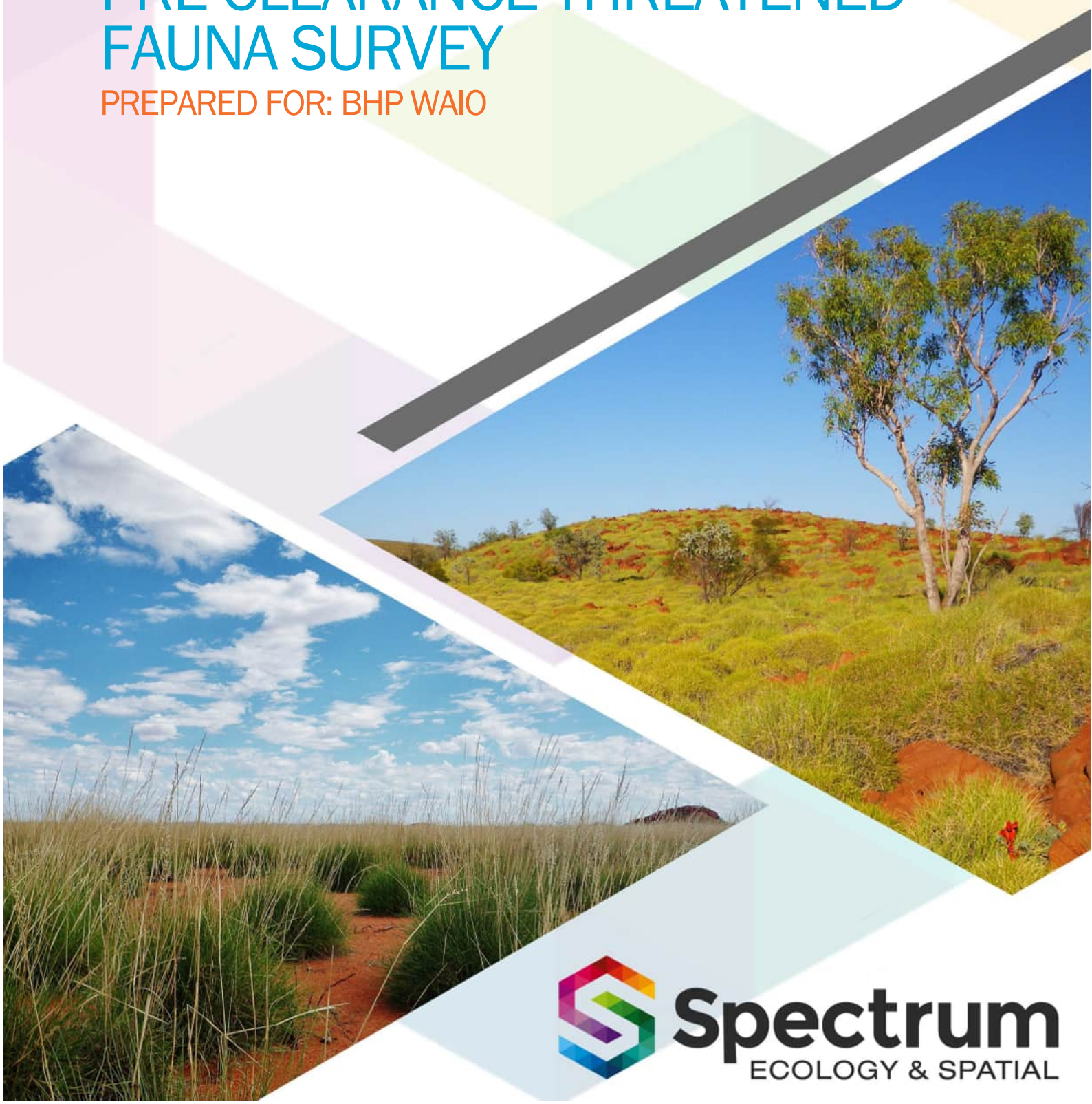
MEMORANDUM

MOOKA RAIL SIDING PRE-CLEARANCE THREATENED FAUNA SURVEY

PREPARED FOR: BHP WAIO



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Project ID: 2236-2	Mooka Rail Siding Pre-clearance Threatened Fauna Survey
Prepared for:	BHP WAIO
Date of issue:	02/06/2023
Prepared by:	Dan Kamien
Spectrum Review:	Melinda Henderson & Astrid Heidrich

1. EXECUTIVE SUMMARY

BHP Western Australian Iron Ore (BHP WAIO) plans to realign a section of rail at Mooka siding on the Mount Newman railway, located approximately 20 km south of Port Hedland. As such, a pre-clearance targeted fauna survey was conducted focusing on three threatened species and suitability of available habitat:

- Bilby (*Macrotis lagotis);*
- Grey Falcon (*Falco hypoleucos)*; and
- Night Parrot (*Pezoporus occidentalis*).

The survey consisted of searches conducted via foot traverse, and opportunistic observation. No direct observation or secondary sign of the targeted species were recorded. Additionally, habitats identified within the Survey Area are not suitable for Night Parrot and offer only potential foraging habitat for Grey Falcon. Although suitable Bilby habitat was recorded in the Survey area, it is not unique or isolated and represents a negligible proportion of available habitat in the locality.

2. PROJECT BACKGROUND

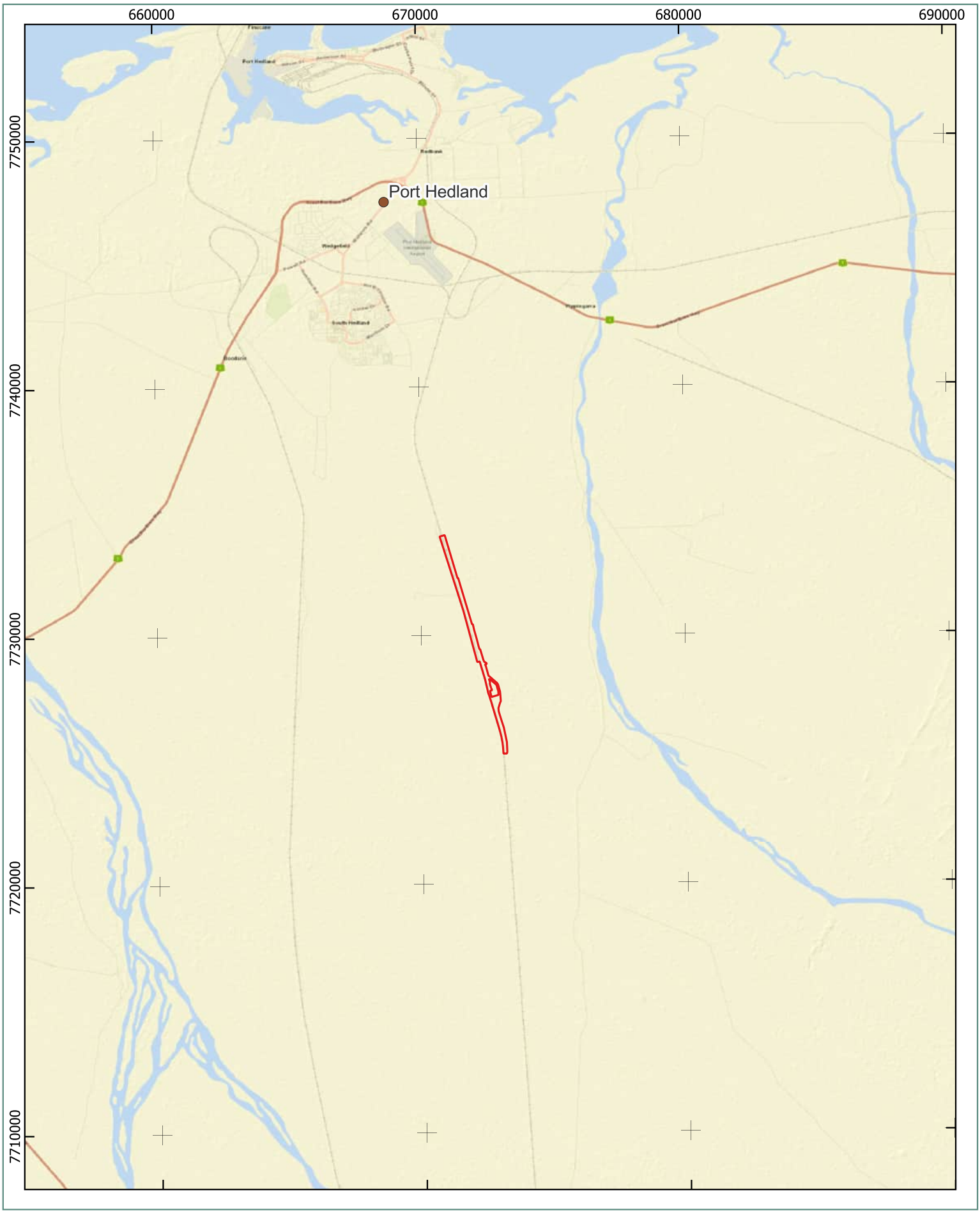
To accommodate construction of additional rail infrastructure, BHP Western Australian Iron Ore (BHP WAIO) plans to realign a section of rail at Mooka siding on the Mount Newman railway, located approximately 20 km south of Port Hedland. As such, BHP WAIO engaged Spectrum Ecology & Spatial (Spectrum) to undertake a targeted threatened fauna survey as part of a pre-vegetation clearance assessment.

2.1. Scope of Work

The scope of this study was to undertake a single-phase, targeted terrestrial fauna survey, focusing on the potential occurrence of threatened species within the 176 ha development envelope, hereafter referred to as the Survey Area (Map 2.1 and Section 3.5.1).

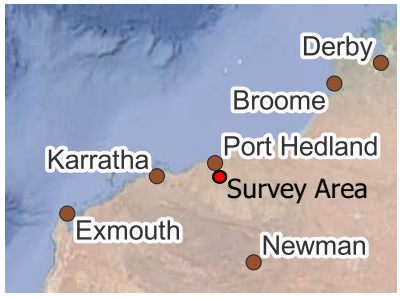
The specific objectives of this study were to:

- conduct an on-ground habitat assessment of the Survey Area, providing comment on habitat suitability for threatened species, specifically the Bilby (*Macrotis lagotis;* listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Biodiversity Conservation Act 2016* (BC Act), the Grey Falcon (*Falco hypoleucos*, EPBC & BC Act Vulnerable) and the Night Parrot (*Pezoporus occidentalis*, EPBC Act Endangered, BC Act Critically Endangered); and
- traverse the Survey Area to determine the presence of Bilby, Grey Falcon and Night Parrot via direct observation or secondary sign.



Legend

Survey Area



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0 2 5 km

Scale 1:150,000 @ A4

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

Author: D. Kamien

Approved: A. Heidrich

Date: 30-05-2023

Survey Area Location Map

BHP Mooka Rail Siding Targeted Fauna

Map 2.1

3. METHODS

3.1. Threatened Fauna Statutory Framework

Fauna species that are rare, threatened with extinction, or have high conservation value, are specially protected by law under either the State BC Act and/or the Commonwealth EPBC Act.

3.2. Fauna Habitat Assessment

Vertebrate fauna landforms were described in the field based on functional landforms within the broader landscape. Available digital aerial imagery was also considered in combination with regional land systems mapping, as well as vegetation to inform the extent of identified habitats. Habitat descriptions were conducted opportunistically where warranted.

3.3. Fauna Sampling

The targeted fauna survey consisted of searches conducted via foot traverse, and opportunistic observation. The survey was conducted in accordance with relevant Commonwealth and State policy, including the following:

- Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (Environmental Protection Authority, 2020);
- Guidelines for Surveys to Detect the Presence of Bilbies, and Assess the Importance of Habitat in Western Australia (DBCA 2017);
- Matters of National Environmental Significance. Significant impact guidelines 1.1 EPBC Act Policy Statement (DoE, 2013);
- Survey Guidelines for Australia's Threatened Birds (DEWHA 2010); and
- Survey Guidelines for Australia's Threatened.(DSEWPaC 2011).

3.4. Survey Personnel and Timing

The targeted fauna survey was completed by a team of two zoologists in a single day on 11 May 2023 (Table 3.1).

Table 3.1: Fauna survey team qualifications and experience.

Name	Position	Role	Qualification	Years of Zoological Consulting Experience
Dan Kamien	Principal Zoologist	Fauna team member	BSc. Hons	18
Melinda Henderson	Senior Zoologist	Fauna team lead	BSc. Hons	8

3.5. Targeted Bilby Survey

A targeted Bilby survey was conducted in accordance with the Department of Biodiversity Conservation and Attractions (DBCA) guideline for surveys to detect the presence of bilbies, which recommends transect searches for survey areas less than 1,600 ha Australia (DBCA 2017).

3.5.1. Transect Searches

Foot traverses were undertaken within the Survey Area, specifically targeting areas of previously undisturbed vegetation (referred to as 'Targeted Areas'), to record any sign evidence of the Bilby (tracks, scats, diggings and/or burrows). A total distance of approximately 14 km was traversed (Map 3.1-Map 3.3).

3.5.2. Occurrence and Sign Evidence

The occurrence of Bilby was determined via evidence of burrows, diggings, tracks, or scats and if present recorded using GPS devices. Photos of evidence were taken where applicable.

Burrows

Bilbies construct burrows that typically have a round entrance that is readily distinguishable from varanids and other reptiles that construct crescent shaped burrows (Southgate et al. 2019). Burrows usually have an apron of excavated soil at the entrance, and are often found under logs, at the base of trees, *Triodia* hummocks, termite mounds or sand mounds (Triggs 1996, Moseby et al. 2012, Southgate et al. 2019).

Only Bilby burrows of high certainty were to be potentially recorded:

- Fresh, confirmed Bilby tracks, scats or diggings detected on/surrounding apron in front of burrow entrance;
- Multiple burrow entrances detected in a foraging area, displaying evidence tracks scats or diggings; or
- Disused burrows consistent with Bilby burrow characteristics (round entrance, suitable depth and evidence of soil apron.

Diggings

Bilbies forage for food at the soil surface, or dig in the subsoil for beetles, termites, root-dwelling larvae, seeds and bulbs, being the only species on mainland Australia that forages for root-dwelling larvae in plant roots (Southgate et al. 2019). Within the Pilbara bioregion, such plant species known to contain root-dwelling larvae include: *Acacia bivenosa*, *A. dictyophleba*, *A. hilliana*, *A. melleodora*, *A. monticola*, *A. stellaticeps*, *Senna notabilis* and *Indigofera georgei* (Dziminski and Carpenter, 2018; Southgate *et al.*, 2019).

Bilby diggings may be of different size and shape, but are typically:

- Shallow, 5-10 cm in depth, with the spoil pile evenly distributed around the dig;
- Deep conical or cylindrical digs, usually less than 50 cm deep; or
- Large ploughed areas of multiple shallow diggings around termite nests.

Other species such as varanids, Echidna, wallabies, bandicoots, mulgara and mice can produce diggings that are like the Bilby.

Tracks

As tracks and gait patterns have the potential to be confused with species other than the Bilby, only tracks assessed with high certainty were to be potentially recorded. That is, track imprints and gait pattern that are obvious and consistent with those produced by Bilby.

Bilby gait is consistent with other similar-sized mammals, including quolls, mulgara, bandicoots, rabbits, rats and occasionally possums (Southgate *et al.*, 2019). However, if tracks are fresh and on conducive substrate, Bilby tracks can be distinguished based on differences in shape, size, and toe and claw prints (Southgate *et al.*, 2019).

Scats

Bilbies produce scats with distinctive characteristics, being oblong in shape, longer than they are wide, firm, usually contain a mixture of sand, plant and invertebrate material, have a smooth coating and rounded ends, and are typically deposited in a group of two to five pellets (Southgate *et al.*, 2019). Scats are mostly found in association with digging activity, deposited on top of or within spoil piles of diggings, and sometimes at burrow entrances (Southgate *et al.*, 2019). Scats consistent with the above description were to be considered positive confirmation of Bilby presence.

3.5.3. Bilby Habitat Assessment

Habitat characteristic notes were taken opportunistically during the foot traverse (see Section 3.2). Note was taken of flora species, surface soil characteristic and evidence of fire.

There are a variety of factors that signify potential Bilby habitat (Southgate *et al.*, 2007, 2019), including the availability of food resources, which are dependent on fire history (Southgate *et al.*, 2007). Bilbies have been recorded in habitats with a range of fire-ages, including recently burnt (1-2 years), unburnt (3-6 years) and long unburnt (>6 years) areas (Southgate *et al.*, 2007; Dziminski and Carpenter, 2018). Recent fire often promotes regeneration of some short-lived species of which bilbies feed on seeds or host insect larvae on which bilbies feed (Southgate and Carthew, 2006; Dziminski and Carpenter, 2017). Conversely, fire kills long-lived larvae host plant species (Southgate et al., 2007, 2019).

3.6. Grey Falcon Survey

The occurrence of Grey Falcon was determined via opportunistic sightings during transects of the survey area. Habitat of the survey was also assessed for suitability for this species.

The Grey Falcon is the rarest falcon in Australia with an estimated population size of less than 1000 individuals (Schoenjahn, 2013). They occur very sparsely in a wide variety of arid and semi-arid zones across an area of about 5 million km^2. Climate characteristics such as temperature and rainfall appear to strongly influence species distribution (Schoenjahn, Pavey and Walter, 2020). Breeding habitat appears to be localised in zones with the high annual average temperatures and in dry winters (Schoenjahn, 2013).

Grey Falcons are frequently recorded on lightly wooded plains and along major watercourses breeding in taller trees such as river gums, or on isolated anthropogenic structures such as communications towers (Johnstone et al, 2013). Nests are often used over several years and can be near nests of other falcons or raptor species (Schoenjahn, 2013). They forage in open landscapes such as rocky plains with hummock grasslands, lower shrublands, and small drainage lines where they predominantly prey on birds, mainly pigeons and parrots (Olson and Olson, 1986; Schoenjahn, 2013).

3.7. Night Parrot Habitat Assessment

Habitat within the Survey Area was assessed for suitability for the Night Parrot concurrently with the targeted Bilby survey. Preferred nesting habitat of the species includes old growth *Triodia* hummocks, at least 40-50 cm in size (DoE 2016; DBCA 2017). This species is thought to feed primarily on *Triodia* seeds, but favourable foraging habitat also includes chenopod shrubs and alternative food source from which moisture can be obtained (Hamilton et al. 2017, Jones 2017).

Legend

- Survey Area
- Foot Traverse
- Disturbed Areas
- Targeted Areas

N

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Scale 1:10,000 @ A4

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

Author: D. Kamien

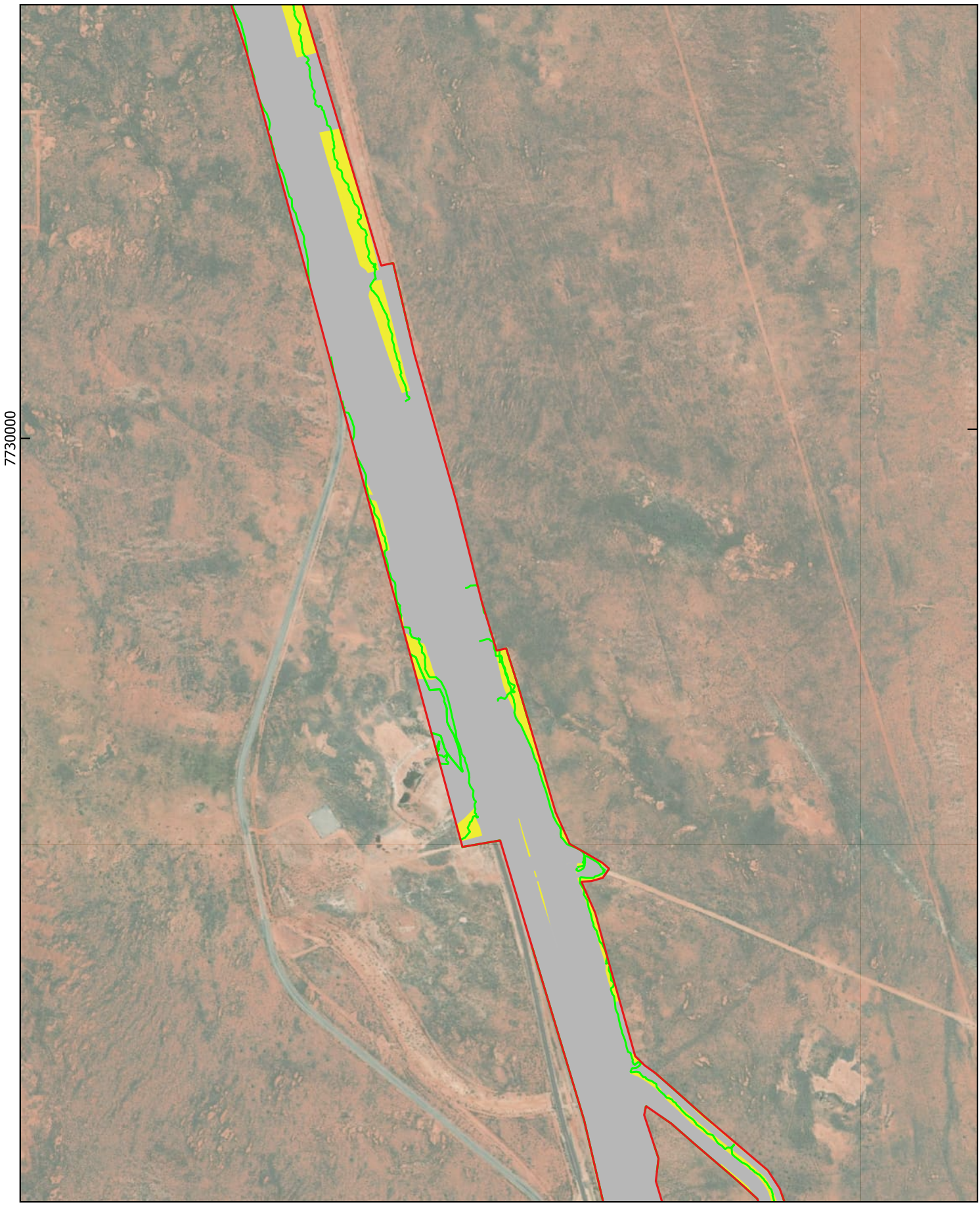
Approved: A. Heidrich

Date: 29-05-2023

Threatened Species Search Effort - North

BHP Mooka Rail Siding Targeted Fauna

Map 3.1



Legend

- Survey Area
- Foot Traverse
- Disturbed Areas
- Targeted Areas

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Scale 1:10,000 @ A4

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

Author: D. Kamien

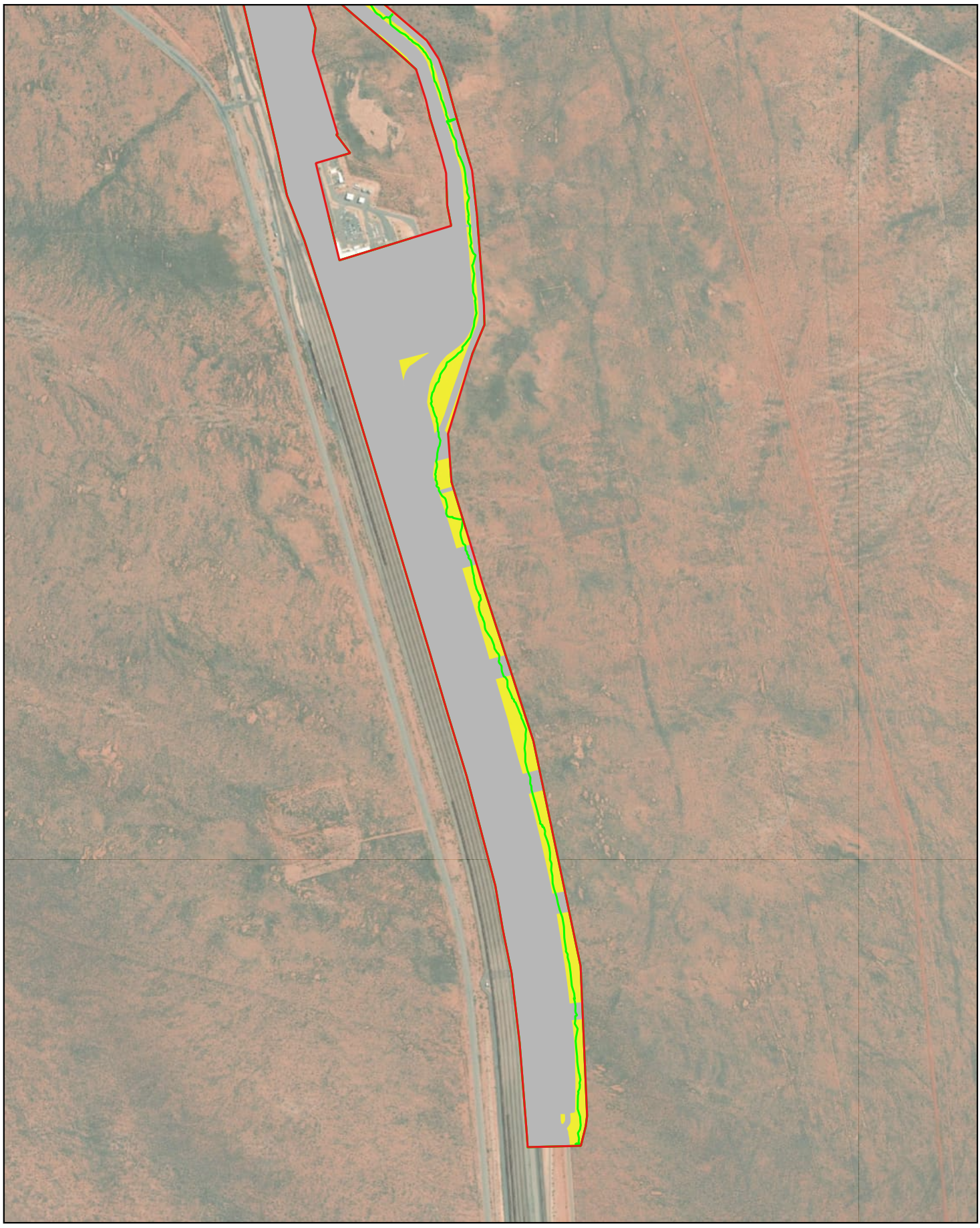
Approved: A. Heidrich

Date: 29-05-2023

Threatened Species Search Effort - Mid

BHP Mooka Rail Siding Targeted Fauna

Map 3.2



Legend

- Survey Area
- Foot Traverse
- Disturbed Areas
- Targeted Areas

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Scale 1:10,000 @ A4

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

Author: D. Kamien

Approved: A. Heidrich

Date: 29-05-2023

Threatened Species Search Effort - South

BHP Mooka Rail Siding Targeted Fauna

Map 3.3

4. SURVEY RESULTS

3.1 Threatened Fauna Records

During the survey, no direct observation or secondary sign of the targeted threatened species (Bilby, Grey Falcon and Night Parrot) were recorded.

3.2. Fauna Habitats

The Survey Area intersected two land system units as defined by (Van Vreeswyk *et al.*, 2004):

- Macroy - stony plains and occasional tor fields based on granite supporting hard and soft *Triodia* shrubby grasslands.
- Uaroo - Broad sandy plains, pebbly plains and drainage tracts supporting hard and soft *Triodia* hummock grasslands with scattered *Acacia* shrubs.

On-ground habitat assessment revealed that the Survey Area is characterised by clay loam eluvial plain supporting *Acacia* spp. shrubland, over *Triodia* sp. hummock grassland. Vegetation comprised four broad units (Table 4.1):

- *Acacia bivenosa* shrubland over *Triodia* sp. hummock grassland;
- *Acacia bivenosa* open shrubland over *A. stellaticeps* low scattered shrubs;
- *Acacia stellaticeps* low shrubland over *Triodia* sp. hummock grassland; and
- *Acacia inaequilatera* tall, scattered shrubs over *A. bivenosa* and *A. stellaticeps* low scattered shrubs.

There was no evidence of recent fire, which is supported by North Australia and Rangelands Fire Information mapping. Fire data indicates that the Survey Area was last burnt in 2008 (Charles Darwin University, 2023).

Trees and watercourses are absent from the Survey Area, thus making it unsuitable nesting habitat for Grey Falcon. Similarly, large and old growth *Triodia* hummocks were absent, thus resulting in an extremely low likelihood of supporting Night Parrot.

Table 4.1: Fauna Habitat within the Survey Area

Habitat Description	Habitat Photo
Acacia bivenosa shrubland over *Triodia* sp. hummock grassland.	
Acacia bivenosa open shrubland over *A. stellaticeps* low scattered shrubs.	
A. stellaticeps low shrubland over *Triodia* sp. hummock grassland.	

Acacia inaequilatera tall, scattered shrubs over *A. bivenosa* and *A. stellaticeps* low scattered shrubs.	

5. DISCUSSION

During the survey, no direct observation or secondary sign of the targeted threatened species (Bilby, Grey Falcon and Night Parrot) were recorded. Additionally, habitats identified within the Survey Area are not conducive to the occurrence of Night Parrot and offer only potential foraging habitat for Grey Falcon.

Considering species preferences, the Survey Area represents suitable Bilby habitat (Table 4.1, Table 5.1). However, examination of aerial imagery, land system mapping and survey ground-truthing demonstrate that the habitats are common and widespread in the surrounding area and are contiguous with the Survey Area. That is, habitats identified in the Survey Area are not unique or isolated and represent a negligible proportion of available habitat in the locality.

Table 5.1: Targeted species habitat significance

Species	Common Name	Habitat Suitability
Macrotis lagotis	Bilby	Suitable for foraging and burrow construction
Falco hypoleucos	Grey Falcon	Suitable for foraging, but unsuitable for nesting
Pezoporus occidentalis	Night Parrot	Unsuitable for foraging and nesting

Previous Bilby records exist in the survey area locality, with three records from 2020, located within 20 km of the Survey Area (Spectrum internal database), and one record from 1969 located within 50 km of the Survey Area (Atlas of Living Australia, 2023). Considering these records in combination with identified habitats, bilbies have the potential to utilise the Survey Area, but there is no evidence of them occurring immediately prior to the survey period (no diggings or tracks) or in the past few years (based on absence of burrows).

5. REFERENCES

Atlas of Living Australia (2023) *Spatial Data Portal - Predict Tool*. Available at: https://www.ala.org.au/ (Accessed: 16 May 2023).

Charles Darwin University (2023) *North Australia and Rangelands Fire Information*. Available at: https://www.firenorth.org.au/nafi3/.

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 Parks and Wildlife (2017) *Interim guideline for preliminary surveys of night parrot (Pezoporus occidentalis) in Western Australia*.

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

Department of the Environment (2013) *EPBC Act Significant impact guidelines 1.1 (EPBC Act 1999) - Matters of National Environmental Significance*.

Department of the Environment (2016) *Conservation Advice Pezoporus occidentalis Night Parrot*.

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

Dziminski, M.A. and Carpenter, F. (2017) *The conservation and management of the bilby (Macrotis lagotis) in the Pilbara*.

Dziminski, M.A. and Carpenter, F. (2018) *The conservation and management of the bilby (Macrotis lagotis) in the Pilbara. Annual report 2017-2018*.

Environmental Protection Authority (2020) 'Technical Guidance: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment'. Western Australia: EPA.

Johnstone, R.E., Burbidge, A.H. and Darnell, J.C. (2013) 'Birds of the Pilbara region, including seas and offshore islands, Western Australia: distribution, status and historical changes', *Records of the Western Australian Museum*, 78, pp. 343–441.

Olson, P.D. and Olson, J. (1986) 'Distribution, status, movements and breeding of the Grey Falcon Falco hypoleucos', *Emu*, 86, pp. 47–51.

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(1), pp. 19–25.

Schoenjahn, J., Pavey, C.R. and Walter, G.H. (2020) 'Ecology of the Grey Falcon Falco hypoleucos–current and required knowledge', *Emu-Austral Ornithology*, 120(1), pp. 74–82.

Southgate, R. *et al.* (2007) 'Bilby Distribution and Fire: A Test of Alternative Models of Habitat Suitability in the Tanami Desert, Australia', *Ecography*, 30(6), pp. 759–776. Available at: http://www.jstor.org/stable/30244528.

Southgate, R. *et al.* (2019) 'Verifying bilby presence and the systematic sampling of wild populations using sign-based protocols - with notes on aerial and ground survey techniques and asserting absence', *Australian Mammalogy* [Preprint].

Southgate, R. and Carthew, S.M. (2006) 'Diet of the Bilby (Macrotis lagotis) in relation to substrate, fire and rainfall characteristics in the Tanami Desert', *Wildlife Research*, 33(6), pp. 507–519.

Van Vreeswyk, A.M.E. *et al.* (2004) 'An inventory and condition survey of the Pilbara region, Western Australia'. Department of Agriculture and Food.