ha for females and 316 ha for males	Previously recorded	Stony sandplain, sandplain, sand dune with *Triodia* grasslands and *Acacia* shrubland. Along drainage or Salt Lake systems (represented by Sand Plain, Stony Plain and Sand Dune habitats within the Survey Area).	10,628.4 ha (42.6%)	Hills, rises, ridges, plains, drainage systems supporting *Acacia* shrubland, *Triodia* grassland or mulga woodland (represented by Mulga Woodland and Drainage Area/ Floodplain within the Survey Area).	5275.8 ha (21.1%)	Previously recorded	**Recorded**
Pilbara leaf-nosed bat (*Rhinonicteris aurantia* (Pilbara form)) (VU; VU)	>10 to 30 km from permanent/ semi-permanent roosts	8 km	Deep, humid caves generally in select geological formations, such as Gorge/ Gully and Breakaway/ Cliff habitats (these habitats were present in the Survey Area however are categorised as supporting habitat only).	0 ha (0%)	Plains and low hills with moderate two-layer non-complex vegetation structure (represented within the Survey Area by all habitats excluding Cleared/ Disturbed).	24,393.2 ha (97.8%)	High	High

MNES species	Home range	Nearest record from Survey Area (km)	Critical habitat		Supporting habitat		Likelihood of occurrence	
			Type	Area within Survey Area (ha (%))	Type	Area within Survey Area (ha (%))	Pre-survey	Post-survey
Ghost bat (*Macroderma gigas*) (VU; VU)	>12 to 30 km	Previously recorded	Deep, humid caves generally in select geological formations, such as Gorge/ Gully and Breakaway/ Cliff habitats. (Breakaway/ Cliff and Gorge/ Gully habitat within Survey Area was categorised as supporting habitat only).	0 ha (0%)	Productive plains areas, isolated trees on plain outskirts, and tree lined water courses (represented within the Survey Area by all habitats excluding Cleared/ Disturbed).	24,393.2 ha (97.8%)	Previously recorded	**Recorded**

Note: MNES = Matters of National Environmental Significance.

5 Discussion

5.1 Fauna Habitats

None of the fauna habitats within the Survey Area are considered to be restricted at the local or sub-regional scale and no uncommon geological units or land systems occur within the Survey Area. The eleven broad fauna habitats observed within the Survey Area are considered representative examples of each habitat type, which all occur widely within the Pilbara bioregion and are capable of supporting faunal assemblages that are generally common and widespread.

Sand Plain and **Sand Dune** habitats were generally found in association with each other and were common throughout the Survey Area (combined at 35.7%). These habitats are considered to be common across the wider Pilbara bioregion. Sand Plain and Sand Dune habitats are considered critical habitat for the bilby, which is likely to utilise these habitats for burrowing and active foraging. Soft soils with the presence of termite mounds, *Triodia* hummocks and *Acacia* roots provide suitable foraging resources for the bilby (historical and current usage recorded). The soft soils and *Triodia* also provide shelter and foraging habitat for the brush-tailed mulgara (historical and current usage recorded). Sand Plain and Sand Dune habitats offer supporting habitat to species that may traverse and forage intermittently, including ghost bat, Pilbara leaf-nosed bat and grey falcon.

Major Drainage Line habitat accounted for a small portion of the Survey Area (0.3%), but this habitat type is identified as being of high value to several MNES fauna species. Major Drainage Line habitat within the Survey Area, represented by Weeli Wolli Creek, is of local importance and was considered as potential critical habitat for northern quoll (high likelihood of occurrence) and Pilbara olive python (recorded in nearby Gorge/ Gully habitat) providing important denning, foraging and dispersal potential. The presence of tall, mature *Eucalyptus* and *Melaleuca* species within this habitat type also provide critical nesting habitat for grey falcon (moderate likelihood of occurrence). Additionally, foraging and dispersal opportunities within Major Drainage Lines provide supporting habitat for ghost bat (recorded in nearby Gorge/ Gully habitat) and Pilbara leaf-nosed bat (high likelihood of occurrence). Weeli Wolli Creek was flowing at the time of the survey (downstream of surplus mine dewatering discharge release) and one significant water feature was recorded.

Gorge/ Gully habitats are common in the Survey Area and across the wider Pilbara bioregion; however, due to their linear nature, they only represent a small portion of the total land area (2.4% of the Survey Area). Despite this small representation, these habitats are of high value to several MNES species and provide potential critical (denning) habitat for the northern quoll and Pilbara olive python (recorded in this habitat). Caves within this habitat in the Survey Area may be opportunistically used as nocturnal roosts or feeding caves by ghost bat and Pilbara leaf-nosed bat. Although, none are considered critical as they do not provide deep, humid environments necessary for diurnal roosting and continuous occupancy. Microhabitats present, such as caves/overhangs, rock piles and rock shelters, provide supporting habitat (foraging and limited roosting) for ghost bat and Pilbara leaf-nosed bat in the absence of critical roosts. Twelve significant caves (All ghost bat and Pilbara leaf-nosed bat Category 4) and twelve significant water features were recorded in this habitat type.

Found in association with Gorge/ Gully was **Breakaway/Cliff** habitat, comprising approximately 0.1% of the Survey Area. Despite providing fewer microhabitats for fauna to exploit compared to Gorge/ Gully habitat, cracks and crevices were common in the BIF structure, providing critical denning habitat for northern quoll. Supporting habitat was present for Pilbara olive python (denning), Pilbara leaf-nosed bat (foraging) and ghost bat (foraging). It also provides potential nesting habitat for the peregrine falcon.

Medium and Minor Drainage Line habitat (combined at 1.3% of the Survey Area) is of moderate value to a wide spectrum of vertebrate fauna and provides supporting (foraging and dispersal) habitat for MNES species, Pilbara olive python, northern quoll, ghost bat, Pilbara leaf-nosed bat, and grey falcon. Medium and Minor Drainage Lines, although not necessarily large in area, are common habitats within the vicinity of the Survey Area and wider Pilbara bioregion.

Drainage Area/ Floodplain habitat (6.6% of the Survey Area) is of moderate value to a variety of fauna species, but generally low in value to Pilbara MNES species. This habitat provides supporting habitat to bilby with some soft substrates for digging and is adjacent to critical bilby habitat of the Sand Plain. This habitat type provides supporting (foraging) habitat to ghost bat, Pilbara leaf-nosed bat and grey falcon.

Mulga Woodland and Stony Plain habitats are common throughout the Survey Area (combined at 14.6%) and across the wider Pilbara bioregion. Both habitats are associated with and interspersed with Sand Plain habitat in the northern part of the Survey Area. These habitats provide suitable habitat for the bilby, with Stony Plain (critical) and Mulga Woodland (supporting) providing foraging resources, with some old *Triodia,* termite mounds and some soft soils for digging. These habitats also provide supporting foraging habitat to ghost bat and Pilbara leaf-nosed bat. Stony Plain habitat provides supporting foraging habitat for grey falcon. **Hillcrest/ Hillslope** habitat (30.0% of the Survey Area) is generally of low value to the target MNES species. Although, it represents value for the western pebble-mound mouse, by providing suitable habitat for their mound structure. This habitat was considered as supporting foraging habitat for ghost bat and Pilbara leaf-nosed bat. Hillcrest/ Hillslope habitat is common within the vicinity of the Survey Area and the wider Pilbara bioregion.

Cleared/ Disturbed areas were only a small portion (2.2%) of the Survey Area and were considered to have no value to MNES or other significant species.

5.2 Vertebrate Fauna Species

One-hundred and two vertebrate fauna species, comprising one amphibian, 14 reptiles, 62 birds, and 25 mammals (including five introduced species) were recorded within the Survey Area during the current survey. The fauna assemblage recorded during the survey is considered typical of the Pilbara bioregion, with the low number of species recorded due to the nature of the survey (i.e. Targeted significant fauna).

5.2.1 Significant Species

Of the 43 significant species identified in the desktop assessment as occurring or potentially occurring in the Survey Area, five species were recorded through secondary evidence; Pilbara olive python (scat), bilby (burrows, diggings and scat), ghost bat (scats), brush-tailed mulgara (burrows and scats) and western pebble-mound mouse (mounds). Six species were considered to have a 'high' post-survey likelihood of occurrence within the Survey Area. These species include the northern quoll, Pilbara leaf-nosed bat, osprey, peregrine falcon, Gane's blind snake and Pilbara barking gecko.

5.2.1.1 Target MNES Species

Extensive survey effort was undertaken to provide an indication of MNES species presence within the Survey Area, including 229 camera trap nights, 29 bat echolocation recording nights, 22 acoustic night parrot recording nights, 17 targeted bilby linear searches, six eDNA water sampling sites, and targeted cave and significant habitat searches throughout the Survey Area. Evidence of three MNES species,

the Pilbara olive python (Gorge/ Gully), bilby (Sand Plain and Sand Dune) and ghost bat (Gorge/ Gully) were identified via secondary evidence within the Survey Area.

The **Pilbara olive python** prefers escarpments, deep gorges, water holes, and rock piles associated with permanent pools in rocky areas in the ranges of the Pilbara region (Pearson 1993, Wilson and Swan 2017). Microhabitat preferences of the Pilbara olive python are under rock piles, on top of rock or under spinifex (Tutt et al. 2004). Individuals spend the cooler months within caves and rock crevices away from water sources. In the warmer summer months, the pythons are found to move around widely, usually in close proximity to water and rocky outcrops (Wilson and Swan 2017).

Preferred habitats for Pilbara olive python were common in the Survey Area. Critical Gorge/ Gully and Major Drainage Line habitat provide microhabitats favourable for denning and ambushing, including rocky outcrops, permanent and temporary pools and thick vegetation. Supporting habitat, including Breakaway/ Cliff, Hillcrest/ Hillslope, Medium Drainage Line and Minor Drainage Line was also present throughout the Survey Area.

A Pilbara olive python scat was recorded in CAVE-10 in Gorge/ Gully habitat, in proximity to Weeli Wolli Creek. Three records were observed within the same gorge on a previous survey (Biologic Environmental Survey 2012b). This species was not detected by motion cameras deployed through this gorge, or by eDNA water samples taken from pools along this gorge. Despite this, Pilbara olive python occupation is likely in this area.

Bilby prefer level or undulating plains, including watercourses and dune systems, composed of cracking clay, soil or sand that allow burrowing, with vegetation consisting of spinifex hummock grassland, with low *Acacia* shrubland (Dziminski and Carpenter 2017). Critical bilby denning and foraging habitat typically consists of sandplains, spinifex dominated interdune corridors and stony plains, salt-lakes surrounded with samphire (*Halosarcia* spp.), and/or Melaleucas or paleo-drainage systems within individual home ranges (Pavey 2006b). This highly mobile species can have large foraging ranges of, on average, 18 ha for females and 316 ha for males (Pavey 2006b), typically digging to access termite mounds, expose bulbs, and expose the roots of wattle and other shrubs that have root-dwelling invertebrate larvae (Pavey 2006b, Commonwealth of Australia 2019). Bilby are also known to migrate to follow food resources, especially in less productive parts of their range (Southgate et al. 2007, Southgate and Carthew 2008) and may appear to move randomly in and out of a survey area (McKenzie et al. 2007).

Seventeen targeted linear searches were undertaken to provide an indication of bilby presence within the Survey Area. Eleven bilby records were identified (all secondary evidence) of varying confidence levels, due to the age of evidence and often absence of multiple secondary identifiers (ie: a single digging only). Two records had a high level of confidence, three with a moderate level of confidence and six with a low level of confidence. The high confidence records included old burrows and old diggings, with scats detected at one site (Bilby-02). A motion camera (CAM03) was deployed at the 'Bilby-02' location, but confirmation of bilby presence was not detected. While occupation is likely occasional, ongoing bilby presence is not likely due to the absence of recent records (of high confidence), and the disturbance across the northern boundary of the Survey Area, surrounding the existing rail line. The disturbance reduces habitat quality and would likely reduce the connectivity from the 'High Quality' critical habitat south of the rail line, to suitable habitat further north towards the Fortescue Marsh. However, it is difficult to be definitive given targeted bilby searches were relatively small compared to the amount of critical bilby habitat across the Survey Area.

Critical denning and foraging bilby habitat typically consists of sandplains, spinifex dominated interdune corridors and stony plains, salt-lakes surrounded with samphire (*Halosarcia* spp.), and/or

Melaleucas or paleo-drainage systems within individual home ranges (Pavey 2006b). The Sandy and Stony Plain habitats are common in the northern half of the Survey Area and within the Pilbara bioregion.

Due to the presence of critical habitat, and secondary evidence observed across the northern part of the Survey Area, this species is considered to have a 'high' likelihood of occurrence.

The **ghost bat** is found across a wide range of habitats but relies on physiologically benign day roosts in temperature-stable caves with chambers or cavities that trap humidity (Bat Call WA 2021b). Critical habitat for ghost bat comprises Gorge/ Gully and Breakaway/ Cliff habitats with the presence of maternity and/or diurnal roost caves, and foraging habitat within 12 km of such caves (Bat Call WA 2021b) (Table B.6, Appendix B).

Secondary ghost bat scat evidence was recorded at two roost caves (CAVE-08 and CAVE-11) during the survey, and one detection via bat detector (BAT-05), all in Gorge/ Gully habitats. The 12 caves identified during the current survey did not exhibit features suitable for diurnal or maternal roosts. However, they could potentially be opportunistically used as nocturnal roosts or feeding caves (Category 4).

Ghost bats have relatively broad foraging habitats, ranging across tree-lined drainage lines, isolated trees on the outskirts of plains, and productive plains of thin woodland over clumped tussock or *Triodia* hummock grass (Bat Call WA 2021b, Bullen et al. 2023). The entire Survey Area, apart from Cleared/ Disturbed habitat, provides supporting foraging habitat for this species. Due to the presence of supporting habitat, and secondary evidence recorded, this species is considered to have a 'high' likelihood of occurrence but is not reliant on any of the habitats within.

Northern quoll is common in a range of habitats within its distribution, including rocky habitats and watercourses. Critical habitat for northern quoll typically consists of rocky environments of high relief supporting diverse microhabitats for foraging and denning, including caves, crevices, and rock piles. Current northern quoll survey effort included 206 targeted camera trap nights at 31 locations, across suitable Gorge/ Gully and Major Drainage Line habitat with no individuals recorded on camera. The Survey Area is situated towards the southern boundary of the current northern quoll distribution (Department of the Environment 2016, Dunlop et al. 2019). While over 500 northern quoll records were detailed on the DBCA Threatened and Priority Fauna Database (Department of Biodiversity, Conservation and Attractions 2023a), over 95% of these records are derived from the Gudai-Darri region approximately 11 km to the west of the Survey Area. A recent fauna survey identified 12 northern quoll (all scat) records within 5 km to the south of the Survey Area (Biologic Environmental Survey 2024).

Critical habitat for the northern quoll in Gorge/ Gully, Breakaway/ Cliff and Major Drainage Line is common through the southern half of the Survey Area, and supporting Hillcrest/ Hillslope, Drainage Area/ Floodplain, Medium Drainage Line and Minor Drainage Line habitats provides suitable dispersal pathways. Due to the presence of critical and supporting habitat, and recent records proximate to the survey area, this species is considered to have a 'high' likelihood of occurrence. These habitats are well-represented in the surrounding areas and the northern quoll is unlikely to be specifically reliant on the habitats within the Survey Area for long-term persistence at a local scale, or population abundance at a regional scale.

The **Pilbara leaf-nosed bat** roosts in deep, warm, humid caves or rock cracks near water pools, and typically forage along vegetated gullies and ridgelines, water courses and drainage lines, and across plains and low hills with complex vegetation structure (Bat Call WA 2021a). As such, the entire Survey

Area, excluding Cleared/ Disturbed areas (558.6 ha; 2.2%), was considered as supporting habitat for this species (Table 13; Figure H.5, Appendix H). This species was not detected from the 10 bat detectors (29 survey nights) deployed across the Survey Area. No diurnal roost caves were observed during the survey, although 12 Category 4 caves recorded in Gorge/ Gully habitat may provide potential nocturnal refuges for feeding or resting. No critical habitat was identified for this species within the Survey Area. Due to the proximate records and the presence of supporting foraging and dispersal habitat within the Survey Area, this species has a 'high' likelihood of occurrence.

The **grey falcon** is one of the least frequently encountered raptor species across Australia, commonly frequenting timbered, lowland plains and *Acacia* shrublands (Garnett et al. 2011, Watson 2011, Schoenjahn 2013, 2018). This species typically nests in the tallest trees along watercourses, generally *Eucalyptus* species, and is thought to have a home range of around 100 km^2 (Marchant and Higgins 1993, Schoenjahn 2013, 2018). The Major Drainage Line habitat within the Survey Area contained large *Eucalyptus spp*. and *Melaleuca sp*. that could provide suitable (critical) nesting habitat for the grey falcon, while supporting foraging and dispersal habitat occurs throughout the Survey Area. Few records are known from the area, and the nearest is 12 km from the Survey Area (Department of Biodiversity, Conservation and Attractions 2023a). The likelihood of occurrence of the grey falcon was assessed as 'moderate', with the species expected to occur within the Survey Area and the broader surrounds on occasion, but not to be solely reliant on any of the habitats within.

While some suitable habitat for the **night parrot** occurs in the Survey Area, their preferred habitat of large, interconnected *Triodia* hummocks in proximity of samphire and chenopod shrublands, on floodplains and claypans and margins of salt lakes, creeks, and other water sources (Department of Biodiversity, Conservation and Attractions 2024) were limited in the Survey Area. Small patches of large *Triodia* hummocks were present in the Survey Area, particularly in the Sand Plain habitat, in the central part of the Rail Corridor and Borrow Pit area. Birds have been known to establish roost sites in relatively isolated patches of only a few hummocks. However, at sites where night parrots have persisted, suitable patches of *Triodia* are widespread at the landscape scale (Department of Biodiversity, Conservation and Attractions 2024). Furthermore, the high levels of disturbance (including likely frequent fires) along the existing rail line corridor, reduces connectivity to suitable, less disturbed areas in the Survey Area, and the absence of chenopod and samphire shrubland, reduce the likelihood of occurrence of night parrot within the Survey Area. The likelihood of occurrence is considered as 'low' for this species.

Previous record locations for the night parrot are not published, but the Survey Area is in proximity to a previous record from 2005 within the Fortescue Marsh (Davis and Metcalf 2008).

Analysis of the 22 ARU recording nights did not detect calls attributed to the night parrot. No critical habitat was identified for this species within the Survey Area due to suitable *Triodia* hummocks patchily distributed, and the absence of chenopod and samphire shrublands. However, some areas contained suitable patchy Triodia hummocks potentially suitable for the night parrot and are considered supporting habitat, including the Sand Plain, Sand Dune and Drainage Area/ Floodplain habitats.

Habitats that are considered critical for the **great desert skink** and **princess parrot** are present within the Sand Dune and Sand Plain habitats. However, the Survey Area is beyond the extent of the known distribution of both these species, which occur further east in the central and western arid zone.

The **southern whiteface** utilises relatively undisturbed open woodlands with a herbaceous understory that provides essential foraging habitat (Department of Climate Change, Energy, the Environment and

Water 2023a), and whilst suitable Mulga Woodland habitat was present, the Survey Area occurs at the northern extent of its distribution and previous records at this latitude are rare.

5.2.1.2 Other Significant Species

Nineteen western pebble-mound mouse mounds were recorded during the current survey, including two active mounds and twelve recently inactive mounds within Hillcrest/ Hillslope habitats. This species generally prefers stony hillsides with hummock grasslands and shelter within complex burrow systems under a mound, which they construct using pebbles collected in the vicinity (Menkhorst and Knight 2011). As such, the Hillcrest/ Hillslope habitats of the Survey Area are likely to support this species. Suitable habitat for the western pebble-mound mouse is widespread throughout the Survey Area and the wider Pilbara bioregion. Thirty-five previous records have been located from within the Survey Area (BHP 2024).

Brush-tailed mulgara is common in a range of habitats, including tussock/hummock grasslands and low open woodlands, and is commonly associated with mature spinifex grasslands, particularly *Triodia basedowii* and *T. pungens* (Masters et al. 2003). Five locations of brush-tailed mulgara evidence (scats and burrows) were found in the Sand Plain habitat in the Survey Area. This species was detected during bilby targeted searches, where three burrows were currently active, and one was inactive. Suitable habitat occurs in Sand Plain and Sand Dune habitats in the Survey Area.

Other significant species, the eastern osprey, peregrine falcon, Gane's blind snake and Pilbara barking gecko were considered to have 'high' likelihood of occurrence due to suitable habitats occurring within the Survey Area and previous records in the vicinity.

6 References

Armstrong, K. N. 2001. The roost habitat and distribution of the orange leaf-nosed bat, *Rhinonicteris aurantius*, in the Pilbara region of Western Australia. Wildlife Research 28:95–104.

Astron Environmental Service. 2023. Yandi 45C Targeted Significant Vertebrate Fauna Survey. unpublished report to BHP Billiton Iron Ore Pty Ltd.

Atlas of Living Australia. 2023. The Atlas of Living Australia. https://www.ala.org.au/.

Bat Call WA. 2021a. A review of Pilbara leaf nosed bat ecology, threats and survey requirements. Report Prepared for the Department of Agriculture, Water and the Environment, Canberra, ACT.

Bat Call WA. 2021b. A review of ghost bat ecology, threats and survey requirements. Report Prepared for the Department of Agriculture, Water and the Environment, Canberra, ACT.

Bat Call WA. 2023. Homestead West Ultrasonic Recorded Data Analysis. Unpublished report to BHP Western Australia Iron Ore.

Beard, J. S. 1975. The Vegetation of the Pilbara Area 1:1 000 000 Vegetation Series. University of Western Australia Press, Nedlands, Western Australia.

BHP. 2023. Vertebrate Fauna Surveys in Western Australia - Technical Process Instruction.

BHP. 2024. BHP WAIO fauna records database (custom search).

Biologic Environmental Survey. 2011a. Area C and Surrounds Vertebrate Fauna Survey. Unpublished report to BHP Billiton Iron Ore Pty Ltd.

Biologic Environmental Survey. 2011b. Yandi Vertebrate Fauna Review.

Biologic Environmental Survey. 2011c. Jinidi Vertebrate Fauna Survey. Unpublished report to BHP Billiton Iron Ore Pty Ltd.

Biologic Environmental Survey. 2011d. Area C to Yandi Fauna Survey.

Biologic Environmental Survey. 2012a. Jinidi to Mainline Vertebrate Fauna Survey. Unpublished Report Prepared for BHP Billiton Iron Ore, Perth, WA.

Biologic Environmental Survey. 2012b. Jinidi to Mainline Vertebrate Fauna Survey. Unpublished Report Prepared for BHP Billiton Iron Ore, Perth, WA.

Biologic Environmental Survey. 2013a. South Flank Targeted Northern Quoll Survey. Unpublished report to BHP Billiton Iron Ore Pty Ltd.

Biologic Environmental Survey. 2013b. Marillana and Surrounds Targeted Mulgara Survey. Unpublished Report Prepared for BHP Billiton Iron Ore, Perth, WA.

Biologic Environmental Survey. 2014. Pilbara Regional Ghost Bat Review. Unpublished Report Prepared for BHP Billiton Iron Ore, Perth, WA.

Biologic Environmental Survey. 2015. Central Pilbara Ghost Bat Population and Roost Assessment. Unpublished report prepared for BHP Billiton Iron Ore Pty Ltd.

Biologic Environmental Survey. 2017a. Ministers North to Yandi Corridor Single Phase Level 2 Fauna and Detailed Flora/Vegetation Survey.

Biologic Environmental Survey. 2017b. Ministers North Level 2 Vertebrate Fauna Survey.

Biologic Environmental Survey. 2023a. Central Pilbara Hub Targeted Matters of National Environmental Significance Vertebrate Fauna Survey. Unpublished report to BHP Billiton Iron Ore Pty Ltd.

Biologic Environmental Survey. 2023b. Targeted Pilbara Olive Python Survey: South Flank and Mining Area C. Unpublished report to BHP Billiton Iron Ore Pty Ltd.

Biologic Environmental Survey. 2024. Jinidi Targeted Vertebrate Fauna Survey. Unpublished report prepared for BHP WAIO, Perth, WA.

Biota Environmental Sciences. 2011. Jinidi Mine Access Road Infrastructure Corridor – Flora and Fauna Values. Unpublished report for BHP Billiton Iron Ore.

Biota Environmental Sciences. 2012a. Jinidi to Mindy Level 1 Fauna Survey. Unpublished Report Prepared for BHP Billiton Iron Ore.

Biota Environmental Sciences. 2012b. South Flank to Jinidi Level 2 Vertebrate Fauna Survey. Unpublished report to BHP Billiton Iron Ore Pty Ltd.

Biota Environmental Sciences. 2013. South Parmelia Level 2 Vertebrate Fauna Survey. Unpublished report to BHP Billiton Iron Ore Pty Ltd.

Birdlife Australia. 2012. The Peregrine Falcon (*Falco peregrinus*) fact sheet.

Birdlife Australia. 2022. Birdata. https://birdata.birdlife.org.au/.

Birdlife Australia. 2023. Birdata. https://birdata.birdlife.org.au/.

Bullen, R. D., S. Reiffer, and J. Trainer. 2023. Satellite tracking Ghost Bats (*Macroderma gigas*) in the Pilbara, Western Australia. Records of the Western Australian Museum 38:1–10.

Bureau of Meteorology. 2023. Climate Data Online. http://www.bom.gov.au/climate/data/index.shtml.

Bureau of Meteorology. 2024. Climate Data Online. http://www.bom.gov.au/climate/data/index.shtml.

Churchill, S. K. 1991. Distribution, abundance and roost selection of the orange horseshoe-bat, Rhinonycteris aurantius, a tropical cave dweller. Wildlife Research 18:343–353.

Cogger, H. G. 2000. Reptiles and Amphibians of Australia. Reed New Holland, Sydney.

Commonwealth of Australia. 2019. Recovery Plan for the Greater Bilby - DRAFT.

Davis, R. A., and B. M. Metcalf. 2008. The Night Parrot (Pezoporus occidentalis) in northern Western Australia: a recent sighting from the Pilbara region. Emu 108:233–236.

Department of Agriculture, Water and the Environment. 2021. Interim Biogeographic Regionalisation for Australia (IBRA), Version 7. http://www.environment.gov.au/land/nrs/science/ibra.

Department of Biodiversity Conservation and Attractions. 2017. Guidelines for surveys to detect the presence of bilbies, and assess the importance of habitat in Western Australia. Department of Biodiversity, Conservation & Attractions, Perth, WA.

Department of Biodiversity, Conservation and Attractions. 2022a. NatureMap Database Search. https://naturemap.dbca.wa.gov.au/.

Department of Biodiversity, Conservation and Attractions. 2022b. Threatened and Priority Fauna Database.

Department of Biodiversity, Conservation and Attractions. 2023a. Threatened and Priority Fauna Database.

Department of Biodiversity, Conservation and Attractions. 2023b. NatureMap Database Search. https://naturemap.dbca.wa.gov.au/.

Department of Biodiversity, Conservation and Attractions. 2024. Guidelines for determining the likely presence and habitat usage of night parrot (*Pezoporus occidentalis*) in Western Australia. Government of Western Australia, Perth WA.

Department of Climate Change, Energy, the Environment and Water. 2022. Protected Matters Search Tool. https://www.environment.gov.au/epbc/protected-matters-search-tool.

Department of Climate Change, Energy, the Environment and Water. 2023a. Conservation Advice for *Aphelocephala leucopsis* (southern whiteface). Department of Climate Change, Energy, the Environment and Water, Canberra, ACT.

Department of Climate Change, Energy, the Environment and Water. 2023b. Protected Matters Search Tool. https://www.environment.gov.au/epbc/protected-matters-search-tool.

Department of Climate Change, Energy, the Environment and Water. 2024. Protected Matters Search Tool. https://www.environment.gov.au/epbc/protected-matters-search-tool.

Department of Conservation and Land Management. 2002. A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Department of Conservation and Land Management, Perth.

Department of Environment. 2013. Matters of National Environmental Significance, Significant impact guidelines 1.1, Environment Protection and Biodiversity Conservation Act 1999. Canberra.

Department of Primary Industries and Regional Development. 2019. Pre-European Vegetation (DPIRD-006).

Department of Sustainability Environment Water Population and Communities. 2011a. Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*. Canberra.

Department of Sustainability Environment Water Population and Communities. 2011b. Survey guidelines for Australia's threatened reptiles. Canberra.

Department of the Agriculture, Water and the Environment. 2022. Australian Faunal Directory. https://biodiversity.org.au/afd/home.

Department of the Environment. 2016. EPBC Act referral guideline for the endangered northern quoll *Dasyurus hallucatus*. Canberra.

Department of the Environment and Energy. 2020a. Directory of Important Wetlands in Australia. Commonwealth of Australia.

Department of the Environment and Energy. 2020b. Australian Wetlands Database - Ramsar Wetlands. https://www.environment.gov.au/cgi-bin/wetlands/alphablist.pl.

Department of the Environment and Energy. 2021. Interim Biogeographic Regionalisation for Australia (IBRA), Version 7. http://www.environment.gov.au/land/nrs/science/ibra.

Department of the Environment, Water, Heritage and the Arts. 2010a. Survey guidelines for Australia's threatened bats: Guidelines for detecting bats listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*.

Department of the Environment, Water, Heritage and the Arts. 2010b. Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*.

Department of the Environment, Water, Heritage and the Arts. 2010c. Survey guidelines for Australia's threatened frogs. Canberra.

Department of Water and Environmental Regulation. 2023. Index of Biodiversity Surveys for Assessments (IBSA). https://www.dwer.wa.gov.au/programs/ibsa.

Dunlop, J., N. Birch, and H. Moore. 2019. Pilbara Northern Quoll Research Program, Annual Report 2018. Department of Biodiversity, Conservation and Attractions, Perth, WA.

Dunlop, J., A. Smith, A. H. Burbidge, N. Thomas, N. A. Hamilton, and K. Morris. 2021. Industry environmental offset funding facilitates a large multi-species fauna translocation program. Pacific Conservation Biology 28:231–246.

Dziminski, M. A., and F. Carpenter. 2017. The conservation and management of the bilby (Macrotis lagotis) in the Pilbara. Progress Report 2016. Department of Parks and Wildlife, Perth.

Ecologia Environment. 2006a. Ministers North Biological Survey. unpublished report to BHP Billiton Iron Ore.

Ecologia Environment. 2006b. Jirridi Biological Survey Summary Report. Unpublished report to BHP Billiton Iron Ore.

eDNA Frontiers. 2023. Detection of Pilbara Olive Python and associated biodiversity of water collections taken in the Western Ridge area, Pilbara WA using eDNA metabarcoding. Unpublished Report Prepared for BHP Western Australian Iron Ore.

ENV Australia. 2007. Area C R-Deposit Fauna Assessment. Unpublished report to BHP Billiton Iron Ore Pty Ltd.

ENV Australia. 2008. Rapid Growth Project 5: Quarry 6 Fauna Assessment.

ENV Australia. 2009. Munjina and Minsters North (Yandi Hub) Fauna Assessment. Unpublished report for BHP Billiton Iron Ore PTY LTD.

ENV Australia. 2010a. Jinayri to Area C Access Corridor Vertebrate Fauna Assessment. unpublished report to BHP Billiton Iron Ore.

ENV Australia. 2010b. Jinayri Mining Lease Vertebrate Fauna Survey. Unpublished report for BHP Billiton Iron Ore.

Environmental Protection Authority. 2016. Environmental Factor Guideline: Terrestrial Fauna. Perth.

Environmental Protection Authority. 2020. Technical Guidance - Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment. Perth.

Environmental Protection Authority. 2023. Statement of Environmental Principles, Factors, Objectives and Aims of EIA. Perth.

Freeland, W. J., J. W. Winter, and S. Raskin. 1988. Australian rock mammals: A phenomenon of the seasonally dry tropics. Biotropica 20:70–79.

Garnett, S. T., J. K. Szabo, and G. Dutson. 2011. The Action Plan for Australian Birds 2010. CSIRO Publishing, Collingwood, Victoria.

Geoscience Australia. 2008. Surface geology of Australia 1:1,000,000 scale, Western Australia. https://dasc.dmp.wa.gov.au/dasc/.

GHD Pty Ltd. 2020. Fortescue Valley Targeted Bilby Survey. Unpublished report prepared for BHP Billiton Iron Ore Pty Ltd.

GHD Pty Ltd. 2022. OB32 West, OB28 and OB33 Targeted Vertebrate Fauna Surveys. Unpublished report prepared for BHP Western Australian Iron Ore.

Government of Western Australia. 2018. 2017 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics/resource/b7bd60c2-bff6-4637-b213-aee4706412c7.

Hill, B., and S. Ward. 2010. National Recovery Plan for the Northern Quoll *Dasyurus hallucatus*. http://www.environment.gov.au/biodiversity/threatened/publications/recovery/pubs/northern-quoll.pdf.

Janse, I., U. Kloecker, D. Roshier, and I. Whitte. 2015. Breeding diet and behaviour of a pair of Grey Falcons *Falco hypoleucos* and their offspring in north-western New South Wales. Corella 39:46–51.

Johnstone, R. E., and G. M. Storr. 1998. Handbook of Western Australian Birds Volume 1 - Non-passerines (Emu to Dollarbird). Western Australian Museum, Perth.

Kendrick, P. 2001a. Pilbara 2 (PIL2 - Fortescue Plains Subregion). Department of Conservation and Land Management, Perth.

Kendrick, P. 2001b. Pilbara 3 (PIL3 - Hamersley Subregion). Department of Conservation and Land Management, Perth.

Ley, A., and B. Tynan. 2016. Observations on nesting Grey Falcons, *Falco hypoleucos*. South Australian Ornithologist 41:49–64.

Marchant, S., and P. J. Higgins. 1993. Handbook of Australian, New Zealand and Antarctic Birds. Volume 2: Raptors to Lapwings. Oxford University Press, Melbourne.

Masters, P., Dickman, C.R., and Crowther, M. 2003. Effects of cover reduction on mulgara, *Dasycercus cristicauda* (Marsupialia: Dasyuridae), rodent and invertebrate populations in central Australia. Austral Ecology 28:658–665.

McKenzie, N. L., and R. D. Bullen. 2009. The echolocation calls, habitat relationships, foraging niches and communities of Pilbara microbats. Records of the Western Australian Museum Supplement 78:123–155.

McKenzie, N. L., A. A. Burbidge, A. Baynes, R. N. Brereton, C. R. Dickman, G. Gordon, L. A. Gibson, P. W. Menkhorst, A. C. Robinson, M. R. Williams, and J. C. Z. Woinarski. 2007. Analysis of factors implicated in the recent decline of Australia's mammal fauna. Journal of Biogeography 34:597–611.

Menkhorst, P., and F. Knight. 2011. A Field Guide to the Mammals of Australia. 3rd Edition. Oxford University Press, Melbourne.

Onshore Environmental. 2013. Flora & Vegetation and Vertebrate Fauna Review, Mt Whaleback AML 7/244. unpublished report to BHP Billiton Iron Ore Pty Ltd, Perth WA.

Onshore Environmental Consultants. 2009. Biological Survey South Parmelia Exploration Leases. Unpublished report to BHP Billiton Iron Ore Pty Ltd.

Outback Ecology. 2010. Area C to Jinayri to Mount Newman Railway - Terrestrial Vertebrate Fauna Survey. unpublished report to BHP Billiton Iron Ore.

Outback Ecology Services. 2008. Area C Mining Operation Environmental Management Plan (Revision 4) A, D, P1 and P3 Deposits, Terrestrial Vertebrate Fauna Assessment. Unpublished report to BHP Billiton Iron Ore Pty Ltd.

Pavey. 2006a. Threatened Species of the Northern territory: Long-Tailed Dunnart *Sminthopsis longicaudata*. Department of Natural Resources, Envionment and the Arts, Northern Territory Government.

Pavey, C. 2006b. Recovery Plan for the Greater Bilby, Macrotis lagotis, 2006-2011. Northern Territory Department of Infrastructure, Planning and Environment, Darwin.

Pearson, D. J. 1993. Distribution, status and conservation status of pythons in Western Australia. Pages 383–395 *in* D. Lunney and D. Ayers, editors. Herpetology in Australia: A Diverse Discipline. Royal Zoological Society of NSW, Sydney.

Ruykys, L., N. Hanrahan, and D. Stokeld. 2024. Novel acoustic lure methodology facilitates detection of the cryptic ghost bat at a landscape scale. Wildlife Research 51:1–15.

Schoenjahn, J. 2013. A hot environment and one type of prey: investigating why the Grey Falcon (*Falco hypoleucos*) is Australia's rarest falcon. Emu 113:19–25.

Schoenjahn, J. 2018. Adaptations of the rare endemic Grey Falcon *Falco hypoleucos* that enable its permanent residence in the arid zone of Australia. University of Queensland.

Shepherd, D. P., G. R. Beeston, and A. J. M. Hopkins. 2002. Native Vegetation in Western Australia: Extent, Type and Status. Department of Agriculture, Perth WA.

Southgate, R., and S. Carthew. 2008. Post-fire ephemerals and spinifex-fuelled fires: a decision model for bilby habitat management in the Tanami Desert, Australia. Internation Journal of WIldfire Fire 16:741–754.

Southgate, R., R. Paltridge, P. Masters, and S. Carthew. 2007. Bilby distribution and fire: a test of alternative models of habitat suitability in the Tanami Desert, Australia. Ecography 30:759–776.

Stewart, A. J., I. P. Sweet, R. S. Needham, O. L. Raymond, A. J. Whitaker, S. F. Liu, D. Phillips, A. J. Retter, D. P. Connolly, and G. R. Stewart. 2008. Surface Geology of Australia 1: 1 000 000 Scale, Western Australia [Digital Dataset]. http://www.ga.gov.au/homeID - 2284.

Thompson, S. A., and G. G. Thompson. 2010. Terrestrial Vertebrate Fauna Assessments for Ecological Impact Assessment. Terrestrial Ecosystems, Mt Claremont.

Threatened Species Scientific Committee. 2008. Approved Conservation Advice for *Liasis olivaceus barroni* (Olive Python - Pilbara subspecies). Canberra.

Threatened Species Scientific Committee. 2016a. Conservation Advice for *Rhinonicteris aurantia* (Pilbara form) Pilbara Leaf-nosed Bat). Canberra.

Threatened Species Scientific Committee. 2016b. Conservation Advice for *Macroderma gigas* (ghost bat). Canberra.

Tutt, M. S., S. Fekete, P. Mitchell, P. Brace, and D. Pearson. 2004. Unravelling the mysteries of the Pilbara Olive Python ecology. Page Threatened Species Network Community Grants Final Report – Project WA11/101. Nickol Bay Naturalists' Club and CALM, Karratha.

Watson, C. 2011. A failed breeding attempt by the Grey Falcon *Falco hypoleucos* near Alice Springs, Northern Territory. Australian Field Ornithology 28:167–179.

Western Australian Museum. 2023. Western Australian Museum Checklist of the Vertebrates of Western Australia. Western Australian Museum.

Wilson, S., and G. Swan. 2017. A Complete Guide to Reptiles of Australia. 5th edition. New Holland Publishers, Sydney.

Appendix A: Environmental Context Mapping

This page has been left blank intentionally.

720000 740000 760000 780000

7500000 7480000 7460000

Survey Area

QUATERNARY
- Qa
- Qd
- Qrc
- Qt

CENOZOIC
- Czims
- Czk
- Czl
- Czlr
- Czs
- Czz

PALEOPROTEROZOIC
- Lchk
- Lfhw
- Lchw
- Lchb

PROTEROZOIC
- -Pd

ARCHEAN
- Alhw
- Ashm
- Achm

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure A.1: Geological units of the study area

Scale: 1:200,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 2 4 6 8 10 Kilometres

N

astron an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_FigA1_Geo

720000 740000 760000 780000

7500000

7480000

7460000

Survey Area

Land System

- Adrian System
- Boolgeeda System
- Calcrete System
- Coolibah System
- Cowra System
- Divide System
- Fan System
- Fortescue System
- Marillana System
- Marsh System
- McKay System
- Narbung System
- Newman System
- Oakover System
- Pindering System
- Platform System
- River System
- Robe System
- Rocklea System
- Turee System
- Urandy System

BHP Western Australian Iron Ore

Jinidi Rail Corridor Targeted Significant Vertebrate Fauna Survey

Figure A.2: Land systems of the study area

Scale: 1:200,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 2 4 6 8 10 Kilometres

N

astron an ecocene company

Author: [redacted] Drawn: [redacted] Date: 26-08-2024 Figure Ref: 2400-015-24-BIDR-1RevA_240826_FigA2_LS

720000
740000
760000
780000
7500000
7480000
7460000

Survey Area

Pre-European Vegetation

- FORTESCUE VALLEY_111
- FORTESCUE VALLEY_29
- FORTESCUE VALLEY_676
- FORTESCUE VALLEY_82
- HAMMERSLEY_18
- HAMMERSLEY_82

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure A.3: Pre-European vegetation of the study area

Scale: 1:200,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 2 4 6 8 10 Kilometres

N

astron

an ecocene company

Author: [redacted] Drawn: [redacted]

Date: 02-07-2025

Figure Ref: 2400-015-24-BIDR-1RevC_250702_FigA3_PEV

This page has been left blank intentionally.

Appendix B: Conservation Listed Fauna Categories, Habitat Condition Scales and Significant Species Suitability Criteria

This page has been left blank intentionally.

Table B.1: Categories and definitions for threatened fauna species listed under the *Environment Protection and Biodiversity Conservation Act 1999.*

Conservation category	Definition
Extinct	Taxa with no reasonable doubt that the last member of the species has died.
Extinct in the wild	Taxa known to survive only in cultivation, in captivity or as a naturalized population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriated seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically endangered (CR)	Taxa facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered (EN)	Taxa are not critically endangered; and are facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable (VU)	Taxa are not critically endangered or endangered; and are facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Conservation dependent (CD)	Taxa are the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered, or critically endangered, or the following subparagraphs are satisfied: ○ the taxa is a species of fish; ○ the taxa is the focus of a management plan that provides management actions necessary to stop the decline of, and support the recovery of, the taxa so that its chances of long term survival in nature are maximized; ○ the management plan is in force under a law of the Commonwealth or of a State or Territory; ○ cessation of the management plan would adversely affect the conservation status of the taxa. Fish includes all taxa of bony fish, sharks, rays, crustaceans, mollusca, and other marine organisms, but does not include marine mammals/reptiles.
Migratory (MI)	Taxa are considered migratory species on International Agreements; i) if they are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II); ii) all migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA); and iii) Are native, migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Note: CD and MI are only related to conservation significant fauna.

Three categories exist for listing Threatened Ecological Communities under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). An ecological community may be categorised as:

Three categories exist for listing Threatened Ecological Communities under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). An ecological community may be categorised as detailed in Table B.2

Table B.2: Categories and criteria of Threatened Ecological Communities (Department of Environment and Conservation 2013).

Categories of ecological communities	
Critically endangered	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
Vulnerable	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

Reference: Department of Environment and Conservation 2013, Definitions, Categories and Criteria for Threatened and Priority Ecological Communities DEC (Parks and Wildlife), <https://www.dpaw.wa.gov.au/images/plants-animals/threatened-species/definitions_categories_and_criteria_for_threatened_and_priority_ecological_communities.pdf.>

Table B.3: Conservation Category Definitions for Western Australian Ecological Communities (*Biodiversity Conservation Act 2016* (BC Act)) (Department of Biodiversity, Conservation and Attractions 2023).

CO: Collapsed Ecological Communities
An ecological community listed by order of the Minister as collapsed under section 31(1) of the BC Act. An ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time: A) there is no reasonable doubt that the last occurrence of the ecological community has collapsed; **or** B) the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover: i) its species composition or structure; or ii) its species composition and structure.
CR : Critically Endangered
A threatened ecological community listed in the category of critically endangered under section 27(1)(a) of the BC Act, as determined by criteria set out in section 28 of the BC Act and the ministerial guidelines. A critically endangered ecological community faces an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines.
EN: Endangered
A threatened ecological community listed in the category of endangered ecological community under section 27(1)(b) of the BC Act, as determined by criteria set out in section 29 of the BC Act and the ministerial guidelines. A threatened ecological community faces a very high risk of becoming eligible for listing as a collapsed ecological community in the near future, as determined in accordance with criteria set out in the ministerial guidelines.
VU: Vulnerable
A threatened ecological community listed in the category of vulnerable ecological community under section 27(1)(c) of the BC Act, as determined by criteria set out in section 30 of the BC Act and the ministerial guidelines. A vulnerable ecological community faces a high risk of becoming eligible for listing as a collapsed ecological community in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines.

Priority Ecological Communities

Priority is not a listing category under the BC Act. Possible threatened ecological communities that do not meet survey criteria or are not adequately defined to enable listing are added to the department's Priority Ecological Communities for Western Australia list under priority 1, 2 or 3. Ecological communities that are adequately known and not threatened but rare, near threatened, or have recently been removed from the threatened list are placed in priority 4. Conservation dependent ecological communities are placed in priority 5.

P1 (Priority 1) Poorly known ecological communities: very few occurrences, very restricted distribution

Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g., within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

P2 (Priority 2) Poorly known ecological communities: few occurrences, restricted distribution

Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

P3 (Priority 3) Poorly known ecological communities: inadequately surveyed or not well defined

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them. This category includes three sub-categories:

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation.

(ii) Communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years).

(iii) Communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change, etc.

P4 (Priority 4) Adequately known ecological communities – rare, near threatened, or recently removed from the threatened list

Ecological communities that are adequately known and either rare but not threatened, near threatened, or have recently been removed from the threatened list. These communities require regular monitoring.

(i) Rare: ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.

(ii) Near threatened: ecological communities that are considered to have been adequately surveyed and that do not qualify as conservation dependent, but that are close to qualifying for a higher threat category.

(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

P5 (Priority 5) Conservation dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Reference: Department of Biodiversity, Conservation and Attractions 2023, CONSERVATION CATEGORY DEFINITIONS for Western Australian Ecological Communities, <https://www.dbca.wa.gov.au/media/3148/download.>

Table B.4: Conservation codes for Western Australian flora and fauna under the Western Australian *Biodiversity Conservation Act 2016* (Department of Biodiversity, Conservation and Attractions 2023).

Code	Conservation category	Definition
Threatened species (T)		Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).
CR	Critically endangered species	Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines".
EN	Endangered species	Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines".
VU	Vulnerable species	Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines".
Extinct species		Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.
EX	Extinct species	Species where "there is no reasonable doubt that the last member of the species has died".
EW	Extinct in the wild species	Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form".
Specially protected species (SP)		Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection. Species that are listed as threatened species (critically endangered, endangered, or vulnerable) or extinct species under the BC Act cannot also be listed as specially protected species.
MI	Migratory species	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).
CD	Conservation dependent species	Species of special conservation need that are dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).
OS	Other specially protected species	Species otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Reference: Department of Biodiversity, Conservation and Attractions 2023, *Conservation Category Definitions for Western Australian Fauna and Flora.* The Government of Western Australia.

Table B.5: Priority definitions for Western Australian threatened fauna under the *Biodiversity Conservation Act 2016* (Department of Biodiversity, Conservation and Attractions, 2020).

Species that may possibly be threatened species that do not meet the criteria for listing under the BC Act because of insufficient survey or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of prioritisation for survey and evaluation of conservation status so that consideration can be given to potential listing as threatened. Species that are adequately known, meet criteria for near threatened, or are rare but not threatened, or that have been recently removed from the threatened species list or conservation dependent or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Priority is not a listing category under the BC Act.

P1: Priority One – Poorly known species
Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, for example, agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements for threatened listing and appear to be under immediate threat from known threatening processes. These species are in urgent need of further survey.
P2: Priority Two – Poorly known species
Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, for example, national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements for threatened listing and appear to be under threat from known threatening processes. These species are in urgent need of further survey.
P3: Priority Three – Poorly known species
Species that are known from several locations and the species does not appear to be under imminent threat or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. These species need further survey.
P4: Priority Four: Rare, near threatened and other species in need of monitoring
(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as a conservation dependent specially protected species. (c) Species that have been removed from the list of threatened species or lists of conservation dependent or other specially protected species, during the past five years for reasons other than taxonomy. (d) Other species in need of monitoring.

Reference: Department of Biodiversity, Conservation and Attractions 2020, *Conservation Codes For Western Australian flora and fauna*, The Government of Western Australia.

Table B.6: Criteria used to define likelihood occurrence of significant fauna species.

Likelihood of occurrence	Pre-survey	Post-survey
Recorded	N/A	Species or evidence of species recorded during survey.
High	Species has been recorded within the survey area or within 20 km of the survey area and preferred habitat appears, or has the potential to be, to be present.	Core or preferred habitats present in the survey area which are abundant and/or high quality condition. OR Species is known to be cryptic and may not have been detected despite adequate survey effort and suitable habitat present within the survey area. OR Species or evidence of species recorded within the survey area however doubt remains over the taxonomic identification, validity of record.
Moderate	Species has not been recorded from within the survey area, however species has been recorded within the prescribed database search area and suitable habitat appears to be present, but in poor condition, limited in extent or is isolated and/or discontinuous.	Core or highly suitable habitats present in the survey area, however non-cryptic species that was not detected despite adequate survey effort. OR Core or preferred habitats present in the survey area are mainly in poor or modified condition, or are limited in extent.
Low	Species recorded from within the prescribed database search area but suitable habitat does not appear to be present.	Species has not been recorded in the survey area despite adequate survey effort. OR Species dependent on specific habitats that do not occur in the survey area. OR Species considered locally extinct.

Table B.7: Suitability/significance of habitat ranking criteria for the six target Matters of National Environmental Significance (MNES) species based on DAWE (2022).

Species	Critical habitat (a)	Supporting habitat (b)	Limited habitat (c)
Bilby *(Macrotis lagotis*)	• Denning and foraging within the home range (18 ha (female) to 316 ha (male)) of stony sandplain, sandplain and/ or recently burnt sandplain. • Denning and foraging within the home range of interdune corridors or stony plains dominated by *Triodia* spp. and *Acacias*. • Denning and foraging within the home range surrounding salt lakes that are dominated with samphire and or *Melaleuca* habitats. • Denning and foraging within the home range of paleo-drainage systems habitat.	Habitat important for foraging including: • Open tussock grasslands on uplands and hills. • Mulga woodland/ shrubland growing on ridges and rises. • Hummock grassland growing on sand plains and dunes, drainage systems, salt lake systems and other alluvial areas. • Laterite and rock feature substrates that support *Acacia kempeana*, *Acacia hilliana* and *Acacia rhodophylla* shrub species and spinifex hummocks with open runways between the hummocks for easy movements.	Habitat that has limited burrowing capacity for the greater bilby.
Pilbara olive python (*Liasis olivaceus barroni*)	• Rocky outcrops in proximity to deep gorges, gullies, and water holes within home range (88 – 450 ha). • Dense riparian vegetated sites in association with permanent wetlands (spring fed) within the home range (88-450 ha) of the individual.	• Deep gorges, gullies, water holes (ephemeral and semi-permanent), drainage lines and water courses. • Within supporting habitat, microhabitats such as under rock piles, on top of rocks or under spinifex or temporary pools in which to ambush prey.	Habitat that has limited sheltering and foraging capacity with no permanent or semi-permanent water.
Northern quoll *(Dasyurus hallucatus)*	• Denning and foraging habitat within the home range (35 hectares (ha) to >100 ha in breeding season) of low rocky hills, gorges, escarpments, ranges, breakaways and boulder fields. • Denning and foraging within the home range of major drainage lines and tree lined creeks. • Denning and foraging within the home range of structurally diverse woodland or forest. • Offshore islands.	• Variable foraging habitats within the home range and dispersal habitats that include: o Drainage lines that act as dispersal corridors. o Basalt hills, mesas, high and low plateaus and lower slopes. o Stony plains supporting hard or soft spinifex grasslands. o Sandstone and dolomite hills and ridges, shrublands, sandy plains, clay pans and tussock grasslands. o Coastal fringes including dunes islands and beaches.	Habitat that has limited sheltering and foraging capacity and not connected to potential denning/shelter and foraging habitat.

Species	Critical habitat (a)	Supporting habitat (b)	Limited habitat (c)
Ghost bat (*Macroderma gigas*)	• Category 1 - Maternity/Diurnal roost caves with permanent Ghost bat occupancy. These may be abandoned underground mines. • Category 2 - Maternity/Diurnal roost caves with regular (but not continuous) Ghost bat occupancy that is capable of supporting one or more reproducing females and their habitat. These may be abandoned underground mines. • Category 3 - Diurnal roost caves with occasional occupancy if adjacent to one or Diurnal roost caves with occasional occupancy if adjacent to one or more Category 2 cave(s). These may be abandoned underground mines. • Rocky outcrops in geological formations such as the following: o Brockman and Marra Mamba banded iron formation (BIF). o Robe Pisolite channel iron deposit (CID) geology. o ironstone geology and granite rockpiles. • Foraging habitat within 12 km radius of these caves or 1,200 ha of habitat surrounding each of these caves.	• Category 3 - Diurnal roost caves with occasional occupancy if isolated from Category 1 and 2 caves. • Category 4 – shallow caves, shelters and deep overhangs that support opportunistic usage for resting and feeding. • Productive plain areas with thin mature woodland over patchy or clumped tussock or hummock grass (*Triodia* spp.) on sand or stony ground. • Isolated trees and trees on the edge of thin thickets on the plains. • Trees along the edges of watercourse woodlands. • Prefer gully or gorge system that opens onto a plain or riparian line.	Habitat that has limited ecological value but may provide capacity for transitory movement across the landscape and/or limited foraging potential.

Pilbara Leaf-nosed bat (*Rhinonicteris aurantia*)	• Roosting habitat
	  o Priority/Category 1 Cave - Permanent diurnal roost and maternity roost with seasonal presence of young.
	  o Priority/Category 2 – Permanent/semi-permanent possible breeding roosts that are used during some part of the breeding cycle (but without the proven presence of young).
	  o Priority/Category 3 - Transitory diurnal roosts, occupied part of the year only, outside the breeding season (i.e. April-June) that facilitate long distance dispersal.
	• Permanent water sources within 8.7 km of a known Priority/Category 1-3 roosts.
	• Foraging habitat within 10 km (1,000 ha) radius of these caves that include:
	  o Plain and low hill habitat that includes watercourses and other sites with semi-permanent or permanent surface water (natural or anthropogenic). Three layers in vegetation structure.
	  o Mesa side or long ridge line with south, east or west facing, deeply incised gullies with vertical walls. Semi-permanent or permanent water pools present. Vegetation is complex. Also north facing gullies with permanent water.
	  o Deep wet 'open' gorge with hills to the side. Wet 'closed' gorge with one or 2 vertical walls. Complex 3-layer, dense vegetation structure. Semi-permanent or permanent water pools present. (priority 1 foraging habitat type).
	• Rocky outcrop geological formations such as the following:
	  o banded Iron Formations (Hamersley Group ironstone terrain).
	  o dolerite/gabbro formations.
	• Granite top rockpiles in the eastern Pilbara.
		• Priority/Category 4- Nocturnal refuge that are occupied at night for resting, feeding or other purpose, with perching not a requirement, which can be moderately deep caves and shallow abandoned mines.
		• Plains and low hills with three-layer, complex vegetation structure. Or moderate two-layer non-complex vegetation structure. Includes ephemeral watercourse.
		• Mesa side or long ridge line with north facing, deeply incised gullies with vertical walls. Or Mesa side or long ridge line with deeply incised gullies in weathered strata (45º sloping walls). Caves and overhangs present. Shrubs and thin tree cover in gully base. Ephemeral watercourse in gully or nearby. (priority 2 foraging habitat).
		• Dry deeply incised gorge into a ridge or mountain. Complex three layer vegetation structure. Ephemeral water course. (priority 1 foraging habitat). Large watercourses, around rocky outcrop, gullies, gorges and over pools.
		• Rocky outcrop areas of exposed rock at the top of rocky outcrop and mesa hills that contain caves and overhangs, and boulder piles in the granite terrains (priority 3 foraging habitat).
		• Major watercourses that support riparian vegetation on flat land plus the main gravelly or sandy channel of the riverbed, sometimes containing pools that persist for weeks or months, and generally supporting higher productivity of biomass than the surrounding habitats. (priority 4 foraging habitat).
		• Open grassland and woodland dominated by *Triodia*, on lowland plains, colluvial slopes and hilltops (priority 5 foraging habitat).
		• Large watercourses, around rocky outcrop, gullies, gorges and over pools.
			Habitat that has limited ecological value but may provide capacity for transitory movement across the landscape and/or limited foraging potential.

Species	Critical habitat (a)	Supporting habitat (b)	Limited habitat (c)
Night parrot (*Pezoporus occidentalis*)	• Nesting and foraging in areas that can support multiple to many occurrences of dense roosting habitat such as old-growth dense hummock-forming spinifex (*Triodia* spp.), thickets of lignum, or dense shrubby samphire. • Nesting and foraging in old-growth spinifex (*Triodia* spp.) in close proximity to ephemeral water sources, which may be associated with the following: o Hummock grasslands (unburnt) in stony or sandplain environments. o Paleo-drainage features in a landscape mosaic with spinifex (*Astrebla* spp.) and *Acacia aneura* (Mulga) woodland. o Treeless areas and bare gibber.	• Areas that are likely to be of relatively high vegetative or seed productivity such as run-on areas, floodplains, salt or clay pans, salt-lake margins. • Paleo-drainage systems, salt lakes and pans. • Permanent or ephemeral sources of free water, or areas where high soil moisture ephemerally or permanently support vegetation that offers a source of water. • Flyways varying from river and creek drainage systems, surrounding dune-fields, forb–grasslands on mainly ironstone gravel-covered plains, low ranges and low dissected tablelands supporting sparse shrublands, undulating stony clay plains supporting Mitchell Grass, and Gidgee.	Habitat that has limited roosting and foraging potential for the night parrot.
Grey falcon (*Falco hypoleucos*)	• Major drainage habitats with suitably size Eucalypts (*Eucalyptus camaldulensis*, E. *coolabah*) as potential nesting habitat, often in the abandoned nest of a raptor or corvid in trees.	• Timbered lowland plains, particularly *Acacia* shrublands that are crossed by tree-lined water courses. • The species has been observed hunting in treeless areas and frequents tussock grassland and open woodland.	Habitat that has limited nesting and foraging potential for the grey falcon.

Species	Critical habitat (a)	Supporting habitat (b)	Limited habitat (c)
Southern whiteface (*Aphelocephala leucopsis*)	• Habitat within the 'known or likely' modelled distribution consisting of: o Relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs, or both. o Habitat with low tree densities and an herbaceous understorey litter cover which provides essential foraging habitat. • Living and dead trees with hollows and crevices which are essential for roosting and nesting.	• Habitat within the 'may occur' modelled distribution consisting of: o Relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs, or both. o Habitat with low tree densities and an herbaceous understorey litter cover which provides essential foraging habitat. • Living and dead trees with hollows and crevices which are essential for roosting and nesting.	Habitat that has limited nesting and foraging potential for the southern whiteface.

Reference: Department of Agriculture, Water and the Environment (DAWE) (2022, in draft), Interim guidelines for Pilbara MNES critical and supporting habitat characterisation, DAWE, Canberra.

Table B.8: Fauna habitat condition scale (Thompson and Thompson 2010).

Habitat condition	Condition description
High Quality Fauna Habitat (1.0)	These areas closely approximate the vegetation mix and quality that would have been in the area prior to any human induced disturbance. The habitat has connectivity with other habitats and is likely to support the most natural vertebrate fauna assemblage.
Very Good Fauna Habitat (0.8)	These areas show minimal signs of human induced disturbance (e.g. grazing, clearing, fragmentation, weeds) and retain almost all of the characteristics of the habitat had it not been disturbed. The habitat has connectivity with other habitats, and fauna assemblages in these areas are likely to be minimally affected by disturbance.
Good Fauna Habitat (0.6)	These areas show signs of human induced disturbance (e.g. grazing, clearing, fragmentation, weeds) but generally retain many of the characteristics of the habitat had it not been disturbed. The habitat still retains some connectivity with other habitats but fauna assemblages in these areas are likely to be affected by disturbance. Fauna assemblages in these areas are likely to be similar to what might be expected in this habitat.
Disturbed Fauna Habitat (0.4)	These areas show signs of human induced significant disturbance (e.g. mining, clearing, tracks and roads). Many of the trees, shrubs and undergrowth have died or have been cleared. These areas may be in the early succession and regeneration stages. Areas may show signs of significant grazing, contain an abundance of weeds or have been damaged by vehicles or machinery. Habitats are fragmented or have limited connectivity with other fauna habitats. Fauna assemblages in these areas are likely to differ significantly from what might be expected in the area had the disturbance not occurred.
Highly Degraded Fauna Habitat (<0.2)	These areas often have a significant human induced loss of vegetation, and/or a large number of vehicle tracks and/or have been completely cleared, and/or areas have been heavily grazed or farmed. There is limited or no fauna habitat connectivity. Fauna assemblages in these areas are likely to differ significantly from what existed prior to the disturbance and are often depleted compared to what existed prior to the disturbance.

Reference: Thompson, SA & Thompson, GG 2010, *Terrestrial Vertebrate Fauna Assessments for Ecological Impact Assessment*, Terrestrial Ecosystems, Mt Claremont

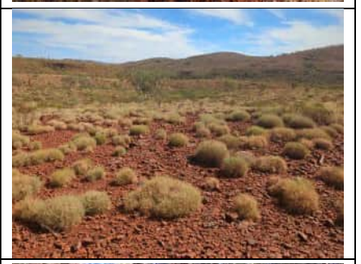
This page has been left blank intentionally.

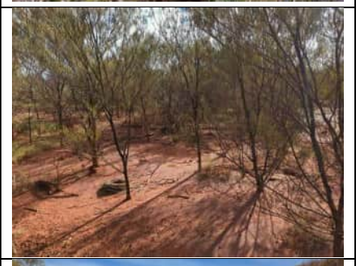
Appendix C: Survey Sampling Sites

This page has been left blank intentionally.

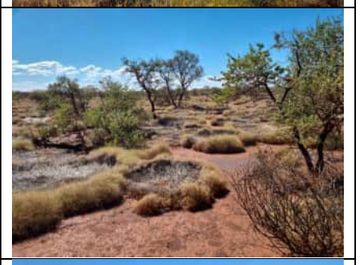
Table C.1: Survey sampling sites.

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
Habitat Assessment									
HA01	768192	7474062	Habitat Assessment	05/05/2024	Sand Dune	0.8	Cattle Grazing	Thick undergrowth, soft soil (burrows), old *Triodia*, leaf litter, termite mounds	
HA02	725876	7506198	Habitat Assessment	06/05/2024	Sand Dune	0.6	Cattle Grazing, Road/ Access Track, Weed Invasion	Soft soil (burrows), old *Triodia*, leaf litter	
HA03	742055	7466199	Habitat Assessment	07/05/2024	Hillcrest/ Hillslope	1.0	Non-Discernible	Crevices	
HA04	741802	7470161	Habitat Assessment	09/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, crevices, rock pile, leaf litter	
HA05	744883	7482226	Habitat Assessment	08/05/2024	Hillcrest/ Hillslope	1.0	Non-Discernible	Crevices, old *Triodia*	

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
HA06	746259	7481066	Habitat Assessment	10/05/2024	Drainage Area/ Floodplain	0.8	Cattle Grazing, Road/ Access Track	Old *Triodia*	
HA07	746286	7481205	Habitat Assessment	10/05/2024	Drainage Area/ Floodplain	0.8	Road/ Access Track	Old *Triodia*, leaf litter	
HA08	745635	7481666	Habitat Assessment	10/05/2024	Minor Drainage Line	0.8	Road/ Access Track	Logs, tree hollows, old *Triodia*	
HA09	730263	7468149	Habitat Assessment	11/05/2024	Hillcrest/ Hillslope	1.0	Non-Discernible	Logs, tree hollows, old *Triodia*	
HA10	741746	7469773	Habitat Assessment	11/05/2024	Medium Drainage Line	0.8	Cattle Grazing	Logs, crevices, thick undergrowth, leaf litter	

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
HA11	730006	7468590	Habitat Assessment	11/05/2024	Major Drainage Line	0.8	Cattle Grazing	Logs, tree hollows, crevices, thick undergrowth, soft soil (burrows), permanent water, pools, semi-permanent water, leaf litter	
HA12	769082	7474329	Habitat Assessment	12/05/2024	Mulga Woodland	0.8	Cattle Grazing	Logs, soft soil (burrows), old *Triodia*, leaf litter	
HA13	731931	7502115	Habitat Assessment	12/05/2024	Medium Drainage Line	0.4	Cattle Grazing, Road/ Access Track, Weed Invasion	Logs, tree hollows, soft soil (burrows), old *Triodia*, leaf litter	
HA14	732843	7468635	Habitat Assessment	12/05/2024	Gorge/ Gully	1.0	Non-Discernible	Logs, tree hollows, crevices, thick undergrowth, soft soil (burrows), semi-permanent water, leaf litter	
HA15	732550	7468438	Habitat Assessment	12/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, rock pile, old *Triodia*	

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
HA16	745358	7482383	Habitat Assessment	12/05/2024	Breakaway/ Cliff	1.0	Non-Discernible	Overhangs, crevices, rock pile	
HA17	768281	7471905	Habitat Assessment	11/05/2024	Sand Dune	0.6	Cattle Grazing, Road/ Access Track	Soft soil (burrows), leaf litter	
Targeted Search									
TBS01	769107	7475637	Targeted Search	05/05/2024	Sand Plain	0.8	Road/ Access Track	Thick undergrowth, soft soil (burrows), old Triodia, leaf litter	
TBS02	769160	7475595	Targeted Search	05/05/2024	Mulga Woodland	0.8	Road/ Access Track	Thick undergrowth, soft soil (burrows), old Triodia	
TBS03	768308	7474156	Targeted Search	05/05/2024	Sand Plain	0.8	Road/ Access Track	Thick undergrowth, soft soil (burrows), old Triodia, leaf litter	

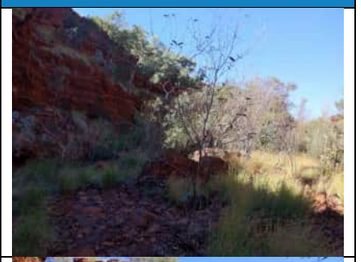
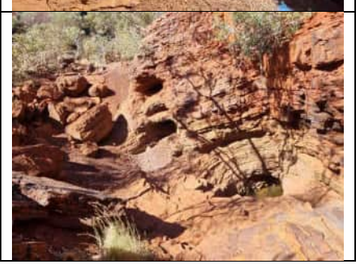
Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
TBS04	767994	7472431	Targeted Search	05/05/2024	Sand Plain	0.8	Road/ Access Track	Thick undergrowth, soft soil (burrows), old Triodia, termite mounds, Elliot Trap (Medium)	
TBS05	725590	7505270	Targeted Search	06/05/2024	Sand Plain	0.8	Road/ Access Track	Soft soil (burrows), old Triodia	
TBS06	752651	7489717	Targeted Search	06/05/2024	Sand Plain	0.8	Cattle Grazing, Road/ Access Track	Soft soil (burrows), leaf litter	
TBS07	746857	7484330	Targeted Search	10/05/2024	Sand Plain	0.8	Cattle Grazing, Road/ Access Track, Weed Invasion	Thick undergrowth, soft soil (burrows), old Triodia, leaf litter	
TBS08	747447	7483972	Targeted Search	10/05/2024	Sand Plain	0.8	Cattle Grazing, Road/ Access Track, Weed Invasion	Thick undergrowth, soft soil (burrows), old Triodia, leaf litter	

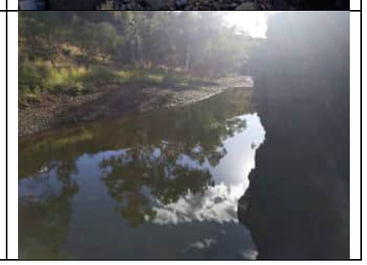
Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
TBS09	769583	7474271	Targeted Search	12/05/2024	Stony Plain	1.0	Non-Discernible	Soft soil (burrows), old Triodia, leaf litter	
TBS10	770901	7476607	Targeted Search	12/05/2024	Sand Plain	0.8	Road/ Access Track	Soft soil (burrows), old Triodia, leaf litter	
TBS11	731789	7501996	Targeted Search	12/05/2024	Stony Plain	0.4	Cattle Grazing, Weed Invasion	Logs, tree hollows, soft soil (burrows), leaf litter	
TBS12	747317	7489416	Targeted Search	14/05/2024	Sand Plain	0.8	Cattle Grazing, Road/ Access Track, Weed Invasion	Tree hollows, thick undergrowth, soft soil (burrows), old Triodia, leaf litter, termite mounds	
TBS13	748115	7490136	Targeted Search	14/05/2024	Mulga Woodland	0.8	Cattle Grazing, Road/ Access Track, Weed Invasion	Logs, tree hollows, thick undergrowth, soft soil (burrows), old Triodia, termite mounds	

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
TBS14	768247	7473880	Targeted Search	15/05/2024	Sand Plain	0.8	Cattle Grazing	Soft soil (burrows), old Triodia, termite mounds	
TBS15	739516	7496180	Targeted Search	15/05/2024	Sand Plain	0.8	Cattle Grazing	Soft soil (burrows), old Triodia, termite mounds	
TBS16	743652	7489575	Targeted Search	15/05/2024	Mulga Woodland	0.8	Cattle Grazing	Soft soil (burrows), old Triodia, termite mounds	N/A
TBS17	768287	7473870	Targeted Search	05/05/2024	Sand Plain	1.0	Non-Discernible	Soft soil (burrows), old Triodia	
Camera (active)									
CAM01	767990	7472168	Camera (active)	05/05/2024 - 15/05/2024	Sand Plain	0.4	Cattle Grazing, Road/ Access Track, Weed Invasion	Soft soil (burrows)	
CAM02	741631	7470169	Camera (active)	09/05/2024 - 14/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, crevices, rock pile	

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
CAM03	746823	7485041	Camera (active)	10/05/2024 - 15/05/2024	Sand Plain	1.0	Non-Discernible	Thick undergrowth, soft soil (burrows), old Triodia, leaf litter	
CAM04	729453	7467875	Camera (active)	11/05/2024 - 14/05/2024	Major Drainage Line	0.8	Cattle Grazing, Weed Invasion	Overhangs, logs, tree hollows, crevices, thick undergrowth, soft soil (burrows), permanent water, pools, semi-permanent water, rock pile, leaf litter	
NQ1-CAM01	742528	7465558	Camera (active)	07/05/2024 - 13/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, tree hollows, crevices, rock pile	
NQ1-CAM02	742201	7465456	Camera (active)	07/05/2024 - 13/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, pools, rock pile, leaf litter	
NQ1-CAM03	741590	7465532	Camera (active)	07/05/2024 - 13/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, rock pile, leaf litter	

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
NQ1-CAM04	741329	7465287	Camera (active)	07/05/2024 - 13/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, tree hollows, crevices, permanent water, rock pile, leaf litter	
NQ1-CAM05	742019	7465687	Camera (active)	07/05/2024 - 13/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, rock pile, leaf litter	
NQ2-CAM01	742913	7466066	Camera (active)	07/05/2024 - 13/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, tree hollows, crevices, thick undergrowth, rock pile, leaf litter	
NQ2-CAM02	742851	7466106	Camera (active)	07/05/2024 - 13/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, tree hollows, crevices, thick undergrowth, rock pile, old Triodia, leaf litter	
NQ2-CAM03	742660	7466143	Camera (active)	07/05/2024 - 13/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, tree hollows, crevices, thick undergrowth, rock pile, old Triodia, leaf litter	

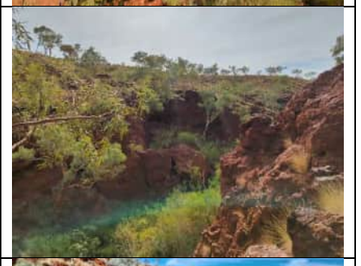
Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
NQ2-CAM04	742424	7466276	Camera (active)	07/05/2024 - 13/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, tree hollows, crevices, thick undergrowth, rock pile, leaf litter	
NQ2-CAM05	742137	7466375	Camera (active)	07/05/2024 - 13/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, tree hollows, crevices, thick undergrowth, rock pile, leaf litter	
NQ2-CAM06	741896	7466523	Camera (active)	07/05/2024 - 13/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, tree hollows, crevices, thick undergrowth, semi-permanent water, rock pile, leaf litter	
NQ3-CAM01	739866	7461916	Camera (active)	07/05/2024 - 14/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, permanent water, rock pile	
NQ3-CAM02	739999	7461931	Camera (active)	07/05/2024 - 14/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, permanent water, rock pile	

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
NQ3-CAM03	740134	7462000	Camera (active)	07/05/2024 - 14/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, rock pile	
NQ3-CAM04	739939	7461820	Camera (active)	07/05/2024 - 14/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, permanent water, rock pile	
NQ3-CAM05	739912	7461771	Camera (active)	07/05/2024 - 14/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, permanent water, rock pile	
NQ4-CAM01	730968	7467679	Camera (active)	07/05/2024 - 14/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, tree hollows, crevices, thick undergrowth, semi-permanent water, rock pile, leaf litter	
NQ4-CAM02	730400	7468386	Camera (active)	07/05/2024 - 14/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, tree hollows, crevices, thick undergrowth, semi-permanent water, rock pile, leaf litter	

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
NQ4-CAM03	730261	7468509	Camera (active)	07/05/2024 - 14/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, tree hollows, crevices, thick undergrowth, semi-permanent water, rock pile, leaf litter	
NQ4-CAM04	731043	7467556	Camera (active)	07/05/2024 - 14/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, logs, tree hollows, crevices, thick undergrowth, pools, semi-permanent water, rock pile, old Triodia, leaf litter	
NQ4-CAM05	730498	7467881	Camera (active)	07/05/2024 - 14/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, logs, tree hollows, crevices, thick undergrowth, pools, semi-permanent water, rock pile, old Triodia, leaf litter	
NQ5-CAM01	737853	7472859	Camera (active)	08/05/2024 - 15/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, rock pile	
NQ5-CAM02	737556	7472863	Camera (active)	08/05/2024 - 15/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, rock pile	

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
NQ5-CAM03	737408	7472678	Camera (active)	08/05/2024 - 15/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, rock pile	
NQ5-CAM04	737265	7472606	Camera (active)	08/05/2024 - 15/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, rock pile	
NQ5-CAM05	737787	7472964	Camera (active)	08/05/2024 - 15/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, rock pile	
NQ6-CAM01	744702	7482537	Camera (active)	08/05/2024 - 15/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, logs, tree hollows, thick undergrowth, rock pile, old Triodia, leaf litter	
NQ6-CAM02	744755	7482455	Camera (active)	08/05/2024 - 15/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, logs, tree hollows, thick undergrowth, rock pile, old Triodia, leaf litter	

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
NQ6-CAM03	744796	7482399	Camera (active)	08/05/2024 - 15/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, logs, tree hollows, thick undergrowth, rock pile, old Triodia, leaf litter	
NQ6-CAM04	744867	7482302	Camera (active)	08/05/2024 - 15/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, logs, tree hollows, thick undergrowth, rock pile, old Triodia, leaf litter	
NQ6-CAM05	744792	7482278	Camera (active)	08/05/2024 - 15/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, logs, tree hollows, thick undergrowth, rock pile, old Triodia, leaf litter	
Echolocation Recording									
BAT01	731003	7467703	Echolocation Recording	07/05/2024 – 10/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, tree hollows, crevices, rock pile, old Triodia, leaf litter	
BAT02	741959	7466534	Echolocation Recording	07/05/2024 – 10/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, tree hollows, thick undergrowth, rock pile, leaf litter	

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
BAT03	741323	7465293	Echolocation Recording	07/05/2024 – 10/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, tree hollows, crevices, permanent water, rock pile, leaf litter	
BAT04	739857	7461918	Echolocation Recording	07/05/2024 – 10/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, permanent water, rock pile, leaf litter	
BAT05	743049	7470208	Echolocation Recording	10/05/2024 – 13/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, logs, tree hollows, crevices, thick undergrowth, rock pile, old Triodia, leaf litter	
BAT06	731346	7467875	Echolocation Recording	10/05/2024 – 14/05/2024	Gorge/ Gully	1.0	Non-Discernible	Caves, overhangs, logs, tree hollows, crevices, thick undergrowth, rock pile, leaf litter	
BAT07	741866	7470164	Echolocation Recording	10/05/2024 – 13/05/2024	Gorge/ Gully	1.0	Non-Discernible	Overhangs, crevices, rock pile, old Triodia, leaf litter	

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
BAT08	729409	7467846	Echolocation Recording	11/05/2024 – 14/05/2024	Major Drainage Line	0.8	Weed Invasion	Overhangs, logs, tree hollows, crevices, thick undergrowth, soft soil (burrows), permanent water, pools, semi-permanent water, rock pile, leaf litter	
BAT09	743159	7476584	Echolocation Recording	13/05/2024 – 15/05/2024	Drainage Area/ Floodplain	0.8	Cattle Grazing	Tree hollows, soft soil (burrows), old Triodia, leaf litter	
BAT10	745298	7481252	Echolocation Recording	13/05/2024 – 15/05/2024	Minor Drainage Line	0.8	Cattle Grazing, Weed Invasion	Tree hollows, soft soil (burrows), old Triodia, leaf litter	
Acoustic Recording									
AUDIO 01	767395	7472580	Acoustic Recording	05/05/2024 – 11/05/2024	Sand Dune	0.8	Cattle Grazing	Soft soil (burrows), old *Triodia*, termite mounds	
AUDIO 02	769204	7474097	Acoustic Recording	05/05/2024 – 11/05/2024	Sand Plain	1.0	Non-Discernible	Soft soil (burrows), old *Triodia*	

Site ID	MGA Zone 51 K		Sampling method	Date	Habitat	Condition*	Disturbance	Microhabitats**	Photo
	Easting (mE)	Northing (mN)							
AUDIO 03	745911	7484626	Acoustic Recording	11/05/2024 – 16/05/2024	Sand Plain	0.8	Cattle Grazing	Tree hollows, thick undergrowth, soft soil (burrows), old *Triodia*, leaf litter	
AUDIO 04	743913	7494769	Acoustic Recording	11/05/2024 – 16/05/2024	Sand Plain	0.8	Cattle Grazing, Road/ Access Track, Weed Invasion	Tree hollows, soft soil (burrows), old *Triodia*, leaf litter	

** Microhabitats present within the habitat type here are general in nature. Significant microhabitat locationss (e.g. roost caves, water features) are detailed in Table G.1 and Table G.2, Appendix G.

*- Fauna habitat condition scale (Thompson and Thompson 2010) (Appendix B Table B.6).

1.0 (High Quality Fauna Habitat)

0.8 (Very Good Fauna Habitat)

0.6 (Good Fauna Habitat)

0.4 (Disturbed Fauna Habitat)

<0.2 (Highly Degraded Fauna Habitat)

This page has been left blank intentionally.

Appendix D: Fauna Species Lists

This page has been left blank intentionally.

Table D.1: Amphibian species list – results of database searches, literature reviews and Astron survey results.

Scientific Name	Common Name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List						
Pelodryadidae											
Cyclorana maini	Sheep frog					X	X			X	
Litoria rubella	Little red tree frog					X	X			X	X
Limnodynastidae											
Neobatrachus aquilonius	Northern burrowing frog					X	X				
Neobatrachus sutor	Shoemaker frog					X	X				
Platyplectrum spenceri	Centralian burrowing frog						X				
Myobatrachidae											
Pseudophryne douglasi	Gorge toadlet					X	X			X	
Uperoleia glandulosa	Glandular toadlet					X	X				
Uperoleia russelli	Northwest toadlet					X	X			X	
Uperoleia saxatilis	Pilbara toadlet					X	X				

Table D.2: Reptile species list – results of database searches, literature reviews and Astron survey results.

Scientific Name	Common Name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List						
Chelidae											
Chelodina steindachneri	Flat-shelled turtle					X	X				
Carphodactylidae											
Nephrurus cinctus	Northern banded knob-tailed gecko						X			X	
Nephrurus wheeleri	Southern banded knob-tailed gecko						X				
Underwoodisaurus seorsus	Pilbara barking gecko				P2	X	X		X	X	
Diplodactylidae											
Crenadactylus pilbarensis	Pilbara clawless gecko					X	X			X	
Diplodactylus bilybara	Western fat-tailed gecko					X					
Diplodactylus conspicillatus	Variable fat-tailed gecko					X	X			X	
Diplodactylus granariensis rex						X	X				
Diplodactylus laevis	Desert fat-tailed gecko					X					
Diplodactylus mitchelli						X					
Diplodactylus pulcher						X	X			X	
Diplodactylus savagei	Southern Pilbara beak-faced gecko					X	X			X	
Lucasium stenodactylus						X	X			X	
Lucasium wombeyi						X	X				
Lucasium woodwardi							X				
Oedura fimbria	Western marbled velvet gecko					X	X			X	X
Rhynchoedura ornata	Western beaked gecko					X				X	
Strophurus elderi						X	X			X	
Strophurus jeanae						X	X			X	
Strophurus wellingtonae						X	X			X	
Gekkonidae											
Gehyra crypta	Western cryptic gehyra					X					
Gehyra fenestrula	Hamersley Range spotted gehyra					X	X				
Gehyra micra	Small Pilbara spotted rock gehyra					X					
Gehyra montium						X	X				
Gehyra pilbara						X	X				
Gehyra punctata						X	X			X	
Gehyra purpurascens						X	X			X	
Gehyra variegata	Tree gecko					X	X			X	X
Heteronotia binoei	Bynoe's gecko					X	X			X	
Heteronotia planiceps						X					
Heteronotia spelea	Pilbara cave gecko					X	X			X	
Pygopodidae											
Delma butleri						X	X			X	
Delma elegans						X	X				
Delma nasuta						X	X			X	
Delma pax						X	X			X	
Delma tincta						X	X			X	
Lialis burtonis	Burton’s legless lizard					X	X			X	X
Pygopus nigriceps						X	X			X	
Agamidae											

Scientific Name	Common Name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List						
Ctenophorus caudicinctus	Western ring-tailed dragon					X	X			X	X
Ctenophorus isolepis isolepis	Central military dragon					X	X			X	X
Ctenophorus nuchalis	Central netted dragon					X	X			X	
Ctenophorus reticulatus	Western netted dragon					X	X			X	
Ctenophorus scutulatus							X				
Diporiphora amphiboluroides	Mulga dragon					X	X				
Diporiphora valens	Southern Pilbara tree dragon					X	X				
Gowidon longirostris	Long-nosed dragon					X	X			X	
Pogona minor minor	Western bearded dragon					X	X			X	
Tympanocryptis cephalus	Coastal pebble-mimic dragon						X			X	
Tympanocryptis diabolicus	Hamersley pebble-mimic dragon					X					
Tympanocryptis fortescuensis	Fortescue pebble-mimic dragon					X					
Scincidae											
Carlia munda						X	X			X	
Carlia triacantha							X			X	
Cryptoblepharus buchananii						X	X			X	
Cryptoblepharus plagiocephalus						X	X			X	
Cryptoblepharus ustulatus	Russet snake-eyed skink					X	X			X	X
Ctenotus ariadnae						X	X			X	
Ctenotus atlas							X				
Ctenotus duricola	Eastern Pilbara lined ctenotus					X	X			X	
Ctenotus grandis grandis							X			X	
Ctenotus grandis titan						X	X				
Ctenotus greeri							X				
Ctenotus hanloni						X	X			X	
Ctenotus helenae						X	X			X	
Ctenotus inornatus						X	X			X	
Ctenotus leonhardii						X	X				
Ctenotus pallasotus	Western Pilbara lined ctenotus					X	X				
Ctenotus pantherinus						X	X			X	
Ctenotus piankai	Coarse sands ctenotus									X	
Ctenotus quattuordecimlineatus							X				
Ctenotus rubicundus						X	X				
Ctenotus rufescens							X				
Ctenotus rutilans						X	X			X	
Ctenotus saxatilis	Rock ctenotus						X			X	X
Ctenotus schomburgkii						X	X				
Ctenotus serventyi						X	X			X	
Ctenotus superciliaris							X				
Ctenotus uber johnstonei					P2		X				
Ctenotus uber uber						X	X			X	
Cyclodomorphus melanops melanops						X	X			X	
Egernia cygnitos	Western Pilbara spiny-tailed skink					X	X				
Egernia depressa	Southern pygmy spiny-tailed skink					X	X				
Egernia formosa	Goldfields crevice-sknk					X	X			X	X
Eremiascincus isolepis						X	X				
Eremiascincus pallidus	Western narrow-banded skink						X			X	
Eremiascincus richardsonii	Broad-banded sand swimmer					X	X			X	

Scientific Name	Common Name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List						
Eremiascincus rubiginosus	Rusty skink					X					
Lerista amicorum						X	X				
Lerista bipes							X			X	
Lerista chalybura						X	X			X	
Lerista flammicauda						X					
Lerista jacksoni						X	X				
Lerista labialis						X	X			X	
Lerista macropisthopus fusciceps							X				
Lerista macropisthopus remota					P2	X			X		
Lerista muelleri						X	X			X	
Lerista neander						X	X			X	
Lerista timida						X	X			X	
Lerista verhmens							X				
Liopholis kintorei	Great desert skink		VU	VU				X			
Menetia greyii						X	X			X	
Menetia surda surda						X	X				
Morethia ruficauda exquisita	Fire-tailed skink					X	X			X	X
Notoscincus ornatus ornatus						X	X			X	
Proablepharus reginae						X	X			X	
Tiliqua multifasciata	Central bluetongue					X	X			X	
Varanidae											
Varanus acanthurus	Spiny-tailed goanna					X	X			X	
Varanus brevicauda	Short-tailed pygmy goanna					X	X			X	
Varanus bushi	Pilbara mulga goanna					X	X			X	
Varanus caudolineatus						X	X			X	
Varanus eremius	Pygmy desert goanna					X	X			X	
Varanus giganteus	Perentie					X	X			X	
Varanus gouldii	Bungarra or sand goanna					X	X			X	
Varanus hamersleyensis	Southern Pilbara rock goanna					X	X				X
Varanus panoptes rubidus	Yellow spotted monitor					X	X			X	X
Varanus pilbarensis	Northern Pilbara rock goanna					X	X			X	
Varanus tristis	Racehorse goanna					X	X			X	
Typhlopidae											
Anilios ammodytes						X	X			X	
Anilios ganei					P1	X	X		X	X	
Anilios grypus						X	X			X	
Anilios hamatus						X	X			X	
Anilios pilbarensis						X	X				
Anilios waitii						X	X				
Pythonidae											
Antaresia childreni	Children's python					X	X			X	
Antaresia perthensis	Pygmy python					X	X			X	X
Aspidites melanocephalus	Black-headed python					X	X				
Liasis olivaceus barroni	Pilbara Olive python		VU	VU		X	X	X	X	X	X
Elapidae											
Acanthophis wellsi	Pilbara death adder					X	X				
Brachyurophis approximans						X	X			X	

Scientific Name	Common Name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List						
Demansia reticulata						X	X			X	
Demansia rufescens	Rufous whipsnake					X	X			X	
Furina ornata	Moon snake					X	X			X	
Pseudechis australis	Mulga snake					X	X			X	X
Pseudonaja mengdeni	Western brown snake					X	X			X	
Pseudonaja modesta	Ringed brown snake					X	X			X	
Pseudonaja nuchalis	Gwardar, northern brown snake						X			X	
Simoselaps bertholdi	Jan's banded snake					X					
Suta fasciata	Rosen's snake					X	X			X	
Suta gaikorstorum						X	X			X	
Suta punctata	Spotted Snake					X	X			X	
Vermicella snelli						X	X			X	

Table D.3: Bird species list – results of database searches, literature reviews and Astron survey results.

Scientific Name	Common Name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Birdata	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List							
Casuariidae												
Dromaius novaehollandiae	Emu					X	X			X	X	X
Anseranatidae												
Anseranas semipalmata	Magpie goose					X				X		
Anatidae												
Anas gracilis	Grey teal					X	X			X		
Anas superciliosa	Pacific black duck					X	X			X	X	
Aythya australis	Hardhead					X	X			X		
Chenonetta jubata	Australian wood duck					X	X			X		
Cygnus atratus	Black swan					X	X			X		
Malacorhynchus membranaceus	Pink-eared duck					X	X			X		
Spatula rhynchotis	Australasian shoveler					X	X			X		
Stictonetta naevosa	Freckled duck					X				X		
Tadorna tadornoides	Australian shelduck					X	X			X		
Phasianidae												
Coturnix pectoralis	Stubble quail						X					
Synoicus ypsilophora	Brown quail					X	X			X	X	
Podicipedidae												
Podiceps cristatus	Great crested grebe					X				X		
Poliocephalus poliocephalus	Hoary-headed grebe					X	X			X		
Tachybaptus novaehollandiae	Australasian grebe (Black-throated grebe)					X	X			X		
Ciconiidae												
Ephippiorhynchus asiaticus	Black-necked stork					X				X		
Threskiornithidae												
Platalea flavipes	Yellow-billed spoonbill					X	X			X		
Platalea regia	Royal spoonbill					X	X			X		
Plegadis falcinellus	Glossy ibis		MI	MI		X	X		X	X		
Threskiornis moluccus	Australian White ibis					X				X		
Threskiornis spinicollis	Straw-necked ibis					X	X			X		
Ardeidae												
Ardea alba	Eastern great egret	-				X	X			X	X	
Ardea intermedia	Intermediate egret					X				X		
Ardea pacifica	White-necked heron					X	X			X		
Bubulcus coromandus	Cattle egret					X				X		
Butorides striatus	Striated heron (Mangrove heron)					X						
Egretta garzetta	Little egret					X	X			X		
Egretta novaehollandiae	White-faced heron					X	X			X	X	
Ixobrychus flavicollis	Black bittern					X				X		
Nycticorax caledonicus	Nankeen night-heron					X	X			X	X	

Scientific Name	Common Name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Birdata	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List							
Pelecanidae												
Pelecanus conspicillatus	Australian pelican					X	X			X		
Phalacrocoracidae												
Microcarbo melanoleucos	Little pied cormorant					X	X			X	X	
Phalacrocorax carbo	Great cormorant					X	X			X		
Phalacrocorax sulcirostris	Little black cormorant						X			X	X	
Phalacrocorax varius	Pied cormorant (Australian pied cormorant)					X	X			X		
Anhingidae												
Anhinga novaehollandiae	Australasian darter					X	X			X		
Accipitridae												
Accipiter cirrocephalus	Collared sparrowhawk					X	X			X	X	X
Accipiter fasciatus	Brown goshawk					X	X			X	X	X
Aquila audax	Wedge-tailed eagle					X	X			X	X	X
Circus approximans	Swamp harrier					X	X			X		
Circus assimilis	Spotted harrier					X	X			X	X	X
Elanus axillaris	Australian black-shouldered kite					X	X			X	X	
Elanus scriptus	Letter-winged kite				P4		X		X			
Erythrotriorchis radiatus	Red goshawk		VU	VU				X				
Haliaeetus leucogaster	White-bellied sea-eagle					X	X			X		
Haliastur sphenurus	Whistling kite					X	X			X	X	X
Hamirostra melanosternon	Black-breasted buzzard					X	X			X	X	X
Hieraaetus morphnoides	Little eagle					X	X			X	X	
Lophoictinia isura	Square-tailed kite					X	X			X	X	
Milvus migrans	Black kite					X	X			X	X	
Pandion haliaetus	Osprey		MI	MI			X		X		X	
Otididae												
Ardeotis australis	Australian bustard					X	X			X	X	X
Rallidae												
Fulica atra	Eurasian coot					X	X			X		
Gallinula tenebrosa	Dusky moorhen					X						
Hypotaenidia philippensis	Buff-banded rail						X			X	X	
Porphyrio melanotus	Purple swamphen					X	X			X		
Porzana fluminea	Australian spotted crake					X						
Tribonyx ventralis	Black-tailed native-hen					X	X			X		
Zapornia pusilla	Baillon's crake					X				X		
Zapornia tabuensis	Spotless crake					X	X			X		
Turnicidae												
Turnix velox	Little button-quail						X			X	X	X
Burhinidae												
Burhinus grallarius	Bush stone-curlew					X	X			X		
Recurvirostridae												

Scientific Name	Common Name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Birdata	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List							
Cladorhynchus leucocephalus	Banded stilt					X	X			X		
Himantopus himantopus	Black-winged stilt					X	X			X		
Recurvirostra novaehollandiae	Red-necked avocet					X	X			X		
Charadriidae												
Charadrius leschenaultii	Greater sand plover		VU & MI	VU & MI						X		
Charadrius ruficapillus	Red-capped plover					X				X		
Charadrius veredus	Oriental plover		MI	MI		X	X	X	X	X		
Elseyornis melanops	Black-fronted dotterel					X	X			X	X	
Erythrogonys cinctus	Red-kneed dotterel					X	X			X		
Vanellus miles	Masked lapwing					X	X					
Vanellus tricolor	Banded lapwing						X					
Rostratulidae												
Rostratula australis	Australian painted snipe		EN	EN		X	X	X	X	X		
Scolopacidae												
Actitis hypoleucos	Common sandpiper		MI	MI		X		X		X		
Calidris acuminata	Sharp-tailed sandpiper		MI	MI		X	X	X		X		
Calidris ferruginea	Curlew sandpiper		CR & MI	CR & MI		X		X		X		
Calidris melanotos	Pectoral sandpiper		MI	MI		X		X				
Calidris ruficollis	Red-necked stint			MI		X				X		
Calidris subminuta	Long-toed stint		MI	MI						X		
Tringa glareola	Wood sandpiper		MI	MI		X	X		X	X		
Tringa nebularia	Common greenshank		MI	MI		X	X		X	X		
Tringa stagnatilis	Marsh sandpiper		MI	MI		X	X		X	X		
Glareolidae												
Stiltia isabella	Australian pratincole					X	X			X		
Laridae												
Chlidonias hybrida	Whiskered tern					X	X			X		
Chroicocephalus novaehollandiae	Silver gull					X				X		
Gelochelidon nilotica	Gull-billed tern		MI	MI		X	X		X			
Gelochelidon macrotarsa	Australian gull-billed tern									X		
Hydroprogne caspia	Caspian tern		MI	MI		X			X	X		
Columbidae												
Geopelia cuneata	Diamond dove					X	X			X	X	X
Geopelia humeralis	Bar-shouldered dove					X				X		
Geopelia striata placida	Peaceful dove					X	X			X	X	
Geophaps plumifera	Spinifex pigeon					X	X			X	X	X
Ocyphaps lophotes	Crested pigeon					X	X			X	X	X
Phaps chalcoptera	Common bronzewing					X	X			X	X	X
Cuculidae												
Centropus phasianinus	Pheasant Coucal					X	X			X	X	
Chalcites basalis	Horsfield's bronze cuckoo					X	X			X	X	

Scientific Name	Common Name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Birdata	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List							
Chalcites osculans	Black-eared cuckoo					X	X			X	X	
Heteroscenes pallidus	Pallid cuckoo					X	X			X	X	
Tytonidae												
Tyto javanica	Eastern barn owl					X				X	X	
Strigidae												
Ninox boobook	Southern boobook					X	X			X	X	X
Ninox connivens	Barking owl					X	X				X	
Podargidae												
Podargus strigoides	Tawny frogmouth					X	X			X	X	
Podargus strigoides phalaenoides												
Caprimulgidae												
Eurostopodus argus	Spotted nightjar					X	X			X	X	X
Aegothelidae												
Aegotheles cristatus	Australian owlet-nightjar					X	X			X	X	X
Apodidae												
Apus pacificus	Fork-tailed swift (Pacific swift)		MI	MI		X	X	X	X	X	X	
Coraciidae												
Eurystomus orientalis	Dollarbird					X						
Alcedinidae												
Dacelo leachii	Blue-winged kookaburra					X	X			X	X	
Todiramphus pyrrhopygius	Red-backed kingfisher					X	X			X	X	X
Todiramphus sanctus	Sacred kingfisher					X	X			X	X	X
Meropidae												
Merops ornatus	Rainbow bee-eater					X	X			X	X	X
Falconidae												
Falco berigora	Brown falcon					X	X			X	X	X
Falco cenchroides	Australian kestrel (Nankeen kestrel)					X	X			X	X	X
Falco hypoleucos	Grey falcon			VU		X	X	X	X		X	
Falco longipennis	Australian hobby					X	X			X	X	
Falco peregrinus	Peregrine falcon			OS		X	X		X	X	X	
Falco subniger	Black falcon						X					
Cacatuidae												
Cacatua sanguinea	Little corella					X	X			X	X	
Calyptorhynchus banksii	Red-tailed black cockatoo					X						
Eolophus roseicapilla	Galah					X	X			X	X	X
Nymphicus hollandicus	Cockatiel					X	X			X	X	X
Psittaculidae												
Barnardius zonarius zonarius	Port Lincoln parrot					X	X			X	X	X
Melopsittacus undulatus	Budgerigar					X	X			X	X	X
Neopsephotus bourkii	Bourke's parrot					X	X			X		
Pezoporus occidentalis	Night parrot		EN	CR			X	X				

Scientific Name	Common Name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Birdata	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List							
Polytelis alexandrae	Princess parrot		VU		P4			X				
Psephotellus varius	Mulga parrot					X				X	X	
Ptilonorhychidae												
Ptilonorhynchus maculatus subsp. guttatus	Western bowerbird					X	X			X	X	X
Maluridae												
Amytornis whitei whitei	Pilbara grasswren					X	X			X	X	X
Malurus assimilis assimilis	Purple-backed fairy-wren					X	X			X	X	X
Malurus leucopterus	White-winged fairy-wren					X	X			X	X	X
Malurus splendens	Splendid fairy-wren					X	X			X		
Stipiturus ruficeps	Rufous-crowned emu-wren					X	X			X	X	
Meliphagidae												
Acanthagenys rufogularis	Spiny-cheeked honeyeater					X	X			X	X	X
Certhionyx variegatus	Pied honeyeater					X	X			X	X	
Epthianura aurifrons	Orange chat					X	X			X		
Epthianura tricolor	Crimson chat					X	X			X	X	X
Gavicalis virescens virescens	Singing honeyeater					X	X			X	X	X
Lacustroica whitei	Grey honeyeater					X	X			X	X	
Lichmera indistincta	Brown honeyeater					X	X			X	X	
Manorina flavigula	Yellow-throated miner					X	X			X	X	X
Melithreptus gularis	Black-chinned honeyeater					X	X			X	X	
Ptilotula keartlandi	Grey-headed honeyeater					X	X			X	X	X
Ptilotula penicillata	White-plumed honeyeater					X	X			X	X	X
Ptilotula plumula	Grey-fronted honeyeater					X	X			X		
Purnella albifrons	White-fronted honeyeater					X	X			X	X	
Stomiopera unicolor	White-gaped honeyeater									X		
Sugomel nigrum	Black honeyeater					X	X			X	X	
Pardalotidae												
Pardalotus rubricatus	Red-browed pardalote					X	X			X	X	
Pardalotus striatus	Striated pardalote					X	X			X	X	X
Acanthizidae												
Acanthiza apicalis	Broad-tailed thornbill (Inland thornbill)					X	X			X	X	X
Acanthiza chrysorrhoa	Yellow-rumped thornbill					X	X			X	X	
Acanthiza robustirostris	Slaty-backed thornbill					X	X			X	X	
Acanthiza uropygialis	Chestnut-rumped thornbill					X	X			X	X	X
Aphelocephala leucopsis	Southern whiteface		VU			X	X	X		X		
Calamanthus campestris	Rufous Fieldwren						X			X		
Gerygone fusca	Western gerygone					X	X			X	X	
Pyrrholaemus brunneus	Redthroat					X	X			X		
Smicrornis brevirostris	Weebill					X	X			X	X	X
Pomatostomidae												
Pomatostomus superciliosus	White-browed babbler					X	X			X	X	

Scientific Name	Common Name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Birdata	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List							
Pomatostomus temporalis	Grey-crowned babbler					X	X			X	X	X
Psophodidae												
Psophodes occidentalis	Western wedgebill (Chiming wedgebill)					X	X			X		
Cinclosomatidae												
Cinclosoma marginatum	Western quail-thrush					X	X			X		
Artamidae												
Artamus cinereus	Black-faced woodswallow					X	X			X	X	X
Artamus cyanopterus	Dusky woodswallow					X	X			X		
Artamus minor	Little woodswallow					X	X			X	X	X
Artamus personatus	Masked woodswallow					X	X			X	X	X
Artamus superciliosus	White-browed woodswallow					X				X		
Cracticus nigrogularis	Pied butcherbird					X	X			X	X	X
Cracticus torquatus	Grey butcherbird					X	X			X	X	X
Gymnorhina tibicen	Australian magpie					X	X			X	X	X
Campephagidae												
Coracina maxima	Ground cuckoo-shrike					X	X			X		
Coracina novaehollandiae	Black-faced cuckoo-shrike					X	X			X	X	X
Lalage tricolor	White-winged triller					X	X			X	X	X
Neosittidae												
Daphoenositta chrysoptera	Varied sittella					X	X			X		
Oreoidae												
Oreoica gutturalis	Crested bellbird					X	X			X	X	X
Pachycephalidae												
Colluricincla harmonica	Grey shrike-thrush					X	X			X	X	X
Pachycephala rufiventris rufiventris	Rufous whistler					X	X			X	X	X
Rhipiduridae												
Rhipidura albiscapa	Grey fantail					X	X			X	X	X
Rhipidura leucophrys	Willie wagtail					X	X			X	X	X
Monarchidae												
Grallina cyanoleuca	Magpie-lark					X	X			X	X	X
Corvidae												
Corvus bennetti	Little crow					X	X			X	X	
Corvus coronoides	Australian raven						X					
Corvus orru	Torresian crow					X	X			X	X	X
Petroicidae												
Melanodryas cucullata	Hooded robin					X	X			X	X	X
Petroica goodenovii	Red-capped robin					X	X			X	X	
Alaudidae												
Mirafra javanica	Horsfield's bushlark					X	X			X	X	
Hirundinidae												
Cheramoeca leucosterna	White-backed swallow					X	X			X	X	

Scientific Name	Common Name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Birdata	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List							
Hirundo neoxena	Welcome swallow					X	X			X		
Hirundo rustica	Barn swallow		MI	MI				X				
Petrochelidon ariel	Fairy martin					X	X			X	X	
Petrochelidon nigricans	Tree martin					X	X			X	X	
Acrocephalidae												
Acrocephalus australis	Australian reed warbler					X	X			X	X	X
Locustellidae												
Cincloramphus cruralis	Brown songlark					X	X			X	X	
Cincloramphus mathewsi	Rufous songlark					X	X			X	X	X
Poodytes carteri	Spinifexbird					X	X			X	X	X
Poodytes gramineus	Little grassbird					X				X	X	
Dicaeidae												
Dicaeum hirundinaceum	Mistletoebird					X	X			X	X	
Estrildidae												
Emblema pictum	Painted finch					X	X			X	X	X
Neochmia ruficauda	Star finch					X	X			X	X	X
Taeniopygia castanotis	Zebra finch					X	X			X	X	X
Motacillidae												
Anthus australis	Australian pipit					X	X			X	X	
Motacilla cinerea	Grey wagtail		MI	MI				X				
Motacilla tschutschensis	Yellow wagtail		MI	MI				X				

Table D.4: Mammal species list – results of database searches, literature reviews and Astron survey results.

Scientific Name	Common name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List						
Tachyglossidae											
Tachyglossus aculeatus acanthion	Short-beaked echidna						X			X	X
Dasyuridae											
Antechinomys longicaudata	Long-tailed dunnart				P4	X			X		
Dasycercus blythi	Brush-tailed mulgara, ampurta				P4	X	X		X	X	X
Dasykaluta rosamondae	Kaluta					X	X			X	
Dasyurus hallucatus	Northern quoll		EN	EN		X		X	X	X	
Ningaui ridei	Wongai ningaui					X	X				
Ningaui timealeyi	Pilbara ningaui					X	X			X	
Planigale ingrami	Long-tailed planigale						X				
Planigale maculata	Common planigale						X				
Planigale kendricki	Orange-headed Pilbara planigale						X			X	
Pseudantechinus woolleyae	Woolley's pseudantechinus					X	X				X
Sminthopsis crassicaudata	Fat-tailed dunnart									X	
Sminthopsis dolichura	Little long-tailed dunnart						X				
Sminthopsis hirtipes	Hairy-footed dunnart						X				
Sminthopsis macroura	Stripe-faced dunnart					X	X			X	
Sminthopsis ooldea	Ooldea dunnart					X	X				
Sminthopsis youngsoni	Lesser hairy-footed dunnart					X	X			X	
Thylacomyidae											
Macrotis lagotis	Bilby, dalgyte		VU	VU		X	X	X	X	X	X
Macropodidae											
Lagorchestes conspicillatus leichardti	Spectacled hare-wallaby (mainland)				P4	X					
Osphranter robustus erubescens	Euro, Biggada					X	X			X	X
Osphranter rufus	Red kangaroo, marlu					X	X			X	X
Petrogale lateralis lateralis	Black-footed rock-wallaby		EN	EN		X					
Petrogale rothschildi	Rothschild's rock-wallaby					X	X			X	X
Muridae											
Leggadina lakedownensis	Short-tailed mouse				P4	X	X		X		
Mus musculus	House mouse	*				X	X				
Notomys alexis alexis	Spinifex hopping-mouse					X	X			X	X
Pseudomys chapmani	Western pebble-mound mouse				P4	X	X		X	X	X
Pseudomys delicatulus	Delicate mouse					X	X				
Pseudomys desertor	Desert mouse					X	X			X	
Pseudomys hermannsburgensis	Sandy inland mouse					X	X			X	
Pseudomys nanus nanus	Western chestnut mouse						X				
Zyzomys argurus	Common rock-rat					X	X			X	X
Pteropodidae											
Pteropus alecto gouldii	Black flying-fox					X					
Rhinonycteridae											
Rhinonicteris aurantia (Pilbara form)	Pilbara leaf-nosed bat		VU	VU		X	X	X	X	X	
Megadermatidae											
Macroderma gigas	Ghost bat		VU	VU		X	X	X	X	X	X
Emballonuridae											
Saccolaimus flaviventris	Yellow-bellied sheath-tailed bat					X	X			X	

Scientific Name	Common name	Introduced	Conservation Codes			ALA	NatureMap	EPBC PMST	DBCA T and P	Previous Surveys	Current Survey
			EPBC Act	BC Act	DBCA Priority Fauna List						
Taphozous georgianus	Common sheath-tailed bat					X	X			X	X
Taphozous hilli	Hill's sheath-tailed bat					X	X				X
Molossidae											
Austronomus australis	White-striped free-tailed bat					X	X			X	X
Chaerephon jobensis subsp. colonicus	Greater northern free-tailed bat									X	X
Ozimops lumsdenae	Northern free-tailed bat					X	X			X	X
Vespertilionidae											
Chalinolobus gouldii	Gould's wattled bat					X	X			X	X
Chalinolobus morio	Chocolate wattled bat					X	X			X	
Chalinolobus nigrogriseus rogersi	Hoary wattled bat					X					
Nyctophilus daedalus	Northwestern long-eared bat					X	X			X	
Nyctophilus geoffroyi geoffroyi	Lesser long-eared bat					X	X			X	X
Scotorepens greyii	Little broad-nosed bat					X	X			X	X
Vespadelus finlaysoni	Finlayson's cave bat					X	X			X	X
Canidae											
Canis familiaris	Dog/Dingo	*				X	X			X	X
Vulpes vulpes	Red fox	*				X					
Felidae											
Felis catus	Cat	*				X	X			X	X
Equidae											
Equus asinus	Donkey	*					X			X	
Equus caballus	Horse	*					X				
Camelidae											
Camelus dromedarius	Dromedary, camel	*				X				X	X
Bovidae											
Bos taurus	European cattle	*				X	X			X	X
Leporidae											
Oryctolagus cuniculus	European rabbit	*				X	X			X	X

This page has been left blank intentionally.

Appendix E: Significant Fauna Species Likelihood of Occurrence

This page has been left blank intentionally

Table E.1: Significant fauna species likelihood of occurrence within the Survey Area.

Common name (*scientific name*)	Conservation codes			Preferred habitat and previous records	Pre-survey likelihood of occurrence	Post-survey likelihood of occurrence
	EPBC Act	BC Act	DBCA			
Reptiles						
Pilbara barking gecko (*Underwoodisaurus seorsus*)			P2	Rocky areas with spinifex and low tree cover. Eight previous records were detailed on the DBCA threatened and priority fauna database, as well as records on ALA and NatureMap search results within 40 km from the Survey Area. BHP-provided data contains eight records within 32 km, with 9 km the nearest. Suitable habitat is common throughout the Survey Area in Hillcrest/Hillslope and Gorge/Gully habitats.	High	High
Spotted ctenotus (northeast) (*Ctenotus uber johnstonei*)			P2	This subspecies is only known from chenopod shrubland at the base of a sandstone hill, near Balgoo. The species was identified on the NatureMap database search only. The Survey Area is outside this species distribution and suitable habitat does not exist within the Survey Area.	Low	Low
Lerista macropisthopus remota			P2	Shelters in loose soil under leaf litter at base of shrubs. Three previous records were detailed on the DBCA threatened and priority fauna database between 28 to 30 km from the Survey Area. Records detailed on ALA within 40 km from the Survey Area. Suitable habitat in Survey Area in Mulga Woodland, Sand Plain and Sand Dune habitats.	Moderate	Moderate
Great desert skink (*Liopholis kintorei*)	VU	VU		Red sandplains and sand ridges. Prefers a mosaic landscape of different aged vegetation and inhabits sites that have been burnt (3-15 years). Sparsely distributed across arid sand flats and clay-based or loamy soils vegetated with spinifex. No previous fauna records were detailed in the database search results; however, it has appeared in the Protected Matters search indicating suitable habitat may be present within the search radius. Suitable habitat occurs within the northern part of the Survey Area, however the current distribution for this species is from the far-eastern Pilbara to the interior deserts.	Low	Low

Common name (*scientific name*)	Conservation codes			Preferred habitat and previous records	Pre-survey likelihood of occurrence	Post-survey likelihood of occurrence
	EPBC Act	BC Act	DBCA			
Gane's blind snake (*Anilios ganei*)			P1	Little information is available on this species, but it is believed to be associated with moist gorges and gullies. Four Previous records were detailed on the DBCA threatened and priority fauna database, as well as records on ALA and NatureMap search results within 40 km from the Survey Area. Previous records from an Outback Ecology 2010 survey, an ENV Australia 2010 survey and a Biota 2011 survey, all 10-25 km south-southwest of the Survey Area. BHP-provided data contained one record within the Survey Area and an additional 11 within 35 km. Suitable habitat occurs within Gorge/Gully habitat where permanent to temporary pools are present.	Recorded (2009)	High
Pilbara olive python (*Liasis olivaceus barroni*)	VU	VU		Generally rocky habitats in close association to permanent and semi-permanent water sources. This includes gorges, rock pools and riparian zones. Twenty-eight previous records were detailed on the DBCA threatened and priority fauna database search result, within 40 km from the Survey Area. An additional 55 records have been recorded within vicinity (60 km) of the Survey Area, including four records from within the Survey Area; three within Gorge/Gully habitat adjacent to Weeli Wolli creek in the SW of the Survey Area, and one record along the existing rail corridor in the north-west of the Survey Area (BHP provided data). Previous records from a Biologic Environmental 2012 survey from 5-20 km northwest of the Survey Area, and a Biota Environmental 2011 survey from 10-20 southwest km from the Survey Area. Critical habitat occurs within the Survey Area in Gorge/Gully and Major Drainage Line habitat.	Recorded (2011 & 2008)	**Recorded** (pending DNA analysis)

Common name (*scientific name*)	Conservation codes			Preferred habitat and previous records	Pre-survey likelihood of occurrence	Post-survey likelihood of occurrence
	EPBC Act	BC Act	DBCA			
Birds						
Glossy ibis (*Plegadis falcinellus*)	MI	MI		Wetland habitats such as freshwater marshes at the edges of lakes, rivers, and wet swamp areas. This species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes, and coastal lagoons. One previous record was detailed on the DBCA threatened and priority fauna database, as well as records in ALA, NatureMap and Birdata search results, within 40 km from the Survey Area. Suitable habitat within permanent pools Weeli Wolli Creek in Major Drainage Line habitat.	Moderate	Moderate
Letter-winged kite (*Elanus scriptus*)			P4	Semi-desert and desert along tree-lined creeks; hunts over grasslands and other low vegetation. One previous record (2018) was detailed on the DBCA threatened and priority fauna database approximately 37 km from the Survey Area. Previous records were also detailed on ALA, NatureMap and Birdata search results, within 40 km from the Survey Area. Suitable habitat is present within the Survey Area, however the scarcity of records suggests it is a vagrant.	Low	Low
Red goshawk (*Erythrotriorchis radiatus)*	VU	VU		The red goshawk occurs in coastal and sub-coastal areas in wooded and forested lands of tropical and warm-temperate Australia. Riparian vegetation also provides significant nesting and foraging opportunities. No previous fauna records were detailed in the database search results; however, it has appeared in the PMST search indicating suitable habitat may be present within the search radius. Potential habitat, most likely along Weeli Wolli creek however overall presence in the Pilbara is considered unlikely.	Low	Low

Common name (*scientific name*)	Conservation codes			Preferred habitat and previous records	Pre-survey likelihood of occurrence	Post-survey likelihood of occurrence
	EPBC Act	BC Act	DBCA			
Osprey (*Pandion haliaetus*)	MI	MI		Coastal waters and estuaries, beaches, islets and reefs. Follows major rivers and wetlands far inlands from coast to large river pools, even to arid regions where large pools occur in gorges hundreds of kilometres inland. One previous record (approx. 1.2 km from the Survey Area) was detailed on the DBCA threatened and priority fauna database, as well as, on ALA, NatureMap and Birdata search results, within 40 km from the Survey Area. Previous records from an Outback Ecology 2010 survey 10-25 km south-southwest from Survey Area. BHP provided data detailed one record from within the Survey Area and an additional two records within one km, located along Weeli Wolly Creek. Suitable habitat occurs in Major Drainage Line habitat along Weeli Wolly Creek.	Recorded (2008)	High
Greater sand plover (*Charadrius leschenaultia*)	VU, MI	VU, MI		Mainly sandy beaches and tidal mud, reef, and sand flats. The species was identified on the Birdata database search only. No suitable habitat occurs within the Survey Area.	Low	Low
Oriental plover (*Charadrius veredus*)	MI	MI		This species inhabits sparsely vegetated plains, beaches and tidal flats, and saltworks and sewage ponds. One previous record from the Fortescue Marsh was detailed on the DBCA threatened and priority fauna database, as well as, on ALA, NatureMap and Birdata search results, within 40 km from the Survey Area. Suitable habitat does not occur in the Survey Area.	Low	Low

Common name (*scientific name*)	Conservation codes			Preferred habitat and previous records	Pre-survey likelihood of occurrence	Post-survey likelihood of occurrence
	EPBC Act	BC Act	DBCA			
Australian painted snipe (*Rostratula australis*)	EN	EN		Shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans; inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum *Muehlenbeckia* or canegrass or sometimes tea-tree (*Melaleuca*). One previous record within the Fortescue Marsh was detailed on the DBCA threatened and priority fauna database, ALA, NatureMap and Birdata search results, within 40 km from the Survey Area. Suitable habitat does not occur in the Survey Area.	Low	Low
Common sandpiper (*Actitis hypoleucos*)	MI	MI		Non-breeding migrant to a wide variety of habitats, such as riverbanks, estuaries, freshwater seeps on coastal shores, tidal creeks, mangrove swamps, and saltmarshes. The EPBC Act protected matters report assessed that this species or species habitat may occur within the Survey Area. One recent record (2023) was found 28 km west of the Survey Area. Previous records were also detailed on ALA and Birdata. Suitable habitat occurs within Major Drainage Line habitat where semi-permanent to permanent surface water occurs.	Moderate	Moderate
Sharp-tailed sandpiper (*Calidris acuminata*)	MI	MI		Muddy edges of shallow fresh/brackish wetlands with emergent sedges, saltmarsh, grass, and low vegetation. The EPBC Act protected matters report assessed that this species or species habitat may occur within the Survey Area. Previous records were detailed ALA, NatureMap and Birdata. No suitable habitat occurs within the Survey Area.	Low	Low

Common name (*scientific name*)	Conservation codes			Preferred habitat and previous records	Pre-survey likelihood of occurrence	Post-survey likelihood of occurrence
	EPBC Act	BC Act	DBCA			
Curlew sandpiper (*Calidris ferruginea*)	CR, MI	CR, MI		Mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and non-tidal swamps, lakes and lagoons near the coast. The EPBC Act protected matters report assessed that this species or species habitat may occur within the Survey Area. Previous records were detailed ALA and Birdata. No suitable habitat occurs within the Survey Area.	Low	Low
Pectoral sandpiper (*Calidris melanotos*)	MI	MI		Mainly swamps, lagoons, river pools, irrigation channels, and sewerage ponds. Also, in samphire flats around estuaries and salt lakes. The EPBC Act protected matters report assessed that this species or species habitat may occur within the Survey Area. Previous records were detailed on ALA. No suitable habitat occurs within the Survey Area. No suitable habitat occurs within the Survey Area. No suitable habitat occurs within the Survey Area. No suitable habitat occurs within the Survey Area.	Low	Low
Red-necked stint (*Calidris ruficollis*)	MI	MI		The edge of sheltered waters, including estuaries, beaches, near-coastal salt lakes, swamps, lakes, sewerage ponds, and bore overflows. Previous records were detailed on the ALA and Birdata. No suitable habitat occurs within the Survey Area.	Low	Low
Long-toed stint (*Calidris subminuta*)	MI	MI		Generally found in coastal environments such as coastal margins, lagoons, beaches, and tidal flats. Previous records were detailed on Birdata. No suitable habitat occurs within the Survey Area.	Low	Low
Wood sandpiper (*Tringa glareola*)	MI	MI		Generally open areas, such as the margins of inland freshwater lakes and reservoirs. This species rarely occurs in coastal habitats but may be found along the creeks of saltmarshes and mangrove swamps. One previous record was detailed on the DBCA threatened and priority fauna database result, 23 km north of the Survey Area. Previous records were detailed ALA, NatureMap and Birdata. No suitable habitat occurs within the Survey Area.	Moderate	Low

Common name (*scientific name*)	Conservation codes			Preferred habitat and previous records	Pre-survey likelihood of occurrence	Post-survey likelihood of occurrence
	EPBC Act	BC Act	DBCA			
Common greenshank (*Tringa nebularia*)	MI	MI		A variety of freshwater, marine and artificial wetlands, including swamps, open muddy or rocky shores of lakes and large rivers, sewage farms, saltworks, muddy coastal flats, mangroves, and estuaries. Four previous records were detailed on the DBCA threatened and priority fauna database result, over 22 km from the Survey Area. Previous records were detailed ALA, NatureMap and Birdata. No suitable habitat occurs within the Survey Area.	Moderate	Low
Marsh sandpiper (*Tringa stagnatilis*)	MI	MI		Found at the margins of inland freshwater and brackish wetlands, such as rice paddy-fields, swamps, saltpans, salt marshes, sewage works, and marshy lake edges and, although it is rare on open coastlines, it can occasionally be found on estuaries, lagoons and intertidal mudflats. One previous record was detailed on the DBCA threatened and priority fauna database result, over 30 km from the Survey Area. Previous records were detailed ALA, NatureMap and Birdata. No suitable habitat occurs within the Survey Area.	Low	Low
Gull-billed tern (*Gelochelidon (Sterna) nilotica*)	MI	MI		Shallow sheltered seas close to land, estuaries, tidal creeks, near-coastal salt lakes, samphire flats, swamps, lagoons, river pools, claypans, dams, and over grain crops. Five previous records were detailed on the DBCA threatened and priority fauna database result, over between 14 and 35 km from the Survey Area. Previous records were detailed ALA and NatureMap. No suitable habitat occurs within the Survey Area.	Moderate	Low
Caspian tern (*Hydroprogne (Sterna) caspia*)	MI	MI		Mainly sheltered seas, estuaries, and tidal creeks. Two previous records were detailed on the DBCA threatened and priority fauna database result, approximately 13 km from the Survey Area. Previous records were detailed ALA and Birdata. No suitable habitat occurs within the Survey Area.	Moderate	Low

Common name (*scientific name*)	Conservation codes			Preferred habitat and previous records	Pre-survey likelihood of occurrence	Post-survey likelihood of occurrence
	EPBC Act	BC Act	DBCA			
Fork-tailed swift (*Apus pacificus*)	MI	MI		Summer migrant to Australia and occurs in low to very high airspace, largely independent of terrestrial habitats and landforms. Three previous records were detailed on the DBCA threatened and priority fauna database, as well as, on ALA, NatureMap and Birdata search results, within 40 km from the Survey Area. BHP provided spatial dataset detailed 18 records, including two previous observations within the Survey Area. Due to typically occurring in higher altitudes, occurrences of this species are generally unlikely, and terrestrial habitats are not relied upon. However, this species may utilise all habitats	Recorded (2012)	Moderate
Grey falcon (*Falco hypoleucos*)	VU	VU		Open habitats: semi-deserts, grassy inland plains, timbered watercourses, and pastoral lands. Seven previous fauna records were detailed in DBCA's Threatened and Priority database within 40 km from the Survey Area, with the nearest within 12 km. BHP provided spatial dataset detailed four records between 32 to 55 km from the Survey Area. Critical habitat occurs along the Major Drainage Line habitat.	High	Moderate
Peregrine falcon (*Falco peregrinus*)			OS	Cosmopolitan, will hunt in any habitat, soaring at height or from a perch, often near cliffs. Nests on rocky ledges in tall, vertical cliff faces and tall trees associated with drainage lines. Twenty-six previous records were detailed on the DBCA threatened and priority fauna database, as well as, on ALA, NatureMap and Birdata search results, within 40 km from the Survey Area. BHP provided spatial dataset detailed seven records within 20 km of the Survey Area. Several records were observed within 5 km of the Survey Area. Suitable habitat is present, particularly along Major Drainage Line, Gorge/ Gully and Breakaway/ Cliff habitats.	High	High

Common name (*scientific name*)	Conservation codes			Preferred habitat and previous records	Pre-survey likelihood of occurrence	Post-survey likelihood of occurrence
	EPBC Act	BC Act	DBCA			
Night parrot (*Pezoporus occidentalis*)	EN	CR		Arid and semi-arid areas characterised by dense, low vegetation. Based on accepted records, preferred habitat consists of *Triodia* grasslands in stony or sandy environments, of samphire and chenopod shrublands, on floodplains and claypans and margins of salt lakes, creeks, and other water sources. Previous records were detailed in NatureMap and the PMST assessed that this species or species habitat is likely to occur within the Survey Area. Its Preferred habitat of large, interconnected *Triodia* hummocks are uncommon in the Survey Area, and samphire and chenopod shrublands are absent. While small patches of large *Triodia* hummocks are present in the Sand Plain, this habitat has regular disturbances of fire, cattle grazing and weeds.	Moderate	Low
Princess parrot (*Polytelis alexandrae*)	VU		P4	Inhabits sand dunes and sand flats in the arid zone. Occurs in savanna woodlands and shrublands that usually consist of scattered stands of *Eucalyptus* spp, Casuarina/Allocasuarina trees, an understorey of shrubs and a ground cover dominated by *Triodia* ssp. No previous fauna records were detailed in the database search results; however, it has appeared in the PMST search indicating suitable habitat may be present within the search radius. Suitable habitat occurs within the Sand Dune and Sand Plain habitats, but the Survey Area is beyond the extent of its known distribution.	Low	Low
Southern whiteface (*Aphelocephala leucopsis*)	VU			Critical habitat includes relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs, or both, habitat with low tree densities, and an herbaceous understorey litter cover, which provides essential foraging habitat, and living and dead trees with hollows and crevices, which are essential for roosting and nesting. Records detailed on NatureMap, ALA and Birdata with 40 km of the Survey Area. Suitable habitat occurs within Mulga Woodland but the Survey Area is beyond the northern extent of its distribution and previous records at this latitude are rare.	Low	Low

Common name (*scientific name*)	Conservation codes			Preferred habitat and previous records	Pre-survey likelihood of occurrence	Post-survey likelihood of occurrence
	EPBC Act	BC Act	DBCA			
Barn swallow (*Hirundo rustica*)	MI	MI		Coastal open country generally, especially near surface water and man-made structures, such as bridges and power wires. No previous fauna records were detailed in the database search results; however, it has appeared in the PMST search indicating suitable habitat may be present within the search radius. Unlikely to utilise the habitats of the Survey Area.	Low	Low
Grey wagtail (*Motacilla cinerea*)	MI	MI		Mainly banks and rocks in fast flowing fresh water. Vagrant to Australia. No previous fauna records were detailed in the database search results; however, it has appeared in the PMST search indicating suitable habitat may be present within the search radius. Unlikely to utilise the habitats of the Survey Area.	Low	Low
Yellow wagtail (*Motacilla tschutschensis*)	MI	MI		Damp short-grass flats, edges of swamps, sewerage ponds, grazed or mowed grass and irrigated areas. Vagrant to Australia. No previous fauna records were detailed in the database search results; however, it has appeared in the PMST search indicating suitable habitat may be present within the search radius. Unlikely to utilise the habitats of the Survey Area.	Low	Low
Mammals						
Long-tailed dunnart (*Antechinomys longicaudata*)			P4	Found in rocky scree and plateau areas, generally with little vegetation or in areas of spinifex hummock grassland, shrubs and open woodland. Five previous records (2022) were detailed on the DBCA threatened and priority fauna database result, between 30 to 32 km from the Survey Area. Previous records were detailed on the ALA search results. Some suitable Hillcrest/ Hillslope habitat present in the Survey Area.	Moderate	Moderate

Common name (*scientific name*)	Conservation codes			Preferred habitat and previous records	Pre-survey likelihood of occurrence	Post-survey likelihood of occurrence
	EPBC Act	BC Act	DBCA			
Brush-tailed mulgara (*Dasycercus blythi*)			P4	Common in a range of habitats – tussock/hummock grasslands and sparse shrubs and low open woodlands on ridge tops, cliffs, scree slopes, hills, and valley floors. Four previous records were detailed on the DBCA threatened and priority fauna database, as well as, on NatureMap and ALA with the search radius. Sixty-six previous records were detailed on the BHP provided spatial dataset within 6 km of the Survey Area, including 10 within the Survey Area. Previous records from a Biologic Environmental 2013 survey 5-20 km north-northwest from Survey Area. Suitable habitat is present in Sand Plain, Sand Dune and Stony Plain Habitats.	Recorded (2012)	**Recorded**
Northern quoll (*Dasyurus hallucatus*)	EN	EN		Occurs in a variety of habitats, but commonly found in rocky escarpments and open lowland savanna forest. Also, in areas associated with rocky areas, but also along watercourses. Five hundred and ten previous records were detailed on the DBCA threatened and priority fauna database, as well as, on ALA search results, within 40 km from the Survey Area. Seventeen previous records were detailed on the BHP provided spatial dataset within 20 km of the Survey Area, with 12 records within 5 km. Recent regional assessment considers there is a general absence of reliable and/or recent records within the Newman area, and the few, isolated records were likely of transient or dispersing males. Critical habitat occurs in Gorge/Gully, Breakaway/ Cliff and Major Drainage Line habitats.	High	High
Bilby (*Macrotis lagotis*)	VU	VU		The major habitats they now occupy in Western Australia include mulga scrub and hummock grasslands on sandplains or along drainage or salt lake systems. They require sandy or loamy soils in which to burrow. Fourty-six previous records were detailed on the DBCA threatened and priority fauna database including six in the Survey Area. Fourty-three previous records were detailed on the BHP provided spatial dataset within 10 km of the Survey Area, including 33 records within the Burrow Pit area. Records detailed on ALA and NatureMap search results within 40 km from the Survey Area. Bilby secondary evidence (scat and old diggings and burrows) were recorded during the current survey. Critical habitat occurs in Sand Plain, Sand Dune, Stony Plain habitats.	Recorded (2020 & 2013)	**Recorded**

Common name (*scientific name*)	Conservation codes			Preferred habitat and previous records	Pre-survey likelihood of occurrence	Post-survey likelihood of occurrence
	EPBC Act	BC Act	DBCA			
Spectacled hare–wallaby (mainland) (*Lagorchetes conspicullatus leichardti*)			P4	Tussock or hummock grassland with mid-dense/sparse tree and shrub cover. The ALA search assessed that one record from 1975 was recorded within 40 km of the Survey Area.	Low	Low
Black-footed rock-wallaby (*Petrogale lateralis lateralis*)	EN	EN		Occurs in cliffs, rock-piles, talus or escarpment refuge and other steep substrates with grassland feeding habitat nearby. Also occurs on limestone outcrops, coastal cliffs and granite outcrops. Previous records were detailed on ALA search results within 40 km from the Survey Area. The Survey Area is outside the current distribution of this species.	Low	Low
Short-tailed mouse (*Leggadina lakedownensis*)			P4	Open tussock and hummock grassland, Acacia shrubland and savanna woodland on alluvial clay/sandy soils. Cracking clays. Previous records were detailed on ALA, and NatureMap search results within 40 km from the Survey Area. Limited suitable habitat of cracking clays in the Survey Area.	Moderate	**Low**
Western pebble-mound mouse (*Pseudomys chapmani*)			P4	Gentle rocky slopes, hills and spurs with small pebble surface cover and sparse vegetation. This species distribution has contracted to the inland Pilbara away from the coastal Pilbara, Murchison, and Gascoyne. Five-hundred and seventy-seven previous records were detailed on the DBCA threatened and priority fauna database including seven within the Survey Area. Records detailed on ALA, and NatureMap search results within 40 km from the Survey Area. Previous records also from an ENV Australia 2008 and 2009 survey, an Outback Ecology 2010 survey, an Ecologia Environment 2006 survey and a Biota Environmental Sciences 2011 survey – all records within 5-25 km of the Survey Area. BHP provided data detailed 2504 previous records within 60 km, of which, 35 have been recorded in the Survey Area. Nineteen western pebble-mouse mounds were recorded during the current survey. Suitable habitat is common within the Survey Area in Hillcrest/ Hillslope habitat.	Recorded (multiple years)	**Recorded**

Common name (*scientific name*)	Conservation codes			Preferred habitat and previous records	Pre-survey likelihood of occurrence	Post-survey likelihood of occurrence
	EPBC Act	BC Act	DBCA			
Pilbara leaf-nosed bat (*Rhinonicteris aurantia* (Pilbara form))	VU	VU		Roosts in deep, warm, humid caves or rock cracks, especially in proximity to water pools. Forages while flying low along watercourses and gorges and over *Triodia* grassland. Four-hundred and forty-seven previous records were detailed on the DBCA threatened and priority fauna database, as well as, on ALA, and NatureMap search results within 40 km from the Survey Area. Approximately 95% (429) records were located from Gudai-darri. Also records on a Biota Environmental Sciences 2011 survey and an ENV Australia 2009 survey from 10-25 km southwest from the Survey Area. BHP provided data detailed five previous records within 20 km. Supporting foraging habitat (all habitats) and some potential roosting habitat (Gorge/ Gully and Breakaway/ Cliff) is present within the Survey Area.	High	High
Ghost bat (*Macroderma gigas*)	VU	VU		A wide range from rainforest, monsoon, and vine scrub in the tropics to open woodlands and arid areas. One-hundred and seventy-eight previous records were detailed on the DBCA threatened and priority fauna database, as well as, on ALA, and NatureMap search results within 40 km from the Survey Area. BHP provided data detailed 94 previous records within 20 km, of which, 14 occur in the Survey Area. There are also records between 5-25 km south-southwest from Survey Area from a Biota Environmental Sciences 2011 survey, Ecologia Environment 2006 survey, Outback Ecology 2010 survey and an ENV Australia 2010 survey as well as 5-20 km north-northwest from the Survey Area from a Biological Environment 2012 survey. Ghost bat was recorded during the current survey through ultrasonic detection and scats found in two roost caves. Supporting foraging habitat (all habitats) and some potential roosting habitat (Gorge/ Gully and Breakaway/ Cliff) is present within the Survey Area.	High	**Recorded**

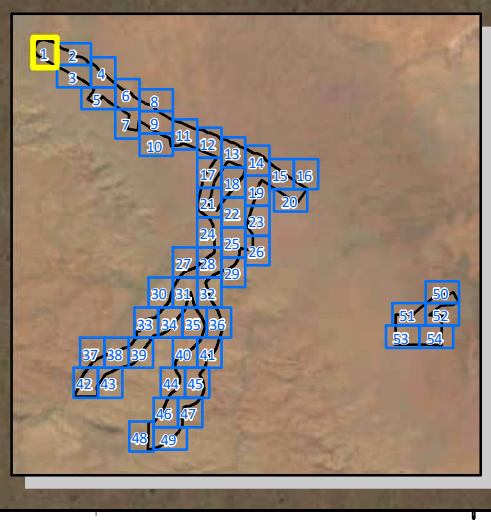
This page has been left blank intentionally.

Appendix F : Fauna Habitat Mapping

This page has been left blank intentionally.

724000
725000
726000
7507000
7506000
7505000
7504000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Survey Area

Habitat Type

- Mulga Woodland
- Sand Dune
- Sand Plain
- Stony Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.1: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

727000
728000
729000
730000
7506000
7505000
7504000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Medium Drainage Line
- Mulga Woodland
- Sand Dune
- Sand Plain
- Stony Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.2: Fauna habitat mapping

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

astron
an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Ls_FigF

727000 728000 729000 730000

7503000

7502000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Minor Drainage Line
- Mulga Woodland
- Sand Dune
- Sand Plain
- Stony Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.3: Fauna habitat mapping

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

astron an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Ls_FigF

731000

732000

7504000

7503000

7502000

Service Layer Credits: Source: Esri, Maxar,

Survey Area

Habitat Type

- Medium Drainage Line
- Mulga Woodland
- Sand Dune
- Sand Plain
- Stony Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.4: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

729000
730000
731000
732000
7501000
7500000
7499000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Medium Drainage Line
- Sand Dune
- Sand Plain
- Stony Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.5: Fauna habitat mapping

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

astron
an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Ls_FigF

733000
734000
735000
7502000
7501000
7500000
7499000

Service Layer Credits: Source: Esri, Maxar,

Survey Area

Habitat Type

- Minor Drainage Line
- Medium Drainage Line
- Sand Plain
- Stony Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.6: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

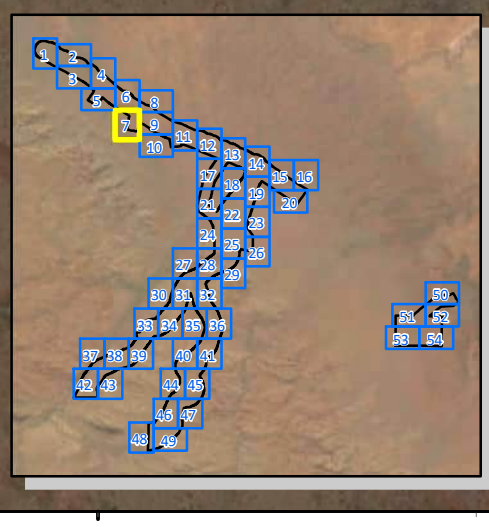
Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

733000
734000
735000
7498000
7497000
7496000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Survey Area

Habitat Type

- Minor Drainage Line
- Medium Drainage Line
- Sand Dune
- Sand Plain
- Stony Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.7: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

736000
737000
738000
739000
7501000
7500000
7499000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

Stony Plain

Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.8: Fauna habitat mapping

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

astron
an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Ls_FigF

736000 737000 738000 739000

7498000

7497000

7496000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Minor Drainage Line
- Medium Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.9: Fauna habitat mapping

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

astron an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Ls_FigF

736000
737000
738000
739000
7495000
7494000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Mulga Woodland
- Sand Plain
- Stony Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.10: Fauna habitat mapping

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

astron an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Ls_FigF

740000 741000 742000

7497000 7496000 7495000

Survey Area

Habitat Type

Mulga Woodland

Sand Plain

Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.11: Fauna habitat mapping

astron

an ecocene company

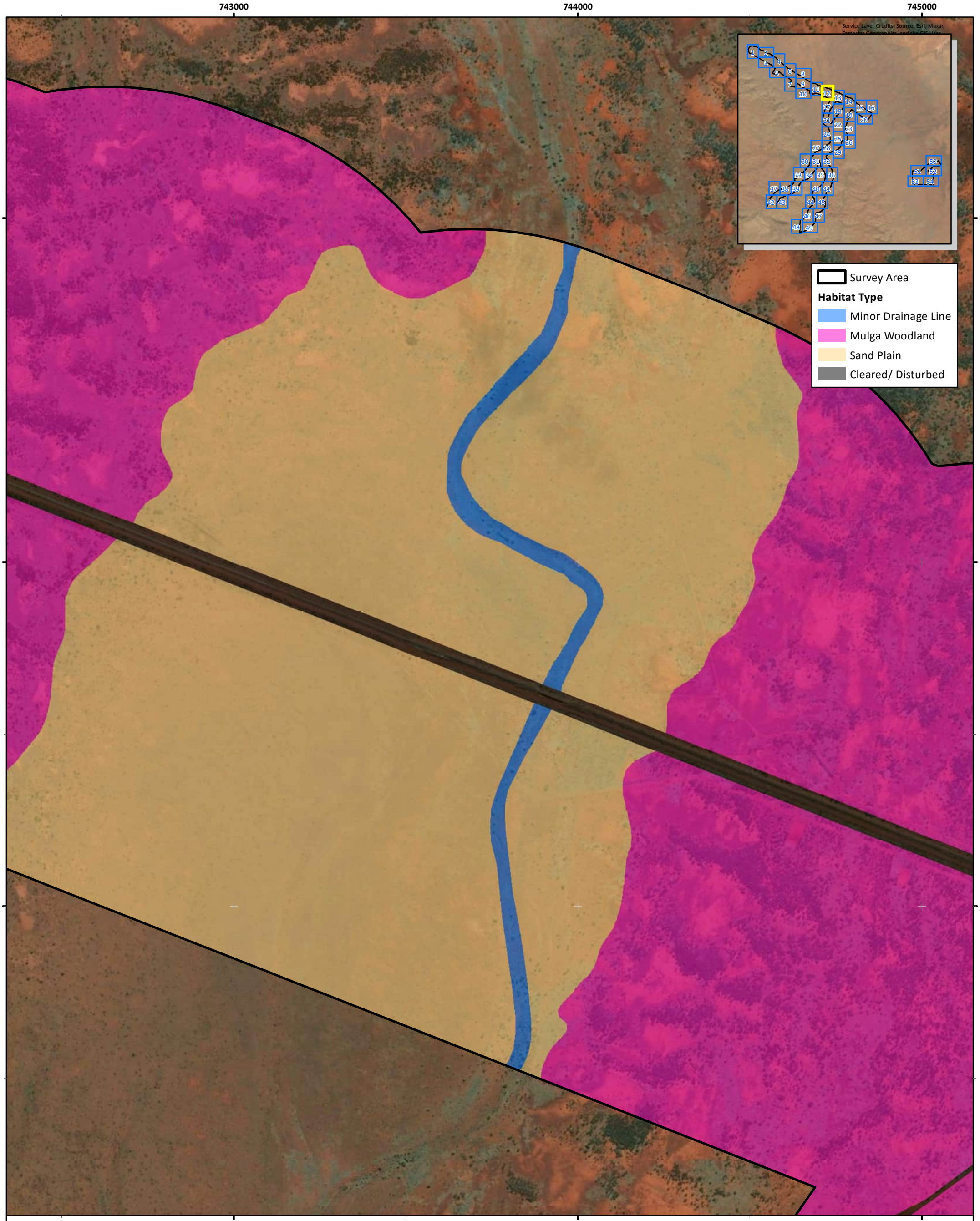
Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N



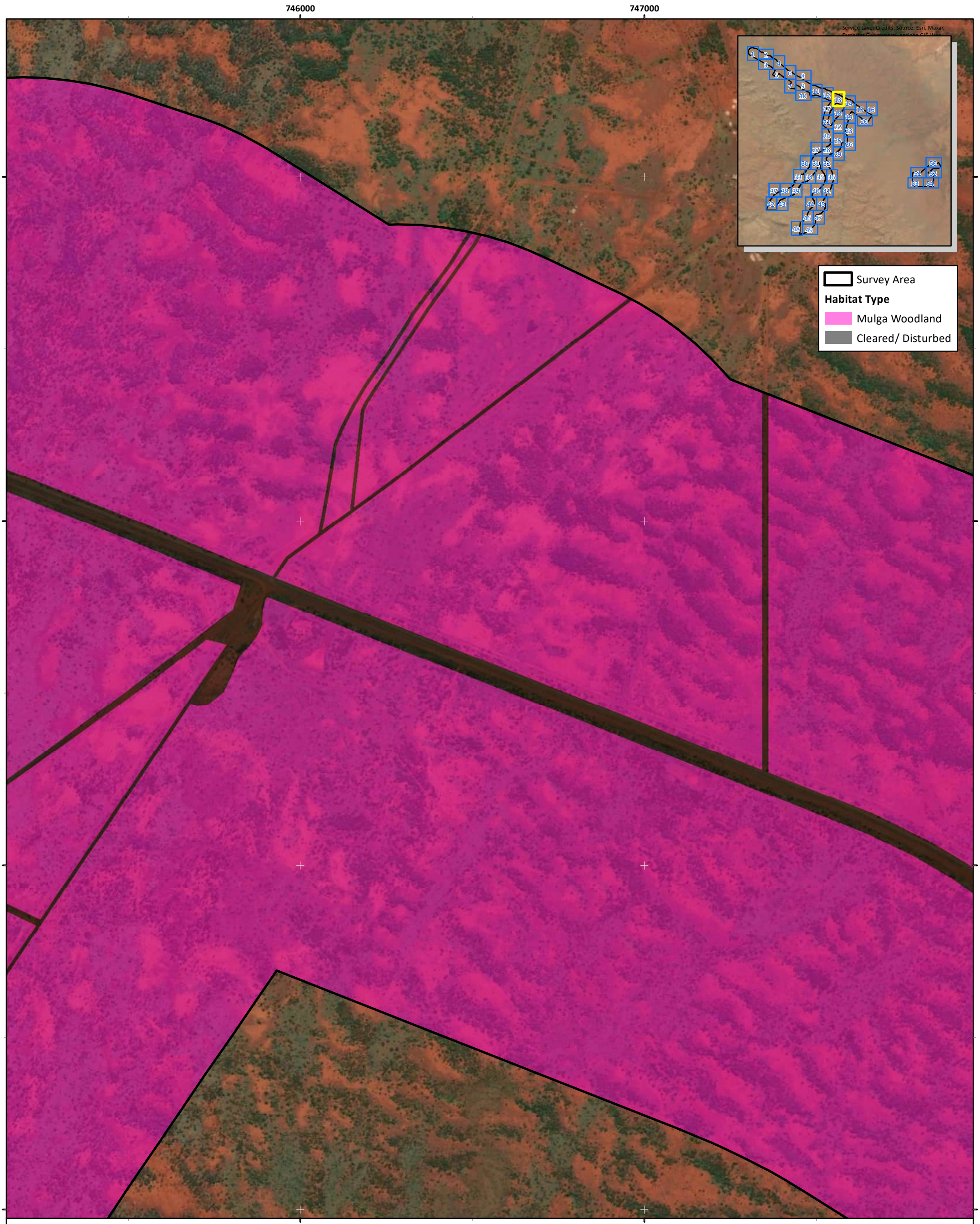
BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.12: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	



BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.13: Fauna habitat mapping

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

748000

749000

750000

7494000

7493000

7492000

Service Layer Credits: Source: Esri, Maxar,

Survey Area

Habitat Type

Mulga Woodland

Sand Plain

Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.14: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

Metres

0 100 200 300 400 500

N

751000

752000

753000

7492000

7491000

7490000

Service Layer Credits: Source: Esri, Maxar,

Survey Area

Habitat Type

Mulga Woodland

Sand Plain

Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.15: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

754000

755000

756000

7492000

7491000

7490000

Survey Area

Habitat Type

Mulga Woodland

Sand Plain

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.16: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

743000

744000

745000

7493000

7492000

7491000

7490000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Mulga Woodland
- Sand Plain
- Stony Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.17: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

746000

747000

7491000

7490000

7489000

Survey Area

Habitat Type

Mulga Woodland

Sand Plain

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.18: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	Metres 0 100 200 300 400 500 N

748000
749000
750000
7491000
7490000
7489000
7488000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

Mulga Woodland

Sand Plain

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.19: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

752000
753000
754000
755000

7489000
7488000
7487000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Mulga Woodland
- Sand Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.20: Fauna habitat mapping

Scale: 1:10,000 at A3

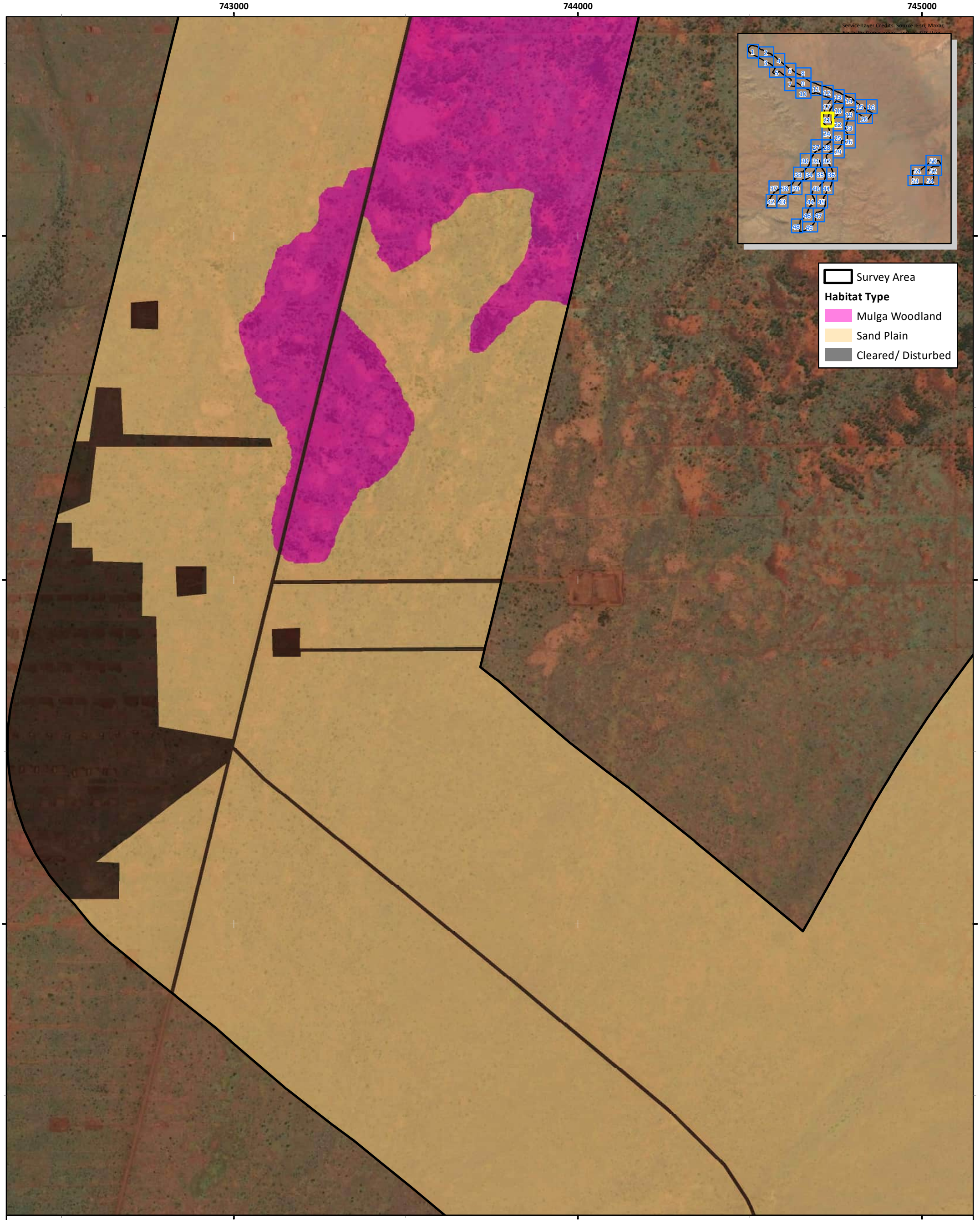
Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

astron
an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Ls_FigF



BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.21: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	



BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.22: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

748000

749000

750000

7487000

7486000

7485000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User

Survey Area

Habitat Type

Sand Plain

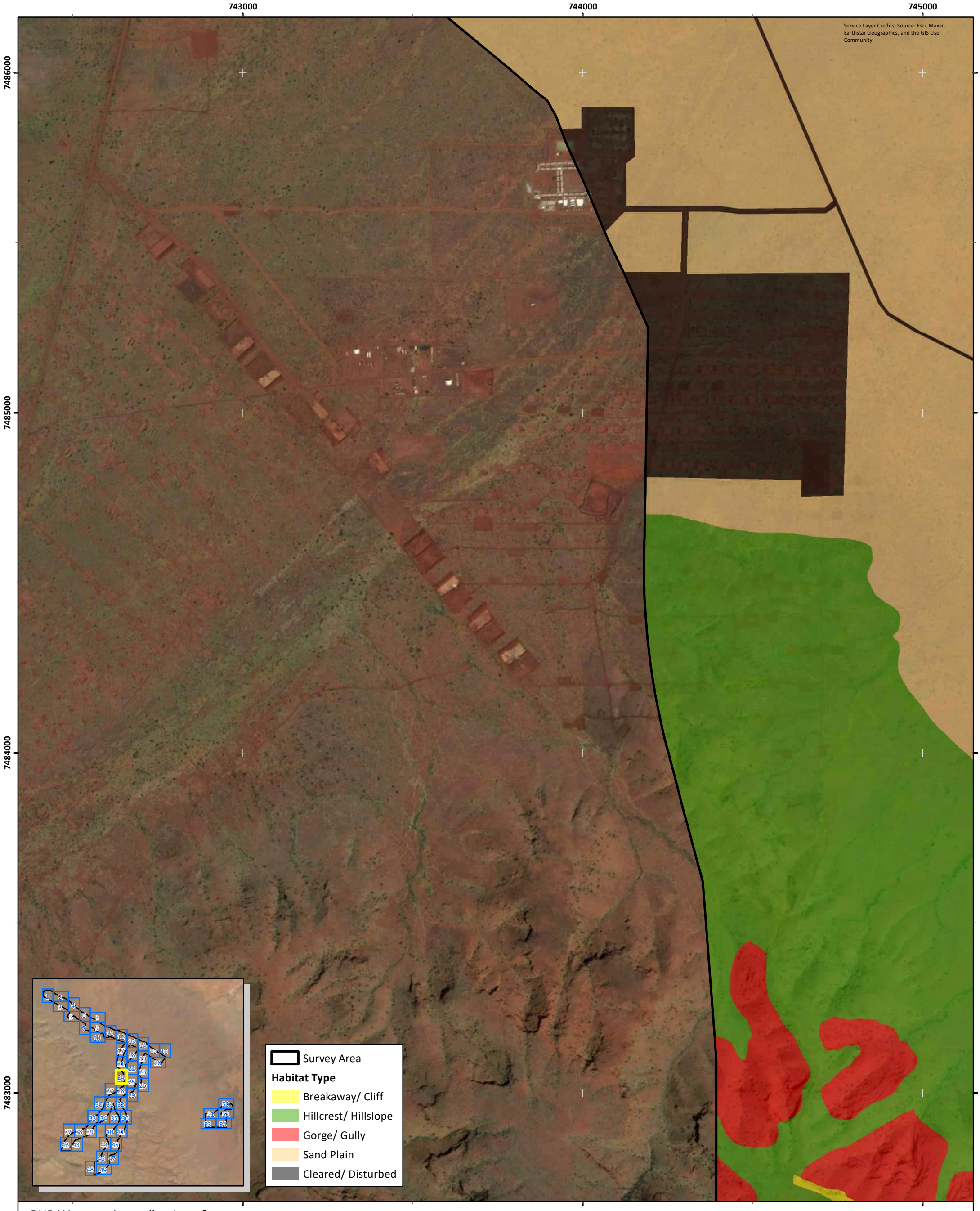
BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.23: Fauna habitat mapping

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	Metres 0 100 200 300 400 500 N



BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.24: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

746000

747000

7485000

7484000

7483000

7482000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Breakaway/ Cliff
- Hillcrest/ Hillslope
- Gorge/ Gully
- Drainage Area/ Floodplain
- Sand Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.25: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	0 100 200 300 400 500 Metres N

748000

749000

750000

7484000

7483000

7482000

7481000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User

Survey Area

Habitat Type

Sand Dune

Sand Plain

Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.26: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

740000

741000

742000

7482000

7481000

7480000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Hillcrest/ Hillslope
- Drainage Area/ Floodplain
- Minor Drainage Line
- Sand Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.27: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

743000

744000

745000

7482000

7481000

7480000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Breakaway/ Cliff
- Hillcrest/ Hillslope
- Gorge/ Gully
- Minor Drainage Line
- Sand Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.28: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

746000

747000

7481000

7480000

7479000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

Hillcrest/ Hillslope

Drainage Area/ Floodplain

Sand Plain

Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.29: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

737000
738000
739000
7479000
7478000
7477000
7476000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

bitat Type

- Hillcrest/ Hillslope
- Drainage Area/ Floodplain
- Minor Drainage Line

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.30: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

740000
741000
742000
7479000
7478000
7477000
7476000
Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Survey Area
Habitat Type
Hillcrest/ Hillslope
Drainage Area/ Floodplain
Minor Drainage Line
Sand Plain
Cleared/ Disturbed
BHP Western Australian Iron Ore
Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey
Figure F.31: Fauna habitat mapping
astron
an ecocene company
Author: [redacted]
Date: 02-07-2025
Drawn: [redacted]
Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF
Scale: 1:10,000 at A3
Coordinate System: GDA 1994 MGA Zone 50
Metres
0 100 200 300 400 500
N

743000
744000
745000
7479000
7478000
7477000
7476000

Survey Area

Habitat Type

- Hillcrest/ Hillslope
- Drainage Area/ Floodplain
- Minor Drainage Line
- Sand Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.32: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3
Coordinate System: GDA 1994 MGA Zone 50
Metres
0 100 200 300 400 500
N

736000

737000

7475000

7474000

7473000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Breakaway/ Cliff
- Hillcrest/ Hillslope
- Gorge/ Gully
- Drainage Area/ Floodplain
- Medium Drainage Line
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.33: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

738000

739000

740000

7475000

7474000

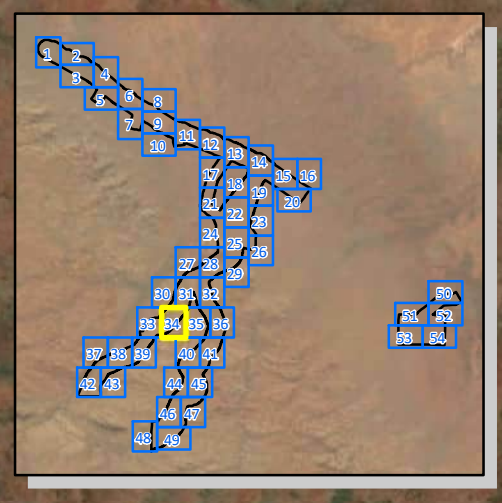
7473000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Hillcrest/ Hillslope
- Gorge/ Gully
- Drainage Area/ Floodplain
- Minor Drainage Line
- Medium Drainage Line



BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.34: Fauna habitat mapping

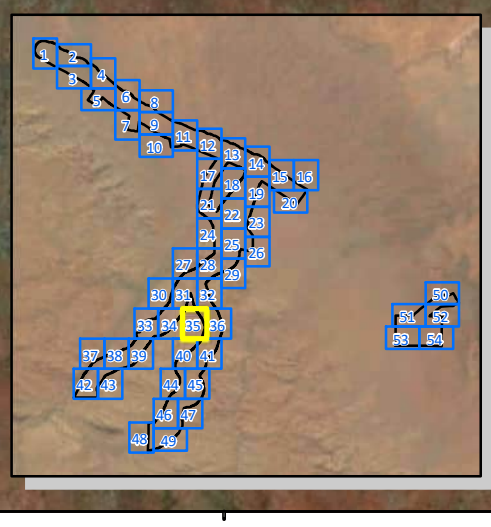
astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

741000
742000
743000
7475000
7474000
7473000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Survey Area

bitat Type

Hillcrest/ Hillslope

Drainage Area/ Floodplain

Minor Drainage Line

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.35: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

Metres

0 100 200 300 400 500

N

744000

745000

746000

7475000

7474000

7473000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User

Survey Area

Habitat Type

- Hillcrest/ Hillslope
- Drainage Area/ Floodplain
- Minor Drainage Line
- Medium Drainage Line
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.36: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

729000

730000

731000

7472000

7471000

7470000

7469000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

bitat Type

Hillcrest/ Hillslope

Drainage Area/ Floodplain

Major Drainage Line

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.37: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

732000
733000
734000
7472000
7471000
7470000
7469000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

Hillcrest/ Hillslope

Gorge/ Gully

Drainage Area/ Floodplain

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.38: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

735000
736000
737000
7472000
7471000
7470000
7469000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Breakaway/ Cliff
- Hillcrest/ Hillslope
- Gorge/ Gully
- Drainage Area/ Floodplain
- Minor Drainage Line
- Medium Drainage Line
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.39: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

740000

741000

742000

7472000

7471000

7470000

7469000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Hillcrest/ Hillslope
- Gorge/ Gully
- Drainage Area/ Floodplain
- Minor Drainage Line
- Medium Drainage Line

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.40: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

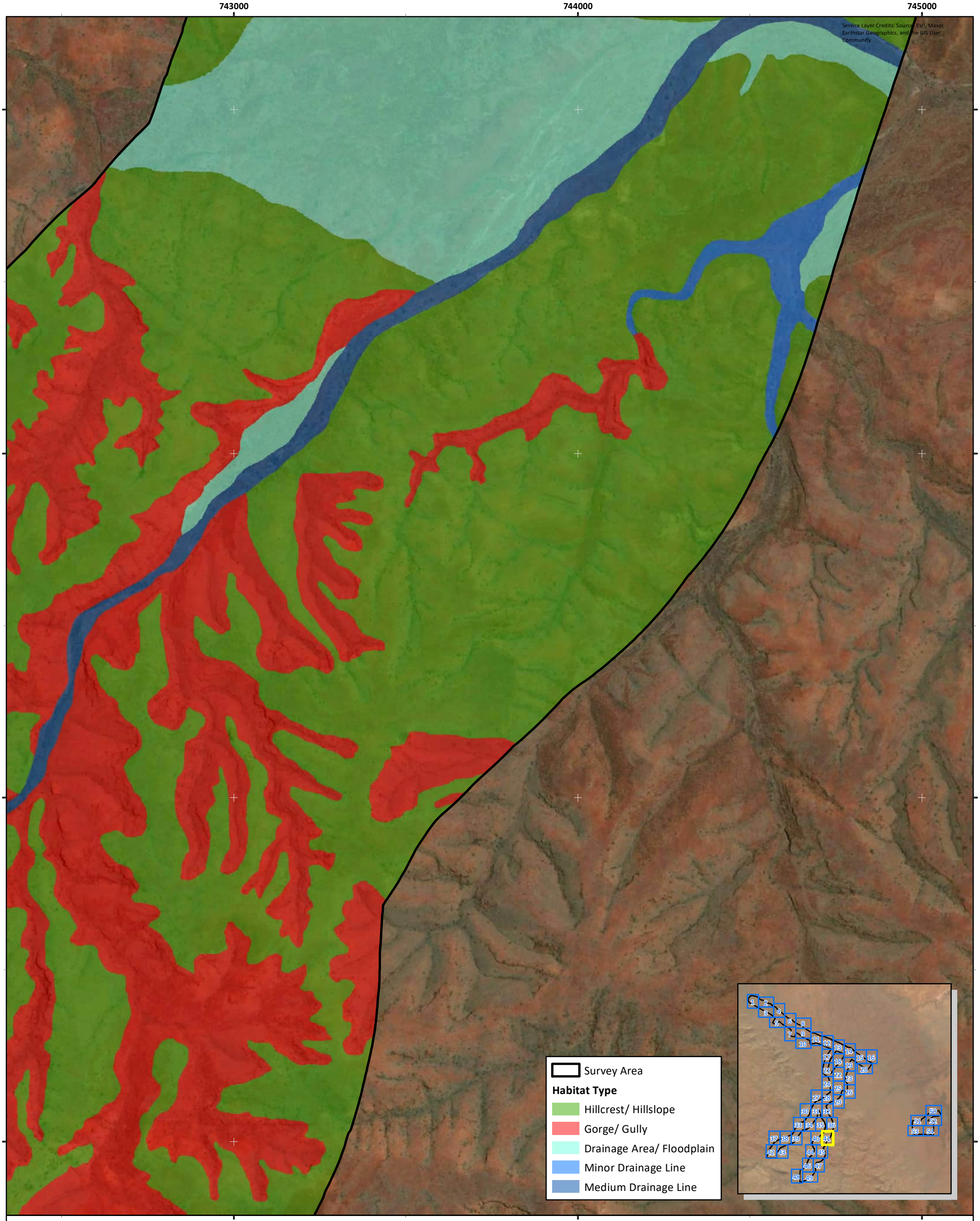
Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

Metres

0 100 200 300 400 500

N



BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.41: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

729000

730000

7468000

7467000

7466000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Hillcrest/ Hillslope
- Gorge/ Gully
- Drainage Area/ Floodplain
- Minor Drainage Line
- Medium Drainage Line
- Major Drainage Line

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.42: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

731000

732000

733000

7468000

7467000

7466000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

Hillcrest/ Hillslope

Gorge/ Gully

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.43: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

739000

740000

7468000

7467000

7466000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Hillcrest/ Hillslope
- Gorge/ Gully
- Drainage Area/ Floodplain
- Minor Drainage Line
- Medium Drainage Line

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.44: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

741000

742000

743000

7468000

7467000

7466000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User

Survey Area

Habitat Type

- Hillcrest/ Hillslope
- Gorge/ Gully
- Drainage Area/ Floodplain
- Minor Drainage Line
- Medium Drainage Line

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.45: Fauna habitat mapping

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

738000
739000
740000
7465000
7464000
7463000
7462000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

Hillcrest/ Hillslope

Gorge/ Gully

Minor Drainage Line

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.46: Fauna habitat mapping

astron
an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:10,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Metres 0 100 200 300 400 500 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF	

741000
742000
7465000
7464000
7463000
7462000
Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Survey Area
Habitat Type
Hillcrest/ Hillslope
Gorge/ Gully
Minor Drainage Line
BHP Western Australian Iron Ore
Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey
Figure F.47: Fauna habitat mapping
an ecocene company
Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF
Scale: 1:10,000 at A3
Coordinate System: GDA 1994 MGA Zone 50
Metres
0 100 200 300 400 500
N

735000
736000
737000
7462000
7461000
7460000
Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Survey Area
Habitat Type
Hillcrest/ Hillslope
Minor Drainage Line
BHP Western Australian Iron Ore
Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey
Figure F.48: Fauna habitat mapping
astron
an ecocene company
Author: [redacted]
Date: 02-07-2025
Drawn: [redacted]
Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Pr_FigF
Scale: 1:10,000 at A3
Coordinate System: GDA 1994 MGA Zone 50
Metres
0 100 200 300 400 500
N

738000 739000 740000 741000

7461000

7460000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

Hillcrest/ Hillslope

Gorge/ Gully

Minor Drainage Line

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.49: Fauna habitat mapping

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

astron an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Ls_FigF

769000 770000 771000 772000

7478000

7477000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

Mulga Woodland

Sand Plain

Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.50: Fauna habitat mapping

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

astron

an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Ls_FigF

765000
766000
767000
768000
7476000
7475000
7474000

Survey Area

Habitat Type

- Mulga Woodland
- Sand Dune
- Sand Plain
- Cleared/ Disturbed

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

BHP Western Australian Iron Ore
Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.51: Fauna habitat mapping

Scale: 1:10,000 at A3
Coordinate System: GDA 1994 MGA Zone 50
0 100 200 300 400 500 Metres

N

astron
an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Ls_FigF

769000
770000
771000
772000
7476000
7475000
7474000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

Mulga Woodland

Sand Plain

Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.52: Fauna habitat mapping

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

astron

an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Ls_FigF

765000 766000 767000 768000

7473000

7472000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

Sand Dune

Sand Plain

Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.53: Fauna habitat mapping

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

Metres

0 100 200 300 400 500

N

astron

an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Ls_FigF

769000
770000
771000
772000
7473000
7472000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Type

- Mulga Woodland
- Sand Dune
- Sand Plain
- Cleared/ Disturbed

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure F.54: Fauna habitat mapping

Scale: 1:10,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 Metres

N

astron
an ecocene company

Author: [redacted] Drawn: [redacted] Date: 02-07-2025 Figure Ref: 2400-015-24-BIDR-1RevC_250702_HabMapping_Ls_FigF

This page has been left blank intentionally.

Appendix G: Significant Features for MNES Vertebrate Species

This page has been left blank intentionally.

Table G.1: Location of significant caves within the Survey Area.

Site ID (Biologic ID)	MGA Zone 50 K		Category rating for Ghost Bat usage according to (Bat Call WA 2021a)	Category rating for Pilbara Leaf-nose Bat usage (Bat Call WA 2021b)	Description	Photographs
	Easting (mE)	Northing (mE)				
CRCP-01	730521	7467851	Category 4	Category 4	**Entrance:** Round/Oval entrance shape, (4 m high x 10 m wide) **Orientation:** North, semi exposed, upper slope **Internal:** One internal chamber; 4 m high x 10 m wide x 20 m deep **Conditions:** Bats present, *Taphozous sp.*	
CRCP-02	731037	7467664	Category 4	Category 4	**Entrance:** Round/Oval entrance shape (3 m high x 10 m wide) **Orientation:** North/East, Exposed, mid slope **Internal:** One internal chamber; 3 m high x 10 m wide x 10 m deep **Conditions:** Bats present, *Vespadelus finlaysoni* and/or *Taphozous sp.*	

Site ID (Biologic ID)	MGA Zone 50 K		Category rating for Ghost Bat usage according to (Bat Call WA 2021a)	Category rating for Pilbara Leaf-nose Bat usage (Bat Call WA 2021b)	Description	Photographs
	Easting (mE)	Northing (mE)				
CRCP-03	742152	7470265	Category 4	Category 4	**Entrance:** Horizontal entrance shape (1 m high x 4 m wide) **Orientation:** East, Exposed, upper slope **Internal:** One internal chamber; 1 m high x 4 m wide x 10 m deep **Conditions:** No bats present.	
CRCP-04	741844	7470177	Category 4	Category 4	Entrance: Horizontal entrance shape (8 m high x 4 m wide) Orientation: East, Semi exposed, upper slope Internal: Unknown number of internal chambers; 8 m high x 4 m wide x 17 m deep Conditions: Bats present, Vespadelus finlaysoni	

Site ID (Biologic ID)	MGA Zone 50 K		Category rating for Ghost Bat usage according to (Bat Call WA 2021a)	Category rating for Pilbara Leaf-nose Bat usage (Bat Call WA 2021b)	Description	Photographs
	Easting (mE)	Northing (mE)				
CRCP-05	743210	7468927	Category 4	Category 4	**Entrance:** Round/oval entrance shape (1 m high x 1 m wide) **Orientation:** North, exposed, upper slope **Internal:** One internal chamber; 1 m high x 1 m wide x 10 m deep **Conditions:** Bats present, *Vespadelus finlaysoni, Taphozous sp.*	
CRCP-06	731284	7467909	Category 4	Category 4	**Entrance:** Horizontal entrance shape (1 m high x 3 m wide) **Orientation:** North, semi exposed, mid slope **Internal:** One internal chamber; 1 m high x 3 m wide x 25 m deep **Conditions:** Bats present, *Vespadelus finlaysoni, Taphozous sp.*	

Site ID (Biologic ID)	MGA Zone 50 K		Category rating for Ghost Bat usage according to (Bat Call WA 2021a)	Category rating for Pilbara Leaf-nose Bat usage (Bat Call WA 2021b)	Description	Photographs
	Easting (mE)	Northing (mE)				
CRCP-07	731427	7467900	Category 4	Category 4	**Entrance:** Horizontal entrance shape (1 m high x 2 m wide) **Orientation:** North/West, semi exposed, mid slope **Internal:** Unknown amount of chambers; 1 m high x 3 m wide x 25 m deep **Conditions:** Bats present, *Vespadelus finlaysoni,* and/or *Taphozous sp.*	
CRCP-08	731342	7467892	Category 4	Category 4	**Entrance:** Round/oval entrance shape (5 m high x 10 m wide) **Orientation:** North, semi exposed, upper slope **Internal:** Two internal chamber; 5 m high x 10 m wide x 20 m deep, 4m height of highest chamber **Conditions:** Ghost bat scat present: approx. 20 scats, aged at 6 months to 3 years. Bats present, *Vespadelus finlaysoni, Taphozous sp.*	

Site ID (Biologic ID)	MGA Zone 50 K		Category rating for Ghost Bat usage according to (Bat Call WA 2021a)	Category rating for Pilbara Leaf-nose Bat usage (Bat Call WA 2021b)	Description	Photographs
	Easting (mE)	Northing (mE)				
CRCP-09	739937	7461855	Category 4	Category 4	**Entrance:** Round/oval entrance shape (5 m high x 5 m wide) **Orientation:** West, exposed, upper slope **Internal:** One internal chamber; 5 m high x 5 m wide x 12 m deep **Conditions:** Bats present, *Taphozous sp.*	
CRCP-10	743070	7470208	Category 4	Category 4	**Entrance:** Round/oval entrance shape (2 m high x 5 m wide) **Orientation:** South, Semi exposed, mid slope **Internal:** Three internal chambers; 2 m high x 5 m wide x unknown greater than 15 m deep, 6m hight of highest chamber **Conditions:** Bats present, *Taphozous sp.*	

Site ID (Biologic ID)	MGA Zone 50 K		Category rating for Ghost Bat usage according to (Bat Call WA 2021a)	Category rating for Pilbara Leaf-nose Bat usage (Bat Call WA 2021b)	Description	Photographs
	Easting (mE)	Northing (mE)				
CRCP-11	732740	7468759	Category 4	Category 4	**Entrance:** Round/oval entrance shape (6 m high x 3 m wide) **Orientation:** West, exposed, mid slope **Internal:** One internal chamber; 6 m high x 3 m wide x 20 m deep **Conditions:** Ghost bat scat present: approx. 20 scats, aged at 3 to 12 months. Bats present, *Vespadelus finlaysoni, Taphozous sp.*	
CRCP-12	733496	7468807	Category 4	Category 4	**Entrance:** Round/oval entrance shape (3 m high x 11 m wide) **Orientation:** South, Semi exposed, mid slope **Internal:** One internal chamber; 3 m high x 11 m wide x 20 m deep **Conditions:** No bats present	

Table G.2: Location of water features within the Survey Area.

Site ID	MGA Zone 50 K		Dimensions (m)	Depth (m)	Type	Groundwater dependant vegetation (GVD)	Photographs
	Easting (mE)	Northing (mE)					
WRCP-01	731044	7467554	9 x 9	3	Likely ephemeral	*Eucalyptus victix*	
WRCP-02	730968	7467672	7 x 2	1.5	Likely ephemeral	*Eucalyptus victix*	

Site ID	MGA Zone 50 K		Dimensions (m)	Depth (m)	Type	Groundwater dependant vegetation (GVD)	Photographs
	Easting (mE)	Northing (mE)					
WRCP-03	730374	7468410	20 x 4	2	Likely ephemeral	*Eucalyptus victix*	
WRCP-04	730250	7468515	20 x 4	2	Likely ephemeral	*Eucalyptus victix*	

Site ID	MGA Zone 50 K		Dimensions (m)	Depth (m)	Type	Groundwater dependant vegetation (GVD)	Photographs
	Easting (mE)	Northing (mE)					
WRCP-05	740001	7461919	3 x 2	2	Likely temporary ephemeral	N/A	
WRCP-06	739926	7461824	17 x 9	9	Likely ephemeral	N/A	

Site ID	MGA Zone 50 K		Dimensions (m)	Depth (m)	Type	Groundwater dependant vegetation (GVD)	Photographs
	Easting (mE)	Northing (mE)					
WRCP-07	729983	7467957	2 x 2	1	Likely ephemeral	N/A	
WRCP-08	731017	7467343	20 x 5	1	Likely ephemeral	*Eucalyptus victix, Eucalyptus camaldulensis, Melaleuca argentea*	

Site ID	MGA Zone 50 K		Dimensions (m)	Depth (m)	Type	Groundwater dependant vegetation (GVD)	Photographs
	Easting (mE)	Northing (mE)					
WRCP-09	742756	7465502	15 x 5	3	Likely ephemeral	N/A	
WRCP-10	730229	7468694	100 x 12	2	Likely permanent	*Eucalyptus victix, Eucalyptus camaldulensis, Melaleuca argentea*	

Site ID	MGA Zone 50 K		Dimensions (m)	Depth (m)	Type	Groundwater dependant vegetation (GVD)	Photographs
	Easting (mE)	Northing (mE)					
WRCP-11	741329	7465269	20 x 10	5	Likely permanent	*Eucalyptus camaldulensis*	
WRCP-12	739854	7461910	20 x 8	5	Likely ephemeral	N/A	

This page has been left blank intentionally.

Appendix H: MNES Habitat Suitability Mapping

This page has been left blank intentionally.

740000

760000

7500000

7480000

7460000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Suitability - Pilibara Olive Python

Critical Habitat

Supporting Habitat

Limited Habitat

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure H.1: MNES Fauna Habitat Suitability Mapping - Pilbara Olive Python

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:180,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Kilometres 0 2 4 6 8 10 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_FigH1_POP	

740000

760000

7500000

7480000

7460000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Suitability - Bilby

Critical Habitat

Supporting Habitat

Limited Habitat

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure H.2: MNES Fauna Habitat Suitability Mapping - Bilby

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:180,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Kilometres 0 2 4 6 8 10 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_FigH2_Bilby	

740000

760000

7500000

7480000

7460000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Suitability - Ghost Bat

Supporting Habitat

Limited Habitat

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure H.3: MNES Fauna Habitat Suitability Mapping - Ghost Bat

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:180,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Kilometres 0 2 4 6 8 10 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_FigH3_GB	

740000

760000

7500000

7480000

7460000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Suitability - Northern Quoll

Critical Habitat

Supporting Habitat

Limited Habitat

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure H.4: MNES Fauna Habitat Suitability Mapping - Northern Quoll

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_FigH4_NQ

Scale: 1:180,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 2 4 6 8 10 Kilometres

N

740000

760000

7500000

7480000

7460000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Suitability - Pilbara Leaf-nosed Bat

Supporting Habitat

Limited Habitat

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure H.5: MNES Fauna Habitat Suitability Mapping - Pilbara Leaf-nosed Bat

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_FigH5_PLNB

Scale: 1:180,000 at A3

Coordinate System: GDA 1994 MGA Zone 50

0 2 4 6 8 10 Kilometres

N

740000

760000

7500000

7480000

7460000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Suitability - Grey Falcon

Critical Habitat

Supporting Habitat

Limited Habitat

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure H.6: MNES Fauna Habitat Suitability Mapping - Grey Falcon

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:180,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Kilometres 0 2 4 6 8 10 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_FigH6_GF	

740000

760000

7500000

7480000

7460000

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Survey Area

Habitat Suitability - Night Parrot

Supporting Habitat

Limited Habitat

BHP Western Australian Iron Ore

Jinidi Rail Corridor and Borrow Pit Targeted Significant Vertebrate Fauna Survey

Figure H.7: MNES Fauna Habitat Suitability Mapping - Night Parrot

astron

an ecocene company

Author: [redacted]	Date: 02-07-2025	Scale: 1:180,000 at A3 Coordinate System: GDA 1994 MGA Zone 50 Kilometres 0 2 4 6 8 10 N
Drawn: [redacted]	Figure Ref: 2400-015-24-BIDR-1RevC_250702_FigH7_NP	

This page has been left blank intentionally.