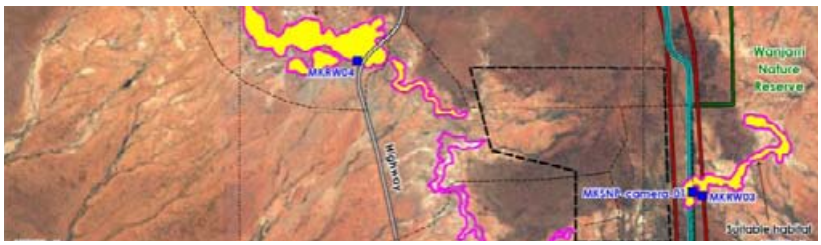
Biota Environmental Sciences

Mt Keith Satellite Black-footed Rock-wallaby Survey



Prepared for BHPB Nickel West

October 2017

Biota Environmental Sciences

ABN 49 092 687 119
Level 1, 228 Carr Place
Leederville Western Australia 6007
Ph: (08) 9328 1900 Fax: (08) 9328 6138

Job No.: 1317

Prepared by: V. Ford

Document Quality Checking History

Version:	Rev A	Peer review:	G. Humphreys
Version:	Rev A	Director review:	G. Humphreys
Version:	Rev 0	Format review:	F. Hedley
		Approved for issue:	G. Humphreys

This report has been designed for double-sided printing. Hard copies supplied by Biota are printed on recycled paper.

This page intentionally blank.

MKS Black-footed Rock-wallaby Survey

Contents

This page intentionally blank

1.0 Executive Summary

BHP Billiton Nickel West proposes to develop the Mt Keith Satellite Proposal (the Proposal) approximately 80 km north of Leinster in the Shire of Leonora. The Proposal has a Development Envelope of 1,259 ha and involves the development of two mine pits (Six Mile Well and Goliath), a waste rock landform, associated support infrastructure and a 20 km transport corridor north to the existing Mt Keith Mine.

Biota Environmental Sciences was commissioned to conduct habitat mapping and determine likelihood of occurrence via a targeted survey of the Black-footed Rock-wallaby (*Petrogale lateralis lateralis*), and to use this information to assess the Proposal's potential risk to the species. The Black-footed Rock-wallaby is listed as Schedule 2 under the *Wildlife Conservation Act 1950* and Endangered under the *Environment Protection and Biodiversity Conservation Act 1999*. The subspecies' populations are presumed to be extinct throughout much of their former range, including that part of central Western Australia where the Proposal is located. The sighting of two Black-footed Rock-wallabies at a site 13.5 km west of the Proposal in 2006, and subsequent molecular analysis of scats confirming their identification in 2015, was therefore significant and prompted the current study. The study aimed to determine whether the Black-footed Rock-wallaby occurs, or is likely to occur, within the Development Envelope or in the breakaway habitat on either side of the Proposal haul road such that the road may present a barrier to movement.

No evidence of current Black-footed Rock-wallaby occupancy was found during the targeted survey. A camera trap placed at the location of the historical record did not record the rock-wallaby and while scats of the species were found in this location, they were small in number and aged in appearance. Core habitat was present in the locality of the known record, including large caves and substantial overhangs, and was more favourable than any closer to the Development Envelope. The rocky habitat directly west of the Development Envelope was shallow and unsuitable for the rock-wallaby, while that within the Development Envelope and directly adjacent east may represent suitable but probably secondary habitat, with shallow caves and overhangs, and is unlikely to represent core habitat.

The Black-footed Rock-wallaby is assessed as having a low likelihood of occurrence within the target area searched for the following reasons: (i) the lack of current evidence of rock-wallaby presence anywhere searched, even from where the species was previously recorded, including no records on the camera traps anywhere on the range even in areas of most prospective habitat; and (ii) the lack of suitable core habitat in the vicinity of the Proposal haul road.

The risk to the species presented by the Proposal is assessed as low due to the low likelihood of occurrence within or near to the Development Envelope, and because only a small amount of non-core habitat will be disturbed by the Proposal (3.9 ha or 1.4% of the breakaway habitat mapped in this study). The Proposal haul road is therefore unlikely to represent a barrier to movement or result in vehicle collisions with the Black-footed Rock-wallaby.

This page intentionally blank.

2.0 Introduction

2.1 The Proposal

BHP Billiton Nickel West (BHPB) proposes to develop the Mt Keith Satellite Proposal (the Proposal), approximately 80 km north of Leinster in the Shire of Leonora (Figure 2.1). The Proposal has a Development Envelope of 1,259 ha and involves the development of two mine pits (Six Mile Well and Goliath), a waste rock landform, associated support infrastructure, an access road and a 20 km transport corridor north to the existing Mt Keith Mine.

2.2 Study Aims

A historical record of the Black-footed Rock-wallaby (*Petrogale lateralis lateralis*), which is listed as a threatened species at both State and Commonwealth levels, was obtained 13.5 km west of the Proposal. This historical record of the species is significant, as it currently represents the only record from the Murchison bioregion. An extension of the breakaway landform of the Barr Smith Range, from which the species was recorded, is intersected by the indicative haul road route associated with the Proposal (the Proposal haul road). Therefore, as part of the environmental impact assessment of the Proposal, BHPB commissioned Biota Environmental Science (Biota) to undertake a targeted survey and habitat mapping exercise across the portion of the range potentially impacted by the Proposal, where it is intersected by the Proposal haul road. The study aimed to assess:

- habitat availability for Black-footed Rock-wallabies;
- the likelihood of occurrence of the species in the locality; and,
- the potential for the Proposal to impact the (sub) species.

This study considered potential impacts to the Black-footed Rock-wallaby in the context of two spatial scales:

- Development Envelope: the maximum area within which the Proposal footprint will be located (1,259 ha) (Figure 2.1);
- Black-footed Rock-wallaby Target Area: the portion of the Barr-Smith Range that intersects the Proposed transport corridor, the area searched during the targeted field survey reported here as shown in Figure 2.1.

2.3 The Black-footed Rock-wallaby

The Black-footed Rock-wallaby (*Petrogale lateralis lateralis*) is listed as Endangered (Schedule 2) under the Western Australian *Wildlife Conservation Act 1950* indicating that the species is considered rare or is likely to become extinct. At the Federal level, the species is also listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999).

The species *Petrogale lateralis* comprises four sub-species that occur across the western half of Australia, all of which are listed (Department of the Environment and Energy 2016). The *P. l. lateralis* sub-species is known from a series of isolated, patchily distributed populations in Western Australia (Pearson 2013, Woinarski et al. 2014) and is presumed extinct throughout much of its former range (Woinarski et al. 2014), including that part of central Western Australia adjacent to the Proposal. Factors thought to have contributed to the decline of the species include predation by introduced carnivores (e.g. fox and cat), competition and habitat degradation caused by introduced herbivores (e.g. goats and rabbits), and insect plagues (references in Pearson 2013).

This nocturnal species requires shelter in the form of caves, cliffs and boulder screes during the day. Habitat critical to survival requires sufficient cave and crevices to provide shelter from extremes of temperature and predators (Pearson 2013). Free water is usually not required unless the animals are in habitat that does not provide adequate protection from heat. Ideal habitat has palatable vegetation such as grasses, herbs and forbs in close proximity to shelter (Pearson 2013).

A sighting of two wallabies on the Barr Smith Range at a site 13.5 km west of the northern end of the Study Area by Geoff Cockerton (consultant with Western Botanical) in 2006 prompted further investigation by Biota staff (on-site at the time) who collected numerous rock-wallaby scats and lodged them with the WA Museum. The site was later visited by Dr. David Pearson of the Department of Biodiversity, Conservation and Attractions (DBCA) who confirmed the scats to be rock-wallaby. In 2015, Dr. Bamford visited the site to collect scats for molecular analyses, with the subsequent sequencing indicating that they most likely belonged to *Petrogale lateralis lateralis* (BCE 2015). A recent discovery of an extant population of *P. l. lateralis* at Kalbarri National Park (Pearson 2016) indicates that small populations can go overlooked even at localities that are relatively frequently visited.

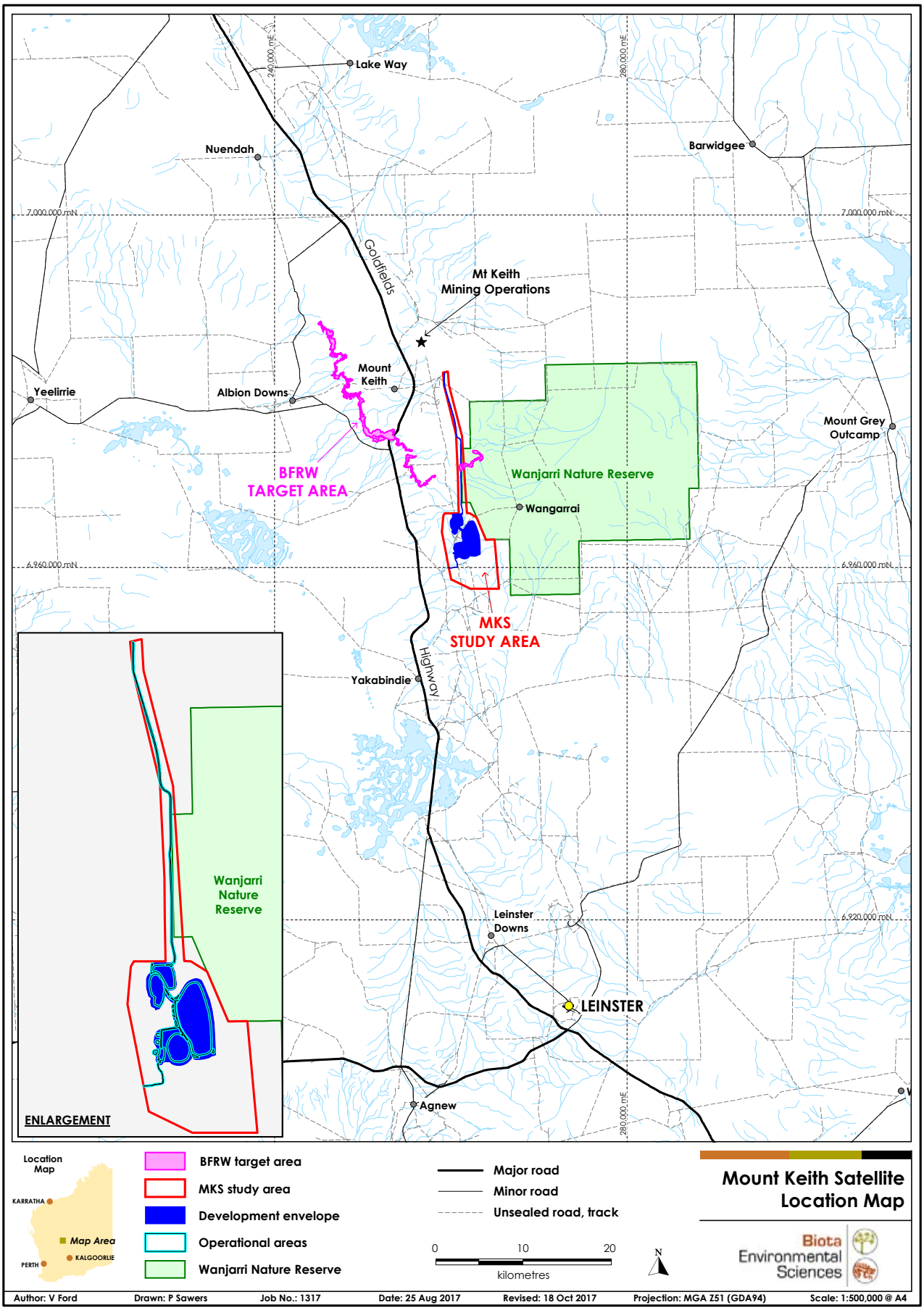


Figure 2.1: Location of the Mt Keith Satellite Proposal and the Black-footed Rock-wallaby Target Area.

This page intentionally blank.

3.0 Methods

3.1 Desktop Habitat Review

Prior to the field survey, a desktop habitat mapping exercise was completed extending 25 km around the Development Envelope and 25 km north of the known locality at -27.241058° S, 120.450147° E,. Mapping of this potential habitat was conducted using Google Earth imagery. This mapping indicated that only a portion of the Barr Smith Range intersected by the Proposal haul road would potentially be impacted and this area was selected for the targeted field survey.

3.2 Field Survey

Ground-truthing of habitat was conducted in a two-day field exercise by two zoologists, from 3 – 4 July 2017, across an approximately 40 km portion of the Barr Smith Range intersecting the Proposal haul road. Given the time constraints, those areas of most prospective habitat and those areas closest to the indicative haul road were searched on foot, whilst the remaining habitat was observed from the vehicle using binoculars (Figure 3.1).

The site of the known record of the species was visited first to determine rock-wallaby presence and describe the habitat in the location. The zoologists traversed habitat on foot for approximately 2 km around this location. From this point an approximately 20 km long driving transect travelling south-east along the range was conducted to describe the habitat. An approximately 8 km portion of the range proved to be inaccessible by vehicle and, within the time constraints, could not be accessed on foot. The portion of the range within the Development Envelope and immediately east was searched on foot. The habitat was categorised as core, suitable, or unsuitable using the criteria detailed in Table 3.1. Five camera traps were deployed (Figure 3.1); one in the locality of the known record, one in a location where scats that could not be conclusively excluded as not rock-wallaby were found, one within the Development Envelope, one immediately east of the Development Envelope and an additional fifth camera was deployed in the Development Envelope on 14 June 2017 as an adjunct to an earlier survey.

Camera traps were Bushnell Trophy Cams with a passive infrared sensor to detect thermal differentials between animals and ambient temperatures, with a sufficient difference triggering the capture of images. The camera uses infrared light emitting diodes as the 'flash', which are less obvious to animals than incandescent flashes. The cameras were programmed to capture 15 seconds of video each time they were triggered.

Table 3.1: Habitat category definitions.

Habitat Category	Habitat Definition
Core	Caves and significant overhangs in proximity to foraging habitat
Suitable	Shallow overhangs or large boulder piles
Unsuitable	No habitat or rocky habitat too shallow to provide shelter

3.3 Personnel and Permits

This study was conducted with a DBCA Licence to take fauna for scientific purposes, Licence number 08-000821-1 (Appendix 1). The qualifications and roles of those conducting the study are provided in Table 3.2.

Table 3.2: Personnel and qualifications.

	Biota Title	Qualification	Study Role
Daniel Kamien	Senior Zoologist	BSc. Hons.	Field survey
Michael Greenham	Zoologist	BSc. Hons.	Field survey
Sylvie Schmidt	Zoologist	B.Sc. Hons., PhD (Zoology)	Review camera footage
Victoria Ford	Zoologist	B.Sc. Hons., PhD (Zoology)	Reporting
Garth Humphreys	Ecologist/Director	B.Sc. Hons.	Report review
Paul Sawers	GIS Manager	Dip. Cartography	Mapping and GIS calculations
Melissa Robinson	GIS Cartographer	Dip. Cartography	Mapping and GIS calculations

Table 3.3: Camera trap sites.

			
Site Name	MKSNP-camera-01	MKRW01	MKRW02
Site Type	Camera trap, Targeted search	Camera trap, Targeted search	Camera trap, Targeted search
Dates	14/06/2017 – 19/06/2017	03/07/2017 – 18/07/2017	03/07/2017 – 14/07/2017
Lat. Long.	-27.3601960949855°S, 120.585851334148°E	-27.2410371952651°S, 120.450311265886°E	-27.2849328909323°S, 120.452628359311°E
Vegetation	Mulga woodland	Mulga woodland, Ptilotus shrubs 2 - 10%	Sparse Mulga woodland, shrubs and grasses.
Landform	HILLS AND SLOPES ▸ Cave	HILLS AND SLOPES ▸ Breakaway	HILLS AND SLOPES ▸ Rock Hill slope
			
Site Name	MKRW03	MKRW04	
Site Type	Camera trap, Targeted search	Camera trap, Targeted search	
Dates	04/07/2017 – 18/07/2017	04/07/2017 – 07/07/2017	
Lat, Long.	-27.3610367160545°S, 120.5882861932°E	-27.3294027848424°S, 120.502828331776°E	
Vegetation	Sparse Eucalypt trees over sparse low Acacia shrubs	Sparse Mulga woodland, shrubs and grasses	
Landform	HILLS AND SLOPES ▸ Breakaway	HILLS AND SLOPES ▸ Foot Slope	

Table 3.4: Walking transects.

			
Site Name	MKRW-TR01-TR02	MKRW-TR01-TR02 cont'd	MKRW-TR01-TR02 cont'd
Site Type	Walking Transect	Walking Transect	Walking Transect
Lat. Long.	-27.2519594896839°S, 120.443617310487°E	-27.251914°S, 120.443558°E	-27.251928°S, 120.443536°E
Vegetation	Mulga woodland and shrubland		
Landform	HILLS AND SLOPES ▸ Breakaway		
			
Site Name	MKWR-TR03-TR04	MKWR-TR03-TR04 cont'd	MKWR-TR03-TR04 cont'd
Site Type	Walking Transect	Walking Transect	Walking Transect
Lat, Long.	-27.3526843171821°S, 120.602060509958°E		
Vegetation	Mulga woodland, *Callitris* woodland, *Ptilotus* shrubs		
Landform	HILLS AND SLOPES ▸ Breakaway		

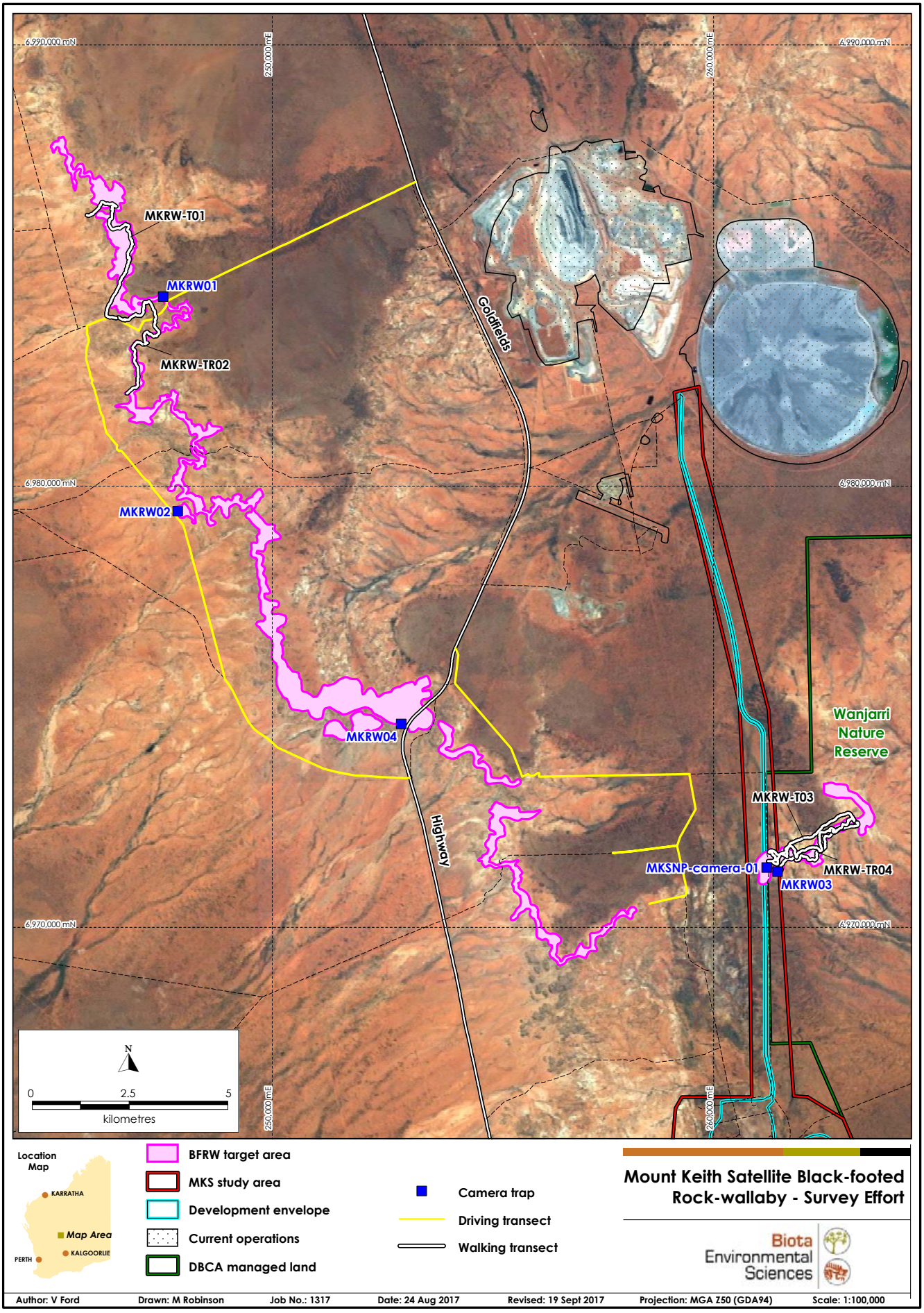


Figure 3.1: Black-footed Rock-wallaby Target Area and survey effort.

This page intentionally blank.

4.0 Results

4.1 Ground-truthing and Habitat Mapping

While the desktop mapping exercise identified a largely contiguous length of breakaway, field observations indicated that not all of the breakaway represented habitat suitable for the rock-wallaby. During the field assessment it was observed that the breakaway habitat in the vicinity of the 2006 sighting location was characterised by substantial cliffs, shelves and caves to a height of 10 m and was considered core habitat based on the criteria defined in Section 3.2 (Figure 4.1). However, habitat of this quality was not observed elsewhere in the Black-footed Rock-wallaby Target Area.

The habitat within and immediately east of the Development Envelope may be suitable for use by the rock-wallaby as there are some suitably sized caves, cliffs and overhanging structures, but these areas still did not contain the core habitat of the quality seen at the location of the historical record. The breakaway habitat immediately west of the Development Envelope was very shallow and is considered unsuitable for the rock-wallaby.

4.2 Fauna Recorded

The Black-footed Rock-wallaby was not directly recorded during the survey. Secondary evidence in the form of scats, resembling those of a rock-wallaby, were collected from the location of historical record (Plate 4.1). However, the scats were not fresh (lacking a shiny mucous coating), relatively few in number and located amongst numerous Euro scats.

The Black-footed Rock-wallaby was not recorded from any of the five camera traps. Nine non-target bird and mammal species were recorded on the cameras (Table 4.1, Plate 4.2 - Plate 4.6).

Plate 4.1: Scats resembling those of Black-footed Rock-wallaby collected from MKRW01.

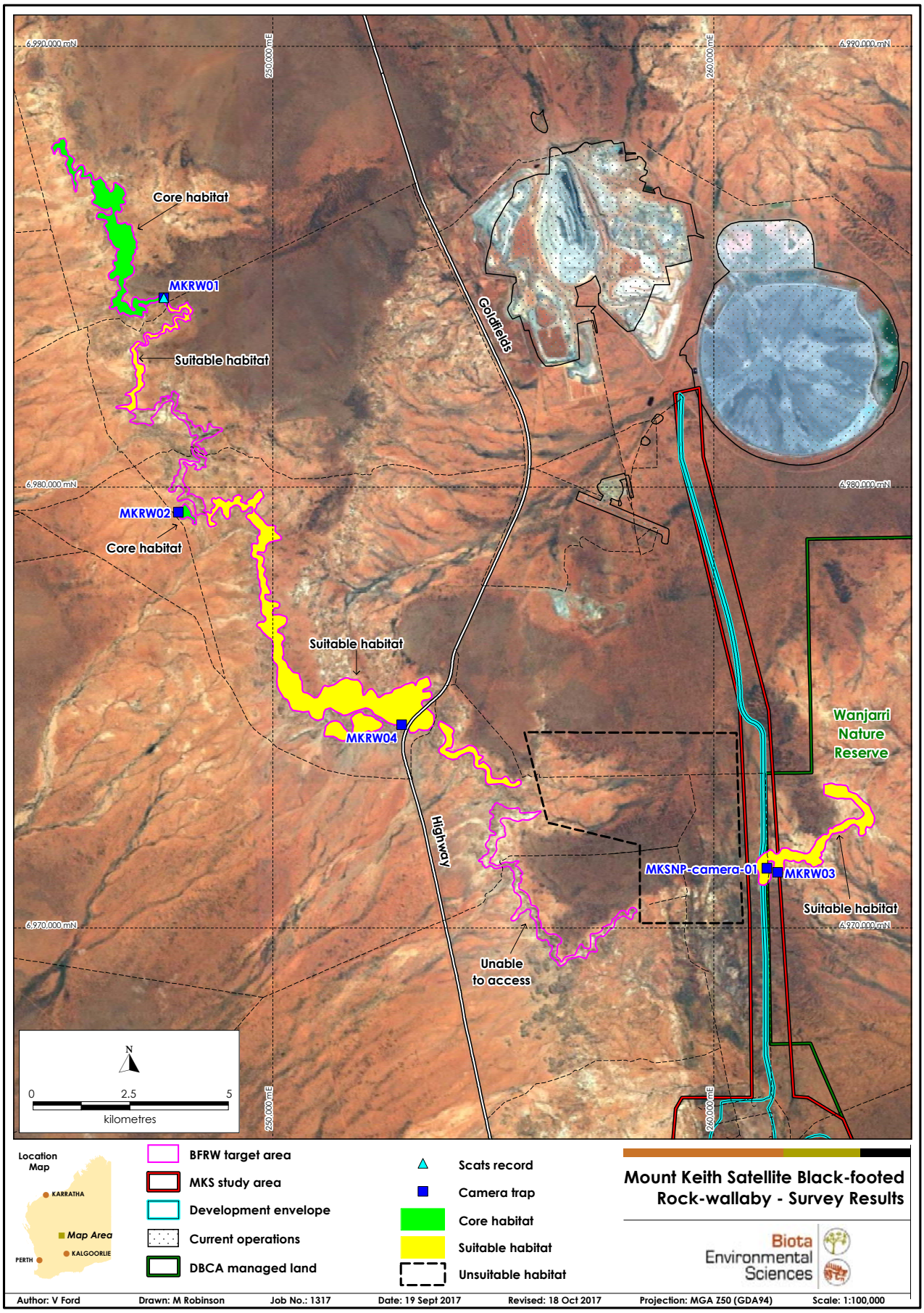


Figure 4.1: Habitat mapping and camera trap locations.

Table 4.1: Camera trap records.

Species Name	Common Name	MKSNPCam01	MKRW01	MKRW02	MKRW03	MKRW04
Canis lupus dingo	Dingo		•		•	
Colluricincla harmonica	Grey shrike-thrush				⁉	
Corvus sp.	Crow sp.		•			
Melanodryas cucullata	Hooded robin		•			
Oryctolagus cuniculus	Rabbit				•	•
Osphranter robustus	Euro, Biggada		•		•	
Pseudantechinus woolleyae	Woolley's Pseudantechinus	•	•	•	•	
Tachyglossus aculeatus	Short-beaked Echidna					•
Taeniopygia guttata	Zebra finch		•			

Plate 4.2: Woolley's Pseudantechinus on camera trap MKSNPCam01.

Plate 4.3: Dingo recorded on camera trap MKRW01.

Plate 4.4: Euro recorded on camera trap MKRW01.

Plate 4.5: Rabbit recorded on camera trap MKR03.

Plate 4.6: Echidna recorded on camera trap MKRW04.

This page intentionally blank.

5.0 Discussion and Risk Assessment

This study aimed to determine whether the Black-footed Rock-wallaby occurs or is likely to occur within the Development Envelope or in the breakaway habitat on either side, such that the Proposal haul road may impact the species.

The two-day targeted field survey was initiated in the locality of a historical record, 13.5 km west of the Development Envelope, which represents the only record from the Murchison bioregion and the motivation for this assessment. Approximately 4 km of breakaway habitat was searched around this historical record. While that 4 km area was assessed as representing core habitat, no evidence of current occupancy was found. A small number of probable rock-wallaby scats were present but these were old in appearance having lost their shiny mucous coating and some were grey in colour indicating advanced age. Typically, numerous latrines are evident in the refuge areas of rock-wallabies due to their philopatry (Jarman and Caprararo 1997), suggesting the site may not be currently utilised. A camera trap placed at the site also did not record the rock-wallaby, though records of other vertebrate species were obtained by this method during the current survey. Taken together, the evidence from the targeted survey indicates that the species is not currently active in the location of the historical record. Whether this represents an extinction of a previously resident population or that the location is used transiently by a nearby rock-wallaby population is unknown. The camera trap located at the site captured a Dingo, a possible contributing factor to the absence of the rock-wallaby at the time of the survey.

Habitat in the locality of the known record was more favourable than any closer to the Development Envelope, representing core habitat with large caves and substantial overhangs. The rocky habitat directly west of the Development Envelope was shallow and unsuitable for the rock-wallaby, while that within the Development Envelope itself, and directly adjacent to the east, may represent suitable habitat supporting shallow caves and overhangs. It is, however, unlikely to represent core habitat.

Based on this study, the Proposal is assessed as representing low risk to the Black-footed Rock-wallaby. The Development Envelope, to which all Proposal activity must be constrained, contains 3.9 ha of suitable habitat, representing approximately 1.4% of the occurrence of breakaway mapped in the desktop habitat mapping exercise (Figure 4.1). The species is considered unlikely to reside either within the Development Envelope or in the area in the immediate vicinity of the proposed haul road for the following reasons: (i) the lack of fresh evidence of rock-wallaby presence anywhere in the Black-footed Rock-wallaby Target Area, even from where the species was previously recorded, including no records on the camera traps anywhere on the range even in areas of most prospective habitat; and (ii) the lack of core habitat in the vicinity of the Proposal haul road.

5.1 Matters of National Environmental Significance Impact Criteria

Based on the assessment of habitat and likelihood of occurrence, an assessment of whether the Proposal is likely to cause significant impact to the Black-footed Rock-wallaby was made against the Matters of National Environmental Significance, Significant impact guidelines 1.1, *Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment 2013) using the criteria for critically endangered and endangered species. The results of this assessment are detailed in Table 5.1.

An impact is defined as 'significant' under guidelines if it is "…*important, notable, or of consequence, having regard to its context or intensity.*" (Department of the Environment 2013). Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment, which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts (Department of the Environment 2013).

We conclude that none of the significant impact criteria would be met, and the adverse effects on potential core habitat for the species are localised and minor in scale (see Table 5.1 for the basis of this conclusion).

As a result, the impacts to the Black-footed Rock-wallaby arising from the action of implementing the Mt Keith Satellite Proposal do not appear to be significant.

Table 5.1: Assessment against Matters of National Environmental Significance (EPBC Act 1999) significant impact criteria.

Impact Criteria	Likelihood	Risk of Significant Impact
Lead to a long-term decrease in the size of a population	The habitat within and near to the Development Envelope does not represent core habitat and so is unlikely to support a resident population of the Black-footed Rock-wallaby. Consequently the likelihood of a long-term impact on a population is considered remote.	Negligible
Reduce the area of occupancy of the species	Although the record from 13.5 km west of the Development Envelope represents the only record from the Murchison bioregion, the rock-wallaby is not expected to reside within the Study Area and the species' area of occupancy will not be reduced.	Negligible
Fragment an existing population into two or more populations	The Proposal haul road represents the only means by which the Proposal could fragment a population. However, the risk of this occurring is very low due to the low likelihood of the species occurrence within or near to the Development Envelope, and because only a small amount of suitable (but non-core) habitat will be disturbed by the Proposal (3.9 ha, representing 1.4% of breakaway habitat mapped within 25 km of the Proposal). Therefore the Proposal haul road is unlikely to represent a barrier to movement or result in vehicle collisions with the Black-footed Rock-wallaby.	Very low
Adversely affect habitat critical to the survival of a species	No core habitat will be impacted by the Proposal.	Negligible
Disrupt the breeding cycle of a population	As there is currently no evidence the Black-footed Rock-wallaby resides or breeds within the Study Area, the species' breeding cycle will not be disrupted.	Negligible
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	As the Development Envelope only contains 3.9 ha of suitable habitat and no core habitat, the likelihood that the species will decline as a result of the Proposal is remote.	Negligible
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The introduction of a haul road between the existing Mt Keith operations and the MKS Proposal has the potential to aid the movement of feral predators (cats/foxes) in the landscape. However, given that no core habitat occurs in the Development Envelope and there is no evidence of a current population of the species, the road is unlikely to introduce predators to an area where the Black-footed Rock-wallaby resides.	Low
Introduce disease that may cause the species to decline.	The likelihood of disease transmission to an individual arising from activities associated with the Proposal is negligible.	Negligible
Interfere with the recovery of the species.	Given that no core habitat occurs in the Development Envelope it is very unlikely that the Proposal will interfere with the recovery of the Black-footed Rock-wallaby.	Negligible

This page intentionally blank.

6.0 References

BCE (2015). Yeelirrie Terrestrial Vertebrate Fauna Review. Unpublished report prepared for Cameco Australia, Bamford Consulting Ecologists.

Biota (2017). Mt Keith Satellite Proposal Vertebrate Fauna Review. Unpublished report prepared for BHP Billiton Nickel West, Biota Environmental Sciences.

Department of the Environment and Energy (2016). Species Profile and Threats Database [WWW Document]. Department of the Environment and Energy, . Retrieved from http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.

Jarman, P., and S. Caprararo (1997). Use of rock-wallaby faecal pellets for detecting and monitoring populations and examining habitat use. *Australian Mammalogy* 19:257–264.

Pearson, D. (2013). Recovery plan for five species of rock wallabies: Black-footed rock wallaby (*Petrogale lateralis*), Short-eared rock wallaby (*Petrogale brachyotis*), Monjon (*Petrogale burbidgei*), Nabarlek (*Petrogale concinna*), Rothschild rock wallaby (*Petrogale rothschildi*). Department of Parks and Wildlife.

Pearson, D. (2016). Surprise! Rock-wallabies found in Kalbarri National Park. *Landscope* 31:35–39.

Western Botanical (2017). Flora and Vegetation Assessment of the Mt Keith Satellite Proposal Study Area. Unpublished Report Prepared for BHP Billiton, Nickel West Pty Ltd, Western Botanical.

Woinarski, J. C. Z., A. A. Burbidge, and P. L. Harrison (2014). *The Action Plan for Australian Mammals 2012*. CSIRO Publishing, Victoria.

Appendix 1

DBCA Regulation 17 Licence

DEPARTMENT OF PARKS AND WILDLIFE

Department of Parks and Wildlife

Enquiries: 17 DICK PERRY AVE, KENSINGTON, WESTERN AUSTRALIA
Telephone: 08 9219 9000
Facsimile: 08 9219 8242
Web Site: https://wildlifelicensing.dpaw.wa.gov.au
Correspondance: **Locked Bag 30**
Bentley Delivery Centre WA 6983

Wildlife Conservation Act 1950

REGULATION 17

Regulation 17 – Licence to take fauna for scientific purposes (Regulation 17 - Standard)

The undermentioned person may take fauna for research or other scientific purposes and where authorised, keep it in captivity, subject to the following and attached conditions, which may be added to, suspended or otherwise varied as considered fit.

Director General

Conditions

1 The licensee shall comply with the provisions of the Wildlife Conservation Act 1950, Wildlife Conservation Regulations 1970 and any Notices in force under this legislation.

2 The licensee shall take fauna only in the manner stated on the endorsed Regulation 17 licence application form and endorsed related correspondence.

3 Unless specifically authorised in the conditions of this Licence or otherwise in writing by the Director General, species of fauna declared as likely to become extinct, rare or otherwise in need of special protection shall not be taken.

4 Any by-catch of fauna, which is declared to be rare, likely to become extinct, or otherwise in need of special protection shall be released immediately at the point of capture. Where such fauna taken under this licence is injured or deceased, the licensee shall contact the Department's Wildlife Licensing Section for advice on disposal. Records must be kept of any such fauna so captured and details are to be included in the report required under further condition below.

5 Any interaction involving Gazetted Threatened Fauna that may be harmful to the fauna and/or invasive may require approval from the Commonwealth Department of the Environment ph 02 6274 1111. Interaction with such species is controlled by the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and Environment Protection and Biodiversity Conservation Regulations 2000 as well as the Wildlife Conservation Act 1950 and Wildlife Conservation Regulations 1970.

6 No fauna shall be taken in areas where it would impinge on pre-existing scientific research programs.

7 Except in the case of approved lethal traps, the licensee shall ensure that measures are taken in the capture and handling of fauna to prevent injury or mortality resulting from that capture or handling. Where traps or other mechanical means or devices are used to capture fauna these shall be deployed so as to prevent exposure of trapped animals to ants and debilitating weather conditions and inspected at regular intervals throughout each day of their use. At the conclusion of research all markers used, and signs and structures erected by the licensee shall be removed and the environment returned to its original condition.

8 Not more than ten specimens of any one protected species of fauna shall be taken and removed from any location less than 20km apart. Where exceptional circumstances make it necessary to take a larger number of specimens from a particular location in order to obtain adequate statistical data, the collector must proceed with circumspection and justify their actions to the Director General in advance.

9 The licensee shall not release any fauna or their progeny in any area where it does not naturally occur, nor hand such fauna over to any other person or authority unless approved by the Director General, nor dispose of the remains of such fauna in any manner likely to confuse the natural or present day distribution of the species.

10 Bioprospecting involving the removal of sample aquatic and terrestrial organisms for chemical extraction and bioactivity screening shall not be conducted without specific written approval by the Director General.

11 No fauna shall be taken from any CALM land, as defined in the Conservation and Land Management Regulations 2002, without prior written approval of the Director General. No fauna shall be taken from any public land without the prior written approval of the Government Authority managing that land.

12 The licensee shall not enter upon any private property or pastoral lease for the purposes of this licence, nor take any fauna from any private land or pastoral lease without the prior consent in writing of the owner or occupier. Similarly, in the case of Aboriginal lands, the licensee must not enter upon or take fauna from such lands without the written approval of the Department of Aboriginal Affairs and/or the relevant native title holders or applicants.

13 Copies of this licence and any written approval or consent required by conditions of this licence must be carried by the licensee and any person/s authorised under the licence at all times when conducting activities relevant to the licence

Department of Parks and Wildlife

Enquiries: 17 DICK PERRY AVE, KENSINGTON, WESTERN AUSTRALIA
Telephone: 08 9219 9000
Facsimile: 08 9219 8242
Web Site: https://wildlifelicensing.dpaw.wa.gov.au
Correspondance: **Locked Bag 30**
Bentley Delivery Centre WA 6983

and must be presented to an authorised officer of the Department upon request.

14 All holotypes and syntypes and a half share of paratypes of species or subspecies permitted to be permanently taken under this licence shall be donated to the Western Australian Museum. Duplicates (one pair in each case) of any species collected, which represents a significant extension of geographic range shall upon request be donated to the Western Australian Museum.

15 To prevent any unnecessary collecting in this State, all specimens and material taken and retained under the authority of this license shall, upon request, be loaned to the Western Australian Museum. Any unused portion or portions of any specimen collected under the authority of this license shall be offered to the Western Australian Museum for inclusion in its collection or made available to other scientific workers if so required.

16 Within one month of the expiration of this licence, the holder shall submit an electronic return into the department's Wildlife Licensing System, detailing the locality, site, geocode, date and number of each species of fauna captured, sighted or vouchered during the currency of the licence. A copy of any paper, report or thesis resulting from the research shall upon completion be lodged with the Director General.

Purpose

Targeted survey for Black-footed Rock Wallaby (Petrogale lateralis) using baited remote motion sensitive cameras.

Locations

BHP Billiton Mt Keith Satellite, Camelot Study Areas.

Authorised Person

Surname	**Given name(s)**
Greenham	Michael

Original Date of Issue	29/06/2017
Date of Issue	29/06/2017
Valid From	03/07/2017
Date of Expiry	27/07/2017

Licensee:	Mr Daniel Kamien
Address	Biota Environmental Sciences Pty Ltd PO Box 155 Leederville WA 6903 Australia

Issued by a Wildlife Licensing Officer of the Department of Parks and Wildlife under delegation from the Minister for Environment pursuant to section 133(1) of the Conservation and Land Management Act 1984.