Peculiar Knob Iron Ore

Annual Compliance Report EPBC 2014/7154
1 December 2022 to 30 November 2024

Southern Iron Pty Ltd

Peak Iron Mines – Perth Head Office ABN: 85 633 258 590 **Southern Iron Pty Ltd** ABN: 52 119 611 068 7 Owston St Mosman Park, WA 6000 Contact: Rob Morrow Email: rob@peakiron.com Phone: 0417 930 256	**Peak Iron Mines – Adelaide Project Office** ABN: 85 633 258 590 **Southern Iron Pty Ltd** ABN: 52 119 611 068 Level 12, 33 King William Street Adelaide, SA 5000 Contact: Diona Antonas Email: diona@peakiron.com Phone: 0411 563 792

Date: 16 February 2024

Doc. Ref: S-2-REP-3-1019_0 EPBC 2014/7154

Executive Declaration

Executive Declaration:

In making this declaration, I am aware that sections 490 and 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) make it an offence in certain circumstances to knowingly provide false or misleading information or documents. The offence is punishable on conviction by imprisonment or a fine, or both. I declare that all the information and documentation supporting this compliance report is true and correct in every particular. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Name	Position or Agent	Signature	Date
Diona Antonas	Manager – Approvals, Environment and Government Relations		16 February 2024

Document Status

Rev No.	Author(s)	Responsible Manager(s)
Rev A	Tegan Stehbens	Diona Antonas
		Manager – Approvals, Environment and Government Relations

Contents

Tables

Figures

List of Appendices

Abbreviations and Definitions

As per the definitions provided in EPBC Act Approval EPBC 2014/7154 and the Annual Compliance Report Guidelines (DotE 2014)

Term	Definition
Baltana sub-region	means STP07 as shown on the *Interim Biogeographic Regionalisation for Australia, Version 7* map published on the Department's website.
Business day	means a day that is not a Saturday, a Sunday or a public holiday in the state or territory of the action.
Commencement/Commencement of the action	means commencement of any works in the Peculiar Knob Iron Ore Project "expansion area".
Compliance report	means a written report: i. providing accurate and complete details of compliance, incidents, and non-compliance with the conditions and the plans; ii. consistent with the Department's Annual Compliance Report Guidelines (2014); iii. include a shapefile of any clearance of any listed threatened species and communities, or their habitat, undertaken within the relevant 12 month period; and iv. annexing a schedule of all plans prepared and in existence in relation to the conditions during the relevant 12-month period.
Compliant	'Compliance' is achieved when all the requirements of a condition have been met, including the implementation of management plans or other measures required by those conditions.
Department	means the Australian Government agency responsible for administering the EPBC Act.
EPBC Act	means the *Environment Protection and Biodiversity Conservation Act 1999*.
Incident	means any event which has the potential to, or does, impact on one or more listed threatened species and communities.
Listed threatened species and communities	means a matter protected under sections 18 and 18A of the EPBC Act.
Minister	means the Australian Government Minister administering the EPBC Act including any delegate thereof.
Non-compliant	A designation of 'non-compliance' should be given where the requirements of a condition or elements of a condition, including the implementation of management plans and other measures, have not been met.
Not applicable	A designation of 'not applicable 'should be given where the requirements of a condition or elements of a condition fall outside of the scope of the current reporting period. For example, a condition which applies to an activity that has not yet commenced.
Plan	means any of the documents required to be prepared, approved by the Minister, implemented by the person taking the action and/or published on the website in accordance with these conditions.
Peculiar Knob Iron Ore Project "expansion area"	means the area identified as the "proposed vegetation clearance area" in Figure 1.
Sensitive ecological data	means data as defined in the Australian Government Department of the Environment (2016) Sensitive Ecological Data – Access and Management Policy V1.0
Shapefile	means location and attribute information of the action provided in an Esri shapefile format. Shapefiles must contain '.shp', '.shx' , '.dbf' files and a '.prj' file that specifies the projection/geographic coordinate system used. Shapefiles must also include an '.xml' metadata file that describes the shapefile for discovery and identification purposes.

Term	Definition
Suitably qualified Thick-billed Grasswren expert	means a person who has professional qualifications, training, skills and/or experience relevant to Thick-billed Grasswren and can give authoritative advice related to rehabilitation of Thick-billed Grasswren habitat.
Thick-billed Grasswren	means the Thick-billed Grasswren (Eastern subspecies) (*Amytornis textilis modestus*) listed as threatened under the EPBC Act.
Threat Abatement Plans	means a Threat Abatement Plan made under the EPBC Act.
Website	means a set of related web pages located under a single domain name attributed to the person taking the action and available to the public.

1 INTRODUCTION

1.1 Project Background

The Peculiar Knob Iron Ore Project (the Project) was approved by the South Australian Department for Manufacturing, Innovation, Trade, Resources and Energy (DMITRE) on 7th of July 2011, and active mining commenced on 1st of December 2011. The Project consists of mining of an estimated 16.7 million tonnes (Mt) of hematite (iron ore) reserves to a vertical depth of 175 metres in the south-eastern portion of ML 6314 area using open pit mining techniques. The Project involves extracting ore at a rate of approximately 3.0 million tonnes per annum (Mt/a). Extracted iron ore is hauled 96 km west to the rail siding at Wirrida and is crushed onsite ready for export via the Port of Whyalla.

In 2013, Southern Iron Pty Ltd (Southern Iron), a wholly owned subsidiary of Peak Iron Mines Pty Ltd, varied the open pit design to decrease the batter angle and widen the overall open pit footprint as a safety measure to prevent wall collapse. A consequential effect of this design change is that a larger volume of waste rock material must be mined to enable the hematite resource to be mined safely. As a result, Southern Iron sought and obtained a new tenement (miscellaneous purposes licence, MPL 147) to facilitate a new waste rock dump just east of the existing mine.

1.2 Project Location

The Peculiar Knob Iron Ore Project (the Project) is located 30 km east of the Stuart Highway, approximately 700 km northwest of Adelaide, and approximately 90 km southeast of Coober Pedy (Figure 1.1). The mine pit, pit access road, haul road, rail siding and crusher plant are all located within the Woomera Prohibited Area, which has been gazetted by the Commonwealth Department of Defence. Southern Iron has an access agreement with the Department of Defence regarding secure access to the Woomera Prohibited Area for mining purposes at Peculiar Knob. The agreement also includes the right to construct, operate, maintain, repair, and replace any road or water transmission system or anything else which is an ancillary activity within the access/infrastructure areas.

1.3 EPBC Act Approval History

Mining and ancillary operations in the Peculiar Knob Mining Area were originally referred under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 5 September 2010. The Project was deemed a 'controlled action' due to potential impacts on the nationally vulnerable *Amytornis textilis modestus* (Thick-billed Grasswren, eastern subspecies). The original application included construction and operation of a mine pit, haul road, rail siding, crusher, accommodation village and groundwater bores, with clearing of up to 400 ha of potential Thick-billed Grasswren habitat. The project was ultimately approved on 8 June 2011 (EPBC 2010/5634).

On 30 October 2012, a variation to conditions of the EPBC approval (Decision Notice EPBC 2010/5634) was obtained, reflecting an increase of 123 ha to the area of potential Thick-billed Grasswren habitat approved for clearance in the Peculiar Knob mining area. This variation increased the total approved clearance area in the Peculiar Knob mining area to 523 ha (see Figure 1.2).

On 11 March 2014, an additional referral was made to the Commonwealth Department of the Environment (DotE) (previously DSEWPaC), which related to the proposed new tenement area required to accommodate extra waste material generated as a result of the pit redesign (Southern Iron

2014). On 11 April 2014, the DotE determined that the proposed action is a ‘controlled action’, with the expansion obtaining approval on 28 July 2014 (EPBC 2014/7154).

As per the Approval Decision Notice- Peculiar Knob Iron Ore Project (EPBC 2014/7154) dated 29 July 2014, a Feral Animal Control Programme (Revision 4) for the expanded area was submitted to Department of Agriculture, Water and the Environment (DAWE) (previously DotE) on the 6 March 2020 and was approved on 10 March 2020. An approval to extend the period of effect by 10 years and subsequent Variations to Conditions Attached to Approval was documented in April 2020 (see Appendix A).

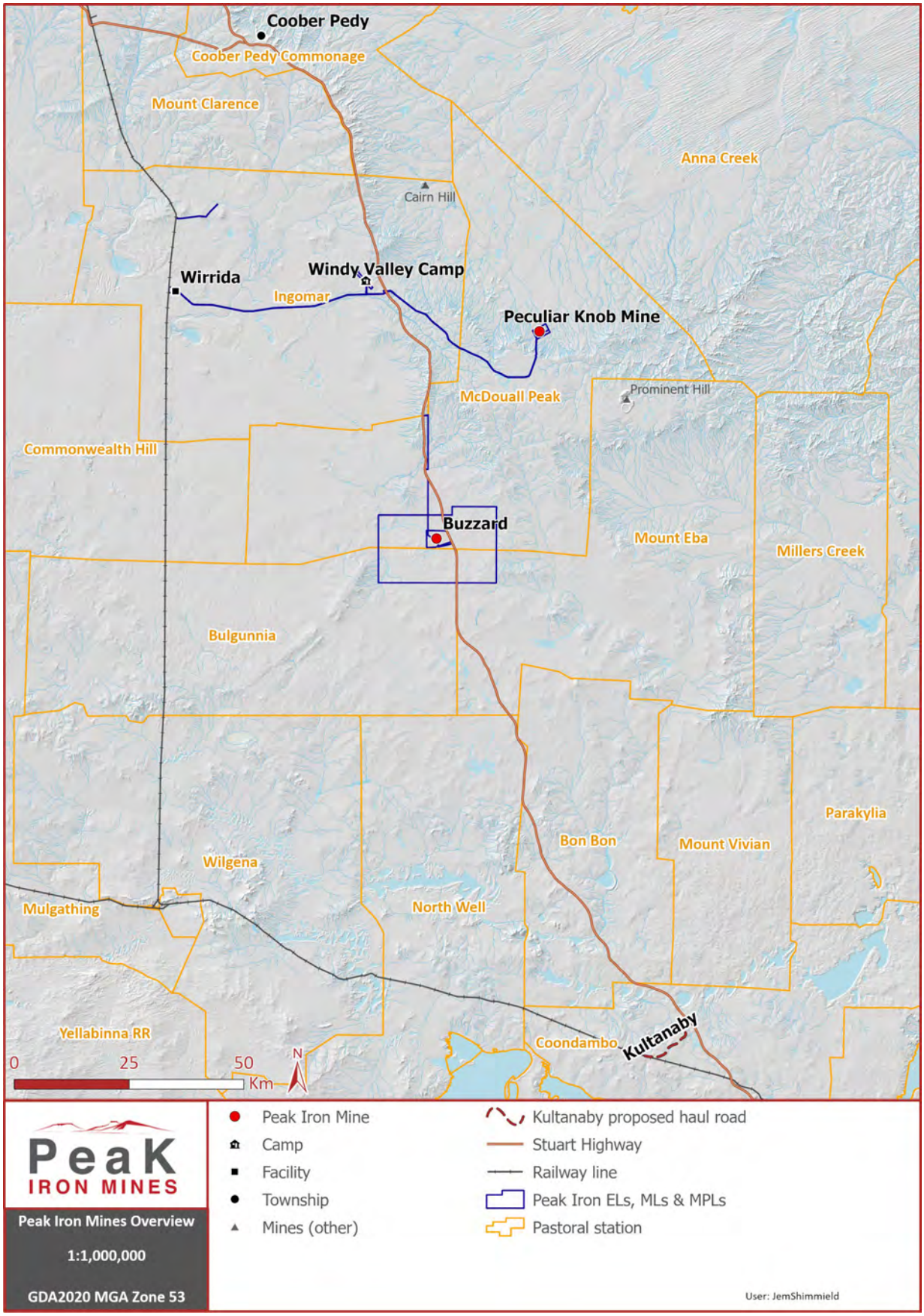


Figure 1.1 Peak Iron Mines overview map

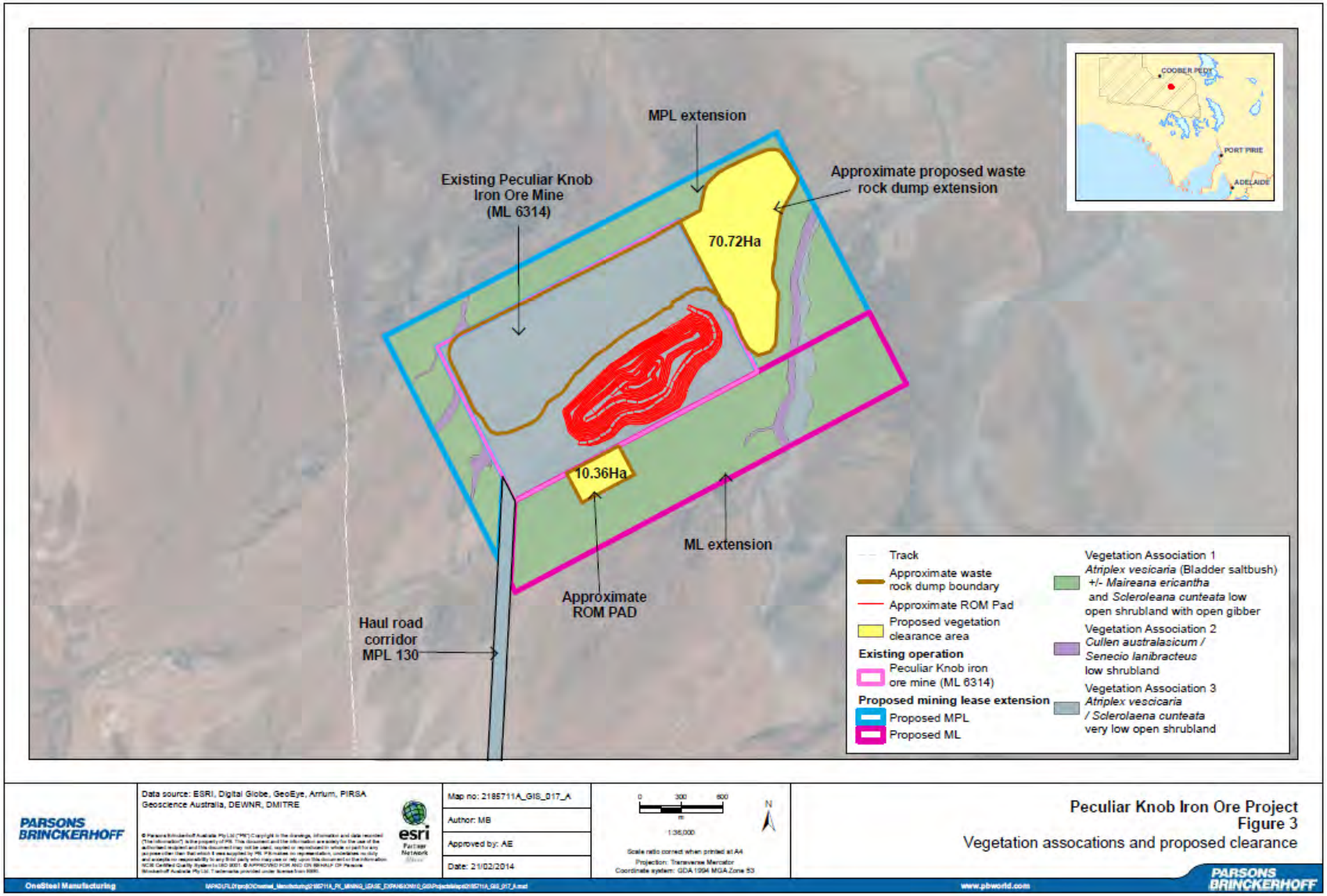


Figure 1.2 Approved clearance for Peculiar Knob Iron Ore expansion (reproduction of Figure 3 from EPBC Referral 2014/7145)

2 DESCRIPTION OF ACTIVITIES

2.1 Approved Action

The Approved Action under EPBC 2014/7154 (amended 28 April 2020) is:

> To expand the Peculiar Knob Iron Ore Project as a result of a revised pit design leading to additional waste rock. Located approximately 90 km southeast of Coober Pedy, South Australia.

As detailed in EPBC Act referral 2014/7154, Southern Iron sought to expand the Peculiar Knob iron ore mineral lease area to accommodate extra waste material as a result of a pit re-design to ensure safe mining practices can be employed. The additional area would require clearing of an additional 81.08 ha of native vegetation, which was assessed as potential habitat for Thick-billed Grasswren.

The action (clearance of vegetation) commenced on 1 December 2020, as communicated in writing to the Department on 9 December 2021.

2.2 Current Activities

2.2.1 Fauna Surveys

Thick-billed Grasswren Habitat Assessment

In 2014, Southern Iron contracted Ecological Horizons Pty Ltd to conduct a Thick-billed Grasswren habitat survey of the proposed waste rock dump expansion area to fulfill Condition 4 of the EPBC conditions (EPBC 2014/7154, see Appendix A). The survey report is presented in Appendix B.

The habitat survey was led by Dr John Read, a published fauna specialist with over thirty years' experience conducting fauna surveys and habitat assessments in the South Australian arid zone.

No Thick-billed Grasswrens were detected during the survey, although previous sightings in the region and suitable habitat suggest the northern third of this area does provide suitable habitat for the species. Ecological Horizons (2014) note that due to their secretive nature, failure to detect Grasswrens during short surveys cannot be considered to indicate the absence of this species, nor the unsuitability of the habitat. Thick-billed Grasswrens have been recorded from the nearby permanent fauna monitoring sites and at other nearby sites (Ecological Horizons 2014).

Ecological Horizons (2014) assessed the impact footprint of the waste rock dump extension to determine whether the vegetation could be considered suitable habitat for Thick-billed Grasswrens. Two habitat types were mapped across the impact footprint:

1. The southern portion is characterised by hard-packed clay soils that shed water and are typically vegetated by low sparse chenopods. This habitat is highly unlikely to support grasswrens because it lacks the extensive patches of emergent chenopods that characterize their habitat.
2. the northern third features more gypseous cracking soils and endorheic gilgais and the headwaters of ephemeral streams. These water-holding or water-transporting habitats support larger emergent chenopods, especially Atriplex omissa and Rhagodia spp that provide suitable habitat for Thick-billed Grasswrens.

The results of the fauna habitat mapping are presented in Figure 2.1.

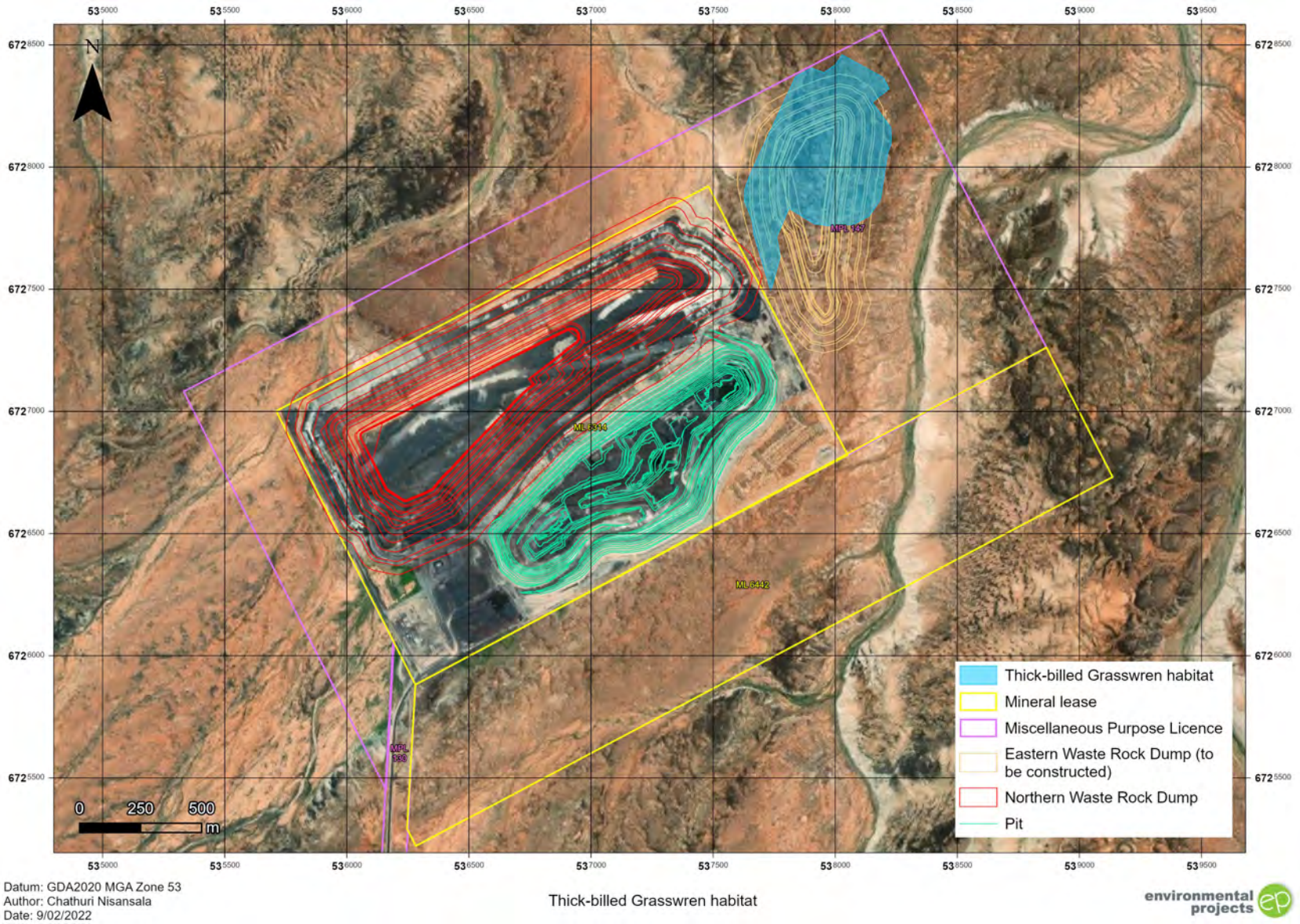


Figure 2.1 Thick-billed Grasswren habitat

Annual Fauna Survey

EBS Ecology was engaged by Peak Iron Mines Pty Ltd (PIM) to conduct the annual ecological compliance monitoring for Peculiar Knob Iron Ore Project (the PK project) in spring 2023, as required under the Program for Environment Protection and Rehabilitation (PEPR). The full report from this survey is presented in Appendix C.

The spring 2022 survey was postponed from late October 2022 to autumn 2023 due to flooding, which made the sites inaccessible. The autumn 2023 survey was scheduled for 12 to 18 April 2023. The results were reported alongside the results of the spring 2023 survey (see Appendix C).

The objectives of the 2023 surveys were to:

- Measure and compare abundance and diversity of fauna at established impact and control sites.
- Compare capture trends at impact sites and control sites when compared to baseline data (EBS 2007).
- Determine if any significant decrease in abundance or diversity of native fauna can be attributed to mining operations (including fire), when compared to control sites.
- Determine if any new pest species (feral animals) have been introduced, or if existing pest species have increased in abundance.

Results from the autumn and spring 2023 surveys found no observable impact to native fauna abundance or diversity caused by mining operations. Specifically:

- There was no reduction in occupancy or abundance of fauna species of conservation significance such as Thick-billed Grasswren or Chestnut-breasted Whiteface.
- Results of the monitoring program demonstrate no adverse impacts on native fauna abundance or diversity when compared with control sites.
- There was no demonstrated increase in pests or incursion of new pest species.
- There were no adverse impacts on fauna abundance or diversity at ephemeral ecosystems when compared with control site results. A reduction in reptiles since 2020 at PK7 was observed at both the control and impact site, which suggests this is unlikely to be unrelated to mine impacts.

In addition to monitoring the general health of populations of native fauna within the Project Area, a program was implemented to monitor the populations of Thick-billed Grasswrens which occur within the Project Area. Thick-billed Grasswrens were observed to occupy three sites during the autumn 2023 bird survey, and during the spring 2023 bird survey were observed at two sites and were observed opportunistically at two additional sites.

2.2.2 Vegetation Clearing

Vegetation clearance commenced 1 December 2020. A total 51.77 ha of vegetation was cleared at the end of the previous reporting period. This is less than the maximum clearing allowance for the eastern waste rock dump of 81.08 ha. No additional vegetation clearing was conducted during the reporting period.

Of the total amount cleared, 28.13 ha considered Thick-billed Grasswren habitat, as per the pre-clearing habitat assessment completed by Ecological Horizons in 2014 (see Section 2.2.1 and Appendix B).

2.2.3 2.2.3 Feral Animal Control Programme

Although vegetation clearance for the Project expansion (and thus the commencement of the activity) only began on 1 December 2020, the approved Feral Animal Control Programme was first implemented in May 2020. The Programme has been implemented twice a year, in autumn and spring, in years 2020, 2021, 2022, and 2023. See the previous EPBC Annual Compliance Report for the results of the 2020, 2021 and 2022 Control Programme; the details of the 2023 Programme are provided below.

Autumn 2022

Feral Solutions conducted baiting (both 1080 baits and Curiosity Cat Baits) and spotlighting over four days during April 2023, as per the programme. The program was cut short as a storm and the resulting rain prevented access to the site. Fox baits and cat traps were laid during the programme, and one fox was shot on the site during spotlighting operations. The rainfall prevented confirmation of whether any baits were taken.

Spring 2022

Feral Solutions conducted baiting and spotlighting between 30 September and 14 October 2023. Fox baits and curiosity cat baits were laid during the programme, and six cats were shot on the site during spotlighting operations.

2.3 Incidents

As per Decision Notice EPBC 2014/7154 (see Appendix A), an ‘incident’ is defined as any event which has the potential to, or does, impact on one or more listed threatened species and communities.

No events of this nature occurred at the Peculiar Knob Iron Ore Project during the reporting period.

3 COMPLIANCE

3.1 Compliance Reporting

This report is the third Annual Compliance Report against the EPBC Approval Conditions (EPBC 2014/7154, see Appendix A) for Peculiar Knob and covers the 12-month period from 1 December 2022 to 30 November 2023.

This report will be published on the Peak Iron website by 28 February 2024.

3.2 Assessment Against the EPBC Approval Conditions

The review of the Project against the EPBC Approval Conditions is detailed in Table 3.1. The assessment found that the Project was 'compliant' for 13 of the 15 conditions, with the remaining two considered 'not applicable'.

As per the Annual Compliance Report Guidelines (DotE 2014), the following designations are used to record findings in compliance reports:

Compliant: 'Compliance' is achieved when all the requirements of a condition have been met, including the implementation of management plans or other measures required by those conditions.

Non-compliant: A designation of 'non-compliance' is given where the requirements of a condition or elements of a condition, including the implementation of management plans and other measures, have not been met.

Not applicable: A designation of 'not applicable' is given where the requirements of a condition or elements of a condition fall outside of the scope of the current reporting period. For example, a condition which applies to an activity that has not yet commenced.

3.3 New Environmental Risks

No new environmental risks to listed threatened flora and fauna, or other matters of national environmental significance, were identified during the reporting period.

Table 3.1 Review against the EPBC Approval Conditions

Ref	Condition	Compliance	Evidence/Comments
1	At the expiry date of this approval, there must be no permanent adverse impact as a result of the action on the abundance of the **Thick-billed Grasswren** within the **Peculiar Knob Iron Ore Project "expansion area"**.	Compliant	The annual spring fauna monitoring survey scheduled for 2022 was delayed due to unforeseen events. The survey was rescheduled for April 2023 (autumn). The annual spring fauna monitoring survey for 2023 was completed. The results for both surveys are reported together in Appendix C. The combined results of the autumn and spring 2023 surveys found no observable impact to native fauna abundance or diversity caused by mining operations.
2	**Habitat Clearing** The person taking the action must not clear more than 81.08 hectares of potential **Thick-billed Grasswren** habitat from the **Peculiar Knob Iron Ore Project "expansion area"**.	Compliant	Vegetation clearance commenced 1 December 2020. A total 51.77 of Thick-Billed Grasswren habitat has been cleared. No clearing has been undertaken during the previous monitoring period.
3	**Habitat Rehabilitation** The person taking the action must rehabilitate **Thick-billed Grasswren** habitat removed within the **Peculiar Knob Iron Ore Project "expansion area"** as a result of the action to a quality of habitat equivalent to the habitat removed.	Not applicable	Habitat rehabilitation has not yet commenced, as operations are ongoing at this stage. The final form of the eastern waste rock dump (within the "expansion area") should be in place in late 2024, with rehabilitation to commence from then.
4	Prior to the clearance of vegetation within the **Peculiar Knob Iron Ore Project "expansion area"** the person taking the action must conduct a habitat survey to establish the quality and extent of **Thick-billed Grasswren** habitat within the **Peculiar Knob Iron Ore Project "expansion area"**. The habitat survey must be undertaken by a **suitably qualified Thick-billed Grasswren expert**. The results of the habitat survey are to be used by the person taking the action as the baseline for rehabilitation activities required by Condition 3 and be reported in the annual **compliance report** required by Condition 10.	Compliant	A Thick-billed Grasswren habitat survey was undertaken and completed by a suitably qualified Thick-billed Grasswren expert (Ecological Horizons 2014, see Appendix B).

Ref	Condition	Compliance	Evidence/Comments
5	The person taking the action must conduct ongoing monitoring of progress towards meeting the outcome in Condition 3, including, but not limited to, the following: a) Following cessation of construction and operation activities associated with the **Peculiar Knob Iron Ore Project "expansion area"**, the person taking the action must undertake an audit of the final **Peculiar Knob Iron Ore Project "expansion area"** landform and determine the actions required to achieve Condition 3. The audit must be done in consultation with a **suitably qualified Thick-billed Grasswren expert** and the results and actions identified reported in the annual **compliance report** required by Condition 10. b) Following the audit required by Condition 5 (a), the person taking the action must conduct annual habitat surveys to monitor rehabilitation of the **Peculiar Knob Iron Ore Project "expansion area"**. The annual habitat surveys must be undertaken **by a suitably qualified Thick-billed Grasswren** expert. The results of the annual habitat surveys must report on the progress of rehabilitation activities, identify whether or not **Thick-billed Grasswren** habitat recovery is evident and progressing satisfactorily and, if required, identify and recommend actions for promoting and accelerating the rate of **Thick-billed Grasswren** habitat recovery. The results and recommendations of the annual habitat surveys must be included in the annual **compliance report** required by Condition 10. c) Condition 5 (b) ceases to apply once the person taking the action has demonstrated to the satisfaction of the **Minister** that Condition 3 has been achieved.	Not applicable	Habitat rehabilitation has not yet commenced, as operations are ongoing at this stage. The final form of the eastern waste rock dump (within the "expansion area") should be in place in late 2024, with rehabilitation to commence from then. An audit as per condition 5(a) will be initiated as part of the closure planning process with annual habitat monitoring to commence following the results of the audit, as per condition 5(b).
6	Any incidental observations during the monitoring activities required by Condition 5 of a **Thick-billed Grasswren** or a **Thick-billed Grasswren** nest must be reported in the annual **compliance report** required by Condition 10.	Compliant	Thick-billed Grasswrens were observed to occupy three sites during the autumn 2023 bird survey, and during the spring 2023 bird survey were observed at two sites and were observed opportunistically at two additional sites (Appendix C).

Ref	Condition	Compliance	Evidence/Comments
7	**Offsets** 7. To offset residual significant impacts to the **Thick-billed Grasswren**, the person taking the action must prepare and submit a Feral Animal Control Programme for approval by the **Minister**. The Feral Animal Control Programme must (but is not limited to): a) apply to a minimum 400 ha area of **Thick-billed Grasswren** habitat within the ***Baltana* sub-region**; b) include measures, consistent with relevant **Threat Abatement Plans**, to control feral cats (*Felis catus*), European wild rabbits (*Oryctolagus cuniculus*) and European red fox (*Vulpes vulpes*); c) be implemented prior to clearing of the **Peculiar Knob Iron Ore Project "expansion area"** and remain in place until the **Peculiar Knob Iron Ore Project "expansion area"** has been rehabilitated in accordance with Condition 3. The Feral Animal Control Programme must be submitted to the **Minister** for approval at least three (3) months prior to implementation. The approved Feral Animal Control Programme must be implemented.	Compliant	The Feral Animal Control Programme was approved by the Department on 10 March 2020 (see Appendix D). The programme has been implemented in autumn and spring of 2020, 2021, 2022 and 2023 (see Section 2.23 and previous EPBC Act Compliance Report).
8	Within 10 days after the **commencement** of the action, the person taking the action must advise the **Department** in writing of the actual date of **commencement**.	Compliant	The action (clearance of vegetation) commenced on 1 December 2020, as communicated in writing to the Department on 9 December 2021.
9	The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement the programme and rehabilitation activities required by this approval, and make them available upon request to the **Department**. Such records may be subject to audit by the **Department** or an independent auditor in accordance with section 458 of the **EPBC Act** or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the **Department's** website. The results of audits may also be publicised through the general media.	Compliant	Records of the actions taken regarding vegetation clearing and implementation of the EPBC Feral Animal Control Programme are being recorded in the Peculiar Knob Environmental Management System and are available for audit on request.

Ref	Condition	Compliance	Evidence/Comments
10	**Annual compliance reporting** The person taking the action must prepare a **compliance report** for each 12-month period following the date of **commencement of the action**, or otherwise in accordance with an annual date that has been agreed to in writing by the **Minister**. The person taking the action must: a. publish each **compliance report** on the **website** within 60 **business days** following the relevant 12-month period; b. notify the Department by email that a compliance report has been published on the website and provide the weblink for the compliance report within five business days of the date of publication; c. keep all **compliance reports** publicly available on the **website** until this approval expires; d. exclude or redact **sensitive ecological data** from **compliance reports** published on the **website**; and e. where any **sensitive ecological data** has been excluded from the version published, submit the full **compliance report** to the **Department** within 5 **business days** of publication. Note: **Compliance reports** may be published on the **Department's** website.	Compliant	This report is the second Annual Compliance Report against the EPBC Approval Conditions for Peculiar Knob. This report will be published on the Peak Iron website by 28 February 2024.
10A	**Reporting non-compliance** The person taking the action must notify the **Department** in writing of any: **incident**; non-compliance with the conditions; or non-compliance with the commitments made in **plans**. The notification must be given as soon as practicable, and no later than two **business days** after becoming aware of the **incident** or non-compliance. The notification must specify: a. any condition which is or may be in breach; b. a short description of the **incident** and/or non-compliance; and c. the location (including co-ordinates), date, and time of the **incident** and/or non-compliance. In the event the exact information cannot be provided, provide the best information available.	Compliant	No incidents or non-compliances with the conditions have occurred.

Ref	Condition	Compliance	Evidence/Comments
10B	The person taking the action must provide to the **Department** the details of any **incident** or non-compliance with the conditions or commitments made in **plans** as soon as practicable and no later than 10 **business days** after becoming aware of the **incident** or non-compliance, specifying: a. any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future; b. the potential impacts of the **incident** or non-compliance; and c. the method and timing of any remedial action that will be undertaken by the person taking the action.	Compliant	No incidents or non-compliances with the conditions have occurred.
11	If the person taking the action wishes to carry out any activity otherwise than in accordance with the programme as specified in the conditions, the person taking the action must submit to the **Department** for the **Minister's** written approval a revised version of that programme. The varied activity shall not commence until the **Minister** has approved the varied programme in writing. The **Minister** will not approve a varied programme unless the revised programme would result in an equivalent or improved environmental outcome over time. If the **Minister** approves the revised programme, that programme must be implemented in place of the programme originally approved.	Compliant	No other actions required.
12	If the **Minister** believes that it is necessary or convenient for the better protection of **listed threatened species and communities** to do so, the **Minister** may request that the person taking the action make specified revisions to the programme specified in the conditions and submit the revised programme for the **Minister's** written approval. The person taking the action must comply with any such request. The revised approved programme must be implemented. Unless the **Minister** has approved the revised programme, then the person taking the action must continue to implement the programme originally approved, as specified in the conditions.	Compliant	A revision has not been requested.

Ref	Condition	Compliance	Evidence/Comments
13	Unless otherwise agreed to in writing by the **Minister**, the person taking the action must publish the programme referred to in these conditions of approval on their **website**. The programme must be published on the **website** within one (1) month of being approved. The person taking the action must notify the **Department** within five (5) **business days** of publishing the programme on the **website**. The programme must remain on their **website** for the period this approval has effect.	Compliant	The Feral Animal Control Programme has been published on Peak Iron Mines website and the Department notified.

*Refer to glossary for full definition of items in **bold**.

REFERENCES

Department of the Environment (DotE) 2014. *Annual Compliance Report Guidelines*, Department of the Environment, Australian Government, Canberra.

Ecological Horizons Pty Ltd 2014. *Proposed Peculiar Knob Waster-rock Dump Extension Thick-billed Grasswren Appraisal*, November 2014, unpublished report prepared for Southern Iron Pty Ltd.

Southern Iron Pty Ltd (Southern Iron) 2014. *EPBC Referral, Peculiar Knob ML & MPL Tenement Extension.* Referred under the EPBC Act to the Commonwealth, see EPBC 2014/7145.

Enbironment and Biodiversity Services (EBS) 2023. *Peculiar Knob Iron Ore Project Annual Fauna Survey Report Autumn / Spring 2023*, February 2023, unpublished report prepared for Peak Iron Mines Pty Ltd.

Appendix A

Decision Notice EPBC 2014/7145 (as amended 28 April 2020)

Australian Government
Department of Agriculture, Water and the Environment

VARIATION OF CONDITIONS ATTACHED TO APPROVAL

Expansion of the Peculiar Knob Iron Ore Project, SA (EPBC 2014/7154)

This decision to vary conditions of approval is made under section 143 of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Approved Action

Person to whom the approval is granted	Southern Iron Pty Ltd ACN: 119 611 068
approved action	To expand the Peculiar Knob Iron Ore Project as a result of a revised pit design leading to additional waste rock. Located approximately 90 km southeast of Coober Pedy, South Australia [See EPBC Act referral 2014/7154]

Variation

Variation of conditions attached to approval	The variation is: Delete condition 10 attached to the approval and substitute with the conditions 10, 10A and 10B specified in table below Add new definitions of Business day, Compliance report, Incident, Plan, Sensitive ecological data, Shapefile and Website specified in the table below
Date of effect	This variation has effect on the date the instrument is signed

Person authorised to make decision

Name and position	Greg Manning Assistant Secretary Assessments (WA, SA, NT), Post Approvals and Policy Branch
Signature	
Date of decision	28 April 2020

Date of decision	Conditions attached to approval
Original dated 29/07/2014	1. At the expiry date of this approval, there must be no permanent adverse impact as a result of the action on the abundance of the **Thick-billed Grasswren** within the **Peculiar Knob Iron Ore Project "expansion area"**.
Original dated 29/07/2014	**Habitat Clearing** 2. The person taking the action must not clear more than 81.08 hectares of potential **Thick-billed Grasswren** habitat from the **Peculiar Knob Iron Ore Project "expansion area"**.
Original dated 29/07/2014	**Habitat Rehabilitation** 3. The person taking the action must rehabilitate **Thick-billed Grasswren** habitat removed within the **Peculiar Knob Iron Ore Project "expansion area"** as a result of the action to a quality of habitat equivalent to the habitat removed.
Original dated 29/07/2014	4. Prior to the clearance of vegetation within the **Peculiar Knob Iron Ore Project "expansion area"** the person taking the action must conduct a habitat survey to establish the quality and extent of **Thick-billed Grasswren** habitat within the **Peculiar Knob Iron Ore Project "expansion area"**. The habitat survey must be undertaken by a **suitably qualified Thick-billed Grasswren expert**. The results of the habitat survey are to be used by the person taking the action as the baseline for rehabilitation activities required by Condition 3 and be reported in the annual **compliance report** required by Condition 10.
Original dated 29/07/2014	5. The person taking the action must conduct ongoing monitoring of progress towards meeting the outcome in Condition 3, including, but not limited to, the following: a) Following cessation of construction and operation activities associated with the **Peculiar Knob Iron Ore Project "expansion area"**, the person taking the action must undertake an audit of the final **Peculiar Knob Iron Ore Project "expansion area"** landform and determine the actions required to achieve Condition 3. The audit must be done in consultation with a **suitably qualified Thick-billed Grasswren expert** and the results and actions identified reported in the annual **compliance report** required by Condition 10. b) Following the audit required by Condition 5 (a), the person taking the action must conduct annual habitat surveys to monitor rehabilitation of the **Peculiar Knob Iron Ore Project "expansion area"**. The annual habitat surveys must be undertaken by a **suitably qualified Thick-billed Grasswren expert**. The results of the annual habitat surveys must report on the progress of rehabilitation activities, identify whether or not **Thick-billed Grasswren** habitat recovery is evident and progressing satisfactorily and, if required, identify and recommend actions for promoting and accelerating the rate of **Thick-billed Grasswren** habitat recovery. The results and recommendations of the annual habitat surveys must be included in the annual **compliance report** required by Condition 10. c) Condition 5 (b) ceases to apply once the person taking the action has demonstrated to the satisfaction of the **Minister** that Condition 3 has been achieved.

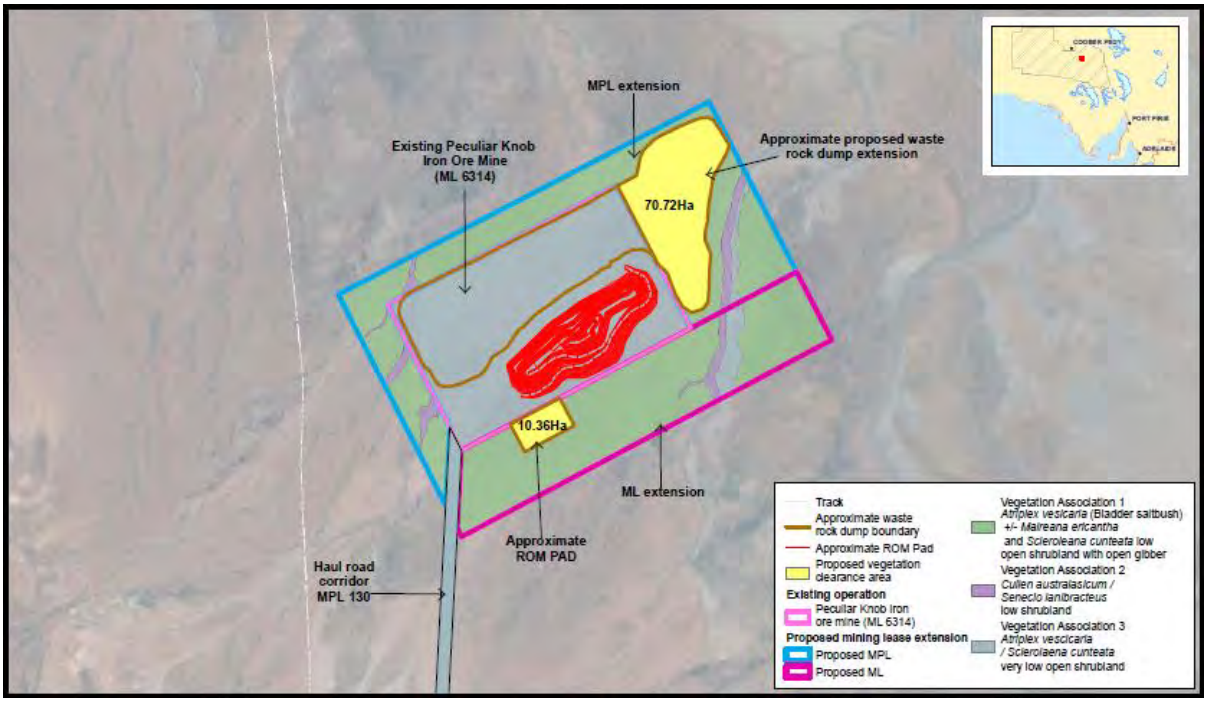
Date of decision	Conditions attached to approval
Original dated 29/07/2014	6. Any incidental observations during the monitoring activities required by Condition 5 of a **Thick-billed Grasswren** or a **Thick-billed Grasswren** nest must be reported in the annual **compliance report** required by Condition 10.
Original dated 29/07/2014	**Offsets** 7. To offset residual significant impacts to the **Thick-billed Grasswren**, the person taking the action must prepare and submit a Feral Animal Control Programme for approval by the **Minister**. The Feral Animal Control Programme must (but is not limited to): a) apply to a minimum 400 ha area of **Thick-billed Grasswren** habitat within the ***Baltana* sub-region;** b) include measures, consistent with relevant **Threat Abatement Plans**, to control feral cats (*Felis catus*), European wild rabbits (*Oryctolagus cuniculus*) and European red fox (*Vulpes vulpes*); c) be implemented prior to clearing of the **Peculiar Knob Iron Ore Project "expansion area"** and remain in place until the **Peculiar Knob Iron Ore Project "expansion area"** has been rehabilitated in accordance with Condition 3. The Feral Animal Control Programme must be submitted to the **Minister** for approval at least three (3) months prior to implementation. The approved Feral Animal Control Programme must be implemented.
Original dated 29/07/2014	**Standard Conditions** 8. Within 10 days after the **commencement** of the action, the person taking the action must advise the **Department** in writing of the actual date of **commencement**.
Original dated 29/07/2014	9. The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement the programme and rehabilitation activities required by this approval, and make them available upon request to the **Department**. Such records may be subject to audit by the **Department** or an independent auditor in accordance with section 458 of the **EPBC Act** or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the **Department's** website. The results of audits may also be publicised through the general media.
As varied on the date this instrument was signed	**Annual compliance reporting** 10. The person taking the action must prepare a **compliance report** for each 12-month period following the date of **commencement of the action**, or otherwise in accordance with an annual date that has been agreed to in writing by the **Minister**. The person taking the action must: a. publish each **compliance report** on the **website** within 60 **business days** following the relevant 12-month period; b. notify the **Department** by email that a **compliance report** has been published on the **website** and provide the weblink for the **compliance report** within five **business day**s of the date of publication;

Date of decision	Conditions attached to approval
	c. keep all **compliance reports** publicly available on the **website** until this approval expires; d. exclude or redact **sensitive ecological data** from **compliance reports** published on the **website**; and e. where any **sensitive ecological data** has been excluded from the version published, submit the full **compliance report** to the **Department** within 5 **business days** of publication. Note: **Compliance reports** may be published on the **Department**'s website.
As varied on the date this instrument was signed	**Reporting non-compliance** 10A. The person taking the action must notify the **Department** in writing of any: **incident;** non-compliance with the conditions; or non-compliance with the commitments made in **plans**. The notification must be given as soon as practicable, and no later than two **business days** after becoming aware of the **incident** or non-compliance. The notification must specify: a. any condition which is or may be in breach; b. a short description of the **incident** and/or non-compliance; and c. the location (including co-ordinates), date, and time of the **incident** and/or non-compliance. In the event the exact information cannot be provided, provide the best information available.
As varied on the date this instrument was signed	10B. The person taking the action must provide to the **Department** the details of any **incident** or non-compliance with the conditions or commitments made in **plans** as soon as practicable and no later than 10 **business days** after becoming aware of the **incident** or non-compliance, specifying: a. any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future; b. the potential impacts of the **incident** or non-compliance; and c. the method and timing of any remedial action that will be undertaken by the person taking the action.
Original dated 29/07/2014	11. If the person taking the action wishes to carry out any activity otherwise than in accordance with the programme as specified in the conditions, the person taking the action must submit to the **Department** for the **Minister's** written approval a revised version of that programme. The varied activity shall not commence until the **Minister** has approved the varied programme in writing. The **Minister** will not approve a varied programme unless the revised programme would result in an equivalent or improved environmental outcome over time. If the **Minister** approves the revised programme, that programme must be implemented in place of the programme originally approved.
Original dated 29/07/2014	12. If the **Minister** believes that it is necessary or convenient for the better protection of **listed threatened species and communities** to do so, the **Minister** may request that the person taking the action make specified revisions to the programme specified in the conditions and submit the revised programme for the **Minister's** written approval. The person taking the action must comply with any such request. The revised approved programme must be implemented. Unless the **Minister** has approved the revised programme, then the person taking the action must continue to implement the programme originally approved, as specified in the conditions.

Date of decision	Conditions attached to approval
Original dated 29/07/2014	13. Unless otherwise agreed to in writing by the **Minister**, the person taking the action must publish the programme referred to in these conditions of approval on their **website**. The programme must be published on the **website** within one (1) month of being approved. The person taking the action must notify the **Department** within five (5) **business days** of publishing the programme on the **website**. The programme must remain on their **website** for the period this approval has effect.

Date of decision	Definitions attached to approval
Original dated 29/07/2014	***Baltana* sub-region** means STP07 as shown on the *Interim Biogeographic Regionalisation for Australia, Version 7* map published on the **Department's** website.
As varied on the date this instrument was signed	**Business day** means a day that is not a Saturday, a Sunday or a public holiday in the state or territory of the action.
Original dated 29/07/2014	**Commencement/Commencement of the action** means commencement of any works in the **Peculiar Knob Iron Ore Project "expansion area**".
As varied on the date this instrument was signed	**Compliance report** means a written report: i. providing accurate and complete details of compliance, **incidents**, and non-compliance with the conditions and the **plans**; ii. consistent with the **Department's** *Annual Compliance Report Guidelines* (2014); iii. include a **shapefile** of any clearance of any **listed threatened species and communities**, or their habitat, undertaken within the relevant 12 month period; and iv. annexing a schedule of all **plans** prepared and in existence in relation to the conditions during the relevant 12-month period.
As varied on the date this instrument was signed	**Department** means the Australian Government agency responsible for administering the **EPBC Act**.
Original dated 3/3/2011	**EPBC Act** means the *Environment Protection and Biodiversity Conservation Act 1999.*
As varied on the date this instrument was signed	**Incident** means any event which has the potential to, or does, impact on one or more **listed threatened species and communities**.
Original dated 29/07/2014	**Listed threatened species and communities** means a matter protected under sections 18 and 18A of the **EPBC Act**.
Original dated 29/07/2014	**Minister** means the Australian Government Minister administering the **EPBC Act** including any delegate thereof.
As varied on the date this instrument was signed	**Plan** means any of the documents required to be prepared, approved by the **Minister**, implemented by the person taking the action and/or published on the **website** in accordance with these conditions.

Date of decision	Definitions attached to approval
Original dated 29/07/2014	**Peculiar Knob Iron Ore Project "expansion area"** means the area identified as the "proposed vegetation clearance area" in Figure 1.
As varied on the date this instrument was signed	**Sensitive ecological data** means data as defined in the Australian Government Department of the Environment (2016) *Sensitive Ecological Data – Access and Management Policy V1.0*
As varied on the date this instrument was signed	**Shapefile** means location and attribute information of the action provided in an Esri shapefile format. Shapefiles must contain '.shp', '.shx' , '.dbf' files and a '.prj' file that specifies the projection/geographic coordinate system used. Shapefiles must also include an '.xml' metadata file that describes the shapefile for discovery and identification purposes**.**
Original dated 29/07/2014	**Suitably qualified Thick-billed Grasswren expert** means a person who has professional qualifications, training, skills and/or experience relevant to **Thick-billed Grasswren** and can give authoritative advice related to rehabilitation of **Thick-billed Grasswren** habitat.
Original dated 29/07/2014	**Thick-billed Grasswren** means the Thick-billed Grasswren (Eastern subspecies) (*Amytornis textilis modestus*) listed as threatened under the **EPBC Act**.
Original dated 29/07/2014	**Threat Abatement Plans** means a Threat Abatement Plan made under the **EPBC Act**.
As varied on the date this instrument was signed	**Website** means a set of related web pages located under a single domain name attributed to the person taking the action and available to the public.

Date of decision	**Annexures**
Original dated 29/07/2014	**Figure 1:** Map of the Peculiar Knob Iron Ore Project "expansion area" 

Appendix B

Thick-billed Grasswren Appraisal, Ecological Horizons 2014

Proposed Peculiar Knob Waster-rock Dump Extension Thick-billed Grasswren Appraisal

November 2014

DRAFT

Ecological Horizons Pty Ltd

Potential Thick-billed Grasswren habitat within the proposed Peculiar Knob Waste Rock Dump extension

Limitations Statement

In preparing this document Ecological Horizons Pty Ltd makes no warranty or guarantee, whether expressed or implied, with respect to the information reported or to the findings, observations or conclusions expressed in this document. Further, such information, findings, observations and conclusions are based solely on observations made and information available to Ecological Horizons Pty Ltd at the time of this study.

Scope

Ecological Horizons was contracted by Arrium (Southern Iron) to conduct a an assessment of Proposed Peculiar Knob Waster-rock Dump Extension in northern South Australia to satisfy conditions of the EPBC Referral 2014/7154 .

The key deliverables was:

1) A habitat survey of the proposed expansion area by a suitably qualified Thick-billed Grasswren expert.

2) Provide baseline information on feral animal distribution to assist in the development of a feral animal control program to be implemented to protect a minimum of 400ha within the Baltana subregion

Credentials of the Thick-billed Grasswren assessor

Dr. John Read from Ecological Horizons Pty Ltd has thirty years' experience of conducting fauna surveys and habitat assessments in the South Australian arid zone. He has coordinated, conducted and written up several surveys for rare birds (including Thick-billed Grasswrens) in northern South Australia and has recorded Thick-billed Grasswrens on each of four annual surveys at the Peculiar Knob mine, including some records adjacent to the survey area (see Table 1). Dr. Read was appointed as the Birds Australia Atlas Coordinator for northern South Australia in the early 2000s, which provides further indication of his credentials.

Assessment Approach

Dr. Read walked the perimeter of the proposed Peculiar Knob Waste Rock Dump extension, guided by Arrium Environmental Scientist Christine Jones on November 6, 2014. The following morning, when detectability of grasswrens was considered to be optimal, the survey area was traversed on foot, with particular attention paid to visiting sites with emergent chenopod shrubs, which are the favoured habitat for the grasswrens. A playback recording of Thick-billed Grasswren calls was broadcast from a portable recorder at a minimum of ten localities for one minute each within the proposed Waste Rock Dump extension, concentrating on areas of potential habitat. Binoculars were also used both to survey clumps of tall chenopods and to scan for moving birds in front of the observer.

Results

No Thick-billed Grasswrens were detected during the survey of the Peculiar Knob Waste Rock Dump extension, although previous sightings in the region and suitable habitat suggest the northern third of this area does provide suitable habitat for the species (Figure 1). Due to their often secretive nature, failure to detect grasswrens during short surveys cannot be considered to indicate the absence of this species, nor the unsuitability of the habitat. Thick-billed Grasswrens have, however, been recorded from the nearby permanent fauna monitoring sites 7I and 7C (Table 1) and also at two other sites within or immediately adjacent to the study area in 2012 (Figure 1). Birds recorded during the survey were Nankeen

Kestrel (1), Rufous Fieldwren (4), Richard's Pipit (2), White-winged Fairywren (5) and Orange Chat (2).

The Peculiar Knob Waste Rock Dump extension overlies two distinctly different habitat types. The southern two thirds is characterized by hard-packed clay soils that shed water and are typically vegetated by low sparse chenopods (Plate 1). The birds occupying this habitat have been surveyed for four years at the nearby PK6I fauna monitoring site without any records of Thick-billed Grasswrens. This habitat is highly unlikely to support grasswrens because it lacks the extensive patches of emergent chenopods that characterize their habitat.

By contrast the northern third features more gypseous cracking soils and endorheic gilgais and the headwaters of ephemeral streams. These water-holding or water-transporting habitats support larger emergent chenopods, especially *Atriplex omissa* and *Rhagodia* spp that provide suitable habitat for Thick-billed Grasswrens (Plates 2-5). Subsequent mapping of the precise boundary of the Peculiar Knob Waste Rock Dump extension indicated that the surveyed area omitted the northern quarter, including the site of a previous Thick-billed Grasswren record. However, the southern extent of the suitable habitat was mapped in detail (Figure 1) and surveyed on both days and the assumption is made that most of the area to the north of this line is suitable habitat for grasswrens.

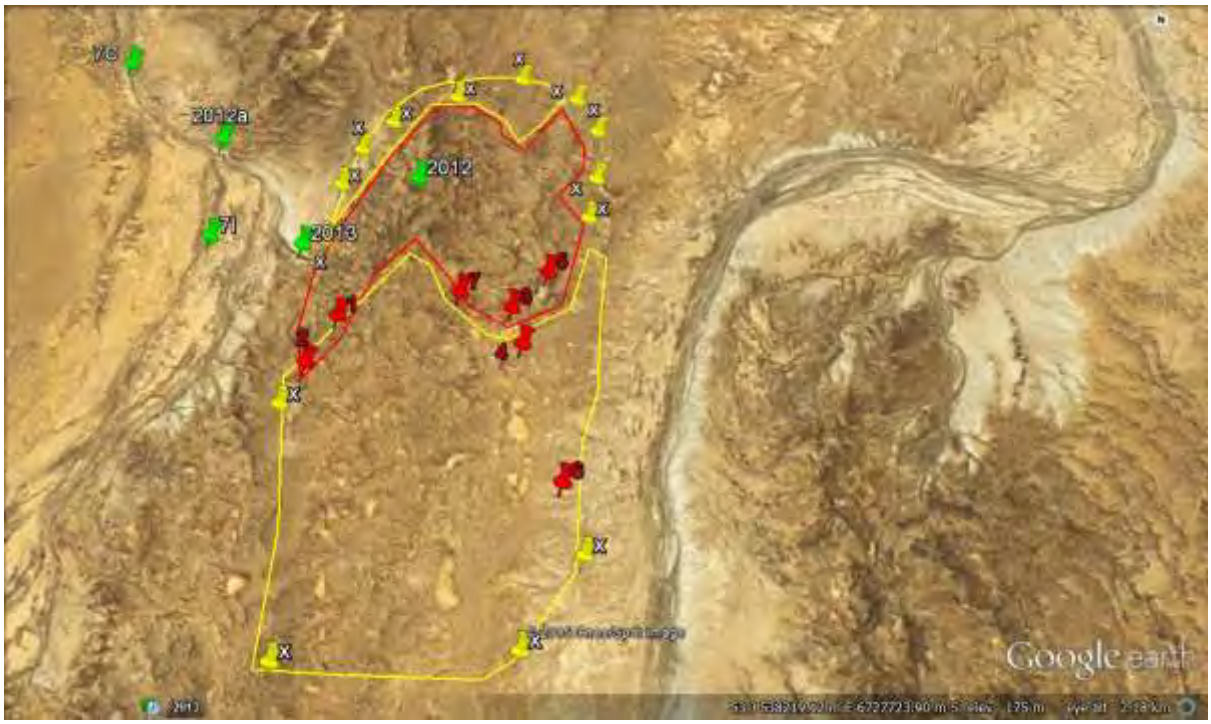


Figure 1. Outline of the proposed Peculiar Knob Waste Rock Dump Extension (yellow symbols), potential habitat sites for Thick-billed Grasswren (red symbols) and previous Thick-billed Grasswren records (green symbols). The extent of suitable grasswren habitat within the proposed Peculiar Knob Waste Rock Dump Extension is demarcated by the red polygon and unsuitable habitats are delineated by the yellow polygon.

Table 1. Presence of Thick-billed Grasswrens (TBGW) at Peculiar Knob bird monitoring sites in 2011- 2014 (Data from Ecological Horizons 2014).

Site	Zone	Eastings	Northings	2011	2012	2013	2014
Bird 1	53J	533409	6717125	TBGW	TBGW	-	-
Bird 2	53J	530401	6716960	TBGW	TBGW	TBGW	TBGW
Bird 3	53J	499300	6737400	-	-	-	-
Bird 4	53J	522850	6721800	-	-	-	TBGW
Bird 5	53J	492200	6734200	-	-	-	-
Bird 6	53J	499300	6735700	-	-	-	-
2I				-	-	-	-
2C				-	-	-	-
3I				-	-	-	TBGW
3C				-	TBGW	TBGW	TBGW
5I				TBGW	-	TBGW	-
5C				-	TBGW	-	-
7I				-	TBGW	-	-
7C				TBGW	-	-	-

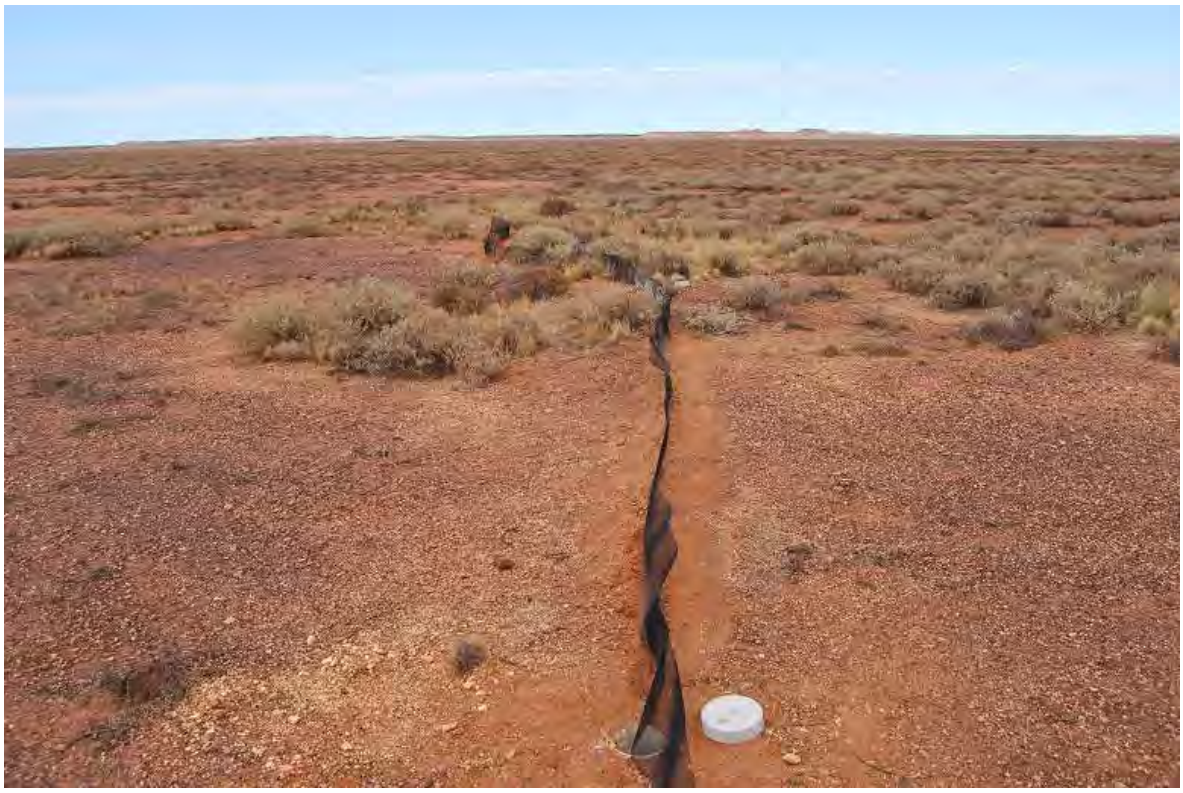


Plate 1. Fauna monitoring site PK06 showing the sparse, low vegetation and hard, water-shedding soils characteristic of the southern two thirds of the proposed Peculiar Knob Waste Rock Dump Extension that are considered unsuitable for Thick-billed Grasswrens.

Plate 2. Headwaters of drainage line on north-western corner of proposed waste Rock Dump extension (Site 2 in Figure 1).

Plate 3 Oodnadatta saltbush (*Atriplex omissa*) growing in drainage line near northern margin of proposed waste rock dump extension (Site 1 in Figure 1) and in similar habitat to previous record 2012 (Figure 1).

Plate 3 Gilgai on eastern margin of proposed waste rock dump

Plate 4. Cracking clay gilgai in proposed waste rock dump extension (Site 5 in Figure 1). Thick-billed Grasswrens would be expected to use the fringing emergent chenopods for shelter and nesting.

Discussion

One third of the proposed Peculiar Knob Waste Rock Dump Extension will be overlain upon habitat suitable for Thick-billed Grasswrens. This nationally listed species has been recorded at the site and at several other localities adjacent to the Peculiar Knob mine.

Waste rock dumps do not provide suitable habitat for Thick-billed Grasswren. Even if they are successfully rehabilitated by native vegetation, rock dumps are unlikely to provide suitable habitats due to their water-shedding nature that is not conducive to colonization by emergent chenopod shrubs. Hence this development should be regarded as permanent removal of the habitat from potential grasswren occupancy.

Construction of the proposed Peculiar Knob Waste Rock Dump Extension could affect the ability of the habitat to support Thick-billed Grasswrens beyond the physical footprint of the dump. Along with the pervasive impacts of dust and noise from construction of the rock dump, changes in the hydrogeological regimes could affect the important emergent chenopod populations, especially since the proposed rock dump lies at the headwaters of grasswren supporting drainage lines. If the dump diverts the natural flow of water from the water-shedding soils to the south to these northward-flowing drainages, it is likely that the emergent chenopods that depend upon enhanced water availability will be negatively impacted. If however, water shed from the rock dumps is clean and mimics natural water flows from the hardpan soils, there may be little change in grasswren habitat downstream of the development.

Appendix C

Annual Fauna Survey Report

EBS 2023

Peculiar Knob Iron Ore Project

Annual Fauna Survey Report Autumn / Spring 2023

Peculiar Knob Iron Ore Project Annual Fauna Survey Report Autumn / Spring 2023

05 January 2024

Version 2

Prepared by EBS Ecology for Peak Iron Mines Pty Ltd

Document Control					
Revision No.	Date issued	Authors	Reviewed by	Date Reviewed	Revision type
1	15/12/2023	EBS Ecology	EBS Ecology	18/12/2023	Draft
2	05/02/2024	EBS Ecology		05/02/2024	Final

Distribution of Copies			
Revision No.	Date issued	Media	Issued to
1	22/12/2023	Electronic	Peak Iron Mines Pty Ltd
2	05/02/2024	Electronic	Peak Iron Mines Pty Ltd

EBS Ecology Project Number: EX230705

CITATION: EBS Ecology (2024) Peculiar Knob Iron Ore Project Annual Fauna Survey Report Autumn / Spring 2023. Report to Peak Iron Mines Pty Ltd. EBS Ecology, Adelaide.

Cover photograph: Smooth Knob-tailed Gecko (*Nephrurus levis levis*) captured during Spring 2023 field survey (Photograph: EBS Ecology).

EBS Ecology
112 Hayward Avenue
Torrensville, South Australia 5031
t: 08 7127 5607
http://www.ebsecology.com.au
email: info@ebsecology.com.au

GLOSSARY AND ABBREVIATION OF TERMS

ANOVA	Analysis of Variance (two factor without replication)
CBWF	Chestnut-breasted Whiteface (*Aphelocephala pectoralis*)
EBS	Environment and Biodiversity Services (trading as EBS Ecology)
EML	Extractive Mineral Lease
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
Ha	Hectares
Hwy	Highway
km	Kilometres
km^2	Square kilometres
LGA	Local Government Area
MARP	Mining and Rehabilitation Program (now PEPR)
m	Metres
mm	Millimetres
ML	Mineral Lease
Mothball	To take out of service but maintain in reserve
MPL	Miscellaneous Purposes Licence
NPW Act	*National Parks and Wildlife Act 1972*
PEPR	Program for Environment Protection and Rehabilitation
PIM	Peak Iron Mines Pty Ltd (PIM).
PK	Peculiar Knob
PUA	Pastoral Unincorporated Area
ROM	Run-of-mine
SA	South Australia(n)
SAAL	South Australian Arid Lands
TBGW	Thick-billed Grasswren (*Amytornis modestus* ssp. *indulkanna*)
WPA	Woomera Prohibited Area

EXECUTIVE SUMMARY

EBS Ecology was engaged by Peak Iron Mines Pty Ltd (PIM) to conduct the annual compliance monitoring for Peculiar Knob (PK) Iron Ore Project (the PK Project) in Spring 2022 and Spring 2023, as required under the Program for Environment Protection and Rehabilitation (PEPR).

Potential ecological impacts of the PK mine are monitored during the annual ecological survey program which has been running as an approval and compliance condition since 2011. Monitoring is currently carried out at eleven paired Impact (I) (five sites) and Control (C) sites (five sites), plus one additional Impact site which was replaced in 2023 and is now considered a Regeneration (R) site. The sites are situated strategically to detect various impacts at three identified 'impact zones': at PK mine and crushing site, along the Haul Road and at Wirrida Rail Siding, as well as potential increased risk of impact in ephemeral drainage ecosystems (PK3, PK5 and PK7). The survey aims to detect any changes in fauna abundance and diversity which may be occurring as a result of the mine.

The spring 2022 survey was postponed from late October 2022 to early December 2022 due to flooding making the sites inaccessible. However, two of the five sites (Site 3 and Site 5) were still inundated in December and a decision was subsequently made to postpone the survey until autumn 2023. The autumn 2023 survey was scheduled for 12 to 18 April 2023. On 14 April a weather system from severe tropical cyclone Isla in Western Australia caused 50 millimetres (mm) of rain to fall in 12 hours, inundating all of the trap sites and making the Project Area largely inaccessible. Traps had been closed prior due to the predicted forecast, and so only one night of trapping was completed at five sites (PK1-C, PK1-R, PK1-I [New], PK3-C, and PK3-I). Based on the limited amount of data collected, the fauna data from the 2023 autumn survey has been collated in this spring 2023 fauna survey report. As such, this report presents the fauna data results for autumn 2023 (in lieu of spring 2022) and spring 2023.

Survey methods include pitfall trapping to detect small mammals and reptiles at 11 sites, and 20-minute 2-hectare (ha) bird surveys at 23 dedicated monitoring sites, including call playback for targeted threatened species, Thick-billed Grasswren (*Amytornis modestus* ssp. *indulkanna*) (EPBC: Vulnerable) and Chestnut-breasted Whiteface (*Aphelocephala pectoralis*) (NPW Act: Rare).

Autumn 2023

One new trapping impact site (PK1-I) was set up in autumn 2023 to replace the now obsolete impact site at the Wirrida Rail Siding (PK1-I now renamed PK1-R). The impact site was moved closer to the existing rail siding impact, following relocation of the crushing facilities. Impact will continue to be monitored as an example of a naturally regenerating site and for continuity of data. In future surveys, monitoring will be undertaken at all three sites (PK1-C, PK1-I [new] and PK1-R).

A total of 19 captures (excluding recaptures) were made in one night of trapping at five paired impact and control sites during the autumn 2023 pitfall survey (PK1-C, PK1-I, PK1-R, PK3-C and PK3-I). This included 6 mammals (four species), 12 reptiles (four species) and one amphibian. No species listed as State or nationally threatened were detected. Difference in abundance and diversity of species between control and impact sites was unable to be assessed with the limited data available for this survey.

Bird surveys resulted in 318 observations of 34 species across 20 bird monitoring sites. Four threatened bird species were observed. Targeted threatened species Thick-billed Grasswrens (*Amytornis modestus*

ssp. *indulkanna*), which are Nationally listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were observed to occupy three sites during the autumn 2023 bird survey. Chestnut-breasted Whiteface (*Aphelocephala pectoralis*), which are State listed as Rare under the *National Parks and Wildlife Act 1972* were recorded opportunistically at one monitoring site (PK1-I) during the field survey, a site they have not previously been detected at, and not within their usual preferred habitat type. Other listed threatened bird species, detected both opportunistically and during the 20-min 2-ha survey, included nationally Vulnerable Southern Whiteface (*Aphelocephala leucopsis leucopsis*) and State Rare Elegant Parrot (*Neophema elegans*).

Spring 2023

A total of 108 captures (excluding recaptures) were made at paired impact and control sites (total 11 sites) during the spring 2023 survey. This included 32 native mammals (five species) and 68 reptiles (comprising 21 species). No species listed as State or nationally threatened were detected. One native bird was also captured (Australian Pipit, *Anthus australis*), and there were seven captures of non-native House Mouse (*Mus musculus*).

Bird surveys resulted in 573 observations of 39 bird species across 20 bird monitoring sites. Nationally Vulnerable Thick-billed Grasswren were observed to occupy two sites during the spring 2023 bird survey and were observed opportunistically at two additional sites. State Rare Chestnut-breasted Whiteface were recorded opportunistically at one monitoring site (PK5-C) during the field survey.

Reptile abundance at one control (site PK7-C) and one impact site (PK7-I) have declined since 2020, however, with the limited data set available and boom-and-bust nature of the landscape, it is unclear if this local reduction is related to mining activity or because of other environmental factors. Across the remainder of sites, reptile abundance has fluctuated between years, however this fluctuation has been comparable between control and impact sites, reflective of seasonal changes in abundance. No parallel reduction in mammal abundance has been observed at PK7-C or PK7-I.

Mammal abundance has decreased significantly since 2021 all at sites, including impact and control sites. Mammals in arid environments often show pronounced fluctuations in population size alternating from being almost absent to being ubiquitous and present at very high density. The decline in mammal abundance observed in 2023 is representative of the boom-and-bust cycles of arid environments, as the environmental conditions, including subsequent landscape scale flooding events, is likely to have caused a local decline in these species. A lag is likely to be observed in their reoccupation of the sites following return to good conditions and ensuing breeding seasons.

Since 2020, a total of 90 bird species, 10 native mammals and 37 reptile species have been reported at the PK Project site during the annual monitoring surveys, either through targeted survey effort or opportunistically.

Results from the autumn and spring 2023 PK fauna survey suggest that there has been no observable impact to native fauna abundance or diversity which can be attributed to mining operations. Specifically:

- There was no reduction in occupancy or abundance of fauna species of conservation significance such as Thick-billed Grasswren or Chestnut-breasted Whiteface.

- Results of the monitoring program demonstrate no adverse impacts on native fauna abundance or diversity when compared with control sites.
- There was no demonstrated increase in pests or incursion of new pest species.
- There were no adverse impacts on fauna abundance or diversity at ephemeral ecosystems when compared with control site results. A reduction in reptiles since 2020 at PK7 was observed at both the control and impact site, which suggests this is unlikely to be unrelated to mine impacts.

Table of Contents

List of Tables

List of Figures

1 INTRODUCTION

1.1 Project background

The Peculiar Knob Iron Ore Mine is located approximately 90-kilometres (km) southeast of Coober Pedy in northern South Australia (SA) and is currently operated by Peak Iron Mines Pty Ltd (PIM).

The Peculiar Knob (PK) Project has been owned and operated by several entities, with the original tenements granted to Western Plains Group (ML 6314) in June 2008. OneSteel Limited took ownership of the project in October 2011, changing its name to Arrium Limited in July 2012, and later mothballed the project in April 2015 due to a downturn in the iron ore market. During this time, the PK Project was maintained by a subsidiary of Arrium, Southern Iron Pty Ltd, under the approved Peculiar Knob Mothballing Environmental Management Plan. PIM acquired the PK project in July 2019 and transitioned the mine out of care and maintenance, resuming mining operations in February 2020. Following the takeover by PIM, crushing and screening works have been relocated from the Wirrida rail loop to the run-of-mine (ROM) pad at the mine site.

The PK mine consists of an open cut iron ore mine and associated infrastructure, as well as an approximately (~) 94 km long 'haul road', used for transporting iron ore from the PK mine site in the east to the Wirrida crushing and rail siding approximately 45 km to the west of the Stuart Highway. From the Wirrida site, iron ore is then transported further afield utilising a rail linkage to the Adelaide to Darwin railway line.

Potential ecological impacts are monitored during the annual ecological survey program which has been running as an approval and compliance condition since 2011. Monitoring is carried out using paired Impact (I) and Control sites (C) situated strategically to detect various impacts at three identified 'impact zones': at PK mine and crushing site, along the Haul Road and at Wirrida Rail Siding, as well as potential increased risk of impact at ephemeral drainage ecosystems.

Possible impacts to fauna caused by the mine activities have been identified as:

- Loss of fauna habitat (through clearance and dust impacts) resulting in impacts to species abundance / diversity through a reduction in food resources, decrease in shelter and resulting increase in predation pressure.
- Noise and vibration and lighting from construction and operation activities.
- Entrapment of fauna in trenches, dams and pitfall traps.
- Collision of vehicles with native fauna.
- Increased abundance of introduced fauna.
- Attraction of fauna to artificially wet areas thereby increasing the likelihood of vehicle collision and predation susceptibility.
- Loss or reduction in quality of downstream riparian habitats.

1.2 Fauna monitoring program details

Fauna monitoring, in association with a series of other mitigation measures, listed in detail in *Peculiar Knob Iron Ore Project – Mining And Rehabilitation Program (MARP) Volume 1 Main Report (Parsons Brinckerhoff Australia, 2013*), has been identified in the document to be undertaken annually and be repeatable at the same time every year.

The MARP was lodged in 2011 by WPG Resources Limited and granted approval by Primary Industries SA (now Department of Primary Industries and Regions SA), as an equivalent to Programs for Environment Protection and Rehabilitation (PEPR) which is now the accepted document. Ecological monitoring is part of the conditions of the PEPR for Peculiar Knob Iron Ore Mine. The PEPR is the key operational document for the mining project, and it details information on environmental control measures and outcome-based performance criteria as outlined in Table 1.

Table 1. Project outcomes, parameters and monitoring activities associated with the Fauna Management Plan for Peculiar Knob Iron Ore Mining Project (Parsons Brinckerhoff 2013).

Outcome	Location	Parameters	Frequency	Compliance criteria / target values and control data
No permanent loss of native fauna abundance or diversity in Mining Lease (ML), Miscellaneous Purpose Licences (MPL), Extractive Mineral Leases (EML) and adjacent areas caused by mining operations and vegetation clearing.	Clearance areas associated with infrastructure footprint on ML, MPL and EML (Table 10.2, Section 10 in MARP).	Annual monitoring to determine abundance and diversity of native fauna.	Annual spring fauna and flora surveys.	Target: vegetation clearance no greater than 890.47 hectares (ha) at commencement of full operations as approved in MARP.
No introduction of new pests (including feral animals) or increase in abundance of existing species.	All infrastructure areas.	Species, location and abundance of identified pest species – recorded and mapped. Success of pest eradication programs (if required).	Annual spring fauna and flora surveys. Eradication programs as required.	Control: Control sites for annual monitoring. Target: Demonstrate that pest eradication / control programs implemented within 72 hrs of reporting infestations.
No permanent loss of native fauna abundance or diversity in ML, MPLs, EMLs and adjacent areas caused by mining operations in ephemeral ecosystems.	Surface water diversions / crossings and ephemeral systems located on or directly adjacent to mine infrastructure areas.	Annual monitoring to determine abundance and diversity of ephemeral ecosystems within Project Area.	Annual spring fauna and flora surveys.	Control: Control sites for annual monitoring. Target: Vegetation clearance no greater than 890.47 ha at commencement of full operations as approved in MARP.

As such, objectives of the fauna monitoring program within the ML are to:

1. Measure and compare abundance and diversity of fauna at established Impact and Control sites.
2. Compare capture trends at Impact sites and Control sites when compared to baseline data (EBS 2007).
3. Determine if any significant decrease in abundance or diversity of native fauna can be attributed to mining operations (including fire), when compared to Control sites.
4. Determine if any new pest species (feral animals) have been introduced, or if existing pest species have increased in abundance.

The Lease and licence conditions relating to fauna are outlined in Table 2.

Table 2. Summary of Fauna – Lease and licence conditions as outlined in the PK MARP (Parsons Brinckerhoff 2013).

Mining Tenement	Condition number and requirement
MPL125 – MPL131 (inclusive), MPL133, MPL134, EML6363-EML6382 (inclusive).	*Schedule C: Environmental Outcomes* *The Licensee must:* *7. Native Fauna* Ensure that there is no permanent loss of native fauna abundance or diversity in the Lease area and in adjacent areas caused by mining operations (including fire).
MPL125 – MPL131 (inclusive); MPL133 and MPL134, MPL 141, EML6363-EML6382 (inclusive).	*9. Weeds and Pests (Feral animals)* Ensure that no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor increase in abundance of existing weed or pest species in the Licence area compared to adjoining land.

In addition to monitoring the general health of populations of native fauna within the Project Area, a program was implemented to monitor the populations of Nationally listed Vulnerable Thick-billed Grasswrens (*Amytornis modestus* ssp. *indulkanna*) which occur within the Project Area. The Thick-billed Grasswren is an EBPC listed species and as such, an EPBC Referral was undertaken and approved with conditions (EBPC 2014/ 7154). A variation was attached to the approval in 2020 (28th April 2020) for *Expansion of the Peculiar Knob Iron Ore Project, SA*. The conditions of the approval (in effect until 31st December 2036) relevant to the fauna survey are presented in Table 3.

Table 3. Conditions of EPBC Referral 2014/7154.

Condition	Conditions attached to approval
1	At the expiry date of this approval, there must be no permanent adverse impact as a result of the action on the abundance of the Thick-billed Grasswren within the Peculiar Knob Iron Ore Project “expansion area”.
6	Any incidental observations during the monitoring activities required by Condition 5 (rehabilitation) of a Thick-billed Grasswren or a Thick-billed Grasswren nest must be reported in the annual compliance report required by Condition 10.
10 – Annual Compliance Monitoring	The person taking the action must prepare a compliance report for each 12-month period following the date of commencement of the action.

Annual monitoring is required to obtain a long-term understanding of the use of habitat by the Thick-billed Grasswren within the Project Area, and to determine what impacts, if any, have been caused by the mine

at the conclusion of operational activities. The PEPR identifies clearing as a risk which may cause a reduction in threatened species abundance across the Project Area.

Though no formal requirement exists for monitoring of State listed Rare Chestnut-breasted Whiteface (*Aphelocephala pectoralis*), surveys have been designed to incorporate this information on this species, as an additional measure of measuring potential impacts of the mine.

1.2.1 Survey objectives

Based on the relocation of the crushing plant in 2020 and subsequent natural regeneration of impact site PK1I, the Spring 2021 fauna survey report recommended the installation of an additional pitfall trapping site closer to the Wirrida Rail Siding, to replace the now obsolete crushing plant impact site.

As such, the objectives of the survey for 2022 / 2023 were to:

- Install a new pitfall trapping site closer to the Wirrida Rail Siding impact area; and
- Continue to monitor the permanent fauna survey sites across the Project Area including five paired (Impact and Control) pitfall trapping sites and 23 dedicated bird monitoring sites by following repeatable survey methods allowing for replication and statistical analysis over time through monitoring each site via:
    - Trapping small-medium mammals, reptiles and amphibians;
    - Conducting bird surveys (20 minute 2-ha search and targeted call playback);
    - Actively searching for tracks, scats, traces (i.e., nests); and
    - Recording opportunistic observations of fauna species to create an ongoing inventory.
- Conduct vehicle mounted spotlight surveys to monitor activity of nocturnal medium and large mammals and other fauna utilising the area (i.e. introduced mammals).
- Produce a document detailing the findings of the annual fauna survey.
- Provide recommendations in relation to fauna management in the area (separate document).
- Provide recommendations in relation to survey design going forwards (if required).

1.3 Survey timeline

A baseline survey was first undertaken in sections of the PK Project Area in 2007 by EBS Ecology. Subsequently, compliance monitoring of five fauna sites have been undertaken between 2011 and 2015.

Mining operations were ceased in the seven months leading up to the 2015 fauna survey, after which time the site went into care maintenance until February 2020. No fauna surveys were undertaken during the shutdown / maintenance period between 2015 and 2020.

In 2015 the haul road was bituminised, significantly reducing potential impacts from dust at associated monitoring sites. In 2020 the crushing facilities were moved from Wirrida Rail Siding to the PK mine site. Bituminisation of the haul road is likely to have reduced potential dust impact on impact sites PK3-I and PK5-I, while relocation of the crushing facilities has removed the potential dust impact on impact sites PK-

I, which has now been transitioned as a Regeneration (R) (PK1-R) site. Small impacts associated with operational activity, noise disturbance and water runoff are still likely to impact the sites, while impact site PK6-I and impact and control site, collectively PK7 may be further negatively impacted by the closer proximity of the crushing plant.

Table 4 presents a summary of the monitoring timetable and relevant events.

Table 4. Summary of previous surveys and maintenance undertaken at the PK site.

Survey Type	Timing	Organisation	Comments
Baseline survey	2007	EBS Ecology	Undertaken in March around the PK mine site.
Permanent monitoring sites established	2011	Ecological Horizons	5 paired impact and control sites established, each with one line of six small (150 millimetres diameter x 500 millimetres deep) pitfall traps set 8-10 metres apart. Bird survey sites were established at PK mine and along the haul road.
Annual monitoring	2012	Ecological Horizons	Additional trap lines added to each trap site consisting of four large pitfall traps.
Annual monitoring	2013	Ecological Horizons	
Annual monitoring	2014	COOE	
Annual monitoring	2015	COOE	Four new bird survey sies were established and surveyed around the Wirrida Rail Siding.
Annual monitoring	2020	COOE	PK3-I and PK5-I were not surveyed due to flooding. PK7-C was unable to be located. A new large pitfall line was established at this location.
Annual monitoring	2021	EBS Ecology	PK7-C was found to only have three pitfall traps on the large line. PK3-C and PK3-I were found to only have 5 small pitfall traps on each line. Pitfall trap lids were secured using tech-screws to prevent damage / loss during flooding events.
Annual monitoring	2022		Postponed to 2023, due to rain event
Annual monitoring	2023 (Autumn)	EBS Ecology	A rain event flooded the site resulting in only one site being surveyed for one night. A new impact site was established with 2 traplines each with five large pitfall traps at the Wirrida Rail Siding (PK1-Impact (NEW)). The site is at the location of Wirrida West bird survey site. The existing PK1-I site has been renamed to PK1-R. A new large pitfall trap was installed at site PK7-C.
Annual monitoring	2023 (Spring)	EBS Ecology	

2 ENVIRONMENTAL SETTING

2.1 Project Area

The Project Area is located within the South Australian Arid Lands (SAAL) Landscape Management Region (LMR), within the Pastoral Unincorporated Area (PUA) Local Government Area (LGA). The Project Area falls across two bioregions (Gawler and Stony Plains) and four subregions (Commonwealth Hill, Ooodnadatta, Baltana and Breakaways). The characteristics of these bioregions are summarised in Appendix 1 – Summary of bioregional landforms within Project Area.

The Project Area occurs within the Woomera Prohibited Area (WPA), which forms a 122,000 square kilometre (km^2) tract of land within the SAAL, utilised periodically for military equipment testing. The Antakirinja Area Minerals Exploration Indigenous Land Use Agreement is in place across the Project Area.

2.2 Land use

Peculiar Knob Project Area is located across two pastoral leases, Ingomar Pastoral Lease (409,400 ha) in the west (including Wirrida) and McDouall Peak to the east (Peculiar Knob Iron Ore Mine), with cattle grazing the primary land use. Evidence of over-grazing and trampling is evident across the Project Area. Impacts are noticeable around ephemeral waterways, where cattle have trampled creek beds, causing pugging of the soil. Grazing impacts are evident on vegetation across the Project Area, especially east of the Stuart Highway.

2.3 Climate

The climate at Peculiar Knob is characteristic of an arid region, typified by hot, dry summers and mild, dry winters with infrequent and unreliable rainfall. The mean maximum temperature (1994-2023) is 27.8 °C and mean annual rainfall 138.4 millimetres (mm). Long term average monthly climate data for the nearest weather station at Coober Pedy (Site Number: 016090) (Bureau of Meteorology 2023) is presented in Figure 1.

Long term averages in the arid zone are generally a poor indicator of expected environmental conditions. Cycles of prolonged drought, interrupted with intense rainfall events are more typical of the climate, leading to the ‘boom and bust’ cycles of flora and fauna.

In the 12 months prior to the 2023 field surveys (autumn and winter), mean monthly maximum temperatures were approximately equivalent to the long-term averages, however several significant rainfall events can be seen in January and October 2022, and April and June 2023 (Figure 2). Preceding the spring 2023 survey, were three months of almost no rainfall.

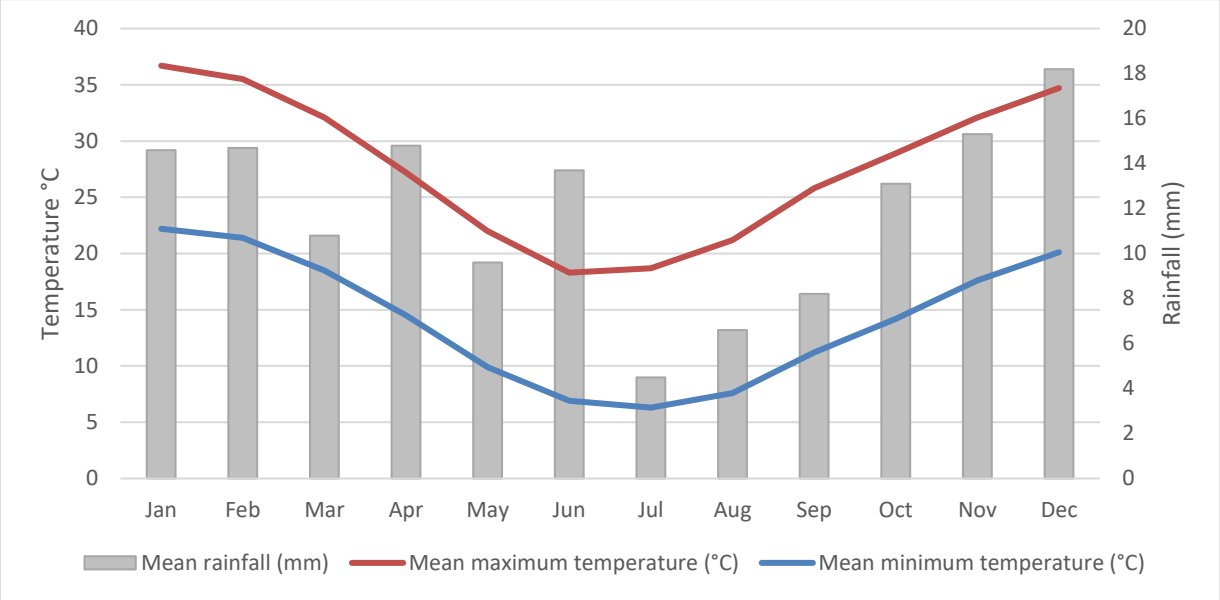


Figure 1. Mean temperature (maximum and minimum) and rainfall each month, from 1994-2023 at Coober Pedy Airport (Site Number: 016090). (Bureau of Meteorology, 2023).

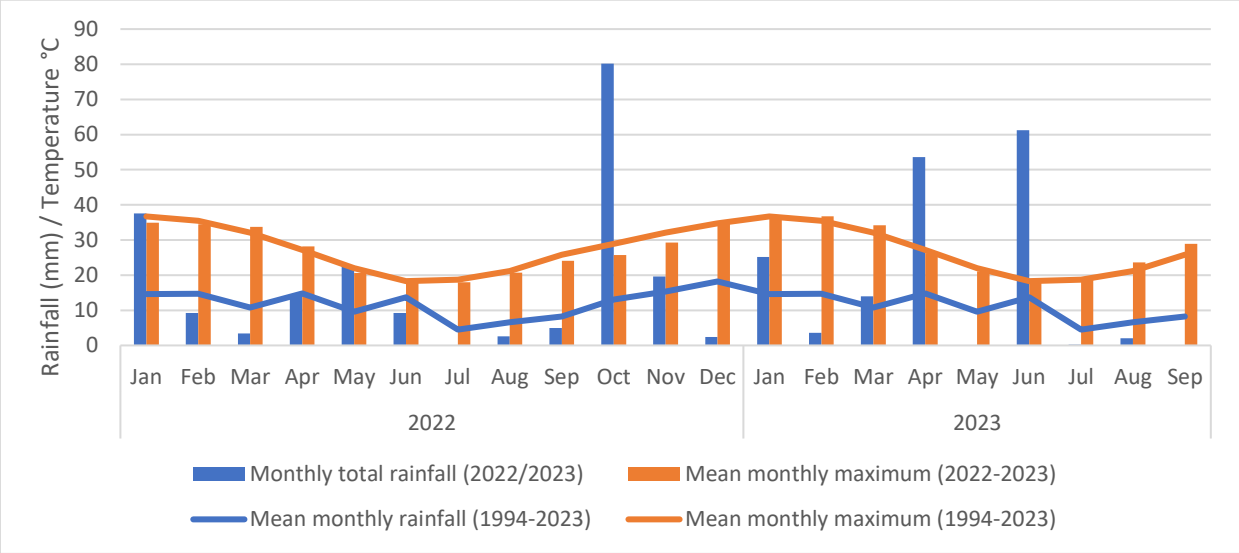


Figure 2. Rainfall and maximum temperatures in the lead up to the autumn 2023 and spring 2023 field survey.

2.3.1 Conditions during the autumn 2023 survey period

The spring 2022 survey was postponed from late October to early December 2022 due a large amount of rainfall (80.2 mm) in the month of October. Two of the five paired sites (collectively, PK3 and PK5) were still inundated in December and a decision was subsequently made to postpone the survey until autumn 2023.

The autumn 2023 survey was scheduled for 12 to 18 April 2023. Maximum daily temperatures (recorded from Coober Pedy Airport, station 016090) averaged 24.4°C, while overnight minimums averaged 13.09°C. Most days experienced moderate winds speeds with fresh gusts, with average morning (9 am) wind speeds of 21.57 km/h and afternoon speeds (3 pm) of 19.43 km/h (maximum gusts averaged 40.14 km/h).

On the evening of 15 April, a weather system linked to tropical cyclone Isla in Western Australia caused an unexpected rainfall event at the site. On April 15, 46.6 mm of rain was reported at the Coober Pedy weather station, however, rainfall was varied across the Project Area with reports of over 50 mm in some locations. The rain inundated all the trap sites and made the Project Area largely inaccessible by road or foot. The coolest maximum temperate for April was reported for the day following the storm, 19.4 °C on 16 April 2023.

Table 5. Weather conditions during the autumn 2023 field survey.

Date	Temp (°C)				Rainfall	Max wind gust	
	Min	Max	9 am	3 pm		Direction	Speed (km/h)
Wednesday 12 April	14.3	27.3	17.6	26.0	1.6	S	41
Thursday 13 April	12.8	28.2	17.4	27.6	0.2	E	31
Friday 14 April	16.8	31.7	20.5	30.8	0.0	NNE	59
Saturday 15 April	14.4	20.5	15.2	19.5	46.6	SW	56
Sunday 16 April	10.0	19.4	13.4	18.7	0.0	SW	39
Monday 17 April	11.2	22.2	16.1	21.7	0.0	E	31
Tuesday 18 April	12.1	23.9	18.1	23.3	0.0	SW	24

Figure 3. Inundated landscape at sunrise following the rainfall event on 15 April in autumn 2023.

2.3.2 Conditions during the spring 2023 survey period

The spring field survey was undertaken on 9 to 15 October 2023. Maximum daily temperatures (recorded from Coober Pedy Airport, station 016090) averaged 29.69°C, while overnight minimums averaged 13.51°C. Most days experienced moderately to fresh southerly winds and strong gusts, with average morning (9 am) wind speeds of 21.71 km/h and afternoon speeds (3 pm) of 20.57 km/h (maximum gusts averaged 50.86 km/h).

Table 6. Weather conditions during the spring 2023 field survey

Date	Temp (°C)					Max wind gust	
	Min	Max	9 am	3 pm	Rainfall	Direction	Speed (km/h)
Monday 9 October	13.5	30.4	21.1	29.3	0.0	SSW	43
Tuesday 10 October	14.3	32.5	20.5	30.9	0.0	SSE	59
Wednesday 11 October	17.7	35.0	22.8	33.5	0.0	SSW	59
Thursday 12 October	13.5	25.7	15.4	24.6	0.0	S	56
Friday 13 October	10.6	25.5	14.0	23.2	0.0	S	46
Saturday 14 October	12.0	29.1	16.6	27.5	0.0	SSW	37
Sunday 15 October	13.0	29.6	16.2	28.0	0.0	S	56

3 METHODS

3.1 Field survey

3.1.1 Survey period

This report covers two survey periods:

- Autumn 2023 (12 to 18 April); and
- Spring 2023 (9 to 15 October).

3.1.2 Sites

Pitfall trapping sites

Until 2023, ten permanent pitfall trap sites have been monitored at PK including five Impact (I) monitoring sites, each with a paired Control (C) site. The five impact sites were originally located to detect any impacts associated with PK mining operations specifically:

- The crushing and loading facilities at the Wirrida Railway siding (PK1-I);
- The PK mine (PK6-I and PK7-I); and
- The haul road (PK3-I and PK5-I).

In autumn 2023 one additional impact site (PK1-I) was installed to capture the reduction in impacts from the relocated crushing site and impacts from the Wirrida Rail Siding loading area, resulting in a new total of 11 permanent pitfall trap sites (Figure 4). Going forward, the previous impact site, PK1-I will be renamed to PK1-Regeneration (PK1-R).

Three main habitat types have been identified across the Project Area, with monitoring sites situated in each (Table 7).

Table 7. Vegetation type associated with each pitfall trapping site.

Site(s)	Vegetation Association	Potential Impact	Habitat Description
Pitfall Sites			
PK1-C PK1-I (new) PK1-R (renamed)	Mulga woodlands	Previously occurred near crushing and loading facilities at the Wirrida rail siding. Crushing facilities have since been removed and a new impact site (PK1.2) has been located closer to the rail siding at the same location as existing bird site, Wirrida West Impact.	Habitat is a sandy substrate with very open Mulga Woodland and open shrubland.
PK3-C PK3-I	Stony plains with cracking clay gilgais and drainage lines	Impacts from the haul road, however this has now been bituminised. Impacts remain from runoff associated with road surface.	Located on low chenopod shrublands with significant drainage line intersecting both impact and control site. Dark grey cracking clay soils.

Site(s)	Vegetation Association	Potential Impact	Habitat Description
PK5-C PK5-I	Stony plains with cracking clay gilgais and drainage lines	Impacts from the haul road, however this has now been bituminised. Impacts remain from runoff associated with road surface.	Cracking clay plains with gilgais and minor drainage lines. Tall chenopod shrubland (*Maireana aphylla* dominant).
PK6-C PK6-I	Stony plains with cracking clay gilgais and drainage lines	Impacts from mine and mine loop road.	Impact site close to PK mine site and loop road, on very flat, red clay, stony gibber plains with very sparse low chenopod (*Atriplex* sp.) shrubland. Control occurs near base of breakaways on stony gibber plains with higher cover of chenopod shrubs.
PK7-C PK7-I	Cracking gypseous plains	Impacts from the mine and mine loop road.	Major drainage line intersects both control and impact site. Identified as an ephemeral ecosystem.

Bird sites

A total of 23 permanent bird monitoring sites are established in the Project Area. This includes the 10 sites associated with the above paired pitfall trapping sites and 13 additional sites, listed in Table 8. Wirrida West Impact coincides with the location of the newly installed trapping site PK1-I. PK2-C and PK2-I are also utilised for vegetation monitoring surveys, however no pitfall trapping occurs at these sites.

Table 8. Vegetation type associated with each bird survey site.

Site(s)	Vegetation Association	Impact	Habitat Description
Bird Sites			
Wirrida West Control (WWC) Wirrida West Impact (WWI) Wirrida South Control (WSC) Wirrida South Impact (WSI)	Mulga woodlands	Impacts from the rail loading facility.	Mulga woodlands with sandy soil.
Bird 1, 3, 4, 5, 6	Chenopod low open shrubland on stony plains.	Haul road / camp road and accommodation facility.	Open chenopod shrublands. Site 4 and 5 are in shrublands adjacent vegetated drainage lines.
Bird 2, 7	Drainage line / waterbody shrubland	Haul road.	All sites associated with ephemeral water body. Vegetation varies between *Eucalyptus* woodland in an ephemeral creek under a culvert (7) and *Maireana* shrubland in cracking clay gilgai (2).
PK2-C and PK2-I	Chenopod low open shrubland on stony plains	Haul road / camp road.	Very sparse low chenopod shrubland with stony gibber surface.

Indicative location of sites is presented in Figure 4. A full list of sites, the survey methods employed at each, and their location is presented in Appendix 2 – Survey site locations and methodology. Maps and photographs of the site conditions at the time of the survey are presented in Appendix 3 – Summary site locations and condition during the 2023 survey.

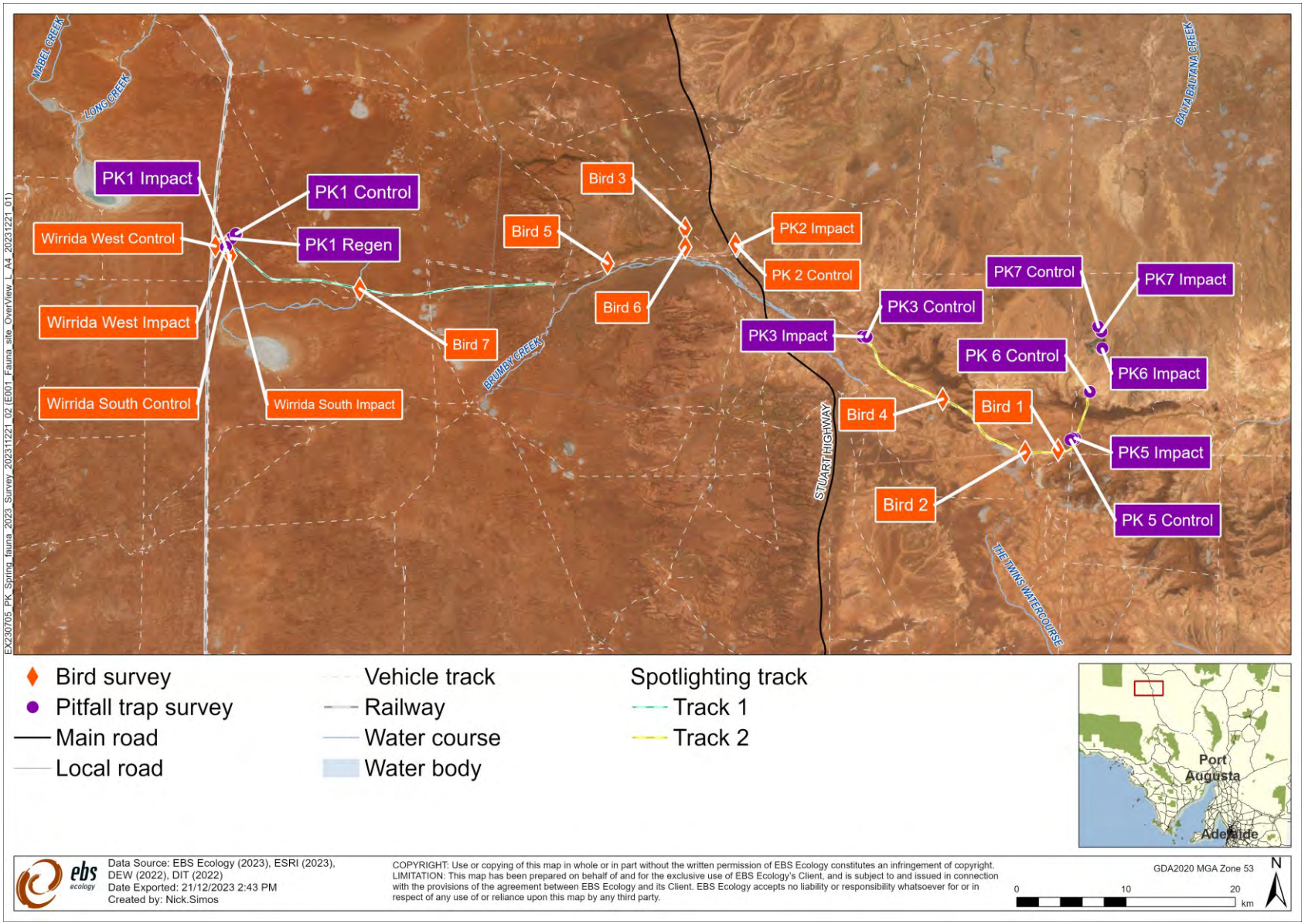


Figure 4. Layout of pitfall trapping and dedicated bird survey sites at the PK site.

3.2 Fauna monitoring program

3.2.1 Pitfall trapping

Eleven semi-permanent pitfall trapping sites have been set up at each of five paired sites using the method outlined in '*Guidelines for Vertebrate Surveys in South Australia'* (Owens 2000). Though there is some variation, most sites consist of two parallel pitfall lines, one with six 'small' (150 mm wide x 500 mm deep) pitfall traps spaced approximately 8-10 m apart, and one with four 'large' (225 mm wide x 600 mm deep) traps spaced 10-15 m apart.

At the time of the survey, temporary wire mesh fencing was erected between pitfall traps using wire pins to reinforce, with an additional ~10 m of fencing trailing at each end of the pitfall line, resulting in two 60-70 m long, parallel trap lines. Maps and images of each pitfall trap line (where available) are presented in Appendix 3 – Summary site locations and condition during the 2023 survey.

Each pitfall trap was 'furnished' with a thin layer of soil, a small piece of sheepskin and a toilet roll, to provide ample cover and insulation to trapped fauna. When ants were in high numbers an insecticide (such as surface spray or ant sand) was used around the entrance to the trap to discourage entry. If insecticide was observed to be ineffective at either preventing or killing ants in pitfall trap, the trap was closed to prevent possible trap deaths.

Traps were opened and set on day one of the survey and subsequently checked morning and evening for a total of four 'trap nights' at each site. Where possible, all trapped fauna was identified at the point of capture, marked using a non-toxic marker (generally in an inconspicuous location under the tail) to record incidence of recapture at subsequent trapping sessions, and then released in a covered location a short distance from the capture site.

If a species was unable to be identified in the field, or a second opinion was sought, specimens were stored temporarily in a small breathable calico bag, kept in a quiet and cool location overnight, until they could be identified and re-released at the point of capture the following day. No specimens were vouchered during the survey.

All equipment was removed from each site at the end of the survey, except for the semi-permanent pitfall traps which remain in-situ, with lids screwed firmly shut and secured with tech screws (Figure 5). Trench lines between pit traps were backfilled following removal of the drift fence (Figure 6).

Figure 5. Tech-screws installed into pitfall lid at one of the flood-prone sites at conclusion of the survey.

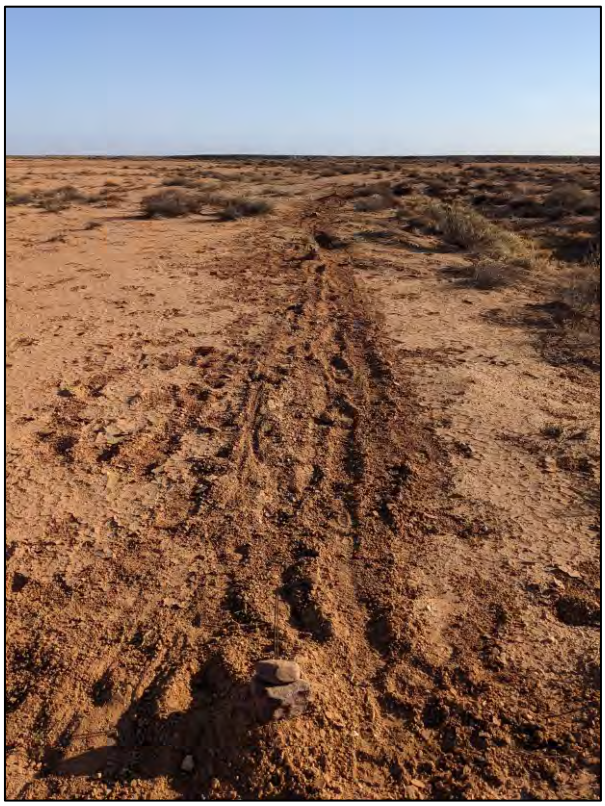


Figure 6. An example of a completed pitfall site, with pitfall trap covered and backfilled trench lines.

3.2.2 Dedicated bird surveys

The Peculiar Knob Iron Ore Mine Project Area is known to be occupied by Nationally threatened species listed under the *Environment Protection and Biodiversity Act 1991* (EPBC Act) and State listed threatened species, protected under the *National Parks and Wildlife Act 1972* (NPW Act).

Targeted surveys methodologies are in place to detect the presence of two threatened bird species (see Section 3.2.2 for description of targeted survey methodology):

- Thick-billed Grasswren (*Amytornis modestus* ssp*. indulkanna*); and
- Chestnut-breasted Whiteface (*Aphelocephala pectoralis*).

Since the 2021 survey, Southern Whiteface (*Aphelocephala leucopsis leucopsis*) has been relisted as Nationally Vulnerable. This species has been recorded within the Project Area during previous surveys.

At each bird monitoring site call playback for target species, was used at the start of the survey for a short period of approximately 1-2 minutes. If wind was thought to be interfering with transmission of sound, call playback was undertaken in multiple locations across the site. Following commencement of playback, a 20 minute 2-hectare (ha) search of the surrounding site was undertaken. All birds observed or heard during this time were recorded. Given the transient nature of most resident bird species this method is considered sufficient in terms of data collection and determining/indicating potential impacts of mining on bird species.

Avian datasheets were used to record the following data:

- Identification method (seen or heard);

- Bird activity (e.g. flying overhead, flying over circling, resting or foraging on tree/shrub/ground);
- Number of individuals observed; and
- Any other notable observations.

All birds observed more than 100 m away from the site, or birds observed within different habitat adjoining the site were recorded as 'off-site'.

3.2.3 Spotlighting

Two, one-way, 30 km spotlighting transects were driven on one night of the survey period in both autumn and spring 2023. The survey night was selected based on the optimal anticipated weather for nocturnal spotlight surveys during the survey period (i.e., warm, low wind, preceding rain if possible).

Spotlighting commenced shortly after last light. Vehicles travelled slowly (approximately 20 to 30 km) per hour with one observer using a handheld spotlight (Lightforce 100W, 12V halogen) to scan the landscape and road. All fauna observed during the spotlighting transect were recorded, identified to species level and a GPS location was taken.

3.2.4 Opportunistic

Opportunistic observations are 'chance' sightings of animals in the field by surveyors while they are on site. Such observations are not intentional such as through trap captures or active searching but can provide valuable additional information on the distribution and occurrence of fauna species across the site. Opportunistic records of fauna species observed during the survey whilst traversing the Project Area, such as between trapping sites and while checking traps, were collected. The species, location and any additional information (such as behaviour) were recorded for each opportunistic sighting. Common fauna species were not recorded opportunistically as the dedicated bird surveys detect these. Uncommon or otherwise notable species, or those which are isolated to specific locations within the Project Area (such as Wedge-tailed Eagles on roadsides) were recorded throughout the survey period.

3.3 Limitations

In variable climates such as the arid zone, preceding climatic conditions have a strong influence on presence of annual flora, and the health and condition of perennial plants. Similarly, weather conditions are known to influence the daily activity, behaviour and detectability of fauna species, for example reptiles are more likely to be active during warm weather and birds are more likely to be detectable in calm weather. The conditions in the lead up to, and during the short timeframe of the survey period may not have been ideal for maximum capture rate or detectability of certain species of flora and fauna.

Whenever possible, bird surveys were conducted in ideal conditions for bird survey methods, including in the morning (before noon), during cool weather, and with minimal wind interference. However, due to time limitations and set survey periods, this was not always possible and weather conditions throughout the surveys were not always ideal.

Trapping sites were set up in 2011 by Ecological Horizons Pty Ltd and paired to create an 'impact' and 'control' site. Sites were strategically placed for each purported impact (mine, haul road, rail siding,

crushing plant), however many of these sites were less than (<) 200 metres (m) from each other and are therefore not considered independent when considering mobile species such as birds and medium-large mammals.

The implemented survey methods and design are deemed not adequate to detect small changes in abundance of medium to large pest animal species (i.e., rabbit, cat, fox, goat). Spotlighting is conducted on one night and is not repeated during the trapping session. Results are reliant on the timing and movement of animals on the survey night and are unlikely to be indicative of real change. Changes in numbers of pest animal species is unlikely to be identified using this methodology unless a significant change has occurred. Mining personnel undertake a targeted feral animal control program (Environmental Projects, 2020), which is likely to provide a better understanding of any changes in diversity and / or abundance of pest species. Any changes in abundance of small pest animal species such as House Mouse (*Mus musculus*) are likely to be detected using pitfall trapping methods.

Data has been collected over three consecutive years (2020-2023). Analysis of the data collected to date is limited due to generally small numbers of captures each year and large seasonal variation between survey periods. Pitfall trapping and fauna monitoring in arid boom-and-bust environments requires long-term data (i.e., more than 10 years) to detect the significance of trends in relation to seasonal compared to potential anthropogenic changes.

Peak Iron Mines have supplied EBS Ecology with access to PDF copies of the 2007 baseline and the 2015 and 2020 annual compliance fauna survey reports, however no digital data, raw data GIS files or 2011-2014 reports are available. This lack of continuous data has limited the capacity to assess changes in fauna species richness and fauna abundance comparison between years or over the years that the monitoring program has been implemented.

3.3.1 Autumn 2023

In autumn 2023 only one night of trapping data was collected for only five out of 11 sites due to a rain event forcing the closure of traps.

Bird surveys were completed as per the standard monitoring program and all sites were completed. However, gusty wind and the large rainfall event is likely to have influenced bird survey results in the autumn 2023 survey. Additionally, the autumn survey period may have reduced the response of territorial birds to call playback, as it is outside of the breeding period for both species.

Spotlighting was completed as pre the standard monitoring program in good weather conditions, prior to the rainfall event, and is unlikely to have been influenced significantly by the weather conditions.

3.3.2 Spring 2023

Survey conditions in spring were favourable for small mammal and reptile trapping, with warm daytime temperatures and relatively mild evening temperatures. No rainfall was recorded during the spring 2023 survey period, and below average rainfall had been recorded in the three months prior to the survey, following a significant event in both April and June. Constant wind and high wind gusts were not ideal for surveying birds during the spring survey, making it difficult for observers to hear bird calls and reducing overall bird activity. Additionally, a technical error resulted in misplacement of data for Bird Site 1, 2 and 4.

4 AUTUMN 2023 FIELD SURVEY RESULTS

Results of the pitfall trapping, bird surveys, spotlighting and opportunistic observations are presented below. A complete fauna species list can be found in Appendix 4 – All species recorded during autumn 2023 field survey.

4.1 Pitfall trapping effort

The autumn 2023 survey was scheduled for 12 to 18 April 2023. Four sites were set, and one new site installed on 13 April 2023 (total five sites). The remainder of sites, excluding PK5-C, were set up on the morning of 14 April 2023, but kept closed due to forecast rain that afternoon. On the afternoon of 14 April, a weather system from severe tropical cyclone Isla in Western Australia caused over 50 mm of rain to fall in 12 hours, inundating all of the trap sites and making the Project Area largely inaccessible (Figure 7). Traps had been closed prior due to the predicted forecast, and so only one night of trapping was completed at five sites. Table 9 details the survey effort for the autumn 2023 field survey.

Table 9. Trap effort for autumn 2023 field survey.

Sitek	Set date	Close date	Effort per Site (number of traps)	Trap nights (nights open)	Site effort (# traps x nights)	Comments
PK1 Control	13/04/2023	14/04/2023	10	1	10	6 small 4 large
PK1 Regen	13/04/2023	14/04/2023	9	1	8	5 small (one closed due to ants) 4 large
PK1 Impact (new)	13/04/2023	14/04/2023	10	1	10	10 large
PK3 Impact	13/04/2023	14/04/2023	9	1	9	5 small 4 large
PK3 Control	13/04/2023	14/04/2023	9	1	9	5 small 4 large
PK5 Impact	14/04/2023	14/04/2023	10	0	0	6 small 4 large
PK5 Control	Not set	N/A		0	0	NA
PK6 Impact	14/04/2023	14/04/2023	10	0	0	6 small 4 large
PK6 Control	14/04/2023	14/04/2023	10	0	0	6 small 4 large
PK7 Impact	14/04/2023	14/04/2023	10	0	0	6 small 4 large
PK7 Control	14/04/2023	14/04/2023	10	0	0	6 small 4 large (1 new pit installed)

4.1.1 Pitfall captures

A total of 19 captures were made during the autumn 2023 pitfall survey. This included 12 individuals from four reptile species, six individuals from four mammal species, and one amphibian (Table 10). Three species new to the site (based on available records) were captured in autumn 2023:

- Monk Snake (*Parasuta monachus*) (Figure 9),
- Beaded Gecko (*Lucasium damaeum*) and
- Mitchell's Hopping Mouse (*Notomys mitchellii*) (Figure 10).

Mitchell's Hopping Mouse is typically distributed further south than the Project Area and additional captures and a vouchered specimen is required to confirm identification.

A comparison of abundance and species diversity is not presented for the autumn 2023 field survey.

Table 10. Captures from the autumn 2023 field survey.

Scientific Name	Common Name	Method	Site					Grand Total
			PK 1.2-I	PK 1-I	PK1-C	PK 3-I	PK3-C	
REPTILES								
Ctenotus schomburgkii	Barred Wedge-snout Ctenotus	Pitfall	3	1	4			8
Liopholis inornata	Desert Skink	Pitfall			1			1
Lucasium damaeum	Beaded Gecko	Pitfall			2			2
Parasuta monachus	Monk Snake	Pitfall	1					1
		Abundance	**4**	**1**	**7**	**0**	**0**	**12**
		Species Richness	**2**	**1**	**3**	**0**	**0**	**4**
MAMMALS								
*Notomys mitchellii (*sp. TBC)	Mitchell's Hopping Mouse	Pitfall		1				1
Planigale tenuirostris	Narrow-nosed Planigale	Pitfall				1		1
Pseudomys hermannsburgensis	Sandy Inland Mouse	Pitfall	2		1			3
Sminthopsis ooldea	Ooldea Dunnart	Pitfall			1			1
		Abundance	**2**	**1**	**2**	**1**	**0**	**6**
		Species Richness	**1**	**1**	**1**	**1**	**0**	**4**
AMPHIBIANS								
Neobatrachus sudellae	Trilling Frog	Pitfall				1		1
		Grand Total Abundance	**6**	**2**	**9**	**2**	**0**	**19**
		Grand Total Richness	**3**	**2**	**4**	**2**	**0**	**9**

Figure 7. Inundated trap site PK3-I following rainfall event.

Figure 8. Trilling Frog (*Neobatrachus sudellae*) emerged during heavy rainfall at site PK3-I.

Figure 9. Monk Snake (*Parasuta monachus*), a new species for the PK site species list.

Figure 10. Mitchell's Hopping Mouse (*Notomys mitchellii*) captured at PK1-R prior to rainfall.

4.2 Dedicated bird surveys

Bird surveys were conducted at 20 out of the 23 usual bird monitoring sites (Table 11). Three sites (PK5-I, PK5-C and Bird 5) were inaccessible due to the rainfall.

Table 11. Bird survey effort during autumn 2023 survey.

Monitoring technique	Total number of Sites	Number of sites surveyed autumn 2023	Effort per site (minutes)	Total Effort
Bird Point Count	23	20	20	400 minutes or 6.67 hours.

Except for the 14 and 15 April, conditions for surveying were generally favourable during the autumn 2023 field survey, with moderate to light winds, mild and sunny conditions following the storm.

Results reported in this section only represent birds observed at a site during the dedicated 20-minute 2-hectare (ha) survey. Eleven of the sites are combined with pitfall trapping sites (including the new site PK1-I, which was installed in the existing location of Wirrida West Impact Site). Additional species were present and identified over the course of the four-day trapping period, with opportune observations presented in Section 4.4.

A total of 318 observations of 34 bird species were recorded during the autumn 2023 targeted bird survey (Table 12). The highest abundance of birds was observed at Bird 7, with a total of 31 observations of 11 species. One site, PK7-I, had no observations during the 20-minute survey.

Bird species recorded in highest abundance were Zebra Finch (*Taeniopygia guttata*) (62) and White-winged Fairywren (*Malurus leucopterus*) (47) consistent with the 2021 spring survey period despite the seasonal variation. Though Zebra Finches are known to flock in good seasonal conditions, these consistent observations across years and seasons may represent a local population.

Zebra Finches were the most widespread species, observed at 15 (75%) of the 20 surveyed sites. This was followed by Australian Raven (*Corvus coronoides*) at 13 (65%) sites and White-winged Fairywren at 12 (60%) sites.

Average species diversity across sites was 5.5 (6) bird species per site. Two sites had equally high species diversity, Bird 5 and Bird 7, with 11 species each, followed by Bird 3 (10), Bird 2 (9), and Wirrida West Control (8).

Two bird species not previously recorded in the Project Area (based on available records since 2020) were observed during the bird surveys, including State Rare Elegant Parrot (*Neophema elegans*) at Bird 3, and Rufous Whistler (*Pachycephala rufiventris*) at Bird 7.

Table 12. Bird species recorded during 20-minute 2-ha bird surveys in autumn 2023.

Species name	Common Name	EPBC Act	NPW Act	Abundance	Occupancy (no. sites) n=20
Acanthagenys rufogularis	Spiny-cheeked Honeyeater			1	1
Acanthiza uropygialis	Chestnut-rumped Thornbill			5	2
Amytornis modestus	Thick-billed Grasswren	VU		10	2
Anas gracilis	Grey Teal			5	1
Anthus australis	Australasian Pipit			5	3
Aphelocephala leucopsis	Southern Whiteface	VU		6	2
Aquila audax	Wedge-tailed Eagle			1	1
Artamus cinereus	Black-faced Woodswallow			6	4
Artamus personatus	Masked Woodswallow			1	1
Calamanthus campestris	Rufous Fieldwren			10	7
Cinclosoma cinnamomeum	Cinnamon Quail-thrush			4	1
Corvus bennetti	Little Crow			2	1
Corvus coronoides	Australian Raven			26	12
Cracticus torquatus	Grey Butcherbird			1	1
Eolophus roseicapilla	Galah			5	1
Epthianura aurifrons	Orange Chat			9	4
Falco cenchroides	Nankeen Kestrel			3	3
Grallina cyanoleuca	Magpie-lark			4	2
Gymnorhina tibicen	Australian Magpie			3	2
Lichenostomus virescens	Singing Honeyeater			16	9
Malurus lamberti	Variegated Fairywren			6	1
Malurus leucopterus	White-winged Fairywren			47	11
Manorina flavigula	Yellow-throated Miner			2	1
Neophema elegans	Elegant Parrot		Rare	1	1
Neopsephotus bourkii	Bourke's Parrot			16	2

Species name	Common Name	EPBC Act	NPW Act	Abundance	Occupancy (no. sites) n=20
Ocyphaps lophotes	Crested Pigeon			3	2
Oreoica gutturalis	Crested Bellbird			9	7
Pachycephala rufiventris	Rufous Whistler			1	1
Petroica goodenovii	Red-capped Robin			3	2
Pomatostomus superciliosus	White-browed Babbler			14	4
Psophodes occidentalis	Chiming Wedgebill			20	9
Ptilotula penicillatus	White-plumed Honeyeater			4	1
Rhipidura leucophrys	Willie Wagtail			6	3
Taeniopygia guttata	Zebra Finch			62	2
Total observations					**317**

Figure 11. Bourke's Parrot observed during field survey at Bird 7.

Figure 12. Wedge-tailed Eagle observed during field survey.

4.2.1 Targeted species

Call playback was undertaken for two target species during dedicated bird surveys. No Chestnut-breasted Whiteface (*Aphelocephala pectoralis*) responded to call playback during the targeted surveys.

A total of 11 individual Thick-billed Grasswren (*Amytornis modestus*) were recorded during the bird survey at three sites – Bird 4, PK3-C and PK3-I. They have previously been recorded at these sites.

4.3 Spotlighting

Spotlighting was undertaken on 13 Aril 2023 following a mild to warm (28°C) day and favourable weather conditions. The survey commenced after dark (approximately 8:45 PM) and took approximately one hour per transect.

Table 13. Spotlighting survey effort in autumn 2023.

Monitoring technique	# of Sites	Effort per Site (trap / time/ distance)	Total effort	Survey effort
Spotlighting	2	30 km length	60 km (30 x 2)	60 km (60 x 1)

Observations were very low, with a total of four species observed during the spotlighting survey, including two native mammals, and two introduced mammals (Table 14).

Table 14. Observations during the autumn 2023 spotlighting survey.

	Scientific	Common	No. individuals
Native mammals	*Macropus fuliginosus*	Western Grey Kangaroo	1
	Macropus rufus	Red Kangaroo	2
Introduced mammals	*Felis catus*	Cat	2
	Oryctolagus cuniculus	Rabbit	3

4.4 Opportunistic observations

A total of 42 species were recorded opportunistically throughout the survey, including 12 species which were not recorded during dedicated bird surveys, presented in Table 15. Opportunistic records were predominantly sighted whist traversing the haul road between trapping sites, or when walking to or from trapping sites, outside of dedicated survey time.

Chestnut-breasted Whiteface was only observed opportunistically during the autumn 2023 survey, with a small group of 8 birds flying through the Site PK1-R. This species has not previously been recorded at this location and the *Acacia aneura* (Mulga) woodland habitat is outside of their usual preferred habitat type. The group may have been moving in response to seasonal conditions.

Thick-billed Grasswrens were opportunistically recorded at three locations outside of the dedicated survey sites / times, including at vegetation monitoring site PK4-I, along the highway near Bird 1 and at PK5-I.

Southern Whiteface (*Aphelocephala leucopsis leucopsis*) was opportunistically observed at PK1-R and along the Wirrida rail loop track, west of the Stuart Highway (Hwy).

Two bird species not previously recorded in the Project Area (based on available records since 2020) were observed opportunistically, including Mulga Parrot (*Psephotellus varius*) and Australian Pratincole (*Stiltia isabella*).

Table 15. Opportunistic observations of species within the Project Area, but not recorded at permanent monitoring sites or using dedicated survey methodology.

Scientific Name	Common Name	No. individuals	Location description
Aphelocephala pectoralis	Chestnut-breasted Whiteface	8	PK1-I
Cacatua sanguinea sanguinea	Little Corella	2	Haul road, west of Stuart Hwy.
Cheramoeca leucosterna	White-backed Woodswallow	1	PK4-I (vegetation site)
Dromaius novaehollandiae	Emu	3	PK1-I / Haul road
Falco berigora	Brown Falcon	1	Haul road near PK3-I
Falco longipennis	Australian Hobby	1	Haul road, west of Stuart Hwy.
Limnodynastes tasmaniensis	Spotted Grass Frog	1	PK3-I
Mirafra javanica secunda	Horsfield's Bushlark	2	Mine / haul road east of Stuart Hwy.
Phaps chalcoptera	Common Bronzewing	2	Bird 5 and Bird 7
Pogona vitticeps	Central Bearded Dragon	1	PK4-C (vegetation site)
Psephotellus varius	Mulga Parrot	1	Haul road, west of Stuart Hwy.
Stiltia isabella	Australian Pratincole	1	Haul road, east of Stuart Hwy.

5 SPRING 2023 FIELD SURVEY RESULTS

Results of the pitfall trapping, bird surveys, spotlighting and opportunistic observations are presented below. A complete fauna species list can be found in Appendix 5 – All species recorded during spring 2023 field survey.

5.1 Pitfall trapping effort

The spring 2023 survey was scheduled for 9 to 15 October 2023. Nine sites were set on 10 October 2023 with the remaining two sites set the following day on 11 October 2023 (Table 16). Ten sites each have a line with up to six small and four large pitfall traps, except for the newly installed site (PK1-I) which has two lines each with five large pitfall traps. The total trap effort for the spring 2023 survey, based on the number of traps set and the number of nights open, is 432 pitfall trap nights.

Table 16. Trap effort for autumn 2023 field survey.

Site	Set date	Close date	Effort per Site (number of traps)	Trap nights (number of nights open)	Survey effort (no. traps x no. nights open)	Trap arrangement / Comments
PK1 Control	10/10/2023	14/10/2023	10	4	40	6 small 4 large
PK1 Regen	10/10/2023	14/10/2023	10	4	40	6 small 4 large
PK1 Impact	10/10/2023	14/10/2023	10	4	40	5 large 5 large
PK3 Impact	10/10/2023	14/10/2023	9	4	36	5 small 4 large
PK3 Control	10/10/2023	14/10/2023	9	4	36	5 small 4 large
PK5 Impact	10/10/2023	14/10/2023	10	4	40	6 small 4 large
PK5 Control	10/10/2023	14/10/2023	10	4	40	6 small 4 large
PK6 Impact	11/10/2023	15/10/2023	10	4	40	6 small 4 large
PK6 Control	11/10/2023	15/10/2023	10	4	40	6 small 4 large
PK7 Impact	10/10/2023	14/10/2023	10	4	40	6 small 4 large
PK7 Control	10/10/2023	14/10/2023	10	4	40	6 small 4 large

5.1.1 Pitfall capture summary

A total of 108 captures (excluding 6 recaptures) were made during the spring 2023 pitfall survey. This included 68 individuals from 21 reptile species, 32 individuals from five native mammal species, one bird and one introduced mammal (Table 17). Analysis of Variance (ANOVA) (two-factor without replication) was used to compare impact and control sites.

Site PK1-R was removed from the analysis due to lack of ongoing impact at this site, and to maintain standard comparisons between impact and control sites. Where data from this site has been included, it

will be specified in the text. The Australian Pipit captured at Site PK3-I was also removed from the analysis due to it being an outlier in the data and not a target species for the survey methodology.

The ANOVA found that there was no significant difference between the number of captures (abundance) at control sites compared to impact sites (P = 0.26). Though there was no statistically significant difference, on average, the number of captures was higher at control sites (11.4) compared to impact (7.2). The most variation between impact at control sites was seen at site PK1 (Impact: 9; Control: 25) and PK7 (Impact: 1; Control: 7), where abundance was higher at the control sites.

The ANOVA also determined that there was no significant difference in diversity (species richness) between control and impact sites (P = 0.49), though across all the sites 21 species were recorded at control sites and 16 at impact sites.

Overall abundance and diversity between control and impact sites in the spring 2023 field survey is illustrated in Figure 13.

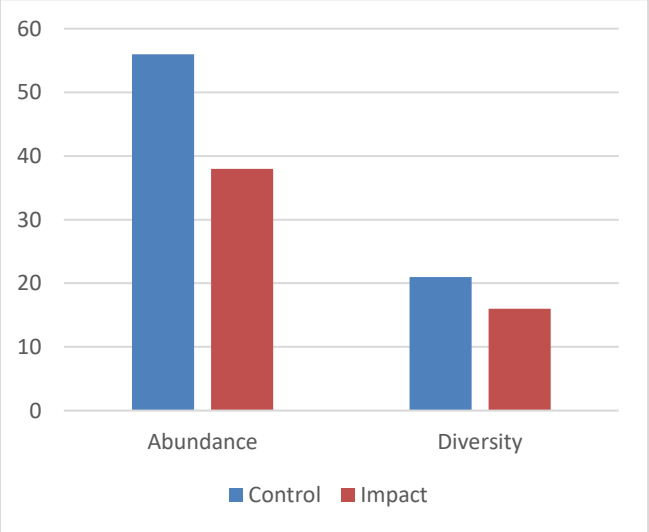


Figure 13. Abundance and diversity between control and impact sites during the spring 2023 survey.

Table 17. Spring 2023 pitfall survey species captures per site.

Scientific Name	Common Name	Method	PK1-I	PK1-C	PK1-R	PK3-C	PK3-I	PK5-C	PK5-I	PK6-C	PK6-I	PK7-C	PK7-I	Grand Total
MAMMAL														
*Mus musculus**	House Mouse	Pitfall		3						1	3			7
Planigale tenuirostris	Narrow-nosed Planigale	Pitfall						1						1
Pseudomys hermannsburgensis	Sandy Inland Mouse	Pitfall	1		1									2
Sminthopsis crassicaudata	Fat-tailed Dunnart	Pitfall						7	7		2	1		17
Sminthopsis macroura	Stripe-faced Dunnart	Pitfall				3	1		2			4	1	11
Sminthopsis ooldea	Ooldea Dunnart	Pitfall			1									1
Abundance (excl. introduced*)			**1**	**0**	**2**	**3**	**1**	**8**	**9**	**0**	**2**	**5**	**1**	**32**
Species Richness (excl. introduced*)			**1**	**0**	**2**	**1**	**1**	**2**	**2**	**0**	**1**	**2**	**1**	**5**
REPTILE														
Ctenophorus isolepis	Central Military Dragon	Pitfall		4	2									6
Ctenophorus nuchalis	Central Netted Dragon	Pitfall	1		1									2
Ctenophorus pictus	Painted Dragon	Pitfall			1									1
Ctenotus olympicus	Saltbush Ctenotus	Pitfall									2			2
Ctenotus saxatilis	Rock Ctenotus	Pitfall								2				2
Ctenotus taeniatus	Eyrean Ctenotus	Pitfall		1										1
Diplodactylus tessellatus	Tessellated Gecko	Pitfall										2		2
Heteronotia binoei	Bynoe's Gecko	Pitfall						1						1
Lerista bipes	North-western Sandslider	Pitfall		1	1									2
Lerista timida	Timid Slider	Pitfall								4	1			5
Liopholis inornata	Desert Skink	Pitfall		3	2									5
Lucasium byrnei	Gibber Gecko	Pitfall									1			1
Lucasium damaeum	Beaded Gecko	Pitfall	2	4	3									9
Lucasium stenodactylum	Crowned Gecko	Pitfall	2	3	3									8
Menetia greyii	Common Dwarf Skink	Pitfall				1	1				2			4
Nephrurus levis	Smooth Knob-tailed Gecko	Pitfall	2	1										3
Pogona vitticeps	Central Bearded Dragon	Pitfall		1										1

Scientific Name	Common Name	Method	PK1-I	PK1-C	PK1-R	PK3-C	PK3-I	PK5-C	PK5-I	PK6-C	PK6-I	PK7-C	PK7-I	Grand Total
Pygopus schraderi	Eastern Hooded Scaly-foot	Pitfall								2				2
Rhynchoedura ornata	Western Beaked Gecko	Pitfall	1		1					2	2			6
Varanus gilleni	Pygmy Mulga Monitor	Hand		1										1
Varanus gouldii	Sand Goanna	Pitfall		3			1							4
Abundance			**8**	**22**	**14**	**1**	**2**	**1**	**0**	**10**	**8**	**2**	**0**	**68**
Species Richness			**5**	**10**	**8**	**1**	**2**	**1**	**0**	**5**	**5**	**1**	**0**	**21**
BIRD														
Anthus australis	Australian Pipit	Pitfall					1							1
Total abundance			**9**	**25**	**16**	**4**	**4**	**9**	**9**	**12**	**13**	**7**	**1**	**109**
Total species richness (excl. introduced)			**6**	**10**	**10**	**2**	**4**	**3**	**2**	**5**	**6**	**3**	**1**	**28**

5.1.2 Mammal abundance and diversity

Mammals were captured at 9 sites (n=11), with site PK1-C and PK6-C the only sites recording no mammal captures. At sites where mammals were captured, there was an average of 3.6 captures per site (range 1 to 9; overall including sites with no captures: 2.9), and 1 to 2 species per site.

PK5-I had the highest mammal abundance, with 9 captures (28.13%) of two dunnart species, Fat-tailed Dunnart (*Sminthopsis crassicaudata*) (Figure 15) and Stripe-faced Dunnart (*S. macroura*). PK5-C had similar abundance, with 8 captures of two species, Fat-tailed Dunnart and Narrow-nosed Planigale (*Planigale tenuirostris*).

There were slightly fewer captures at impact (14) compared to control (16) sites, however this was not statistically significant (P = 0.74). There was no difference in species diversity between impact and control, with three mammal species recorded at both control and impact sites. Diversity and abundance of native mammals for each site is displayed in Figure 14.

Introduced species *Mus musculus* (House Mouse) was detected at three sites, PK1-C, PK6-C and PK6-I, with a total of 7 individuals captured during the survey.

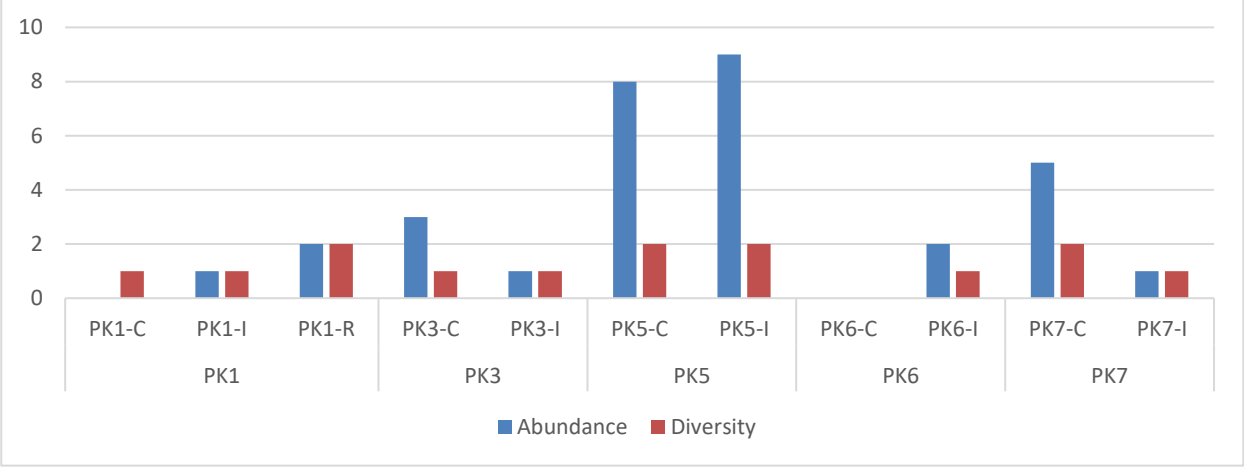


Figure 14. Mammal abundance and diversity at each site in the 2023 spring survey, including site PK1-I, not included in analysis.

Figure 15. Fat-tailed Dunnart captured during the spring 2023 field survey.

5.1.3 Reptile abundance and diversity

Reptiles were captured at 9 sites (n=11), with site PK5-I and PK7-I the only sites recording no reptile captures. At sites where reptiles were captured, there was an average of 7.6 captures per site (range 1 to 22; overall including sites with no captures: 6.18), and an average of 4.1 species per site (range 1 to 10; overall including sites with no captures: 3.36).

The highest reptile abundance and diversity was captured at site PK1-C, with 32% of all captures (22 individuals) and 48% of the total species diversity (10 species) for the survey. PK1-I, PK6-C and PK6-I all recorded similarly high abundance and diversity, while the remainder of sites recorded a very low number of reptile captures.

High abundance and diversity were also recorded at PK1-R (not included in the ANOVA statistics), with 14 individuals from 8 species recorded.

Overall, there were fewer captures at impact (21) compared to control (36) sites, however this was not statistically significant (P = 0.25). Impact sites also had lower species diversity (12) than control sites (17), but this was not statistically significant (P=0.4) and did not include site PK1-R which recorded an additional two species. Collectively, PK1 (I/C) was found to have significantly higher reptile diversity than other sites (P = 0.03), likely attributable to the mulga vegetation community at this site. Diversity and abundance of reptiles for each site is displayed in Figure 16.

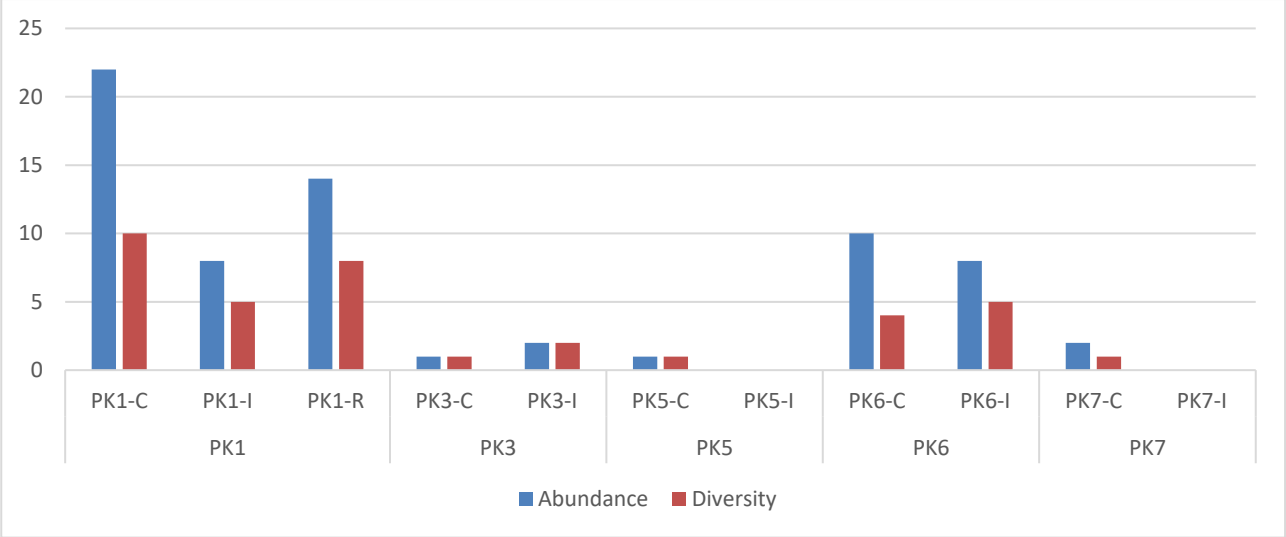


Figure 16. Reptile abundance and diversity at each site in the 2023 spring survey, including site PK1-R, not included in analysis.

Three species new to the site (based on available records since 2020) were captured in spring 2023, Painted Dragon (*Ctenophorus pictus*), Rock Ctenotus *(Ctenotus saxatilis* syn*. inornatus*) (Figure 17). And *Heteronotia binoei* (Bynoe's Gecko).

Figure 17. *Ctenotus saxatilis* (Rock Ctenotus) detected for the first time at PK6-C.

Figure 18. *Lucasium byrnei* (Gibber Gecko) recorded for the first time since 2020.

5.2 Dedicated bird surveys

Bird surveys were conducted at each of the 23 standard bird monitoring sites during the spring 2023 field survey (Table 18). Due to a technical error, data collected at Bird 1, 2 and 4 is not available and therefore excluded from the analysis.

Table 18. Bird survey effort during spring 2023 survey.

Monitoring technique	Total number of Sites	Number of sites surveyed autumn 2023	Effort per site (minutes)	Total Effort
Bird Point Count	23	23	20	460 minutes or 7.6 hours.

Conditions for surveying were not favourable during the spring 2023 field survey, with warm to hot days and gusty winds occurring throughout the survey period.

A total of 573 individuals from 39 bird species were recorded during the spring 2023 targeted bird survey (Table 19). The highest abundance of birds was recorded at WSI, with 117 observations of 9 species. Other sites with high abundance included Bird 7 (82), WSC (59) and WWC (43). One site, PK6-I had recorded no observations during the 20-minue survey.

Average abundance per site was 28.55 individuals (range 0 to 117). The bird species recorded in highest abundance was Zebra Finch with 220 individuals accounting for 38% of all observations. This was followed by White-winged Fairywren (44) and Budgerigar (*Melopsittacus undulatus*) (43).

Zebra Finches were also the most widespread species, occurring at 12 (52%) sites, followed by White-winged Fairywren at 11 (47.8%) sites. Singing Honeyeater (*Lichenostomus virescens*) and Chiming Wedgebill (*Psophodes occidentalis*) were each recorded at 8 (34.8%) sites.

Average species diversity across sites (excluding Bird 1, 2 and 4) was 6.05 bird species per site (range 0 to 12). Highest diversity was recorded at Bird 7 (12), followed by WWC (11), WWI / PK1-I (10), and WSC (9).

Table 19. Bird species recorded during 20-minute 2-ha bird surveys in spring 2023.

Species name	Common Name	Abundance	Occupancy
Acanthiza uropygialis	Chestnut-rumped Thornbill	9	2
Amytornis modestus	Thick-billed Grasswren	5	2

Species name	Common Name	Abundance	Occupancy
Anthus australis	Australasian Pipit	13	6
Aphelocephala leucopsis leucopsis	Southern Whiteface	4	2
Aquila audax	Wedge-tailed Eagle	5	2
Artamus cinereus	Black-faced Woodswallow	9	4
Calamanthus campestris	Rufous Fieldwren	3	3
Cincloramphus cruralis	Brown Songlark	4	1
Corvus bennetti	Little Crow	20	3
Corvus coronoides	Australian Raven	7	4
Dromaius novaehollandiae	Emu	1	1
Eolophus roseicapilla	Galah	6	2
Epthianura albifrons	White-fronted Chat	2	1
Epthianura aurifrons	Orange Chat	27	4
Epthianura tricolor	Crimson Chat	25	6
Falco cenchroides	Nankeen Kestrel	1	1
Falco longipennis murchisonianus	Australian Hobby	2	2
Gymnorhina tibicen	Australian Magpie	1	1
Hirundo neoxena	Welcome Swallow	2	1
Lichenostomus virescens	Singing Honeyeater	19	8
Malurus assimilis	Purple-back Fairywren	6	1
Malurus leucopterus	White-winged Fairywren	44	11
Manorina flavigula	Yellow-throated Miner	1	1
Melopsittacus undulatus	Budgerigar	43	6
Merops ornatus	Rainbow Bee-eater	2	1
Mirafra javanica secunda	Horsfield's Bushlark	2	1
Northiella haematogaster	Blue Bonnet	3	2
Nymphicus hollandicus	Cockatiel	2	1
Ocyphaps lophotes	Crested Pigeon	5	5
Oreoica gutturalis	Crested Bellbird	3	2
Petrochelidon nigricans neglecta	Tree Martin	27	1
Petroica goodenovii	Red-capped Robin	1	1
Pomatostomus superciliosus	White-browed Babbler	28	6
Psophodes occidentalis	Chiming Wedgebill	11	8
Ptilotula penicillatus	White-plumed Honeyeater	5	2
Rhipidura leucophrys	Willie Wagtail	1	1
Taeniopygia guttata	Zebra Finch	218	12
Todiramphus pyrrhopygius	Red-backed Kingfisher	3	2
Vanellus tricolor	Banded Lapwing	1	1
	Total observations	**571**	

5.2.1 Targeted species

Call playback was undertaken for two target species during dedicated bird surveys. No Chestnut-breasted Whiteface (*Aphelocephala pectoralis*) responded to call playback during the targeted surveys.

A total of five individual Thick-billed Grasswren (*Amytornis modestus*) were recorded during the bird survey at two sites –PK3-I and PK5-C. They have previously been recorded at these sites.

Recently listed as nationally Vulnerable, Southern Whiteface (*Aphelocephala leucopsis leucopsis*) was reported at two sites, WSC and WWC.

5.3 Spotlighting

Spotlighting was undertaken on 11 October 2023 following a hot (35°C) day. The survey commenced after dark (approximately 8:45 PM).

Table 20. Spotlighting survey effort for spring 2023.

Monitoring technique	# of Sites	Effort per Site (trap / time/ distance)	Total effort	Survey effort
Spotlighting	2	30 km length	60 km (30 x 2)	60 km (60 x 1)

During the 2023 spring survey, spotlighting was done on the warmest evening (following a 35°C day).

Activity was very low, with a total of four species detected during the field survey, including one native mammal, one reptile and two introduced mammals (Table 21).

Table 21. Observations during the autumn 2023 spotlighting survey.

	Scientific	Common	No. individuals
Native mammals	*Macropus rufus*	Red Kangaroo	20
Reptiles	*Nephrurus levis*	Smooth Knob-tailed Gecko	1
Introduced mammals	*Oryctolagus cuniculus*	Rabbit	3
	Ovis aires	Sheep	2

5.4 Opportunistic observations

A total of 29 species were recorded opportunistically throughout the survey including 17 species which were not detected using targeted survey methods (Table 22).

Records also included seven sightings of Chestnut-breasted Whiteface, a target species which was otherwise not detected onsite using call playback. One observation of four individuals was at PK5-C (opportunistic observation and not during the targeted bird survey) where they have previously been recorded and two other locations along the haul road, east of the Stuart Highway.

Thick-billed Grasswren were detected opportunistically at PK3-C and PK5-C, however this species had also been detected at the nearby paired impact site and are likely to represent the same population.
Two additional State listed species were detected opportunistically, State Vulnerable Australian Bustard (*Ardeotis australis*) and State Rare Peregrine Falcon (*Falco peregrinus*).

Wedge-tailed Eagles (*Aquila audax*) were abundant along the haul road between Stuart Highway and Wirrida, with at least 28 observations made in one drive, including several large groups resting on the ground or in small trees.

Table 22. Opportunistic observations of species within the Project Area, but not recorded using dedicated survey methodology.

Scientific Name	Common Name	Cons. Rating	No. individuals	Location Description
Aphelocephala pectoralis	Chestnut-breasted Whiteface	SA: R	7	Haul road (east) / PK5-C
Ardeotis australis	Australian Bustard	SA:VU	1	Stuart Highway / Haul road (west)
Chalcites basalis	Horsfield's Bronze Cuckoo		1	PK1-C
Cheramoeca leucosternus	White-backed Swallow		4	Haul road (west)
Cinclosoma cinnamomeum	Cinnamon Quailthrush		1	Haul road (east)
Circus assimilis	Spotted Harrier		1	Haul road (west)
Demansia cyanochasma	Desert Whipsnake		1	PK7-C / Haul road (west)
Falco berigora	Brown Falcon		3	Haul road (west / east)
Falco peregrinus	Peregrine Falcon	SA: R	1	Haul road (east)
Grallina cyanoleuca	Magpie-lark		1	Windy Valley camp
Macropus robustus	Euro		4	PK mine
Neopsephotus bourkiii	Bourke's Parrot		1	Wirrida Rail Siding / Haul Road
Pseudechis australis	Mulga Snake		1	Haul road (west)
Pseudonaja aspidorhyncha	Strap-snouted Brown Snake		1	Haul road (east)
Tachyglossus aculeatus	Short-beaked Echidna		1	Breakaways
Tiliqua rugosa	Shingleback		1	PK mine / PK6-I
Tympanocryptis intima	Smooth-snouted Earless Dragon		1	Breakaways

Opportunistic observations included six species which have not previously been recorded in the Project Area (based on available data from 2020) including:

- Australian Bustard (NPW Act: Vulnerable), detected nearby the Stuart Highway on the last day of the Project. It is a nomadic species which occurs sporadically in South Australia, where it is listed as State Vulnerable.
- Horsfield's Bronze Cuckoo (*Chalcites basalis*) recorded calling at site PK1-C.
- Spotted Harrier (*Circus assimilis*) observed along the haul road, west of the Stuart Highway.
- Euro (*Macropus robustus*) observed traversing the steep sided slopes of the mine waste rock dump.
- Desert Whipsnake (*Demansia cyanochasma*), observed along the haul road and at site PK7-C (Figure 19).
- Short-beaked Echidna (*Tachyglossus aculeatus*), scats detected in the vicinity of the breakaways and anecdotally reported from nearby the haul road underpass by truck drivers.

Figure 19. Desert Whipsnake (*Demansia cyanochasma*) at PK7-C, observed opportunistically during the spring 2023 field survey.

6 COMPLIANCE AND COMPARISON WITH PREVIOUS SURVEYS

Comparisons are limited to the data which has been made available, which includes only the 2020 and 2021 survey report. Historical fauna monitoring reports were supplied to EBS in January 2024, including the baseline (Ecological Horizons, 2011) report and 2015 monitoring report (Ecological Horizons, 2015). Raw data files are not available for these surveys and additional time is required to digitise data contained within the supplied reports, as such comparisons drawn are anecdotal only. Variation in numbers from one year to the next cannot conclusively be considered significant when considering the arid boom and bust cycle. Reduction in occupancy of resident species such as the Thick-billed Grasswren may be representative of an impact. A summary of compliance with outcomes listed in the PEPR for 2023 is presented in Table 23 and discussed in more detail in the following sections.

Compliance outcomes are not assessed for the autumn 2023 survey period as there was insufficient data collected to make any assumptions.

Table 23. Compliance outcomes 2023.

Outcome	Compliant 2022/2023	Comments
No permanent loss of native fauna abundance or diversity in ML, MPLs, EMLs and adjacent areas caused by mining operations and vegetation clearing.	Yes	There was no observable difference in abundance or diversity of native fauna recorded between control and impact sites in the 2023 surveys. There was no change to occupancy of targeted threatened bird species, Thick-billed Grasswren. Reptile abundance (from pitfall captures) has remained stable since 2020. Mammal abundance has been highly variable, with a large increase in 2021 followed by a decline in numbers in 2023. Variation is likely due to seasonal variation and extreme weather events preceding survey periods rather than mining impacts.
No introduction of new pests (including feral animals) or increase in abundance of existing species.	Yes	No new pest species were detected during the 2023 fauna survey. Abundance of existing pest animal species was comparable to previous years.
No permanent loss of native fauna abundance or diversity in surface water diversions / crossings and ephemeral systems located on or directly adjacent to mine infrastructure areas, caused by mining operations and vegetation clearing.	Yes	There was no established trend indicating reduction in abundance or diversity of fauna related to mine impacts in ephemeral ecosystems. PK3-I had slightly lower than average mammal and reptile abundance and diversity. PK5-I had comparable, or higher mammal diversity and abundance to all other sites. There were no captures of reptiles at site PK5-I in spring 2023 and only one at PK5-C. A decline in reptile abundance at PK7-C and PK7-I has been noted, however it is not clear if this is related to mine impacts, as bot the control and impact site have seen the same decline.

6.1 Abundance of fauna species with conservation significance

Six species of conservation significance were recorded during the 2023 survey period (autumn and spring), including the two target species:

- Australian Bustard (*Ardeotis australis*) (NPW Act: Vulnerable);
- Chestnut-breasted Whiteface (*Aphelocephala pectoralis*) (NPW: Rare) (target);
- Elegant Parrot (*Neophema elegans*) (NPW Act: Rare);
- Peregrine Falcon (*Falco peregrinus*) (NPW Act: Rare);
- Thick-billed Grasswren (*Amytornis modestus*) (EPBC: Vulnerable) (target); and
- Southern Whiteface (*Aphelocephala leucopsis leucopsis*) (EPBC Vulnerable).

Since the previous reporting period, Southern Whiteface (*Aphelocephala leucopsis leucopsis*) has been listed as nationally Vulnerable. This species has been recorded in each survey period since 2020, predominantly opportunistically. In autumn 2023, the species was recorded at 9 of the 20 dedicated bird survey sites surveyed during that period.

There was no notable reduction in occupancy or abundance of targeted species, Thick-billed Grasswren and Chestnut-breasted Whiteface (Appendix 6 – Site occupancy of threatened bird species for each survey year). Thick-billed Grasswren have been consistently observed at sites PK3 and PK5 since 2011/2012 and were again observed at these sites. Observations at impact and control sites cannot be considered independent of each other due to their proximity, and therefore these observations at four sites are considered to be two (not four) resident populations. Chestnut-breasted Whiteface occupancy is more sporadic; however, the species was still observed at one site in both autumn and spring survey periods. The species was detected at PK1-R for the first time in autumn 2023, which may be a result of displacement due to storm conditions.

Plains Mouse (*Pseudomys australis*) (EPBC: Vulnerable) was reported from the 2011 to 2015 field surveys (Cooe 2020). No monitoring was undertaken during the mothball period (2015 to 2020). This species has not been detected since the mine reopened and surveys recommenced, in 2020, despite potentially suitable ‘boom’ conditions observed elsewhere in the landscape, such as at Arid Recovery (Roxby Downs) where populations exploded following good rainfall in 2021 and have persisted into 2023 (Arid Recovery 2023). Major threats to this species include predation from feral cats and foxes and through habitat degradation from trampling and grazing from sheep and cattle (Moseby 2012).

6.2 Abundance and diversity of native fauna at impact vs control sites

Reptile abundance (from pitfall captures) has remained stable since 2020, with slightly lower abundance overall at impact sites. Mammal abundance has been highly variable, with a large increase from 2020 in 2021, followed by a decline in numbers in 2023 (Figure 20). Fluctuations are consistent across control and impact sites.

In 2023, reptile diversity was higher at control sites (18) than impact sites (14) however this is not a sustained trend, as impact sites had higher diversity in the previous 2021 trapping session (Figure 21). Mammal diversity was slightly lower at control sites (3) compared to impact sites (4) in 2023. As with abundance, fluctuations in diversity are consistent across control and impact sites. Variation is likely due to seasonal conditions and extreme weather events preceding survey periods rather than mining impacts.

Since 2020, a total of 10 native mammal species and 37 reptile species have been identified at the PK trapping sites. Overall, equal diversity of mammals (8 species) has been recorded at both control and impact sites. Slightly higher diversity of reptiles has been recorded at impact (29) compared to control (27) sites.

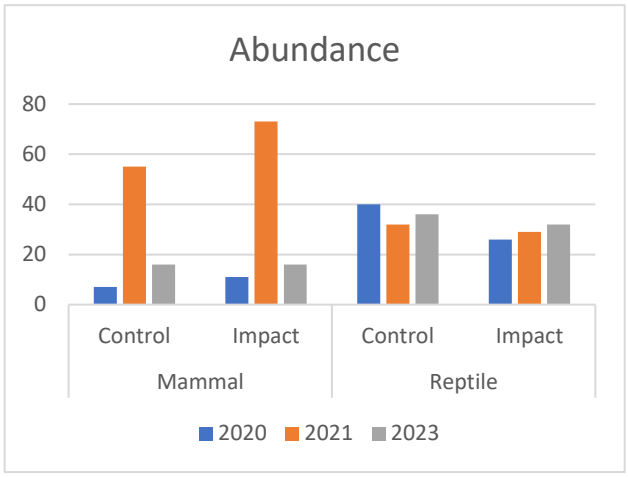


Figure 20. Mammal and reptile abundance between impact and control sites from 2020 to 2023.

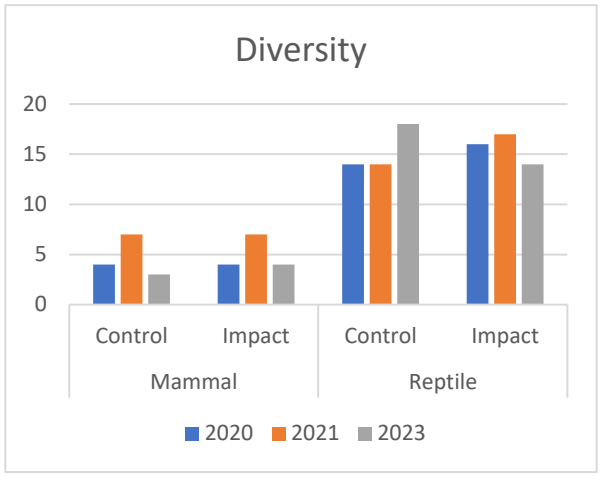


Figure 21. Mammal and reptile diversity between impact and control sites from 2020 to 2023.

PK7 (I and C) has reported a decline in reptile abundance since 2020 at both the control and impact sites. The same trend has not been detected in mammal abundance at PK7, and no similar trend has been observed at other sites (Figure 22). There are no sustained trends in mammal abundance between sites or between years, with variation likely attributable to climatic conditions. Significant rainfall events can temporarily render a landscape uninhabitable for small ground dwelling animals, and long-term inundation of sites is likely to impact their survival. A lapse between flooding events and occurrence of subsequent breeding events is likely to cause a lag in abundance of reptiles and mammals, despite apparent favourable conditions.

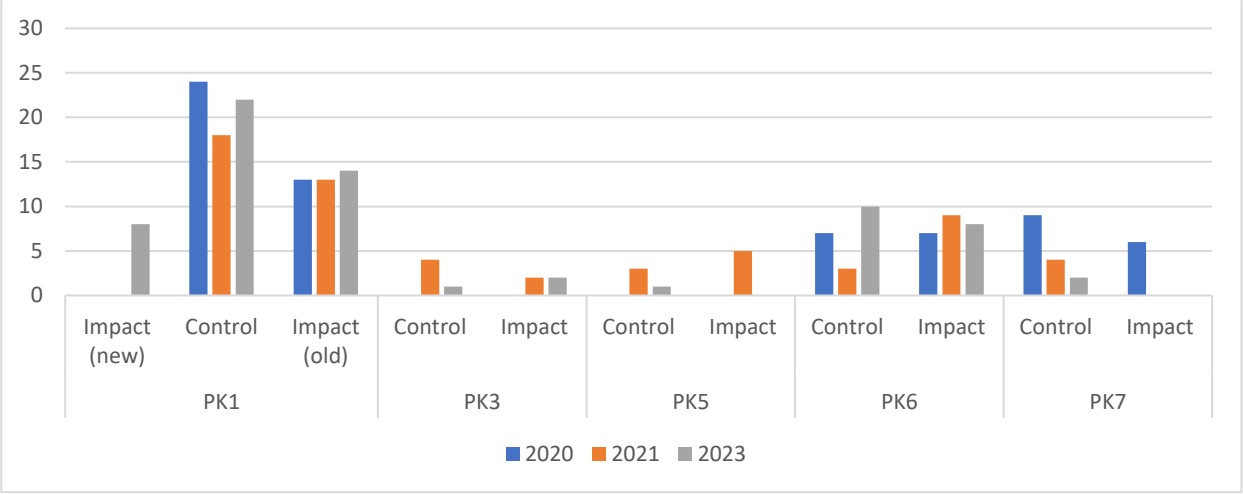


Figure 22. Reptile abundance at all trapping sites since 2020.

6.3 Abundance and diversity of bird species

A total of 49 bird species were recorded across the Project Area during the spring 2023 survey period including both opportune and survey observations, with 44 reported in autumn 2023. Similar diversity was reported in 2021 (48), however diversity was markedly higher in 2020 with 65 species recorded during the survey period.

The increased diversity observed in 2020 was predominantly caused by an influx of aquatic bird species due to flood conditions. Other possible causes for higher bird diversity reported in 2020 may include additional opportunistic survey effort, or potentially, activity of bird species moving further away from mining infrastructure since re-commencement of the mine activities in 2020, leading to lower observations around the mine infrastructure survey area.

A total of 90 bird species have now been reported at the PK mine site during surveys between 2020 and 2023.

6.4 Abundance or incursion of pest animal species

No new pest species were detected during the 2023 fauna survey.

Sheep (*Ovis aries*) were recorded for the first time, however, given the use of the land as a pastoral station, it is likely that this species has been present but not recorded on previous surveys. In the context of the mine on a pastoral station, this species is not considered a 'pest' species.

Abundance of pest species House Mouse (*Mus musculus*) was slightly higher in spring 2023 (7) compared to 2021 (2) and 2020 (5). Capture numbers of this species are still considered low, and the difference between trapping sessions is not significant, likely related to preceding weather conditions.

Rabbits (*Oryctolagus cuniculus*) were detected in low abundance, and numbers were comparable to previous years.

Three Cats (*Felis catus*) were detected in autumn 2023, none were detected in spring. This may indicate a combination of response to weather events and / or positive outcomes from implementation of the feral animal control program, however, as survey methods are not specifically designed to detect this species, it may not be indicative of any change to the population.

6.5 Abundance or diversity of native fauna at ephemeral ecosystems

Three paired monitoring sites are situated in proximity to ephemeral ecosystems, PK7, PK3 and PK5. Data is only available for two trapping sessions for site PK3 and PK5 as the sites were inaccessible due to water inundation, and not surveyed in 2020. As such, comparison in reptile and mammal abundance and diversity is reliant on only two years of data for these sites (spring 2021 and the current spring 2023 session).

Reptile and mammal abundance was higher at all ephemeral sites in 2021 compared to 2023 (Figure 23 to Figure 26), which is likely to be indicative of ideally timed weather conditions in the lead up to the survey. The higher abundance of mammals was observed across all sites in 2021. Site 7 had higher abundance and diversity of reptiles in 2020 than the subsequent two trapping sessions, however, as sites PK3 and PK5 were not surveyed in 2020 it is not clear if this is explained by seasonal or site conditions.

A decrease in mammal abundance and diversity at ephemeral ecosystems in 2023 may be explained by the sustained inundation of these sites following flooding events in late spring 2022 and again in autumn 2023. Differences in abundance are consistent across years, between impact and control sites, indicating that there is no influence from the mine activities.

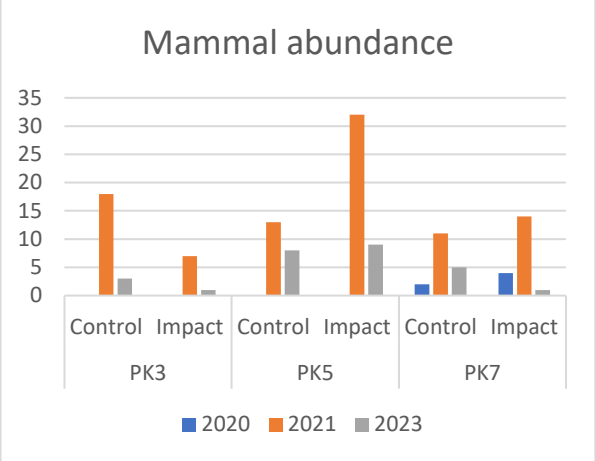


Figure 23. Trends in mammal capture abundance at ephemeral pitfall sites since spring 2020.

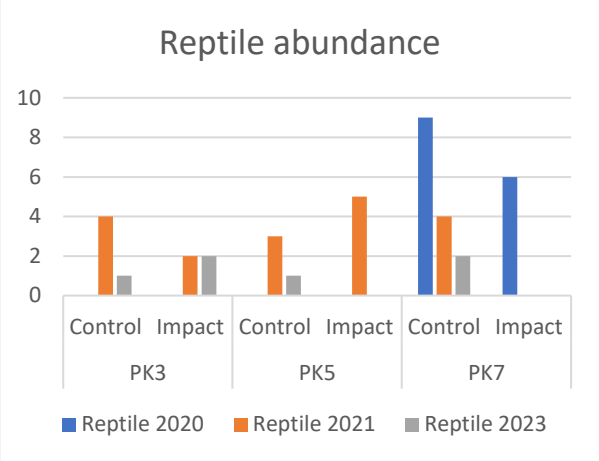


Figure 24. Trends in reptile capture abundance at ephemeral pitfall sites since spring 2020.

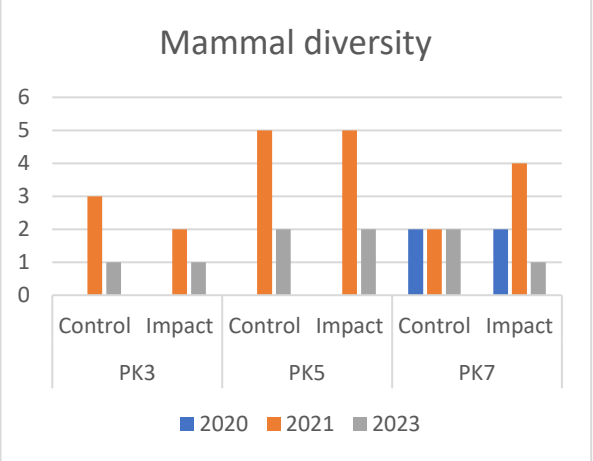


Figure 25. Trends in mammal diversity at ephemeral pitfall sites since spring 2020.

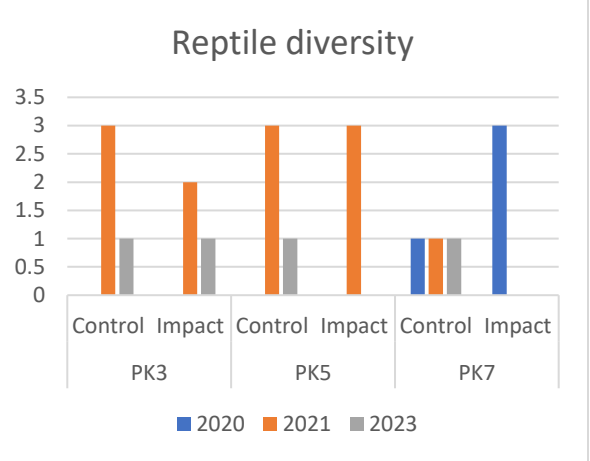


Figure 26. Trends in reptile diversity at ephemeral pitfall sites since spring 2020.

7 DISCUSSION

Results from the 2023 PK fauna surveys suggest that there has been no observable, sustained impact to native fauna abundance or diversity caused by mining operations. Specifically:

- There was no reduction in occupancy or abundance of targeted fauna species of conservation significance, Thick-billed Grasswren or Chestnut-breasted Whiteface.
- Results of the monitoring program demonstrate no adverse impacts on native fauna abundance or diversity when compared with control sites.
- There was no demonstrated increase in pest species, and no incursion of new pest species was detected.
- There were no adverse impacts on fauna abundance or diversity at ephemeral ecosystem when compared with control site results. A reduction in reptiles since 2020 at PK7 was observed at both the control and impact site, which suggests this is unlikely to be unrelated to mine impacts.

Reptile abundance and diversity at Site PK7 control and impact has declined since the survey in 2020. As there is no equivalent decline in abundance and diversity of mammal species, it is considered unlikely that this decline is due to impacts from the mine. Flooding in 2020 may have caused displacement of reptile species into areas which aren't typically favourable, resulting in higher than typical abundance and diversity at PK-7 in that reporting year.

Bird abundance in 2023 was high, with a total of 573 observations. This was comparable to numbers recorded in spring 2021 following flood conditions, however the diversity of aquatic species was not present in the 2023 surveys. Instead, abundance was increased by granivorous species such as Zebra Finches. Processes that drive movement of nomadic, migratory, and irruptive bird species are more complex than individual site rainfall predictors and are likely to include environmental patterns on a much larger, Australia-wide scale (Gibson *et al*. 2021). For example, if resources are abundant across the landscape, a localised flood event in the arid zone is unlikely to provide unique resources. Similarly, timing of rainfall in relation to the survey period is likely to have a large influence. Despite above average rainfall (April and June 2023), conditions in the three months prior to the spring survey (July, August, September) recorded only 2.2 mm of rain.

Mammal abundance reduced considerably following the boom conditions experienced in the 2021 survey. Localised flooding at survey sites may have temporarily reduced or relocated populations of small mammals away from these sites. As with previous years, site PK5-I and PK5-C maintained a higher abundance of small mammals than other sites, reinstating its potential importance as a refuge area. No mammal species were captured at PK1-C and PK6-C in 2023, however, there is no evidence to suggest this is related to mine activities. Notably, EPBC listed mammal species, *Pseudomys australis* (Plains Mouse), was reported from both 2011 to 2015, but has not subsequently been detected on site. Given its boom-and-bust lifecycle it is not known if this represents a mine impact on the presence of the population, or seasonal conditions, and further investigation is advised.

Mammal diversity in spring 2023 was low, with a notable absence of native mice, Desert Short-tailed Mouse (*Leggadina forresti*) and Sandy Inland Mouse (*Pseudomys hermannsburgensis*), and small marsupial

Planigale species (*P. tenuirostris* and *P. gilesi*). Population drivers for small mammals including native and introduced rodents and marsupial mammals are complex. The sustained, landscape scale flooding events that occurred in spring 2022 and autumn 2023 may have impacted small mammal populations, by causing drowning of species that burrow or inhabit soil cracks (Smith 2023). Additionally, response of mammals may be linked to timing of flooding. Small insectivorous marsupials typically reproduce in winter and spring (Smith 2023), however, the preceding spring (2022) and winter (2023) periods had large scale flooding which is likely to have reduced breeding success during the typical breeding season.

The long-term use of the land around PK for livestock grazing is also likely to influence small mammal (and reptile) abundance and their ability to respond to seasonal conditions. It is unknown if stocking rates were adjusted following recent rainfall events.

Based on recommendations from the 2021 report, a new 'impact' site was installed at the Wirrida Rail Siding site. This site was placed near the rail loading area and aims to detect possible impacts from dust and disturbance related to this activity. The paired site contains similar *Acacia aneura* (Mulga) woodland to the paired control site (PK1-C). The original PK1-I (now PK1-R) site will continue to be monitored, as it may show a faunal response to the removal of previous impacting factor of the crushing plant. Faunal response to the absence of a purported impact is site may be valuable in informing future stages of the Project.

8 REFERENCES

Arid Recovery (2023). Online Resource available at: https://aridrecovery.org.au/ [Accessed: 22/12/2023].

Bureau of Meteorology (BOM) (2023). Climate statistics for Australian locations: Coober Pedy Airport 016090. Commonwealth of Australia.

Care of Our Environment (COOE) (2020). Annual Fauna Survey 2020. Report to Peak Iron Mines. COOE Pty Ltd.

Dickman C.R., Greenville A.C., Tamayo B., and Wardle G.M. (2011). Spatial dynamics of small mammals in central Australian desert habitats: the role of drought refugia. *Journal of Mammalogy*, **92** (6): 1193-1209.

Environmental Projects (2020). Peculiar Knob Iron Ore Mine, Feral Animal Control Program. Peculiar Knob Iron Ore Mine, Southern Iron Pty Ltd. Rev 4 – 4 March 2020.

EBS Ecology (2022a). Peculiar Knob Iron Ore Project Annual Fauna Survey 2021. Report to Peak Iron Mines. EBS Ecology, Adelaide.

Gibson M.R., Runge C.A., Stephens P.A., Fuller R.A., and Willis S.G., (2021). Where nothing stands still: quantifying nomadism in Australian arid-zone birds. *Landscape Ecology* **37**, pp. 191-208.

Moseby, K., (2012). National Recovery Plan for the Plains Mouse *Pseudomys australis*. Department of Environment, Water and Natural Resources, South Australia.

Owens H. (2000). Guidelines for Vertebrate Surveys in South Australia Using the Biological Survey of South Australia. First Edition December 2000. National Parks and Wildlife South Australia, Department for Environment and Heritage.

Parsons Brinckerhoff (2013). Peculiar Knob Iron Ore Mining Project – Mining and Rehabilitation Program (MARP) Volume 1, Main Report. Produced for Southern Iron Pty Ltd.

Smith, M., (2023). Local and regional scale drivers of arid zone small mammal population dynamics. PhD Thesis, University of New South Wales, School of Biological Earth and Environmental Sciences.

9 APPENDICES

9.1 Appendix 1 – Summary of bioregional landforms within Project Area

Gawler IBRA Bioregion

IBRA bioregion, subregion, and environmental association environmental landscape summary.

Gawler IBRA bioregion	
Semi-arid to arid, flat topped to broadly rounded hills of the Gawler Range Volcanics and Proterozoic sediments, low plateaux on sandstone and quartzite with an undulating surface of aeolian sand or gibbers and rocky quartzite hills with colluvial footslopes, erosional and depositional plains and salt encrusted lake beds, with black oak (belah) and Myall low open woodlands, open mallee scrub, bluebush/saltbush open chenopod shrublands and tall mulga shrublands on shallow loams, calcareous earths and hard red duplex soils.	
Commonwealth Hill IBRA subregion	
Remnant vegetation	Approximately 98% (1418168 ha) of the subregion is mapped as remnant native vegetation, of which 1% (12115 ha) is formally conserved.
Landform	Plains broken by hills and ridges; some dune tracts; saline flats; clay pans; seasonal swamps and lakes. Lakes fringed on the eastern margins by lunettes.
Geology	Sand mantle with minimal soil development, dune sands, outcrops of bare rock; clay silt & sand in alluvial & seasonal swampy lowlands. gypsum & halite deposits; some kopi dunes. Silcrete & ferricrete development. Deeply weathered Palaeozoic basement
Soil	Brown calcareous earths, Siliceous sand, Loamy soils with weak pedologic development.
Vegetation	Arid and semi-arid acacia low open woodlands and shrublands with tussock grass.
Conservation significance	13 species of threatened fauna, 5 species of threatened flora. 0 wetlands of national significance.

Stony Plains IBRA Bioregion

IBRA bioregion, subregion, and environmental association environmental landscape summary.

Stony Plains IBRA bioregion	
Arid stony silcrete tablelands and gibber and gypsum plains with sparse low chenopod shrublands on duplex soils and calcareous earths, dissected by large arid drainage systems with coolibah and redgum on cracking clays along riverbanks of numerous creeks and rivers.	
Oodnadatta IBRA subregion	
Undulating plains with some gypsum crusting, low hills with silcrete gibbers and low gypcrete escarpments. On escarpments and the reddish powdery calcareous loams of the tableland, Maireana astrotricha chenopod shrubland occurs along with a tall open shrubland of *Acacia aneura*, *A. cibaria and Hakea leucoptera.* The plains support the same vegetation communities, while on the floodplains a low woodland of *Eucalyptus coolabah* ssp*. arida, Acacia salicina, A. cambagei and A. aneura,* and *Eucalyptus camaldulensis* woodland occur.	
Remnant vegetation	Approximately 99% (2575667 ha) of the subregion is mapped as remnant native vegetation, of which 3% (72943 ha) is formally conserved.
Landform	Silcrete capped low tablelands and plains.
Geology	Nodular, prismatic silcretes; ferricretes, calcretes, commercial quality opal; gilgai; desert armour; hardpans; deep weathering profiles; ferruginized & calcreted scarp exposures with pallid zones & duricrusts; porcellanitic cemented sediments. Evaporites

Soil	Loamy soils with weak pedologic development, Crusty loamy soils with red clayey subsoils, Cracking clays, Brown calcareous earths.
Vegetation	Chenopod shrublands.
Conservation significance	28 species of threatened fauna, 43 species of threatened flora. 2 wetlands of national significance.
Baltana IBRA subregion	
Remnant vegetation	Approximately 99% (2646867 ha) of the subregion is mapped as remnant native vegetation, of which 2% (44931 ha) is formally conserved.
Landform	Silcrete capped low tablelands and plains.
Geology	Nodular,prismatic silcretes; ferricretes,calcretes,commercial quality opal; gilgai; desert armour; hardpans;deep weathering profiles;ferruginized & calcreted scarp exposures with pallid zones & duricrusts; porcellanitic cemented sediments. Evaporites
Soil	Loamy soils with weak pedologic development, Crusty loamy soils with red clayey subsoils, Cracking clays, Brown calcareous earths.
Vegetation	Chenopod shrublands.
Conservation significance	31 species of threatened fauna, 35 species of threatened flora. 2 wetlands of national significance.
Breakaways IBRA subregion	
A dissected silcrete tableland and mesas, and extensive gibber-covered footslopes on deeply weathered shales. There is a cover of chenopod shrubs and forbs (*Atriplex vesicaria*, *Sclerolaena* spp. *Halosarcia* spp.) on crusty red duplex soils and reddish firm siliceous loams with small areas of low woodland (*Acacia cambagei*, *Eucalyptus camaldulensis*, *E. coolabah* ssp. *arida*) on brown self-mulching cracking clays.	
Remnant vegetation	Approximately 100% (2418715 ha) of the subregion is mapped as remnant native vegetation, of which 6% (133227 ha) is formally conserved.
Landform	Silcrete capped low tablelands and plains.
Geology	Nodular, prismatic silcretes; ferricretes, calcretes, commercial quality opal; gilgai; desert armour; hardpans; deep weathering profiles; ferruginized & calcreted scarp exposures with pallid zones & duricrusts; porcellanitic cemented sediments. Evaporites
Soil	Loamy soils with weak pedologic development, Crusty loamy soils with red clayey subsoils, Cracking clays, Brown calcareous earths.
Vegetation	Assumed native vegetation cover.
Conservation significance	20 species of threatened fauna, 27 species of threatened flora. 1 wetlands of national significance.

9.2 Appendix 2 – Survey site locations and methodology

Table 24. Summary of dedicated fauna survey site locations and survey methodology employed.

Site	Abbreviation	Survey Method	Method
PK1 Rehab (Formerly PK1 Impact)	PK1-R	Pitfall traps	Small trap line (6)
			Large trap line (4)
		Bird survey	2-ha point count
		Call playback	~2 min / species
PK1 Control	PK1-C	Pitfall traps	Small trap line (6)
			Large trap line (4)
		Bird survey	2-ha point count
		Call playback	~2 min / species
PK1 Impact (NEW)	PK1-I	Pitfall traps	Large trap line (5)
			Large trap line (5)
		Bird survey	2-ha point count
		Call playback	~2 min / species
PK2 Impact	PK2-I	Bird survey	2-ha point count
		Call playback	~2 min / species
PK2 Control	PK2-C	Bird survey	2-ha point count
		Call playback	~2 min / species
PK3 Impact	PK3-I	Pitfall traps	Small trap line (6)
			Large trap line (4)
		Bird survey	2-ha point count
		Call playback	~2 min / species
PK3 Control	PK3-C	Pitfall traps	Small trap line (6)
			Large trap line (4)
		Bird survey	2-ha point count
		Call playback	~2 min / species
PK5 Impact	PK5-I	Pitfall traps	Small trap line (6)
			Large trap line (4)
		Bird survey	2-ha point count
		Call playback	~2 min / species
PK5 Control	PK5-C	Pitfall traps	Small trap line (6)
			Large trap line (4)
		Bird survey	2-ha point count
		Call playback	~2 min / species
PK6 Impact	PK6-I	Pitfall traps	Small trap line (6)
			Large trap line (4)
		Bird survey	2-ha point count
		Call playback	~2 min / species
PK6 Control	PK6-C	Pitfall traps	Small trap line (6)
			Large trap line (4)
		Bird survey	2-ha point count
		Call playback	~2 min / species
PK7 Impact	PK7-I	Pitfall traps	Small trap line (6)
			Large trap line (4)
		Bird survey	2-ha point count
		Call playback	~2 min / species

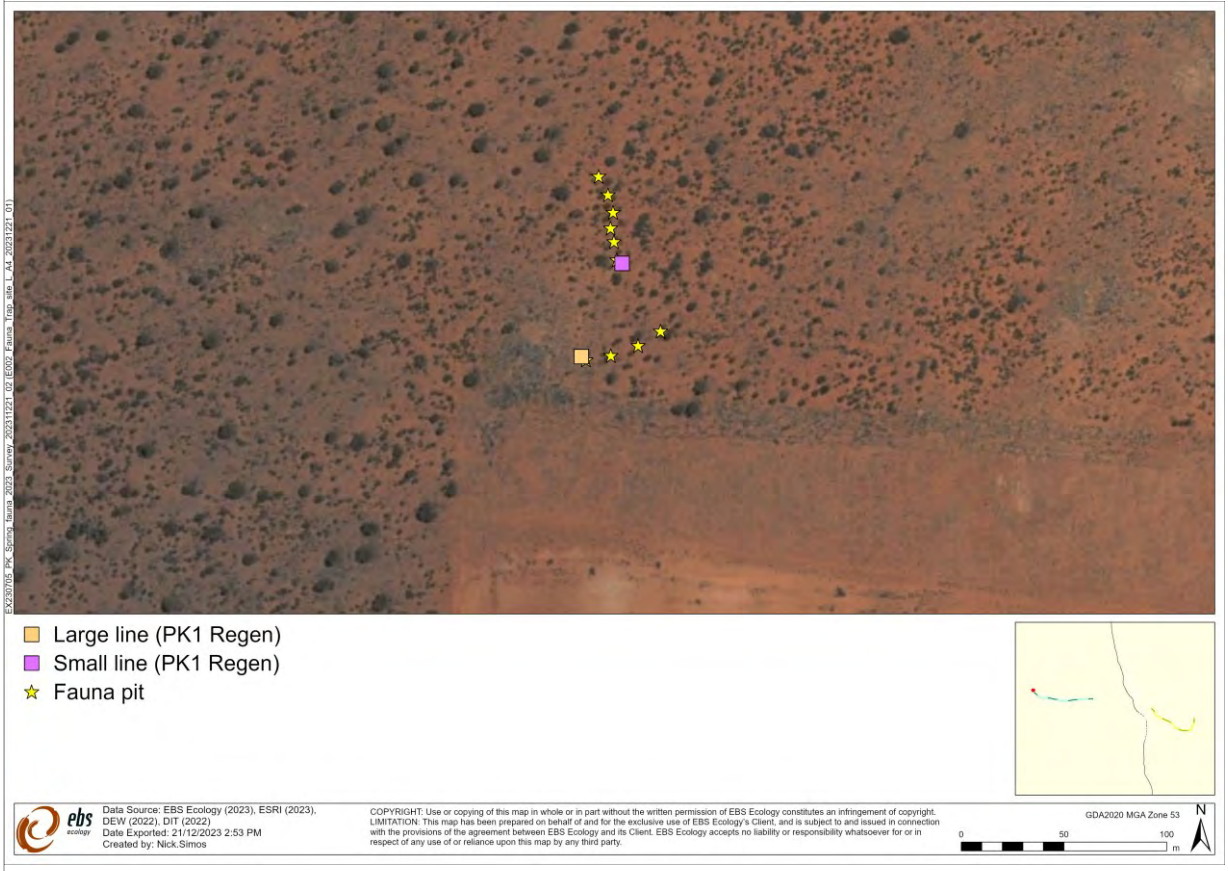
Site	Abbreviation	Survey Method	Method
PK7 Control	PK7-C	Pitfall traps	Small trap line (6)
			Large trap line (3)
		Bird survey	2-ha point count
		Call playback	~2 min / species
Wirrida West Impact (PK-1.2I)	WWI	Bird survey	2-ha point count
		Call playback	~2 min / species
Wirrida West Control	WWC	Bird survey	2-ha point count
		Call playback	~2 min / species
Wirrida South Impact	WSI	Bird survey	2-ha point count
		Call playback	~2 min / species
Wirrida South Control	WSC	Bird survey	2-ha point count
		Call playback	~2 min / species
Bird 1	B1	Bird survey	2-ha point count
		Call playback	~2 min / species
Bird 2	B2	Bird survey	2-ha point count
		Call playback	~2 min / species
Bird 3	B3	Bird survey	2-ha point count
		Call playback	~2 min / species
Bird 4	B4	Bird survey	2-ha point count
		Call playback	~2 min / species
Bird 5	B5	Bird survey	2-ha point count
		Call playback	~2 min / species
Bird 6	B6	Bird survey	2-ha point count
		Call playback	~2 min / species
Bird 7	B7	Bird survey	2-ha point count
		Call playback	~2 min / species

9.3 Appendix 3 – Summary site locations and condition during the 2023 survey

PK1 Rehab

PK1-R: Large pitfall traps

PK1-R: Small pitfall traps

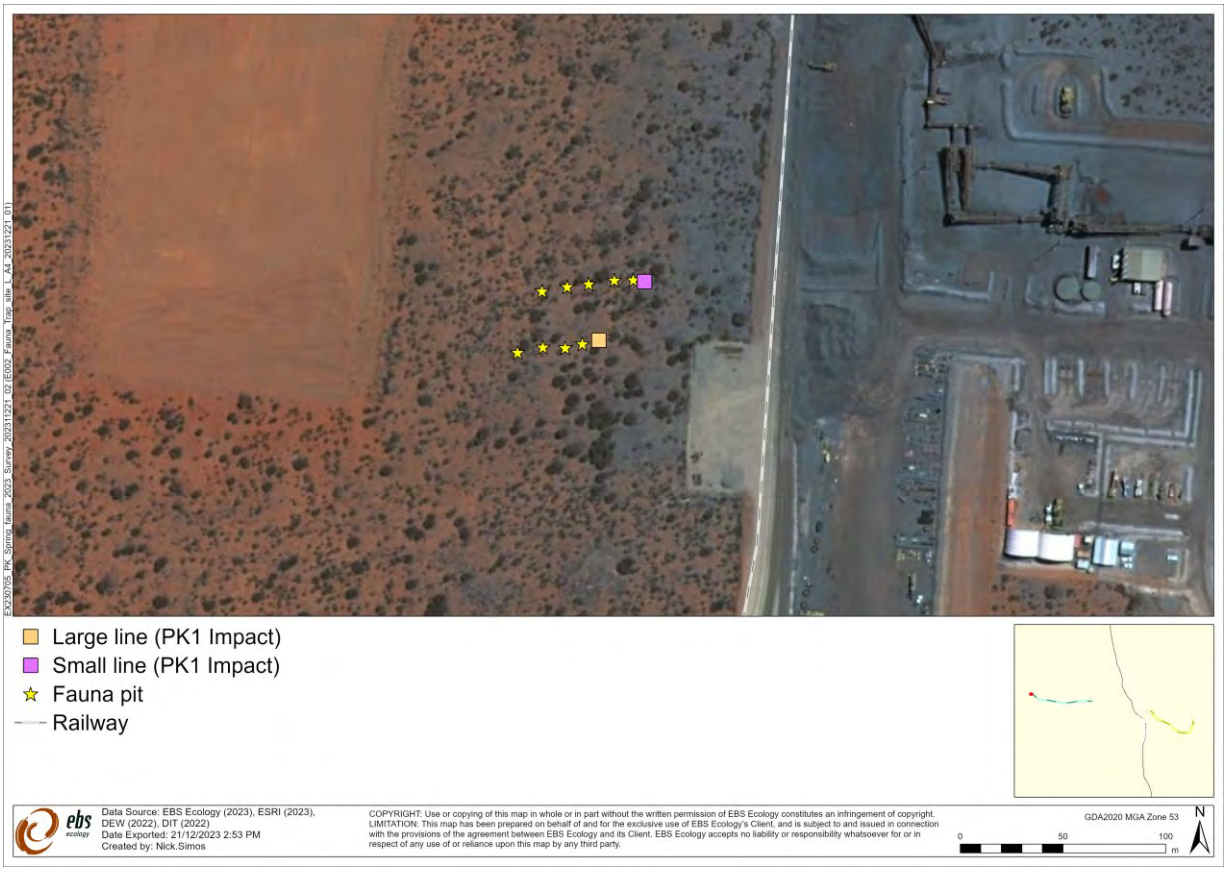


Map of PK1-R: Site layout

PK1 Impact (NEW autumn 2023)

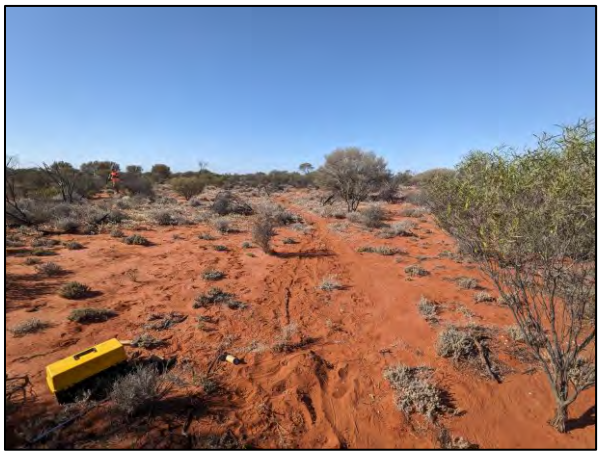
PK1-I: Large pitfall traps

PK1-I: Large pitfall traps



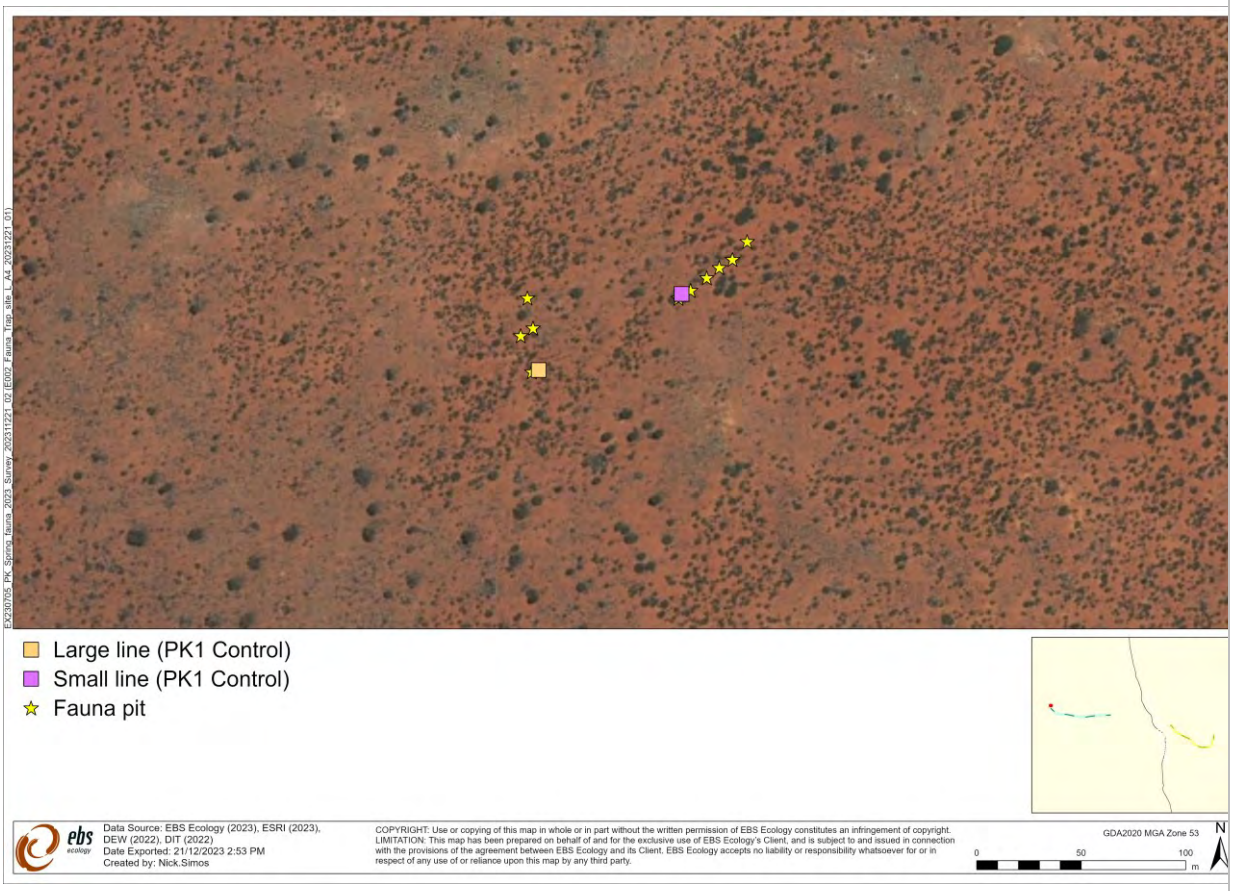
Map of PK1-I: Site layout

PK1 Control



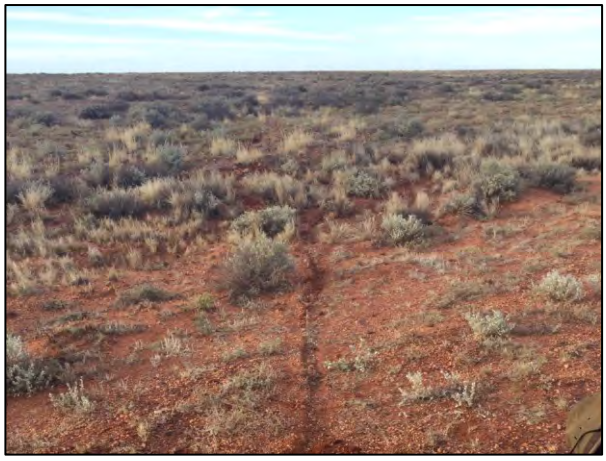
PK1-C: Large pitfall traps

PK1-C: Small pitfall traps

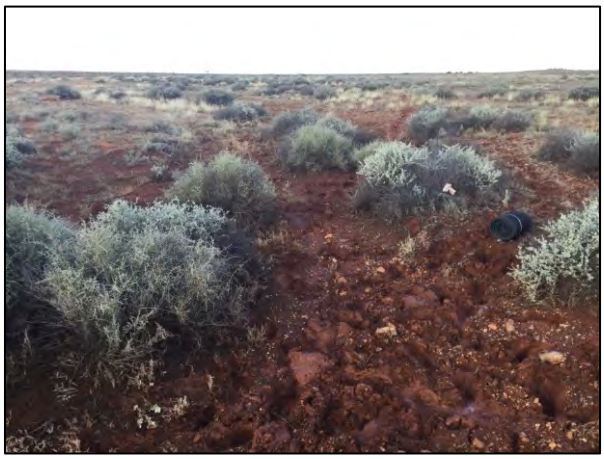


Map of PK1-C: Site layout

PK3 Impact



PK3-I: Large pitfall traps



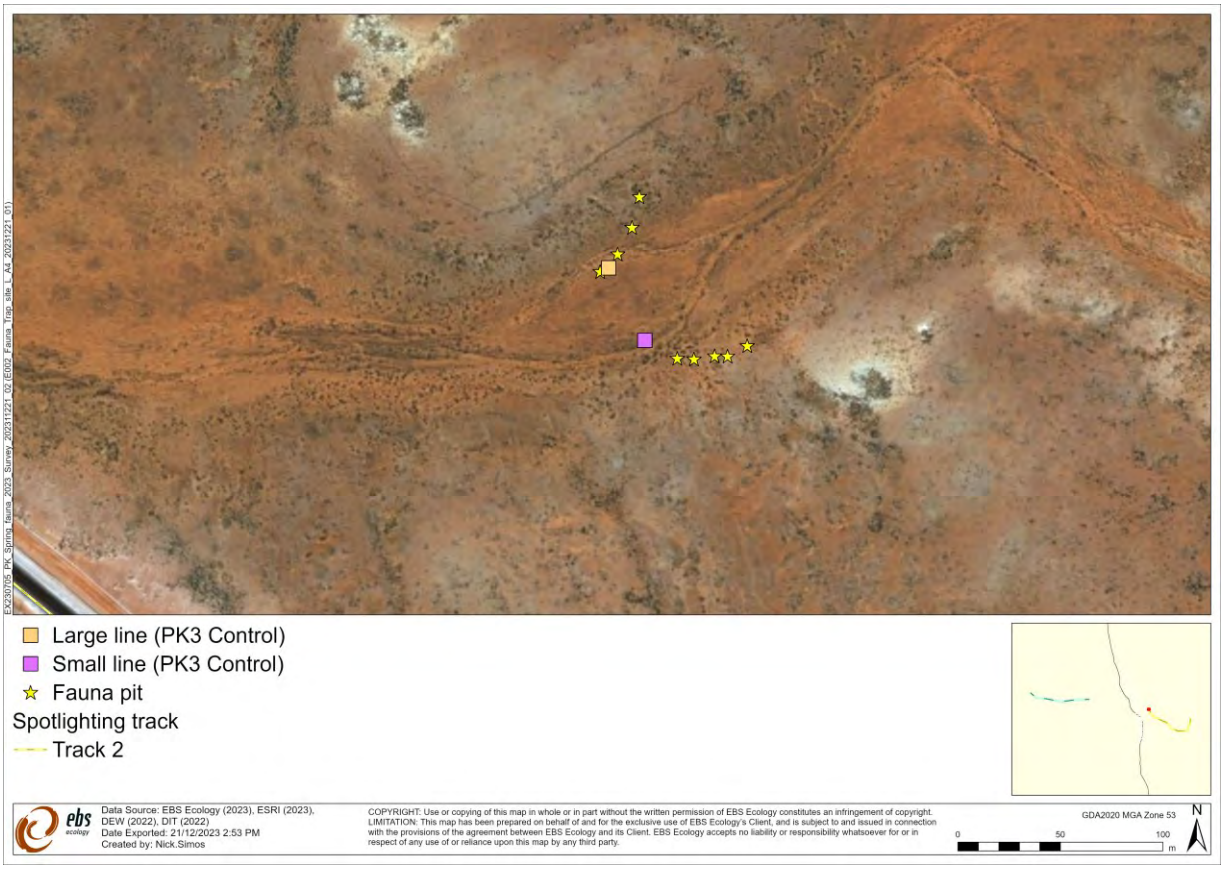
PK3-I: Small pitfall traps (closed, autumn 2023)

Map of PK 3I: Site layout

PK3 Control

PK3-C: Large pitfall traps (spring 2023)

PK3-C: Small pitfall traps (spring 2023)

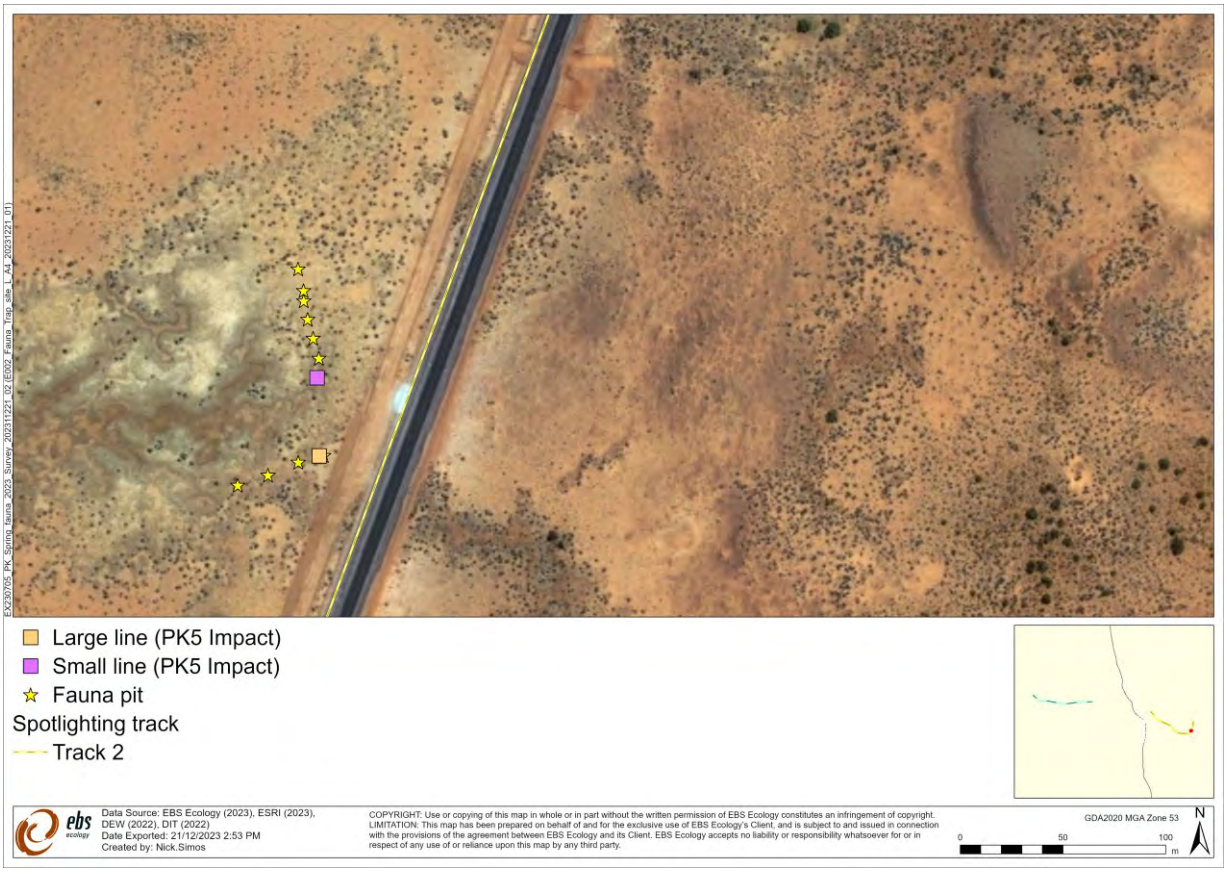


Map of PK3-C: Site layout

PK5 Impact

PK5-I: Large pitfall traps (set, autumn 2023).

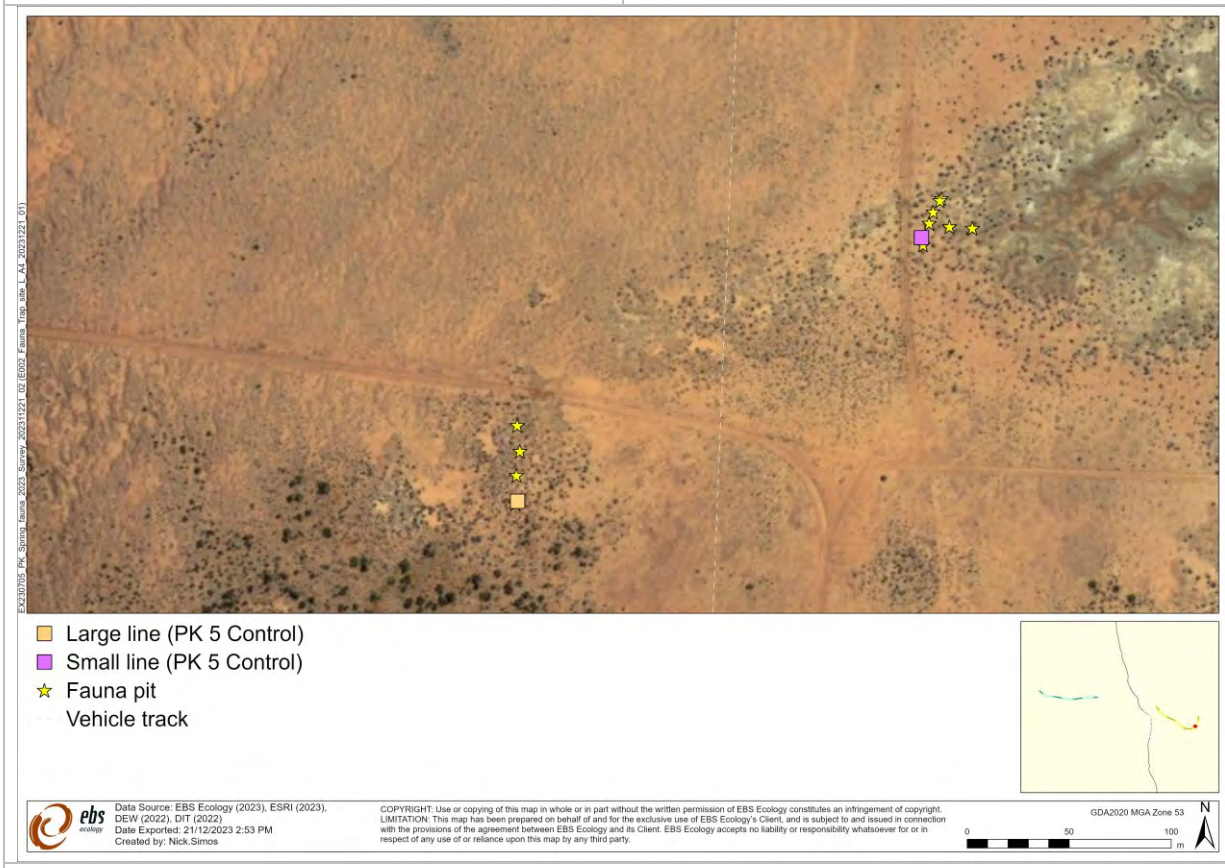
PK5-I: Small pitfall traps (set, autumn 2023).



Map of PK5-I: Site layout

PK5 - Control

No image available.	*No image available.*
PK5-C: Large pitfall traps	**PK5-C: Small pitfall traps**



Map of PK5-C: Site layout

PK6 Impact

PK6-I: Large pitfall traps (closed, spring 2023).

PK6-I: Small pitfall traps (closed, autumn 2023).

Map of PK6-I: Site layout

PK6 Control

PK6-C: Large pitfall traps (closed, autumn 2023).

PK6-C: Small pitfall traps (closed, spring 2023).

Map of PK6-C: Site layout

PK7 Impact

PK7-I: Large pitfall traps (closed, autumn 2023).

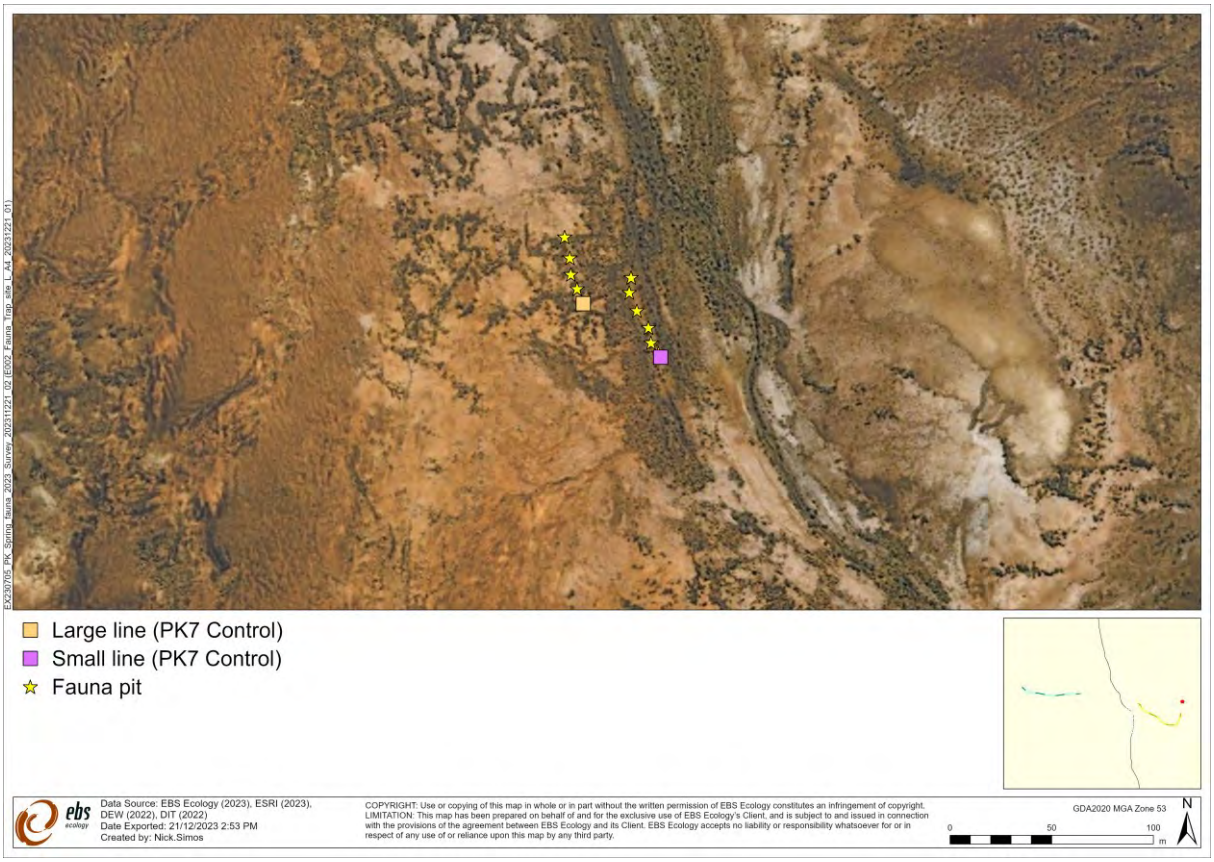
PK7-I: Small pitfall traps (closed, autumn 2023).

Map of PK7-I: Site layout

PK7 Control

PK7-C: Large pitfall traps (closed, autumn 2023).

PK7-C: Small pitfall traps (closed, autumn 2023).



Map of PK7-C: Site layout

9.4 Appendix 4 – All species recorded during autumn 2023 field survey.

Species name	Common Name	EPBC Act	NPW Act	Non-native	2-ha 20-min bird surveys	Opportune records	Pitfall traps	Spotlight survey	Grand Total
Birds									
Acanthagenys rufogularis	Spiny-cheeked Honeyeater				1				**1**
Acanthiza uropygialis	Chestnut-rumped Thornbill				5	1			**6**
Amytornis modestus indulkanna	Thick-billed Grasswren	VU			11	3			**14**
Anas gracilis gracilis	Grey Teal				5	1			**6**
Anthus australis australis	Australasian Pipit				5	2			**7**
Aphelocephala leucopsis leucopsis	Southern Whiteface	VU			6	2			**8**
Aphelocephala pectoralis	Chestnut-breasted Whiteface		R			1			**1**
Aquila audax audax	Wedge-tailed Eagle				1	7			**8**
Artamus cinereus	Black-faced Woodswallow				6	2			**8**
Artamus personatus	Masked Woodswallow				1				**1**
Cacatua sanguinea sanguinea	Little Corella					2			**2**
Calamanthus campestris	Rufous Fieldwren				10	1			**11**
Cheramoeca leucosterna	White-backed Woodswallow					1			**1**
Cinclosoma cinnamomeum	Cinnamon Quail-thrush				4				**4**
Corvus bennetti	Little Crow				2				**2**
Corvus coronoides coronoides	Australian Raven				26	1			**27**
Cracticus torquatus	Grey Butcherbird				1	1			**2**
Dromaius novaehollandiae	Emu					3			**3**
Eolophus roseicapilla	Galah				5	1			**6**
Epthianura aurifrons	Orange Chat				9	1			**10**
Falco berigora	Brown Falcon					1			**1**
Falco cenchroides	Nankeen Kestrel				3	1			**4**
Falco longipennis	Australian Hobby					1			**1**
Grallina cyanoleuca	Magpie-lark				4				**4**
Gymnorhina tibicen	Australian Magpie				3				**3**

Species name	Common Name	EPBC Act	NPW Act	Non-native	2-ha 20-min bird surveys	Opportune records	Pitfall traps	Spotlight survey	Grand Total
Lichenostomus virescens	Singing Honeyeater				16	1			**17**
Malurus lamberti	Variegated Fairywren				6				**6**
Malurus leucopterus leuconotus	White-winged Fairywren				47	1			**48**
Manorina flavigula	Yellow-throated Miner				2	1			**3**
Mirafra javanica secunda	Horsfield's Bushlark					2			**2**
Neophema elegans	Elegant Parrot		R		1				**1**
Neopsephotus bourkii	Bourke's Parrot				16	2			**18**
Ocyphaps lophotes	Crested Pigeon				3	2			**5**
Oreoica gutturalis	Crested Bellbird				9	2			**11**
Pachycephala rufiventris	Rufous Whistler				1				**1**
Petroica goodenovii	Red-capped Robin				3	3			**6**
Phaps chalcoptera	Common Bronzewing					2			**2**
Pomatostomus superciliosus	White-browed Babbler				14	1			**15**
Psephotellus varius	Mulga Parrot					1			**1**
Psophodes occidentalis	Chiming Wedgebill				20	1			**21**
Ptilotula penicillatus	White-plumed Honeyeater				4	1			**5**
Rhipidura leucophrys leucophrys	Willie Wagtail				6	1			**7**
Stiltia isabella	Australian Pratincole					1			**1**
Taeniopygia guttata	Zebra Finch				62	2			**64**
	Birds subtotals				318 (34 species)	57 (35 species)			**383 (44 species)**
Mammals									
Macropus (Osphranter) rufus	Red Kangaroo					2		1	**3**
Macropus fuliginosus	Western Grey Kangaroo					4			**4**
Notomys sp. (mitchellii)	Mitchell's Hopping Mouse						1		**1**
Planigale tenuirostris	Narrow-nosed Planigale						1		**1**
Pseudomys hermannsburgensis	Sandy Inland Mouse						3		**3**
Sminthopsis ooldea	Ooldea Dunnart						1		**1**
	Mammal subtotals					6 (2 species)	6 (4 species)	1 (1 species)	**13 (6 species)**

Species name	Common Name	EPBC Act	NPW Act	Non-native	2-ha 20-min bird surveys	Opportune records	Pitfall traps	Spotlight survey	Grand Total
Reptiles									
Ctenotus schomburgkii	Barred Wedge-snout Ctenotus						8		**8**
Liopholis inornata	Desert Skink						1		**1**
Lucasium damaeum	Beaded Gecko						2		**2**
Parasuta monachus	Monk Snake						1		**1**
Pogona vitticeps	Central Bearded Dragon					1			**1**
	Reptile subtotals					1 (1 species)	12 (4 species)		**13 (6 species)**
Amphibians									
Neobatrachus sp.						1			**1**
Neobatrachus sudellae	Trilling Frog					2	1		**3**
	Amphibian subtotals					3 (2 species)	1 (1 species)		**4 (2 species)**
Introduced mammals									
Felis catus	Cat			Yes		1		2	**3**
Oryctolagus cuniculus	Rabbit			Yes		1		3	**4**
	Introduced mammals subtotals					2 (2 species)		5 (2 species)	**7 (2 species)**
Grand Total					**317**	**69**	**19**	**6**	**411**

Conservation Ratings: SA (NPW Act) and Aus. (EPBC Act): VU = Vulnerable, R = Rare

9.5 Appendix 5 – All species recorded during spring 2023 field survey.

Scientific	Common	EPBC	NPW	2-ha 20 min	Opportune	Pitfall	Spotlight
Bird							
Acanthiza uropygialis	Chestnut-rumped Thornbill			9			
Amytornis modestus	Thick-billed Grasswren	VU		5	3		
Anthus australis	Australasian Pipit			13		1	
Aphelocephala leucopsis	Southern Whiteface	VU		4	4		
Aphelocephala pectoralis	Chestnut-breasted Whiteface		Rare		7		
Aquila audax	Wedge-tailed Eagle			5	28		
Ardeotis australis	Australian Bustard		Vulnerable		1		
Artamus cinereus	Black-faced Woodswallow			9			
Calamanthus campestris	Rufous Fieldwren			3			
Chalcites basalis	Horsfield's Bronze Cuckoo				1		
Cheramoeca leucosternus	White-backed Swallow				4		
Cincloramphus cruralis	Brown Songlark			4			
Cinclosoma cinnamomeum	Cinnamon Quailthrush				1		
Circus assimilis	Spotted Harrier				1		
Corvus bennetti	Little Crow			20			
Corvus coronoides	Australian Raven			7			
Dromaius novaehollandiae	Emu			1	1		
Eolophus rosiecapilla	Galah			6	1		
Epthianura albifrons	White-fronted Chat			2			
Epthianura aurifrons	Orange Chat			27			
Epthianura tricolor	Crimson Chat			25	1		
Falco berigora	Brown Falcon				3		
Falco cenchroides	Nankeen Kestrel			1	4		
Falco longipennis murchisonianus	Australian Hobby			2	2		
Falco peregrinus	Peregrine Falcon		Rare		1		
Grallina cyanoleuca	Magpie-lark				1		
Gymnorhina tibicen	Australian Magpie			1			
Hirundo neoxena	Welcome Swallow			2			

Scientific	Common	EPBC	NPW	2-ha 20 min	Opportune	Pitfall	Spotlight
Lichenostomus virescens	Singing Honeyeater			19			
Malurus assimilis	Purple-back Fairywren			6			
Malurus leucopterus	White-winged Fairywren			44			
Manorina flavigula	Yellow-throated Miner			1			
Melopsittacus undulatus	Budgerigar			43			
Merops ornatus	Rainbow Bee-eater			2			
Mirafra javanica secunda	Horsfield's Bushlark			2			
Neopsephotus bourkiii	Bourke's Parrot				1		
Northiella haematogaster	Blue Bonnet			3			
Nymphicus hollandicus	Cockatiel			2			
Ocyphaps lophotes	Crested Pigeon			5	2		
Oreoica gutturalis	Crested Bellbird			3			
Petrochelidon nigricans neglecta	Tree Martin			27			
Petroica goodenovii	Red-capped Robin			1			
Pomatostomus superciliosus	White-browed Babbler			28			
Psophodes occidentalis	Chiming Wedgebill			11			
Ptilotula penicillatus	White-plumed Honeyeater			5			
Rhipidura leucophrys	Willie Wagtail			1			
Taeniopygia guttata	Zebra Finch			218			
Todiramphus pyrrhopygius	Red-backed Kingfisher			3	1		
Vanellus tricolor	Banded Lapwing			1			
Mammal							
Macropus robustus	Euro				4		
Macropus (Osphranter) rufus	Red Kangaroo						20
Planigale tenuirostris	Narrow-nosed Planigale					1	
Pseudomys hermannsburgensis	Sandy Inland Mouse					2	
Sminthopsis crassicaudata	Fat-tailed Dunnart					19	
Sminthopsis macroura	Stripe-faced Dunnart					11	
Sminthopsis ooldea	Ooldea Dunnart					1	
Tachyglossus aculeatus	Short-beaked Echidna				1		
Reptile							

Scientific	Common	EPBC	NPW	2-ha 20 min	Opportune	Pitfall	Spotlight
Ctenophorus isolepis	Central Military Dragon					6	
Ctenophorus nuchalis	Central Netted Dragon					2	
Ctenophorus pictus	Painted Dragon					1	
Ctenotus olympicus	Saltbush Ctenotus					2	
Ctenotus saxatilis	Rock Ctenotus					2	
Ctenotus taeniatus	Eyrean Ctenotus					1	
Demansia cyanochasma	Desert Whipsnake				1		
Diplodactylus tessellatus	Tessellated Gecko					2	
Heteronotia binoei	Bynoe's Gecko					1	
Lerista labialis	Eastern Two-toed Slider					2	
Lerista timida	Timid Slider					5	
Liopholis inornata	Desert Skink					6	
Lucasium byrnei	Gibber Gecko					1	
Lucasium damaeum	Beaded Gecko					10	
Lucasium stenodactylum	Crowned Gecko					9	
Menetia greyii	Common Dwarf Skink					4	
Nephrurus levis	Smooth Knob-tailed Gecko					3	1
Pogona vitticeps	Central Bearded Dragon				4	1	
Pseudechis australis	Mulga Snake				1		
Pseudonaja aspidorhyncha	Strap-snouted Brown Snake				1		
Pygopus schraderi	Eastern Hooded Scaly-foot					2	
Rhynchoedura ornata	Western Beaked Gecko					7	
Tiliqua rugosa	Shingleback				1		
Tympanocryptis intima	Smooth-snouted Earless Dragon				1		
Varanus gilleni	Pygmy Mulga Monitor					1	
Varanus gouldii	Sand Goanna				1	4	
Introduced mammal							
Mus musculus	House Mouse					7	
Oryctolagus cuniculus	Rabbit						3
Ovis aires	Sheep						2

Conservation Ratings: SA (NPW Act) and Aus. (EPBC Act): VU = Vulnerable, R = Rare

9.6 Appendix 6 – Site occupancy of threatened bird species for each survey year

Table 25. Occupancy of targeted threatened bird species (Chestnut-breasted Whiteface [CBWF] and Thick-billed Grasswren [TBGW]) at bird survey sites since 2011.

Site	2011	2012	2013	2014	2015	2020	2021	2023 (Autumn)	2023 (Spring)
PK1-C	-	-	-	-	-	-	-		
PK1-R	-	-	-	-	-	-	-	CBWF	
PK1-I									
PK2-C	TBGW, CBWF	-	-	-	-	-	-		
PK2-I	CBWF	-	-	-	-	-	-		
PK2-C	-	TBGW	TBGW	TBGW	TBGW	-	-	TBGW	TBGW
PK3-I	-	-	-	TBGW	-	-	TBGW	TBGW	TBGW
PK4-C	-	-	-	-	-	-	-		
PK4-I	-	-	-	-	-	-	-		
PK5-C	-	TBGW	-	-	-	-	TBGW, CBWF		CBWF, TBGW
PK5-I	TBGW	-	TBGW	CBWF	TBGW	TBGW	-		TBGW
PK6-C	-	-	-	-	-	-	-		
PK6-I	-	-	-	-	-	-	-		
PK7-C	TBGW	-	-	-	-	-	-		
PK7-I	-	TBGW	-	-	-	-	-		
Bird 1	TBGW	TBGW	-	-	-	-	TBGW		
Bird 2	TBGW	TBGW	TBGW	TBGW	TBGW	-	-		
Bird 3	-	-	-	-	-	-	-		
Bird 4	-	CBWF		TBGW	TBGW		TBGW	TBGW	
Bird 5	CBWF	CBWF	CBWF	-	-	-	-		
Bird 6	CBWF	-	-	-	-	-	-		
Bird 7	-	-	-	-	-	-	-		
WWC	-	-	-	-	-	-	-		
WWI	-	-	-	-	-	-	-		
WSC	-	-	-	-	-	-	-		
WS1	-	-	-	-	-	-	-		

9.7 Appendix 7 – Cumulative species list (Mammals / Reptiles / Amphibians)

Species name	Common name	2020 Spring	2021 Spring	2023 Autumn	2023 Spring
Mammal	**Species subtotal**	**8**	**9**	**6**	**8**
Macropus (Osphranter) rufus	Red Kangaroo	✓		✓	✓
Macropus fuliginosus	Western Grey Kangaroo	✓		✓	
Macropus robustus	**Euro**				✓
Notomys mitchellii	**Mitchell's Hopping Mouse**			✓	
Planigale tenuirostris	Narrow-nosed Planigale		✓	✓	✓
Pseudomys hermannsburgensis	Sandy Inland Mouse	✓	✓	✓	✓
Sminthopsis crassicaudata	Fat-tailed Dunnart	✓	✓		✓
Sminthopsis macroura	Stripe-faced Dunnart	✓	✓		✓
Sminthopsis ooldea	Ooldea Dunnart	✓	✓	✓	✓
Sminthopsis sp.	Dunnart sp.		✓		
Tachyglossus aculeatus	**Short-beaked Echidna**				✓
Leggadina forresti	Desert Short-tailed Mouse		✓		
Notomys alexis	Spinifex Hopping Mouse		✓		
Planigale gilesi	Giles Planigale		✓		
Pseudomys bolami	Bolam's Mouse	✓			
Pseudomys sp.		✓			
Reptile	**Species subtotal**	**28**	**30**	**5**	**26**
Anilios bituberculatus	Prong-snouted Blind Snake	✓	✓		
Antaresia stimsoni	Stimson's Python	✓			
Ctenophorus isolepis	Central Military Dragon	✓	✓		✓
Ctenophorus nuchalis	Central Netted Dragon	✓	✓		✓
Ctenophorus pictus	**Painted Dragon**				✓
Ctenophorus reticulatus	Western Netted Dragon	✓			
Ctenotus olympicus	Saltbush Ctenotus	✓			✓
Ctenotus regius	Royal Ctenotus	✓	✓		
Ctenotus saxatilis	**Rock Ctenotus**				✓
Ctenotus schomburgkii	Barred Wedge-snout Ctenotus	✓	✓	✓	
Ctenotus taeniatus	**Eyrean Ctenotus**				✓
Demansia cyanochasma	**Desert Whipsnake**				✓
Diplodactylus conspicillatus	Burrow-plug Gecko		✓		
Diplodactylus laevis	(blank)	✓			
Diplodactylus tessellatus	Tessellated Gecko	✓	✓		✓
Gehyra purpurascens	Purplish Dtella	✓			
Gehyra sp.	Dtella		✓		
Heteronotia binoei	**Bynoe's Gecko**				✓
Lerista labialis	Southern Sandslider	✓			✓
Lerista timida	Timid Slider		✓		✓
Lialis burtonis	Burton's Snake-lizard	✓			
Liopholis inornata	Desert Skink	✓	✓	✓	✓

Species name	Common name	2020 Spring	2021 Spring	2023 Autumn	2023 Spring
Lucasium byrnei	Gibber Gecko	✓			✓
Lucasium damaeum	**Beaded Gecko**			✓	✓
Lucasium stenodactylum	Crowned Gecko	✓	✓		✓
Menetia greyii	Common Dwarf Skink	✓	✓		✓
Nephrurus levis	Smooth Knob-tailed Gecko		✓		✓
Parasuta monachus	**Monk Snake**			✓	
Pogona vitticeps	Central Bearded Dragon	✓	✓	✓	✓
Pogona vitticeps	Central Bearded Dragon		✓		
Pseudechis australis	Mulga Snake	✓	✓		✓
Pseudonaja aspidorhyncha	Strap-snouted Brown Snake	✓			✓
Pseudonaja modesta	Ringed Brown Snake		✓		
Pygopus nigriceps	Hooded Scaly-foot	✓			
Pygopus schraderi	Eastern Hooded Scaly-foot	✓	✓		✓
Rhynchoedura eyrensis	Eyre Basin Beaked Gecko	✓	✓		
Rhynchoedura ornata	Western Beaked Gecko		✓		✓
Suta suta	Curl Snake	✓	✓		
Tiliqua rugosa	Shingleback	✓	✓		✓
Tympanocryptis intima	Gibber Earless Dragon	✓	✓		✓
Tympanocryptis tetraporophora	Eyrean Earless Dragon	✓	✓		
Varanus gilleni	Pygmy Mulga Monitor		✓		✓
Varanus gouldii	Sand Goanna	✓	✓		✓
Anilios endoterus	Interior Blind Snake		✓		
Delma butleri	Unbanded Delma		✓		
Rhynchoedura eyrensis	Eyre Basin Beaked Gecko		✓		
Tympanocryptis lineata	Lined Earless Dragon		✓		
Amphibian	**Species subtotal**	**1**	**0**	**2**	**0**
Neobatrachus sp.					
Neobatrachus sudellae	Trilling Frog	✓		✓	
Introduced mammal	**Species subtotal**	**0**	**5**	**2**	**3**
Bos sp.	Cow		✓		
Felis catus	Cat		✓	✓	
Macropus (Osphranter) rufus	Red Kangaroo		✓		
Mus musculus	House Mouse		✓		✓
Oryctolagus cuniculus	Rabbit		✓	✓	✓
Ovis aires	**Sheep**				✓

Species indicated in bold are new to the Project Area, recorded in autumn or spring 2023 (based on available historical data). Conservation Ratings: SA (NPW Act) and Aus. (EPBC Act): VU = Vulnerable, R = Rare.

9.8 Appendix 8 – Cumulative species list (Birds)

Species name	Common name	Cons. Rating	2020 Spring	2021 Spring	2023 Autumn	2023 Spring
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		✓	✓	✓	
Acanthiza uropygialis	Chestnut-rumped Thornbill		✓	✓	✓	✓
Aegotheles cristatus	Australian Owlet-nightjar		✓			
Amytornis modestus	Thick-billed Grasswren	Aus.: VU	✓	✓	✓	✓
Anas gracilis gracilis	Grey Teal		✓		✓	
Anthus australis	Australasian Pipit		✓	✓	✓	✓
Antigone rubicunda	Brolga	SA:VU	✓			
Aphelocephala leucopsis leucopsis	Southern Whiteface	Aus.: VU	✓	✓	✓	✓
Aphelocephala pectoralis	Chestnut-breasted Whiteface	SA: R		✓	✓	✓
Aquila audax	Wedge-tailed Eagle		✓	✓	✓	✓
Ardea pacifica	White-necked Heron		✓	✓		
Ardeotis australis	**Australian Bustard**	**SA:VU**				✓
Artamus cinereus melanops	Black-faced Woodswallow		✓	✓	✓	✓
Artamus personatus	Masked Woodswallow		✓	✓	✓	
Ashbyia lovensis	Gibberbird		✓			
Barnardius zonarius	Australian Ringneck			✓		
Cacatua sanguinea	Little Corella		✓	✓	✓	
Calamanthus campestris	Rufous Fieldwren		✓	✓	✓	✓
Calidris acuminata	Sharp-tailed Sandpiper		✓			
Certhionyx variegatus	Pied Honeyeater		✓	✓		
Chalcites basalis	**Horsfield's Bronze Cuckoo**					✓
Chenonetta jubata	Australian Wood Duck		✓			
Cheramoeca leucosterna	White-backed Swallow		✓	✓	✓	✓
Chrysococcyx lucidus	Shining Bronze Cuckoo			✓		
Cincloramphus cruralis	Brown Songlark		✓			✓
Cincloramphus mathewsi	Rufous Songlark		✓	✓		
Cinclosoma cinnamomeum	Cinnamon Quail-thrush		✓		✓	✓
Cinclosoma clarum	Copper-backed Quail-thrush			✓		
Circus assimilis	**Spotted Harrier**					✓
Colluricincla harmonica	Grey Shrike-thrush		✓			
Coracina novaehollandiae	Black-faced Cuckoo Shrike			✓		
Corvus bennetti	Little Crow		✓	✓	✓	✓
Corvus coronoides	Australian Raven			✓	✓	✓
Cracticus torquatus	Grey Butcherbird				✓	
Dromaius novaehollandiae	Emu		✓	✓	✓	✓
Egretta novaehollandiae	White-faced Heron		✓			
Elseyornis melanops	Black-fronted Dotterel		✓			
Eolophus roseicapilla albiceps	Galah		✓	✓	✓	✓
Epthianura albifrons	White-fronted chat					✓
Epthianura aurifrons	Orange Chat		✓		✓	✓
Epthianura tricolor	Crimson Chat		✓	✓		✓

Species name	Common name	Cons. Rating	2020 Spring	2021 Spring	2023 Autumn	2023 Spring
Falco berigora	Brown Falcon		✓	✓	✓	✓
Falco cenchroides	Nankeen Kestrel		✓	✓	✓	✓
Falco longipennis	Australian Hobby				✓	✓
Falco peregrinus	Peregrine Falcon	SA: R		✓		✓
Falco subniger	Black Kite			✓		
Gavicalis virescens	Singing Honeyeater		✓			
Geopelia cuneata	Diamond Dove		✓			
Grallina cyanoleuca	Magpie-lark		✓		✓	✓
Gymnorhina tibicen	Australian Magpie				✓	✓
Haliastur sphenurus	Whistling Kite		✓			
Himantopus himantopus	Black-winged Stilt		✓			
Hirundo neoxena	Welcome Swallow		✓	✓		✓
Lalage tricolor	White-winged Triller		✓	✓		
Lichenostomus virescens	Singing Honeyeater			✓	✓	✓
Malacorhynchus membranaceus	Pink-eared Duck		✓			
Malurus assimilis	Purple-backed Fairy-wren		✓	✓	✓	✓
Malurus leucopterus	White-winged Fairy-wren		✓	✓	✓	✓
Manorina flavigula	Yellow-throated Miner		✓		✓	✓
Melanodryas cucullata	Hooded Robin		✓			
Melopsittacus undulatus	Budgerigar		✓	✓		✓
Merops ornatus	Rainbow Bee-eater		✓			✓
Mirafra javanica secunda	**Horsfield's Bushlark**				✓	✓
Neophema elegans	**Elegant Parrot**	**SA: R**			✓	
Neopsephotus bourkii	Bourke's Parrot		✓	✓	✓	✓
Northiella haematogaster	Blue Bonnet			✓		✓
Nymphicus hollandicus	Cockatiel					✓
Ocyphaps lophotes	Crested Pigeon		✓	✓	✓	✓
Oreoica gutturalis	Crested Bellbird		✓	✓	✓	✓
Pachycephala rufiventris	**Rufous Whistler**				✓	
Peltohyas australis	Inland Dotterel		✓			
Petrochelidon ariel	Fairy Martin		✓			
Petrochelidon nigricans	Tree Martin		✓			✓
Petroica goodenovii	Red-capped Robin		✓	✓	✓	✓
Phaps chalcoptera	Common Bronzewing			✓	✓	
Poliocephalus poliocephalus	Hoary-headed Grebe		✓			
Pomatostomus superciliosus	White-browed Babbler		✓	✓	✓	✓
Psephotellus varius	**Mulga Parrot**				✓	
Psophodes occidentalis	Chiming Wedgebill		✓	✓	✓	✓
Ptilotula penicillatus	White-plumed Honeyeater		✓	✓	✓	✓
Recurvirostra novaehollandiae	Red-necked Avocet		✓			
Rhipidura leucophrys leucophrys	Willie Wagtail		✓	✓	✓	✓
Stiltia isabella	**Australian Pratincole**				✓	
Taeniopygia guttata	Zebra Finch		✓	✓	✓	✓

Species name	Common name	Cons. Rating	2020 Spring	2021 Spring	2023 Autumn	2023 Spring
Todiramphus pyrrhopygia	Red-backed Kingfisher		✓	✓		✓
Todiramphus sp.	Kingfisher sp.			✓		
Tribonyx ventralis	Black-tailed Native-hen		✓			
Tringa glareola	Wood Sandpiper		✓			
Turnix velox	Little Button-quail		✓	✓		
Vanellus tricolor	Banded Lapwing		✓			✓
Conservation Ratings: SA (NPW Act) and Aus. (EPBC Act): VU = Vulnerable, R = Rare						

EBS Ecology
112 Hayward Avenue
Torrensville, SA 5031
www.ebsecology.com.au
t. 08 7P27 5607

Appendix D

Feral Animal Control Programme

PECULIAR KNOB IRON ORE MINE

FERAL ANIMAL CONTROL PROGRAMME

Peculiar Knob Iron Ore Mine

Southern Iron Pty Ltd

Rev 4 – 4 March 2020

REVISION RECORD

Date	Version No	Description	Author	Checked by	Approved by
12/12/2019	1	Draft	Geoff Mills	Lisa Bailie	Client
18/12/2019	2	For submission	Geoff Mills	Lisa Bailie	Client
20/02/2020	3	Response document	Geoff Mills	Lisa Bailie	Client
04/03/2020	4	FINAL	Geoff Mills	Lisa Bailie	Client

When printed this document is uncontrolled

Table of Contents

List of Tables

List of Figures

Attachments

Attachment 1 Ecological Horizons Report – Waster-rock Dump Extension Thick-billed Grasswren Appraisal

Attachment 2 COOE Report – Vegetation Assessment of ML6314 and the Surrounding Area

1. PURPOSE

1.1 Background

The Feral Animal Control Programme is a requirement of Condition 7 (Offsets) of the Decision Notice 2014-7154 made under sections 130(1) and 133 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The condition is to offset residual significant impacts to the Thick-billed Grasswren (Eastern subspecies) (*Amytornis textilis modestus*).

The programme must be applied to a minimum area of 400 ha within the Interim Biogeographic Regionalisation for Australia (IBRA) Baltana sub-region (Stony Plains STP-07). Implementation of the programme must commence prior to any vegetation clearance of the Peculiar Knob Iron Ore Project expansion area and remain in place until the expansion area has been rehabilitated in accordance with Condition 3 (Habitat Rehabilitation) of Decision Notice 2014-7154. Condition 3 requires that the project expansion area be rehabilitated to 'a quality of habitat equivalent to the habitat removed'.

1.2 Definition of terms

DAWE or The Department means The Department Agriculture, Water and the Environment (previously the Department of the Environment and Energy).

EPBC Act means *Environment Protection and Biodiversity Conservation Act 1999.*

Commencement means Commencement of any works within the Peculiar Knob Iron Ore Project "expansion area".

Implementation means A contract with a service provider(s) to deliver all aspects of the approved programme has been executed and control activities have commenced (PAPP and 1080 baiting stations are installed, and rabbit warrens surveyed and ripped).

TBGW means Thick-billed Grasswren.

TBGW habitat within the expansion area means Gypseous cracking soils and endorheic gilgais and the headwaters of ephemeral streams. Water-holding or water-transporting habitats that support larger emergent chenopods, especially *Atriplex nummularia ssp omissa* and *Rhagodia spinescens* (see Figure 1-1).

Rehabilitation performance indicators means performance indicators that demonstrate the project expansion area be rehabilitated to a quality of habitat equivalent to the habitat removed. Rehabilitation performance indicators will be developed for approval in a revised plan.

Commitment means the programme will be implemented once approved by the Minister.

The programme will be implemented prior to commencement of any works within the Peculiar Knob Iron Ore Project 'expansion area'.

The programme will remain in place until the rehabilitation performance indicators have been achieved.

1.3 Objective

The programme objective is to abate threats to the Thick-billed Grasswren by controlling the impact of fox (*Vulpes vulpes*) and cat (*Felis catus*) predation, and habitat protection through rabbit (*Oryctolagus cuniculus*) control.

Secondary objectives as a result of the programme may include:

- a fauna threat abatement engagement opportunity with land managers
- an opportunity to facilitate the adoption of best practice baiting methods
- an opportunity to build on broader fauna threat abatement programmes
- an opportunity to establish tall shrubland plants suited to Thick-billed Grasswren habitat on ripped rabbit warrens.

1.4 Issues to be addressed

Foxes, feral cats and rabbits present major threats to biological diversity including to the Thick-billed Grasswren. The fox and the rabbit are both declared pests under the *Natural Resources Management Act 2004* (NRM Act), however the feral cat is not listed as a declared species under the NRM Act, possibly due to a lack of demonstrated effective cat control techniques. In response, the Commonwealth has published under the EPBC Act, threat abatement plans to provide guidance on pest control measures including:

- *Threat abatement plan for predation by the European red fox* (DEWHA 2008)
- *Threat abatement plan for predation by feral cats* (Department of the Environment, 2015)
- *Threat abatement plan for competition and land degradation by rabbits* (Department of the Environment and Energy 2016).

Fox baiting is encouraged and facilitated within the South Australian Arid Lands Natural Resources Management (SAAL NRM) region through Natural Resources SA Arid Lands (NR SAAL). The SAAL NRM Board have identified that this is an activity that offers potential for engagement of pastoralists in an NRM activity that has benefits for biodiversity. Additionally, facilitation of coordinated local district baiting provides an opportunity for communication of best practice baiting methods and related NRM information. NR SAAL have been contacted and have provided advice on inputs to this programme.

The Baltana sub-region is predominantly comprised of hard compacted clay soils or cracking clay soils. These soil types are typically unsuitable for rabbit infestation, however the programme area will be surveyed to identify the opportunities for rabbit control through warren destruction. As rabbits are known to forage up to 250 metres from warrens, a buffer of 250 metres adjacent to the offset area will be inspected for rabbit warrens for destruction.

1.5 Description of area to be cleared

In 2014 Southern Iron Pty Ltd engaged Ecological Horizons to conduct a habitat survey to establish the quality and extent of the Thick-billed Grasswren habitat within the Peculiar Knob Iron Ore Project expansion area (Condition 4 of Decision Notice 2014-7154). The survey was conducted by Thick-billed Grasswren expert Dr John Read.

The Peculiar Knob Waste Rock Dump (WRD) extension overlies two distinct habitat types. The southern two-thirds are characterized by hard-packed clay soils that shed water and are typically vegetated by low sparse chenopods. The birds occupying this habitat have been surveyed for four years at the nearby PK6I fauna monitoring site without any records of Thick-billed Grasswren. This habitat is highly unlikely to support grasswrens because it lacks the extensive patches of emergent chenopods that characterize their habitat.

By contrast the northern third features more gypseous cracking soils and endorheic gilgais and the headwaters of ephemeral streams. These water-holding or water-transporting habitats support larger emergent chenopods, especially *Atriplex omissa* and *Rhagodia* spp, that provide suitable habitat for Thick-billed Grasswrens. Subsequent mapping of the precise boundary of the WRD extension indicated that the surveyed area omitted the northern quarter, including the site of a previous Thick-billed Grasswren record. However, the southern extent of the suitable habitat was mapped in detail and surveyed on both days and the assumption is made that most of the area to the north of this line is suitable habitat for grasswrens (Ecological Horizons 2014 – provided in Attachment 1)(see Figure 1-1). The vegetation recorded by Dr Read as *Atriplex omissa* and *Rhagodia* spp were recorded during baseline flora surveys as *Atriplex nummularia ssp omissa* and *Rhagodia spinescens* (EBS, March 2007).

A full description of the vegetation community quality, species composition and structure is provided in Attachment 2 (EPBC Referral, Appendix D, Flora and Fauna Survey Report, COOE 2013). The area of disturbance described by Ecological Horizons 2014 as suitable Thick-billed Grasswren habitat is described by COOE 2013 as Vegetation Association 1 (see Attachment 2; COOE 2013, Section 4.1, Figure 1).

The portion of the area to be cleared that is described as suitable Thick-billed Grasswren habitat by Ecological Horizons 2014 and by COOE 2013 is considered to be the benchmark for rehabilitation outcomes for the affected area at the cessation of mining. Information regarding rehabilitation completion criteria is discussed in Section 1.5.

Clearance will not commence until this feral animal control programme has been approved and pest control actions in the approved plan have commenced (see Section 2.4).

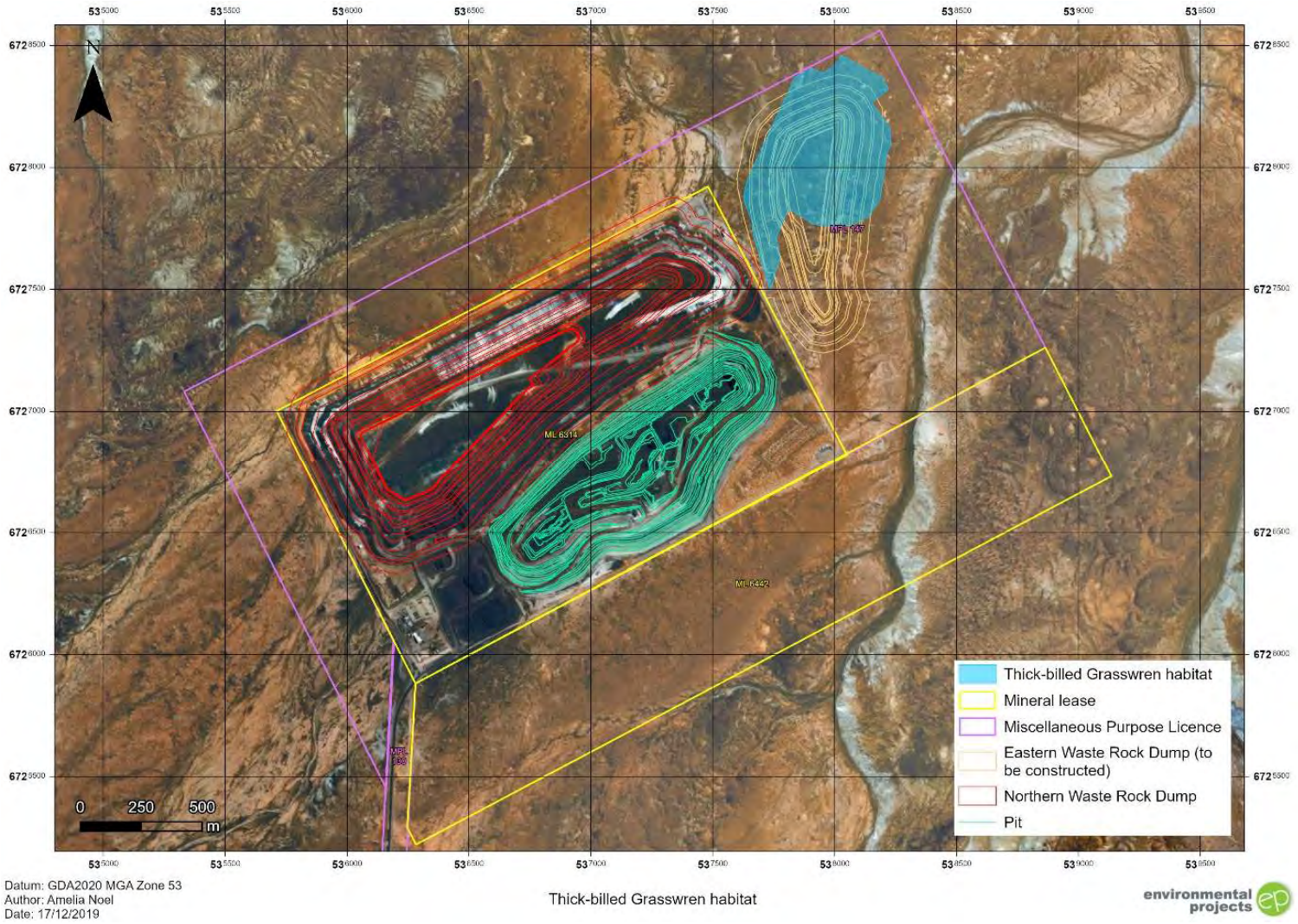


Figure 1-1: Area described by Dr Read as suitable Thick-billed Grasswren habitat (Ecological Horizons 2014)

1.6 Rehabilitation strategy

The rehabilitated waste rock dump (WRD) final cover design utilises a moisture and store-and-release cover system. Rainfall will be stored in the interstices of the topsoil and released through evaporation rather than be shed as runoff. The topsoil cap will be comprised of a minimum PSD 22% silt and clay (Peculiar Knob PEPR, November 2019). Although primarily designed to minimise runoff and soil erosion, the final cover design mimics the pre-existing landform of cracking clays and gilgais. In addition to the cover design, sediment traps and drainage channels will be installed between the rehabilitated WRD and the northern boundary of the mining lease. The sediment traps and drainage channels will mimic the purpose of drainage head waters and gilgais as described in the existing environment.

Once the WRD has been shaped to the approved final landform profile and the final cover design installed, the WRD plateau and toe where evaporation ponds and drainage channels are installed, will be seeded with the pre-existing and preferred habitat vegetation species (including *Atriplex nummularia ssp omissa* and *Rhagodia spinescens*) of the Thick-billed Grasswren. Seeds will be locally collected and dispersed across the top, face and toe of the rehabilitated WRD.

The feral animal control programme will remain in place until the rehabilitation has been completed in accordance with Condition 3 of the EPBC 2014-7154 approval.

Based on pre-clearance vegetation community quality, species composition and structure benchmarks, rehabilitation performance indicators and completion criteria will be developed during the operation phase of mining and provided to the DAWE in a revised plan for approval prior to the commencement of rehabilitation.

2. SCOPE OF PROGRAMME

2.1 Scale

Two suitable location options to apply the 400 ha feral animal control programme were considered.

Option 1 is located immediately to the north of the Peculiar Knob expansion area, within the area described by Dr Read as gypseous cracking soils and endorheic gilgais and the headwaters of ephemeral streams. Although favourable due to its close proximity to the disturbance area, access to Option 1 would be extremely difficult due to lack of tracks and associated mine safety management.

Option 2 is very similar terrain and is located approximately 20 km west of Option 1. Option 2 has the advantage of good access tracks away from the mine site however it has the added advantage that a small stone quarry extractive mineral lease (EML) is situated within the option area. The EML will likely increase population densities of cat and fox making the control programme more effective. Option 2 has therefore been chosen as the preferred option. The EML has a pre-disturbed area of approximately 20 ha, therefore an additional 20 ha has been added to the 400 ha programme area. Figure 2-1, Figure 2-2 and Figure 2-3 show the two option areas for implementation of the programme. Figure 2-4 shows the Option 2 area in detail.

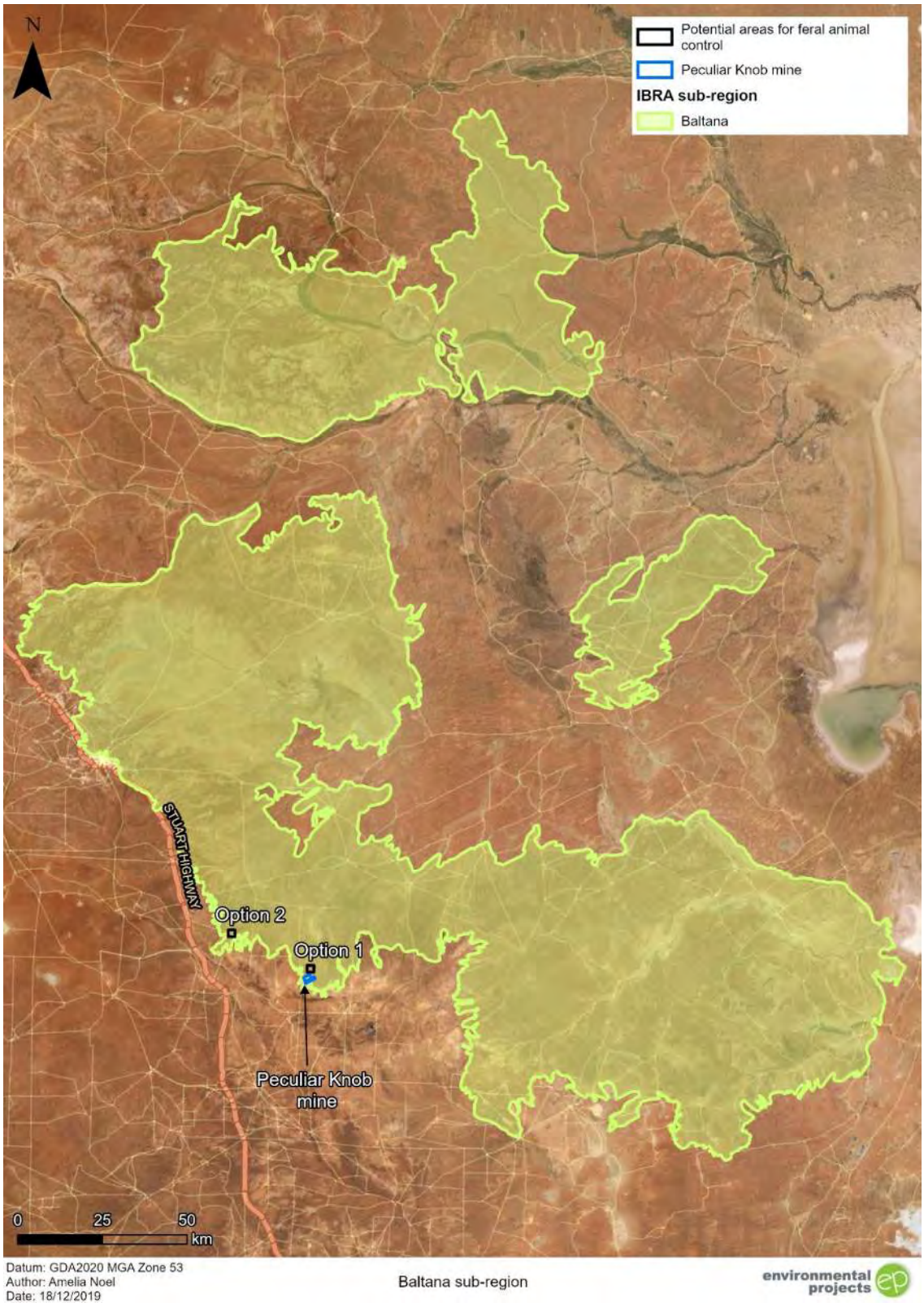


Figure 2-1: Implementation area options within the Baltana sub-region

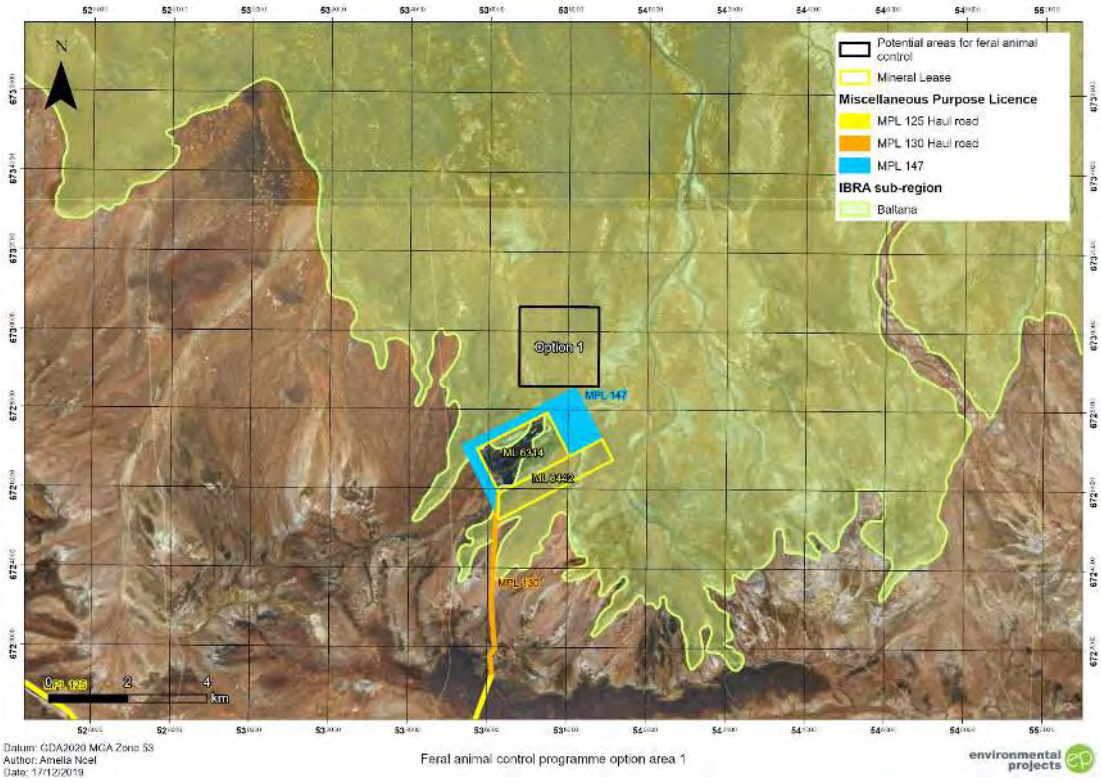


Figure 2-2: Feral animal control programme Option 1 area

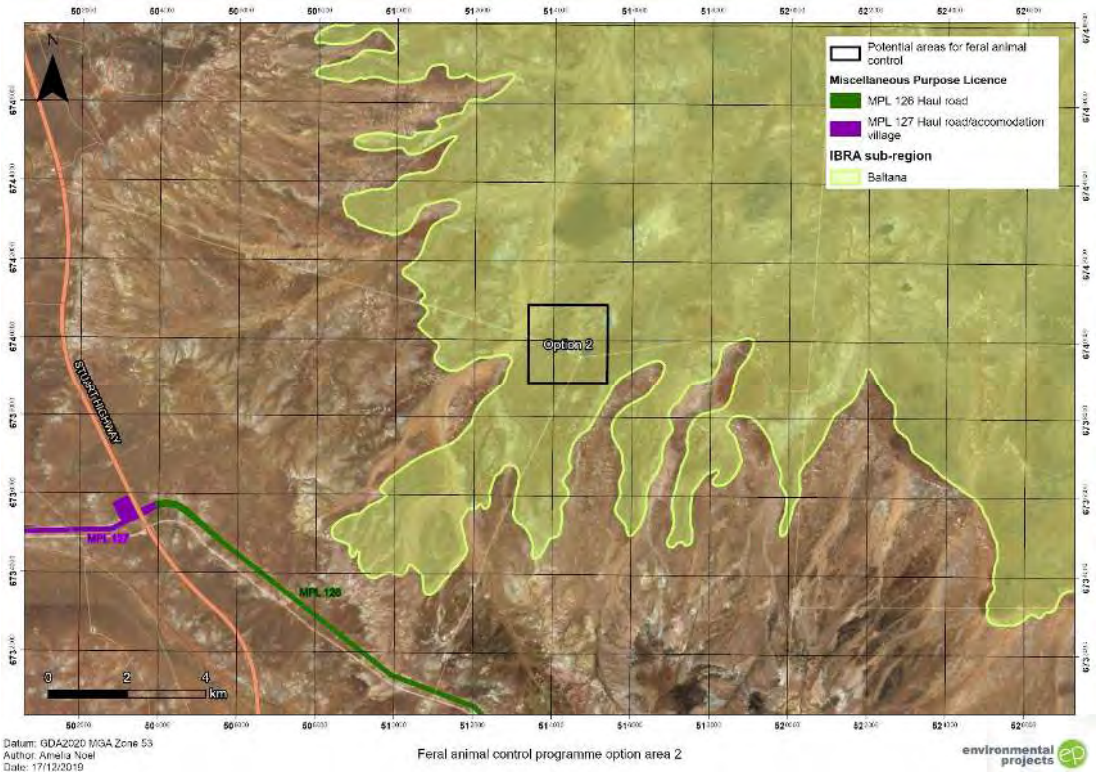


Figure 2-3: Feral animal control programme Option 2 area

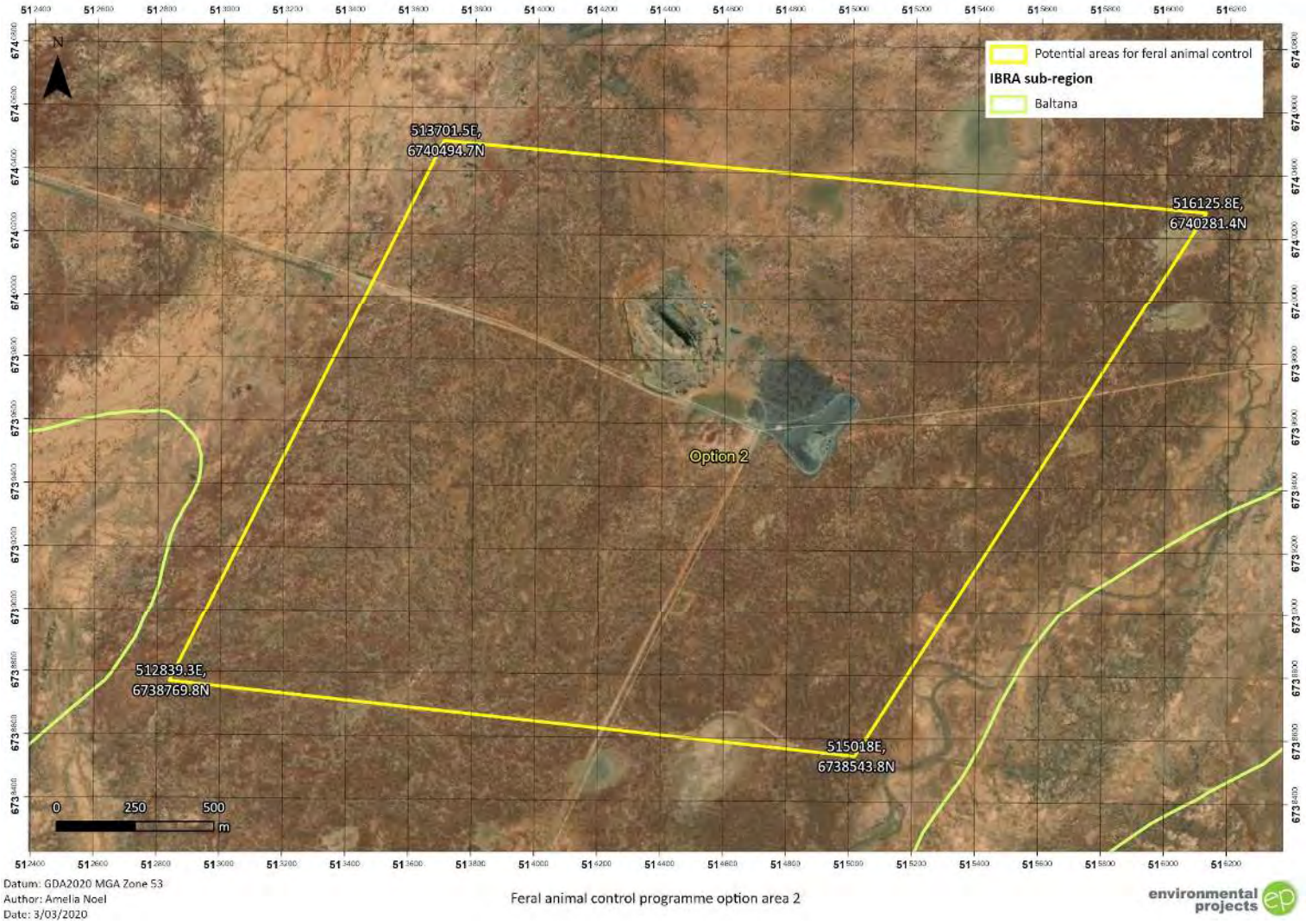


Figure 2-4: Feral animal control programme Option 2 area (detail)

2.2 Programme details

2.2.1 Fox

The programme has been designed with strong reference to the following documents:

- *Threat abatement plan for predation by the European red fox* (DEWHA, 2008)
- PestSmart: *A field guide to poison baiting: wild dogs and foxes* (Mifsud G. 2016)
- Fact Sheet: *Baiting for Fox Control* (Centre for Invasive Species Solutions 2013)
- *Directions for use of 1080 fox baits in South Australia* (PIRSA 2014).

The programme will utilise 1080 FoxOff baits within the area identified. To maximise baiting effectiveness, baiting will take place during Autumn (migration period) with follow-up baiting in Spring (breeding season) so that recovery of the fox population is addressed. Each campaign period will last two weeks and be inspected twice a week as per PestSmart and PIRSA recommendations.

At least five baiting stations will be established, one each located at the four corners and one near the middle of the programme area. Additional baits will be laid along tracks at 200 to 500 metre intervals. Baits will be buried to 5 to 10 cm.

Uptake of baits will be monitored at sample stations using three automatic in-situ cameras placed at two of the corner stations and the centre station, and also by visual inspections at all stations. Taken baits will be replaced during inspections. Baiting lines and bait station location waypoints will be recorded, mapped and included along with bait uptake data in annual reports, or another period as required.

General awareness and participation in fox control by neighbours and the local community will be encouraged through sharing of information about the programme through printed material and verbal discussions.

2.2.2 Cat

To-date there has been few methods identified to effectively control feral cats as they rarely take baits.

The *Threat abatement plan for predation by feral cats* (Department of the Environment 2015), Section 1.2.3 states that control of cats is difficult as they are found in very low densities and have large home ranges, making them difficult to locate. Cats are also extremely cautious in nature, making them hard to cost-effectively control with traditional measures such as shooting and trapping.

The site for the programme was in part chosen due its proximity to an EML that operates on a campaign basis and therefore a place that is likely to attract cats for shelter and has the potential for fluctuating food resources.

The methods of cat impact abatement considered for this programme include shooting, baiting, cage traps and the recently developed grooming traps.

Shooting could be effective because of the relatively small scale of the control area, if timed strategically.

To successfully trap feral cats, the lure or attractant chosen is important, with individual feral cats preferring different styles of lure, while some feral cats may not be attracted by any lures (Department of the Environment 2015). However trapping could be effective if timed in periods of scarce resources.

Cats prefer live prey and will only take baits when other resources are scarce, however baiting could be effective if timed strategically using surface baits such as Curiosity® in both autumn and spring.

In recent years a cat grooming trap, the 'Felixer', has been developed that takes advantage of the cats fastidious grooming habit. The Felixer targets cats and foxes and can be programmed to play a variety of audio lures to attract feral cats and foxes. Rangefinder sensors are used to distinguish the target species from nontarget species and then sprays target species with a measured dose of toxic gel. The solar-powered Felixer can hold 20 sealed cartridges of toxic gel, which automatically reset after firing. The Felixer automatically photographs all animals detected (including nontargets that are not fired upon). All data is downloaded and recorded for reporting purposes. Although the Felixer has the potential to be an effective cat control tool, little data is currently available to measure its success rate in all situations. Grooming traps are currently cost inhibitive, especially for a control area of this small scale.

After consideration of all the control options, it is proposed that an integrated programme of baiting, cage traps and spotlight shooting is adopted. Baiting utilising approved baits for the control of feral cats, such as Curiosity® baits, will be laid in both autumn and spring, at the same time and duration of the fox baiting programme, at baiting stations near the four corners and near the centre of the programme area. Monitoring the uptake of baits will utilise the three in-situ automatic cameras and via inspection observations during the baiting periods. Timing of the baiting periods will be planned to occur within periods of nil activity at the EML to coincide with periods of low food resources for cats. Likewise, cage trapping and spotlight shooting will occur at the same time as the baiting in autumn and spring and whilst there is no activity at the EML.

General awareness and participation in cat control by neighbours and the local community will be encouraged through sharing of information about the programme through printed material and verbal discussions.

Effectiveness of existing and new control technologies will be reviewed annually to assess the potential for improvements to control methods. Changes to the programme will be submitted to the Department for consideration for approval in revised plans if and when appropriate to do so.

2.2.3 Rabbit

This section was developed with reference to the *Threat abatement plan for competition and land degradation by rabbits* (Department of the Environment and Energy 2016).

At least 400 ha including the programme area will be surveyed for rabbit warrens. If present, warrens will be mapped and destroyed by ripping. Rabbit warrens within 250 metres of the area boundary will also be surveyed and destroyed to minimise rabbit grazing impacts.

General awareness and participation in rabbit control by neighbours and the local community will be encouraged through sharing of information about the programme through printed material and verbal discussions.

2.2.4 Control measures to be adopted

Table 2-1 provides a summary of the recommended control measures and the proposed controls to be adopted for this programme.

Table 2-1: Feral animal control measures to be adopted

Source document	Recommended control	Adopted controls/justification
FOX *Threat abatement plan for predation by the European red fox* (DEWHA 2008) A field guide to poison baiting: wild dogs and foxes (Mifsud 2016) PestSmart FactSheet: Baiting for Fox Control (2013) *Directions for use of 1080 fox baits in South Australia* (PIRSA 2014)	• poison baiting • shooting • trapping • den fumigation or destruction • exclusion fencing	**Poison baiting (1080 FoxOff) has been adopted for this programme.** Apart from broadscale baiting, the other recommended methods are expensive, labour intensive, long term and of limited effectiveness.
CAT *Threat abatement plan for predation by feral cats* (Department of the Environment 2015)	• shooting • leg hold traps • cage traps • 1080 Eradicat baits (WA only) • PAPP Curiosity baits • grooming trap • exclusion fencing.	**Integrated control utilising PAPP baits, cage traps and spotlight shooting have been adopted for this programme with an annual review.** All controls with the exception of exclusion fencing are considered to be of limited effectiveness. Shooting depends on the off chance of cat sightings, leg hold and cage traps are considered to be too stressful for the captured animals, grooming traps and exclusions fencing are considered to be too expensive.
RABBIT *Threat abatement plan for competition and land degradation by rabbits* (Department of the Environment and Energy 2016)	• poison baiting • biological control agents • warren ripping and fumigation • fencing • harbour removal • shooting.	**Warren ripping has been adopted for this programme.** Destruction of warrens in this harsh environment should negate the need to bait, shoot or fumigate. Exclusion fencing is too expensive, harbour removal is not applicable to this area and biological control is the responsibility of other agencies.

2.3 Implementation

The programme will be implemented as follows:

- the programme will be implemented once approved by the Minister
- the programme will be implemented prior to commencement of any works within the Peculiar Knob Iron Ore Project 'expansion area'
- the programme will remain in place until the rehabilitation performance indicators have been achieved
- a local service provider will deliver the fox baiting and rabbit control programmes
- 1080 bait will be used for fox baiting, only FoxOff manufactured 1080 bait will be utilised

- the service provider will be responsible for adherence to 1080 handling procedures including provision of safety equipment for handling and transport
- the service provider will be responsible for 'poison laid' signage, laying the bait, monitoring bait lines, bait stations and bait replacement
- the service provider will be responsible for rabbit warren mapping and destruction
- cat control will utilise integrated control of Curiosity® baits containing the toxin PAPP, cage traps and spot shooting
- adjacent landholders and NR SAAL will be consulted and given opportunities to be engaged in the programme or add value through broader supplementary control programmes
- monitoring and evaluation of outcomes and reporting will be coordinated by Southern Iron Pty Ltd (the tenement holder).

2.4 Description of Implementation

Implementation means rabbit, fox and cat control activities have each commenced (PAPP and 1080 baiting stations have been installed and rabbit warrens surveyed and ripped).

2.5 Community Engagement

General awareness will be raised through community engagement including one-on-one conversations and through printed information/fact sheets.

2.6 Risk Management

The following measures will be implemented to address potential risks:

- neighbour and broader community concerns will be addressed by highly focused promotion into the target area by multiple methods i.e. phone contact, in person, written including fact sheets
- off-target damage to domestic dogs will be addressed by early consultation and extensive signage provided for all properties adjacent to the baiting area
- 1080 accredited storage facility–options for using storage facilities of adjacent NRM Boards or PIRSA will be investigated.

2.7 Monitoring and evaluation

Monitoring will be underpinned by delineation of the baiting area, bait lines and bait station waypoints through mapping and wooden stakes.

Analysis of timing and frequency of camera image data.

Bait uptake will be monitored and used as an indicator of fox abundance and threat reduction success.

Cat bait uptake camera data will be used as an indicator of cat abundance and threat reduction success.

The number of warrens ripped and re-ripped due to annual inspections of ripped warrens to ensure they are not reopened and occupied.

The feasibility of utilising data from annual PEPR required fauna surveys will be investigated.

2.8 Information management

All data will be recorded and maintained by Southern Iron Pty Ltd and reported upon request to the Department of Agriculture, Water and the Environment as per Condition 9 of Decision Notice 2014-7154. Furthermore, Southern Iron Pty Ltd will by 30 June each year after commencement of the action, publish a report on their website that addresses compliance to all conditions of Decision Notice 2014-7154 for the previous 12 months, or part thereof, including compliance to this programme.

2.9 Summary of programme

A summary of the Feral Animal Control Programme is provided in Table 2-2.

Table 2-2: Summary of Peculiar Knob Feral Animal Control Programme

Aspect	Control/description	Timing	Document reference
Fox	1080 FoxOff baiting	Prior to commencement Biannually – Autumn and Spring	Section 2.2.1 and 2.3
Cat	Integrated control of PAPP Curiosity® baiting, cage traps and shooting	Prior to commencement Biannually – Autumn and Spring	Section 2.2.3 and 2.3
Rabbit	Warren destruction	Prior to commencement	Section 2.2.3 and 2.3

3. RISK ASSESSMENT

3.1 Background

Pest animals are synonymous with the introduction of non-native species, soil and native vegetation disturbance or the provision of artificial watering points or any artificial change to ecosystem function, which can in some way alter the balance of nature.

Some native fauna species benefit from such changes–these species are identified as increasers. The range and abundance status of other species are threatened by these factors, making them decreaser species. It is possible that the Thick-billed Grasswren is a decreaser species that could be vulnerable to predation by cats and foxes and to habitat degradation.

3.2 Consultation

During the development of this programme, consultation has been undertaken with:

- Natural Resources South Australian Arid Lands (NR SAAL)
- Dr John Read (Ecological Horizons)
- Antakirinja Matu-Yankunytjatjara Aboriginal Corporation (AMYAC)

- adjacent Pastoral land lessees.

3.3 Legal and other requirements

The following legislation was considered during the development of the programme:

- *Environment Protection and Biodiversity Conservation Act 1999*
- *Natural Resources Management Act 2004*
- *National Parks and Wildlife Act 1972*
- *Mining Act 1971*.

3.4 Risk assessment

A risk assessment was undertaken to determine the likely success of the programme.

The risk assessment was conducted to assess the expected uncontrolled and controlled impacts on the Thick-billed Grasswren from feral predators (fox and cat), and from habitat degradation from introduced herbivore (rabbit) within the required 400 ha control programme area (see Figure 2-1).The risk assessment process firstly assigned the expected uncontrolled impact consequence level score (1-5) (see Table 3-1) and then assigned the likelihood level score of the impact occurring (1-5) (see Table 3-2). The scores were added together to present the expected risk rating (negligible–very high) (see Table 3-3).

The risk rating was then considered alongside feasibility of control to inform the appropriate pest animal control strategy level (see Table 3-4). The process was then repeated to assess the expected abatement of risk to the species from carrying out the control measures (see Table 3-5, Table 3-6 and Table 3-7).

Table 3-1: Uncontrolled impact consequence

Negligible	Minor	Medium	Major	Extreme
Level 1	Level 2	Level 3	Level 4	Level 5
Environmental				
No significant regional impacts to the species No lasting effects	Low level predation of the species. Species remains abundant when climatic conditions are favourable.	Moderate effects on population densities, populations can recover when conditions are favourable.	Serious population depletion with possible localised species extinction. Long term effect Difficult for species abundance to recover.	Species depletion with possible regional species extinction.
Legal				
No legal issues	Minor legal issue. Non-compliance or breach of regulation that can be easily rectified.	Serious breach of regulation. Prosecution possible.	Major breach of regulation, Investigation and prosecution by authority. Prosecution probable.	Very serious breach of regulation Investigation by authority with significant prosecution and fines.

Table 3-2: Likelihood of impact

Likelihood	Impact
5 Almost certain	The impact is expected to occur at some stage
4 Likely	The impact will probably occur, not surprised if it happens
3 Possible	The impact might occur at some stage
2 Rare	The impact could happen at some time but surprised if it happens
1 Unlikely	The impact is not likely to happen at any stage

Table 3-3: Expected risk rating

Consequence/Likelihood	1 Negligible	2 Minor	3 Medium	4 Major	5 Extreme
5 Almost Certain	Moderate	High	Very High	Very High	Very High
4 Likely	Moderate	High	High	Very High	Very High
3 Possible	Low	Moderate	High	Very High	Very High
2 Rare	Negligible	Low	Moderate	High	Very High
1 Unlikely	Negligible	Low	Moderate	High	High

Table 3-4: Pest animal control strategy level

Pest Risk	Feasibility of Control				
	Negligible	Low	Medium	High	Very High
Negligible 1-4	Monitor	Monitor	Monitor	Contain spread	Contain spread
Low 5	Monitor	Monitor	Contain spread	Contain spread	Destroy populations
Medium 6	Contain spread	Contain spread	Destroy populations	Destroy populations	Destroy populations
High 7	Protect sites	Protect sites	Destroy populations	Eradicate	Eradicate
Very High 8-10	Protect sites	Protect sites	Destroy populations	Eradicate	Eradicate

Table 3-5: Fox (*Vulpes vulpes*) expected abatement of risk

	Impacts	Controls	Uncontrolled risks			Controlled risks			Comments	Feasibility of control
Environmental	Predation on TBGW	Baiting	3	5	8	1	5	6		Medium
Economic										
Social										
Legal	Declared species, legal requirement to control. (NRM Act 2004)								Required by Decision Notice 2014-7154	Destroy populations

Table 3-6: Cat (*Felis catus*) expected abatement of risks

	Impacts	Controls	Uncontrolled risks			Controlled risks			Comments	Feasibility of control
Environmental	Predation on TBGW	Baiting	3	5	8	2	5	7		Medium
Economic										
Social										
Legal									Required by Decision Notice 2014-7154	Destroy populations

Table 3-7: Rabbit (*Oryctolagus cuniculus*) expected abatement of risk

	Impacts	Controls	Uncontrolled risks			Controlled risks			Comments	Feasibility of control
Environmental	Degradation of TBGW habitat	Destruction of rabbit warrens	3	3	6	1	3	4		Very High
Economic										
Social										
Legal	Declared species, legal requirement to control. (NRM Act 2004)								Required by Decision Notice 2014-7154	Destroy populations

4. REFERENCES

Centre for Invasive Species Solutions 2013, *PestSmart FactSheet: Baiting for Fox Control*. The Centre for Invasive Species Solutions, Canberra, ACT.

COOE Pty Ltd, 2013. *Vegetation Assessment of ML6314 and the Surrounding Area, Significant Environmental Benefit (SEB)*, November 2013, unpublished report prepared for Arrium Mining.

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). *Threat abatement plan for predation by the European red fox*, DEWHA, Canberra.

Department of the Environment, 2015. *Threat abatement plan for predation by feral cats*, Commonwealth of Australia, 2015.

Department of the Environment and Energy 2016. *Threat abatement plan for competition and land degradation by rabbits*, Commonwealth of Australia 2016.

EBS 2007, *Flora and Fauna Assessment, Peculiar Knob, March 2007*, unpublished report to Parsons Brinckerhoff Australia, EBS Adelaide.

Ecological Horizons Pty Ltd 2014. *Proposed Peculiar Knob Waster-rock Dump Extension Thick-billed Grasswren Appraisal*, November 2014, unpublished report prepared for Southern Iron Pty Ltd.

Mifsud G (2016). A field guide to poison baiting: wild dogs and foxes. 3rd edition 2018. PestSmart Toolkit publication. The Centre for Invasive Species Solutions, Canberra, ACT.

Peak Iron Mines Pty Ltd, 2019. *Peculiar Knob Iron Ore Mine, Program for Environment Protection and Rehabilitation (PEPR) Update*, Revision 3, November 2019.

PIRSA, 2014. *Directions for use of 1080 fox baits in South Australia.*

ATTACHMENT 1

Ecological Horizons Pty Ltd 2014. *Proposed Peculiar Knob Waster-rock Dump Extension Thick-billed Grasswren Appraisal*, November 2014, unpublished report prepared for Southern Iron Pty Ltd.

Proposed Peculiar Knob Waster-rock Dump Extension Thick-billed Grasswren Appraisal

November 2014

DRAFT

Ecological Horizons Pty Ltd

Potential Thick-billed Grasswren habitat within the proposed Peculiar Knob Waste Rock Dump extension

Limitations Statement

In preparing this document Ecological Horizons Pty Ltd makes no warranty or guarantee, whether expressed or implied, with respect to the information reported or to the findings, observations or conclusions expressed in this document. Further, such information, findings, observations and conclusions are based solely on observations made and information available to Ecological Horizons Pty Ltd at the time of this study.

Scope

Ecological Horizons was contracted by Arrium (Southern Iron) to conduct a an assessment of Proposed Peculiar Knob Waster-rock Dump Extension in northern South Australia to satisfy conditions of the EPBC Referral 2014/7154 .

The key deliverables was:

1) A habitat survey of the proposed expansion area by a suitably qualified Thick-billed Grasswren expert.

2) Provide baseline information on feral animal distribution to assist in the development of a feral animal control program to be implemented to protect a minimum of 400ha within the Baltana subregion

Credentials of the Thick-billed Grasswren assessor

Dr. John Read from Ecological Horizons Pty Ltd has thirty years' experience of conducting fauna surveys and habitat assessments in the South Australian arid zone. He has coordinated, conducted and written up several surveys for rare birds (including Thick-billed Grasswrens) in northern South Australia and has recorded Thick-billed Grasswrens on each of four annual surveys at the Peculiar Knob mine, including some records adjacent to the survey area (see Table 1). Dr. Read was appointed as the Birds Australia Atlas Coordinator for northern South Australia in the early 2000s, which provides further indication of his credentials.

Assessment Approach

Dr. Read walked the perimeter of the proposed Peculiar Knob Waste Rock Dump extension, guided by Arrium Environmental Scientist Christine Jones on November 6, 2014. The following morning, when detectability of grasswrens was considered to be optimal, the survey area was traversed on foot, with particular attention paid to visiting sites with emergent chenopod shrubs, which are the favoured habitat for the grasswrens. A playback recording of Thick-billed Grasswren calls was broadcast from a portable recorder at a minimum of ten localities for one minute each within the proposed Waste Rock Dump extension, concentrating on areas of potential habitat. Binoculars were also used both to survey clumps of tall chenopods and to scan for moving birds in front of the observer.

Results

No Thick-billed Grasswrens were detected during the survey of the Peculiar Knob Waste Rock Dump extension, although previous sightings in the region and suitable habitat suggest the northern third of this area does provide suitable habitat for the species (Figure 1). Due to their often secretive nature, failure to detect grasswrens during short surveys cannot be considered to indicate the absence of this species, nor the unsuitability of the habitat. Thick-billed Grasswrens have, however, been recorded from the nearby permanent fauna monitoring sites 7I and 7C (Table 1) and also at two other sites within or immediately adjacent to the study area in 2012 (Figure 1). Birds recorded during the survey were Nankeen

Kestrel (1), Rufous Fieldwren (4), Richard's Pipit (2), White-winged Fairywren (5) and Orange Chat (2).

The Peculiar Knob Waste Rock Dump extension overlies two distinctly different habitat types. The southern two thirds is characterized by hard-packed clay soils that shed water and are typically vegetated by low sparse chenopods (Plate 1). The birds occupying this habitat have been surveyed for four years at the nearby PK6I fauna monitoring site without any records of Thick-billed Grasswrens. This habitat is highly unlikely to support grasswrens because it lacks the extensive patches of emergent chenopods that characterize their habitat.

By contrast the northern third features more gypseous cracking soils and endorheic gilgais and the headwaters of ephemeral streams. These water-holding or water-transporting habitats support larger emergent chenopods, especially *Atriplex omissa* and *Rhagodia* spp that provide suitable habitat for Thick-billed Grasswrens (Plates 2-5). Subsequent mapping of the precise boundary of the Peculiar Knob Waste Rock Dump extension indicated that the surveyed area omitted the northern quarter, including the site of a previous Thick-billed Grasswren record. However, the southern extent of the suitable habitat was mapped in detail (Figure 1) and surveyed on both days and the assumption is made that most of the area to the north of this line is suitable habitat for grasswrens.

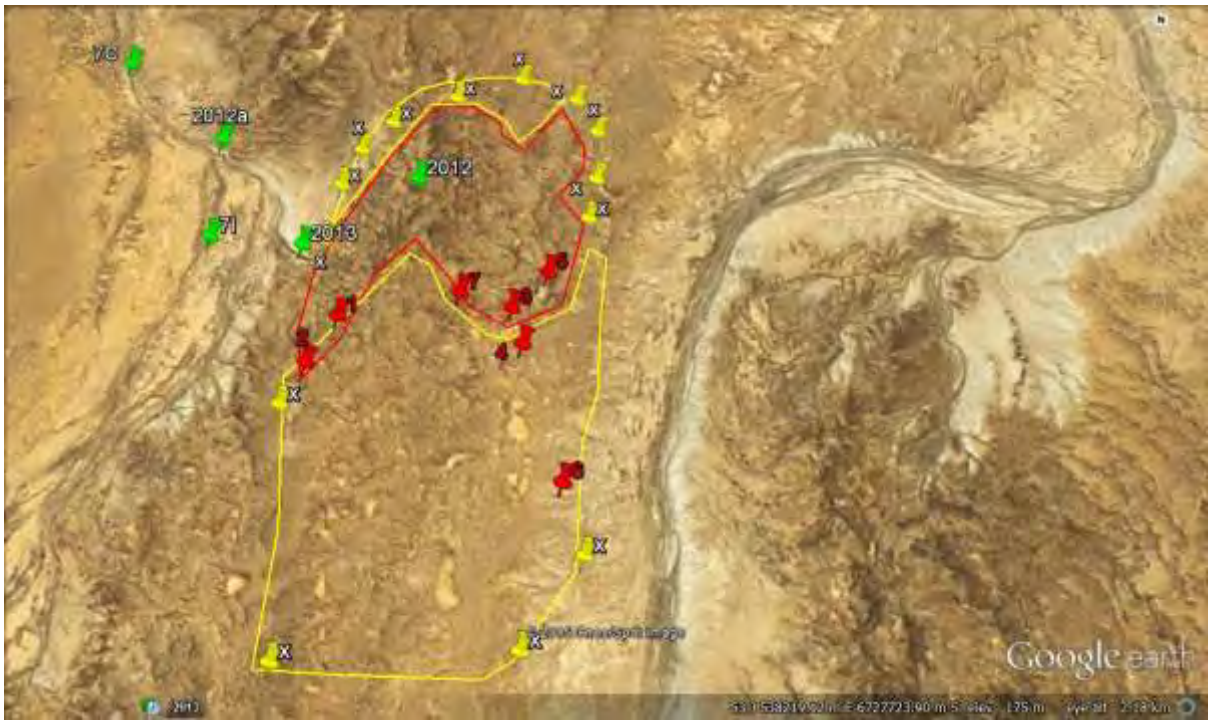


Figure 1. Outline of the proposed Peculiar Knob Waste Rock Dump Extension (yellow symbols), potential habitat sites for Thick-billed Grasswren (red symbols) and previous Thick-billed Grasswren records (green symbols). The extent of suitable grasswren habitat within the proposed Peculiar Knob Waste Rock Dump Extension is demarcated by the red polygon and unsuitable habitats are delineated by the yellow polygon.

Table 1. Presence of Thick-billed Grasswrens (TBGW) at Peculiar Knob bird monitoring sites in 2011- 2014 (Data from Ecological Horizons 2014).

Site	Zone	Eastings	Northings	2011	2012	2013	2014
Bird 1	53J	533409	6717125	TBGW	TBGW	-	-
Bird 2	53J	530401	6716960	TBGW	TBGW	TBGW	TBGW
Bird 3	53J	499300	6737400	-	-	-	-
Bird 4	53J	522850	6721800	-	-	-	TBGW
Bird 5	53J	492200	6734200	-	-	-	-
Bird 6	53J	499300	6735700	-	-	-	-
2I				-	-	-	-
2C				-	-	-	-
3I				-	-	-	TBGW
3C				-	TBGW	TBGW	TBGW
5I				TBGW	-	TBGW	-
5C				-	TBGW	-	-
7I				-	TBGW	-	-
7C				TBGW	-	-	-

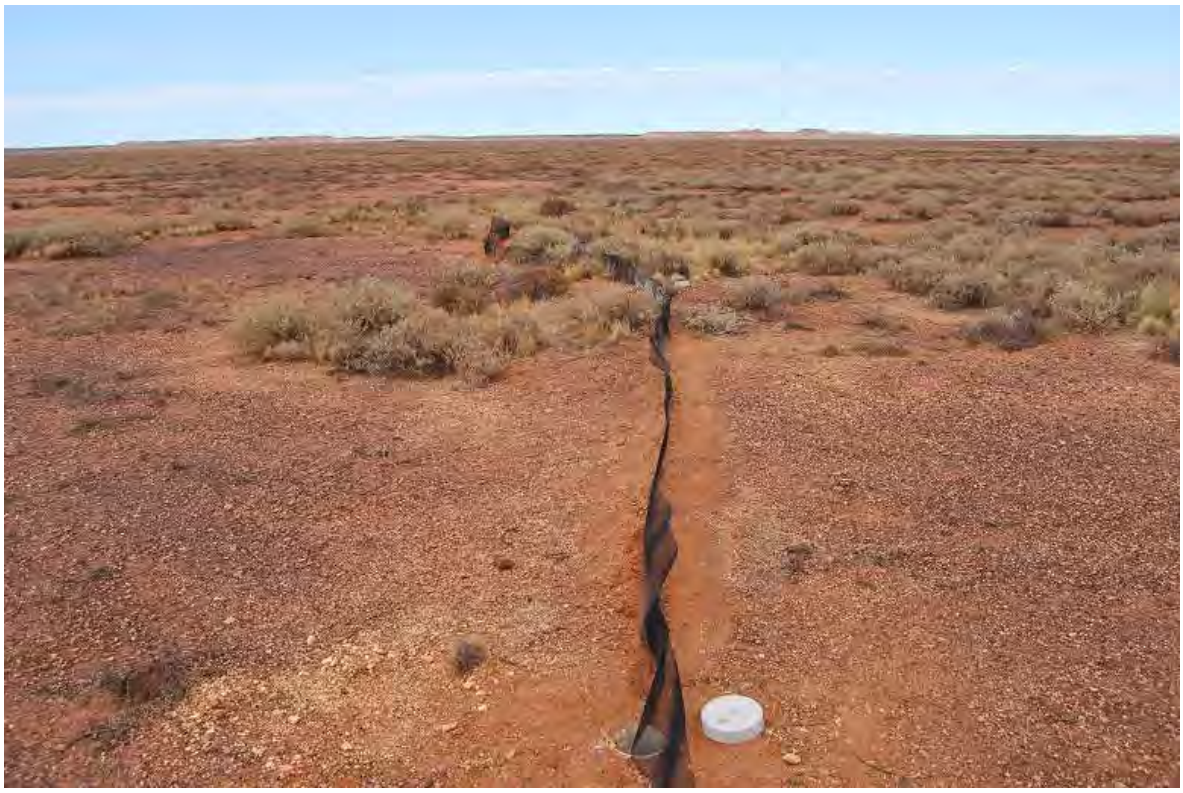


Plate 1. Fauna monitoring site PK06 showing the sparse, low vegetation and hard, water-shedding soils characteristic of the southern two thirds of the proposed Peculiar Knob Waste Rock Dump Extension that are considered unsuitable for Thick-billed Grasswrens.

Plate 2. Headwaters of drainage line on north-western corner of proposed waste Rock Dump extension (Site 2 in Figure 1).

Plate 3 Oodnadatta saltbush (*Atriplex omissa*) growing in drainage line near northern margin of proposed waste rock dump extension (Site 1 in Figure 1) and in similar habitat to previous record 2012 (Figure 1).

Plate 3 Gilgai on eastern margin of proposed waste rock dump

Plate 4. Cracking clay gilgai in proposed waste rock dump extension (Site 5 in Figure 1). Thick-billed Grasswrens would be expected to use the fringing emergent chenopods for shelter and nesting.

Discussion

One third of the proposed Peculiar Knob Waste Rock Dump Extension will be overlain upon habitat suitable for Thick-billed Grasswrens. This nationally listed species has been recorded at the site and at several other localities adjacent to the Peculiar Knob mine.

Waste rock dumps do not provide suitable habitat for Thick-billed Grasswren. Even if they are successfully rehabilitated by native vegetation, rock dumps are unlikely to provide suitable habitats due to their water-shedding nature that is not conducive to colonization by emergent chenopod shrubs. Hence this development should be regarded as permanent removal of the habitat from potential grasswren occupancy.

Construction of the proposed Peculiar Knob Waste Rock Dump Extension could affect the ability of the habitat to support Thick-billed Grasswrens beyond the physical footprint of the dump. Along with the pervasive impacts of dust and noise from construction of the rock dump, changes in the hydrogeological regimes could affect the important emergent chenopod populations, especially since the proposed rock dump lies at the headwaters of grasswren supporting drainage lines. If the dump diverts the natural flow of water from the water-shedding soils to the south to these northward-flowing drainages, it is likely that the emergent chenopods that depend upon enhanced water availability will be negatively impacted. If however, water shed from the rock dumps is clean and mimics natural water flows from the hardpan soils, there may be little change in grasswren habitat downstream of the development.

ATTACHMENT 2

COOE Pty Ltd, 2013. Vegetation Assessment of ML6314 and the Surrounding Area, Significant Environmental Benefit (SEB), November 2013, unpublished report prepared for Arrium Mining.



VEGETATION ASSESSMENT OF ML6314 AND THE SURROUNDING AREA

Significant Environmental Benefit (SEB)

Arrium Mining

November 2013

Cooe
Care Of Our Environment

Previously trading as Natural Resource Services Pty Ltd

COOE Pty Ltd ABN 65 147 909751

P: +61 0(8) 8362 4282 | E: info@cooe.com.au | PO Box 591, Littlehampton SA 5250 | www.cooe.com.au

<Back of Title Page>

Vegetation Assessment of ML6314 and the surrounding area

Significant Environmental Benefit (SEB)

Prepared for: Arrium Mining

Prepared by: COOE Pty Ltd

Level 7, 19 North Terrace Hackney, SA 5069

PO Box 591 Littlehampton, SA 5250

+61 8 8362 4282, www.cooe.com.au

DOCUMENT CONTROL

Document code: ARR.PKV.02_20131113_PKVegAssessML6314_FINAL

Date	Version	Reason for change	Author(s)	Editor(s)
11/10/2013	Draft 01	Draft	AD, VG, AC	Sean Steed
11/10/2013	Final Draft	Submission to client		Graeme Noll
13/11/2013	Final Draft 02 – map to be updated	Edits as per client's request	AC	SS
19/11/2013	Final	Updated Fig. 1 included	AC	SS

Executive Summary

Mining operations that involve the clearance of native vegetation must be undertaken in accordance with a management plan that the Native Vegetation Council (NVC) is confident will result in a significant environmental benefit (SEB) (DWLBC 2005). COOE Pty Ltd (COOE) was engaged by Arrium Mining (Arrium) to undertake a vegetation assessment within an identified area of 671.5 ha immediately surrounding the Peculiar Knob Iron Ore Mining Project (PK Project) Mineral Lease 6314 (ML6314). The 671.5 ha represents a proposed MPL and native vegetation clearance will be required as part of a proposed expansion of PK operations.

Vegetation associations were identified, the area of each association calculated and resultant condition evaluated. Land clearing designs were then compared to the vegetation associations to calculate the SEB offset amount required within the proposed MPL. Additionally, a desktop fauna assessment was undertaken to identify potential species which may be found within, or close to, the survey area. The desktop fauna assessment was based on previous surveys conducted in 2007 (PB 2012).

Three vegetation associations were identified within the survey area:

1) *Atriplex vesicaria* (Bladder Saltbush) +/- *Maireana ericantha and Sclerolaena cuneata* low open shrubland with open gibber (6:1)
2) *Cullen australasicum* / *Senecio lanibracteus* low shrubland (6:1)
3) *Atriplex vesicaria / Sclerolaena cuneata* very open shrubland (6:1).

The proposed waste rock dump is the only area that will require vegetation clearance with an area of 56.52 ha. The vegetation within this area will include only vegetation association 1. Based on the SEB ratios assigned to vegetation to be cleared, 169.56 ha of vegetation is required as an offset to achieve a SEB if restoration activities are achieved on-site.

Options to satisfy SEB offsets includes revegetation and rehabilitation of suitable areas or payment into the Native Vegetation Fund. Should payment to the Fund be an option, total payment required to satisfy SEB is = $51,998.40.

Table of Contents

List of Tables

List of Figures

List of Plates

Appendices

Abbreviations

DMITRE	Department for Manufacturing, Innovation, Trade, Resources and Energy
DPTI	Department of Planning, Transport and Infrastructure
DWLBC	Department of Water, Land and Biodiversity Conservation
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
MLP	Mining Lease Proposal
MPL	Miscellaneous Purposes License
NV Act	*Native Vegetation Act 1991* (SA)
NV Regulations	*Native Vegetation Regulations 2003* (SA)
PEPR	Program for Environment Protection and Rehabilitation
PK	Peculiar Knob
SEB	Significant Environmental Benefit

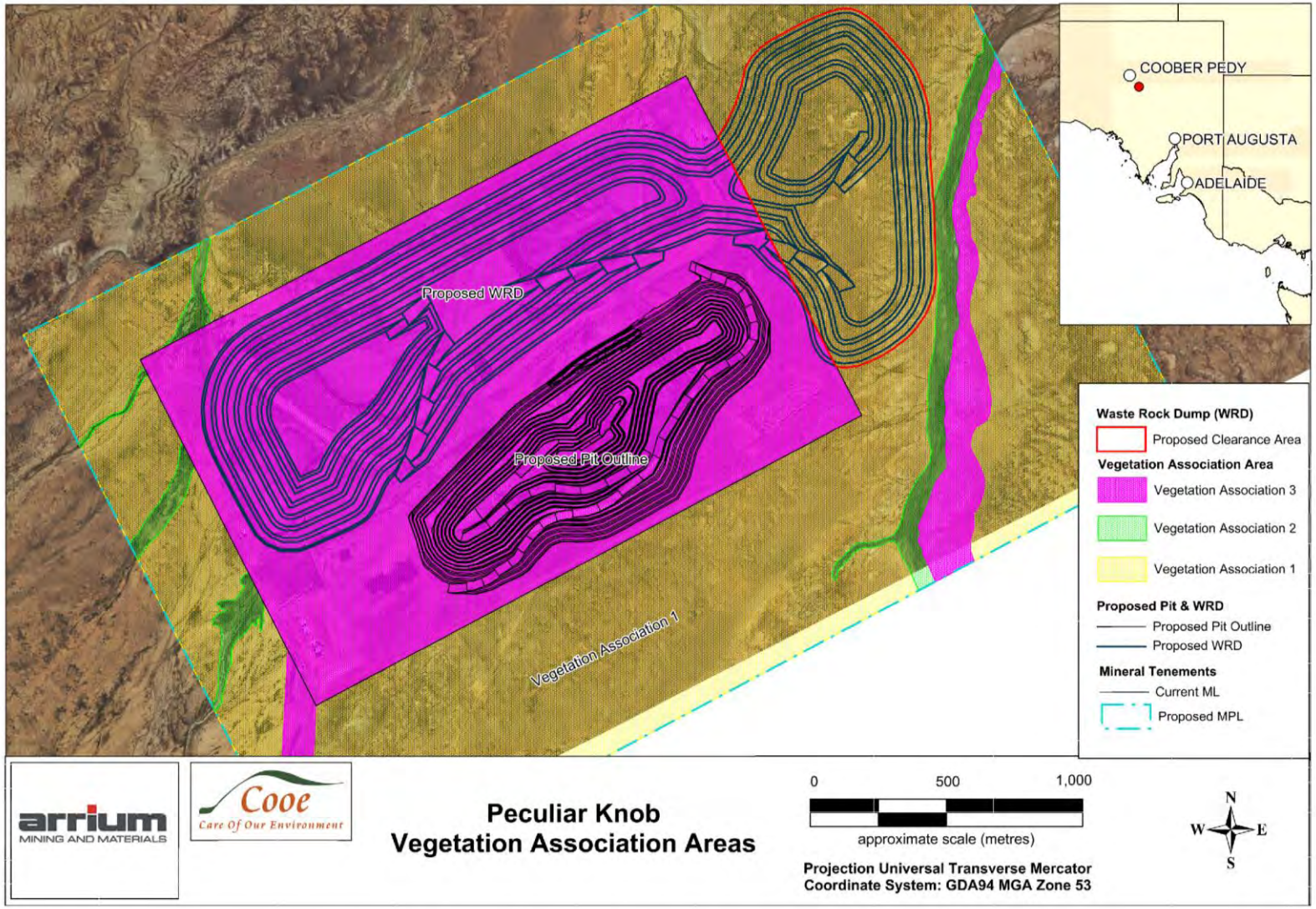
1 Introduction

Arrium Mining commissioned COOE to undertake a vegetation assessment within an identified area immediately surrounding the Peculiar Knob (PK) Iron Ore Mine ML6314 (hereafter referred to as, "study area"). Native vegetation clearance is required as part of a proposed expansion of PK mining operations surrounding ML6314. Approximately 671.5 ha of vegetation within the proposed MPL was surveyed as part of this assessment (Figure 1).

1.1 Objectives

An assessment of native vegetation within the study area was undertaken to establish vegetation communities and to calculate required SEB offsets for proposed vegetation clearance. The specific objectives were to:

- Conduct a site walkover of the approximate MPLA area of 671.5 ha that surrounds ML6314 to describe the vegetation associations (refer to Figure 1)
- Provide a general species list for each vegetation association
- Undertake a desktop fauna study report based on previous surveys and with consideration to EPBC Guidelines in line with PK Approvals
- Calculate SEB offset areas and associated payments.



*Colours for Vegetation Association 1 and 3 are in-line with that identified in Appendix D, Vegetation 2 is a new association for the area. Vegetation Association 1 where the proposed WRD, pit and acces road are located was not surveyed by COOE, information is provided by Arrium from a survey done in 2007 by EBS.

Figure 1. Vegetation associations surveyed within the proposed Peculiar Knob expansion (ML6314)

2 Regulatory Framework

All native vegetation in South Australia is protected under the provisions of the *Native Vegetation Act 1991* (SA) (NV Act) and *Native Vegetation Regulations 2003* (SA) (NV Regulations), where the South Australian NVC must approve any clearance of vegetation not exempted under the NV Regulations. Under the NV Act, clearance means:

- the killing or destruction of native vegetation
- the removal of native vegetation
- the severing of branches, limbs, stems or trunks of native vegetation
- the burning of native vegetation, and
- any other substantial damage to native vegetation, including the draining or flooding of land, or any other act or activity, that causes the killing or destruction of native vegetation, the severing of branches, limbs, stems or trunks of native vegetation or any other substantial damage to native vegetation (DWLBC 2005).

There are exemptions under the NV Act and NV Regulations for native vegetation clearance undertaken as part of operations under the *Mining Act 1971* (SA). The exemption allows native vegetation clearance for mining operations, provided it is undertaken in accordance with a management plan that details to the satisfaction of the NVC how the project will result in SEB (DWLBC 2005).

The Guidelines for a Native Vegetation Significant Environmental Benefit Policy for the Clearance of Native Vegetation Associated with the Minerals and Petroleum Industry (DWLBC 2005) identify common objectives in the administration of the NV Regulations. Specifically, proposed mining operations should ensure:

- That there is no practicable alternative that would avoid the clearance of native vegetation, the clearance of less vegetation or the clearance of less significant vegetation.
- The retention and enhancement of biodiversity, native vegetation and landscape values.
- The restoration of native vegetation by land users to maintain and enhance biodiversity, protect water quality and conserve soil resources.
- Biological diversity of vegetation is maintained through appropriate land management practices, including a suite of measures from vegetation retention and re-establishment.
- Where native vegetation clearance is unavoidable, measures are undertaken to counterbalance the loss of that vegetation with a significant environmental benefit either on the site or within the same region, either by works undertaken by the proponent, or through payment of money into the native vegetation fund (as established under the *Native Vegetation Act 1991* (SA)).
- The clearance of higher value vegetation should be offset by a higher significant environmental benefit.
- The significant environmental benefit should support the highest possible biodiversity outcomes in terms of quality, position in the landscape, and ongoing management.

3 Methods

A field assessment was undertaken over a two day period from 17 to 18 September 2013, involving a walk through assessment of the native flora species present within the study area.

The survey recorded vegetation associations and associated vegetation condition ratings throughout the area. The vegetation condition ratings were based on the SEB ratios provided in Table 1.

The identification of flora species were verified against Kutsche & Lay (2003) and Moore (2005).

Table 1. SEB ratios used to rate condition of vegetation communities

Condition	SEB Ratio	Indicators for Condition
Very Poor Weed-dominated with only scattered areas or patches of native vegetation	2:1	– Vegetation structure no longer intact (e.g. removal of one or more vegetation strata). – Scope for regeneration, but not to a state approaching good condition without intensive management. – Dominated by very aggressive weeds. – Partial or extensive clearing (greater than 50% of area). – Poor. – Evidence of heavy grazing (tracks, browse lines, species changes, no evidence of solid surface crust).
Poor Native vegetation with considerable disturbance	4:1	– Vegetation structure substantially altered (e.g. one or more vegetation strata depleted). – Retains basic vegetation structure or the ability to regenerate it. – Very obvious signs of long-term or severe disturbance. – Weed dominated with some very aggressive weeds. – Partial clearing (10 to 50% of area). – Evidence of moderate grazing (tracks, browse lines, soil surface crust extensively broken).
Moderate Native vegetation with some disturbance	6:1	– Vegetation structure altered. – Most seed sources available to regenerate original structure. – Obvious signs of disturbance (e.g. tracks, bare ground). – Minor clearing (less than 10 % of area). – Considerable weed infestation with some aggressive weeds. – Evidence of some grazing (tracks, soil surface crust patchy).
Good Native vegetation with little disturbance	8:1	– Vegetation structure intact (e.g. all strata intact) – Disturbance minor, only affecting individual species. – Only non-aggressive weeds present. – Some litter build-up.
Intact Vegetation	10:1	– All strata intact and botanical composition close to original. – Little or no signs of disturbance. – Little or no weed infestation. – Soil surface crust intact. – Substantial litter cover.

Source: DWLBC (2005)

4 Results

4.1 Vegetation Survey Results

Three vegetation associations were identified throughout the study area (Figure 1) as listed below:

- *Atriplex vesicaria* (Bladder saltbush) +/- *Maireana ericantha and Sclerolaena cuneata* low open shrubland with open gibber (Vegetation Association 1),
- *Cullen australasicum* / *Senecio lanibracteus* low shrubland (Vegetation Association 2)
- *Atriplex vesicaria / Sclerolaena cuneata* very open shrubland (Vegetation Association 3)

Full species lists for each vegetation association have been documented in Appendix B, with a summary of dominant species and vegetation condition documented in Table 2 to Table 4. A total of 57 native species were identified in all vegetation associations within the proposed MPL area surveyed.

Vegetation association 1 – *Atriplex vesicaria +/- Maireana ericantha and Sclerolaena cuneata low open shrubland with open gibber*

Atriplex vesicaria (Bladder saltbush) +/- *Maireana ericantha* and *Sclerolaena cuneata* low open shrubland with open gibber was the dominant vegetation association within the study area, occupying an area of 639.1 ha. This association comprised of low chenopod open shrubland with patches of un-vegetated open gibber and dense vegetation along the minor ephemeral drainage lines (Plate 1). The overstorey species were sparsely distributed and only observed within the minor ephemeral drainage lines. The sparse distribution of overstorey species within the association may be attributed to the gilgais and sub-soil condition. The vegetation association supported a reasonable covering of annual species following recent rains. No species of conservation value were identified.

Cattle activity was evident (scats, soil disturbance, trampling and slight grazing) particularly throughout the minor ephemeral drainage lines (Plate 2). Cattle grazing was primarily evident on the juvenile plants of the overstorey species. A number of rabbit warrens were also observed throughout the area. Old exploration tracks and pastoral roads were also observed in areas south of the current ML and east of the eastern creek line (Plate 3).

Two weed species were identified throughout vegetation association 1*, Malvastrum americanum* and *Sonchus oleraceus.* Both species were located north of ML6314 and in very small numbers.

The overall vegetation condition was moderate for vegetation association 1, due to the evidence of grazing and slight disturbance. This association has been allocated an overall SEB risk rating of 6:1.

Table 2. Summary of vegetation association 1 - *Atriplex vesicaria +/- Maireana ericantha and Sclerolaena cuneata low open shrubland with open gibber*

Overstorey and midstorey species	*Eremophila serrulata* *Pittosporum angustifolium* *Santalum acuminatum* *Senna sp.*
Common Understorey species	*Abutilon halophilum* *Astrebla pectinata* *Atriplex spongiosa* *Atriplex vesicaria* *Digitaria brownii* *Dissocarpus paradoxus*

	Enneapogon avenaceus *Enteropogon acicularis* *Eragrostis setifolia* *Leiocarpa leptolepis* *Maireana aphylla* *Maireana ericantha* *Panicum decompositum* *Polycalymma stuartii* *Ptilotus obovatus var. obovatus* *Pycnosorus eremaeus* *Salsola kali* *Sclerolaena cuneata* *Sclerolaena diacantha* *Sclerolaena divaricata* *Setaria constricta*
Emergent species	None recorded
Conservation significant flora species	None recorded
Weed species	*Sonchus oleraceus* *Malvastrum americanum*
Condition	*Atriplex vesicaria* (Bladder saltbush) +/- *Maireana ericantha* and *Sclerolaena cunceata* low open shrubland with open gibber was considered to have a condition rating of 6:1.

Plate 1. Vegetation association 1 - *Atriplex vesicaria +/- Maireana ericantha and Sclerolaena cuneata low open shrubland with open gibber*

Plate 2. Cattle tracks within a minor ephemeral drainage line

Plate 3. Old Pastoral road located in the study area, south of ML6314

Vegetation association 2 - *Cullen australasicum/ Senecio lanibracteus* low shrubland

The *Cullen australasicum/ Senecio lanibracteus* low shrubland vegetation association was located along the major ephemeral drainage lines throughout the study area (Plate 4). These major drainage lines were densely vegetated in comparison to the other two vegetation associations.

Some cattle grazing was evident with heavy soil disturbance and tracks evident within the creeklines. One weed species was identified, *Sonchus oleraceus* (sowthistle). This species was observed at the major drainage line located east of ML6314. *S. oleraceus* formed a dense population in locations where water persisted for regionally prolonged periods.

The overall vegetation condition was moderate for vegetation association 2, due to the evidence of grazing and presence of weed species. This association has been allocated an overall SEB risk rating of 6:1.

Table 3. Summary of vegetation association 2 - *Cullen australasicum* / *Senecio lanibracteus* low shrubland

Overstorey and midstorey species	*Acacia aneura*
Common Understorey species	*Senecio lanibracteus* *Aristida holathera ssp. holathera* *Astrebla pectinata* *Atriplex holocarpa* *Atriplex vesicaria* *Cullen australasicum* *Cyperus sp.* *Enteropogon acicularis* *Lavatera plebeia* *Maireana aphylla* *Maireana sp.* *Polycalymma stuartii* *Pycnosorus eremaeus* *Setaria constricta*
Emergent species	None recorded
Conservation significant flora species	None recorded
Dominant weed species	*Sonchus oleraceus*
Condition	The *Cullen australasicum* / *Senecio lanibracteus* was considered to have a rating of 6:1.

Plate 4. Vegetation association 2 - *Cullen australasicum* / *Senecio lanibracteus* low shrubland

Vegetation association 3 – *Atriplex vesicaria / Sclerolaena cuneata very open shrubland*

The *Atriplex vesicaria / Sclerolaena cuneata* vegegation association is located on weathered bulldog shale, east of the current ML. This association was sparsely populated with the lowest species density and diversity of the three vegetation associations identified within the study area (Plate 5). No weed species were recorded.

Activity of native fauna within this vegetation association was high evidenced by the high number of burrows, in particular reptiles. Rabbit warrens were also prevalent throughout this vegetation association.

The overall vegetation condition was moderate for vegetation association 3, due to evidence of grazing. Despite the low flora species diversity and evidence of rabbits in comparison to the other associations, the high activity of native fauna in this association justified an overall SEB risk rating of 6:1.

Table 4. Summary of vegetation association 3 – *Atriplex vesicaria / Sclerolaena cuneata very open shrubland*

Overstorey and midstorey species	None recorded
Understorey species	*Arabidella glaucescens* *Atriplex quinii* *Atriplex vesicaria* *Pycnosorus eremaeus* *Salsola kali* *Sclerolaena cuneata* *Senecio lanibracteus*
Emergent species	None recorded
Conservation significant flora species	None recorded
Weed species	None recorded
Condition	*Atriplex vesicaria / Sclerolaena cuneata* vegetation association was considered to have a condition rating of 6:1

Plate 5. Vegetation association 3 – *Atriplex vesicaria / Sclerolaena cuneata very open shrubland*

4.2 Flora of Conservation Significance

No flora species with a state or national conservation rating were detected during the survey.

4.3 Fauna Desktop Study

The clearance of native vegetation may have a localised impact on the native fauna in the area. A desktop study has been conducted by COOE to compile existing information on the native fauna species recorded within (or in proximity to) the study area and is summarised below. The desktop assessment consisted of the following:

- Review of the Environmental & Biodiversity Services (EBS) Flora and Fauna Assessment, Peculiar Knob report, dated March 2007 – to identify fauna previously recorded in proximity to the study area, and
- Review of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) approvals conditions for the PK Project.

4.3.1 Mineral Lease 6314

A flora and fauna assessment comprising background research and field surveys was undertaken for the ML6314 area and access road (originating from adjacent the OzMinerals Prominent Hill Mine haul road to PK ML6314) by EBS in March 2007. The results from this study were subsequently outlined in the PK Iron Ore Project Mining and Rehabilitation Program (now referred to as, 'Program for Environment Protection and Rehabilitation' (PEPR)), dated 4 July 2011.

Fauna recorded during the March 2007 survey at sites PK 003, PK 004, PK 005 and PK 006 have been documented in Table 5 and Table 6 as they are considered to represent similar vegetation associations identified in the current study. Sites PK 003 to PK 005 are located within ML6314 and site PK 006 is located approximately 250 metres south of ML6314.

Table 5. Vertebrate captured at PK fauna sites PK 003, PK004, PK 005 and PK 006, March 2007 (EBS 2007)

Location	Species	Common Name
GROUND-DWELLING MAMMALS		
PK004	*Leggadina forresti*	Forest Mouse
PK004	*Planigale gilesii*	Giles Planigale
PK004, PK005	*Planigale tenuirostris*	Narrow-nosed Planigale
PK005, PK006	*Sminthopsis crassicaudata*	Fat-tailed Dunnart
PK006	*Sminthopsis macroura*	Stripe-tailed Dunnart
REPTILES		
PK003, PK004, PK005, PK006	*Ctenotus olympicus*	Eastern Spotted Ctenotus
PK004	*Delma butleri*	Unbanded Delma
PK005	*Diplodactylus byrnei*	Gibber Gecko
PK006	*Lerista muelleri*	Dwarf Three-toed Slider
PK003	*Lialis burtonis*	Burton's Snake-lizard
PK004	*Menetia greyii*	Common Dwarf Skink
PK003	*Suta suta*	Curl Snake
PK005	*Tiliqua rugosa*	Sleepy Lizard
BATS		
PK004, PK005	*Nyctophilus geoffroyi*	Lesser Long-eared Bat

Table 6. Birds recorded at Peculiar Knob within and surrounding ML6314 (EBS 2007)*

Location	Species	Common Name
PK003, PK004	*Amytornis textilis*	Thick-billed Grasswren
PK003, PK004, PK005, PK006	*Anthus novaeseelandiae*	Richard's Pipit
PK003, PK004	*Aquila audax*	Wedge-tailed Eagle
PK003, PK004	*Calamanthus campestris*	Rufous Fieldwren
PK003, PK004	*Charadrius australis*	Inland Dotterel
PK003, PK004, PK005, PK006	*Cincloramphus cruralis*	Brown Songlark
PK005, PK006	*Dromaius novaehollandiae*	Emu
PK003, PK004, PK005, PK006	*Epthianura aurifrons*	Orange Chat
PK003, PK004, PK005, PK006	*Epithianura tricolor*	Crimson Chat
PK003, PK004, PK005, PK006	*Malurus leucopterus*	White-winged Fairywren
PK005, PK006	*Ocyphaps lophotes*	Crested Pigeon
PK005, PK006	*Phylidonyris albifrons*	White-fronted Honeyeater
PK005, PK006	*Turnix velox*	Little Button-quail
PK003, PK004	*Vanellus tricolor*	Banded Lapwing

***NB.** The EBS report (2007) provides general locations for the bird species observed for 'Buffer Zone' and 'Mining Lease'. Sites PK 003 and PK 004 are identified as being located within the Buffer Zone (around the high impact mining zone). Sites PK 005 and PK 006 are identified as being located within the Mining Lease. Birds may not have been observed in their exact site locations identified in Table 6, but rather in the general area. COOE has provided these site locations rather than the EBS general locations for consistency.

4.3.2 *Environment Protection and Biodiversity Conservation Act 1999* (Cth)

As part of the 2007 fauna assessment, EBS performed an EPBC Act Protected Matters database search to identify the likelihood of species of conservation significance occurring within and surrounding the PK study area. This data has been documented in Appendix C.

The *Amytornis textilis modestus* (Thick-billed Grasswren) has a national rating of vulnerable and a State rating of rare. This species and its habitat was identified in the EPBC Act Protected Matters Report as likely to occur within the nominated area and was subsequently detected on site during the 2007 EBS survey. As part of the 2007 assessment conducted by EBS, it was identified that mining activities (drilling and operational works) will impact on the population of the Thick-billed Grasswren within ML6314.

The Thick-billed Grasswren was observed during the COOE September 2013 survey and was also observed around the site during the COOE July 2013 survey, in the chenopod low shrubland with open gibber association (association 2) within an area of dense Blue Bush.

The PK Project was deemed to be a controlled action on date 9 June 2011 and subsequently approved with conditions on date 27 August 2012. On 30 October 2012 Southern Iron Pty Ltd was provided with a Variation to Conditions Attached to Approval. The variation involved the footprint of the PK Project, specifically that the person taking the action must ensure that no more than 523 ha of potential *Amytornis texilis modestus* habitat is removed from within the PK study area, as indicated in Appendix D dated 27 August 2012.

Consideration should be given to this condition in any proposed expansion of PK Project operations involving the removal of native vegetation that may be inhabited by *Amytornis texilis modestus*. The conditions for clearance of habitat for threatened fauna is further clarified in the Guidelines for a Native Vegetation SEB Policy (DWLBC 2005) where it is stated that, 'if the clearance removes any habitat for native fauna species that are listed under State (NPW Act) or Commonwealth (EPBC Act) legislation as threatened at any level, options for replacing the removed habitat should be considered'.

5 Significant Environmental Benefit

5.1 Extent of Vegetation Clearance

The total area to be cleared and vegetation associations to be disturbed is based on preliminary drawings provided by Arrium. The exact location of any of the proposed waste dump clearance areas for ML6314 has been identified (Figure 1). The total area to be cleared is provided in Table 7.

Within vegetation association 1, 56.52 ha of vegetation will require clearing as part of the proposed expansion of the PK operations. The SEB offset area has been calculated in Table 7. Calculation of the size of the PK expansion through the surveyed vegetation association was estimated from Map '19972A_Perculiar_Knob_Mine_20cm_Mosaic_August2012' provided to COOE by Arrium.

It should be noted that if ecological restoration activities will be achieved on-site, on completion of mining activities, then the initial SEB ratio will be reduced by 50% (DWLBC 2005). Should Arrium Mining undertake an on-site restoration program for the total area disturbed on completion of mining operations the total SEB offset area can be reduced by 50% to 3:1 hectares (Table 7.

Table 7. Vegetation to be cleared for the study area

Vegetation Community	Initial SEB ratio	Area surveyed (Ha)	Total Area to be Cleared (ha)	Offset Area (ha) (without restoration)	Offset Area (ha) (with restoration, 3:1)
Vegetation association 1 - *Atriplex vesicaria* (Bladder saltbush) +/- *Maireana ericantha and Sclerolaena cuneata* low open shrubland with open gibber	6:1	639.1	56.52	339.12	169.56
Vegetation association 2 - *Cullen australasicum* / *Senecio lanibracteus* low shrubland	6:1	18.49	-	-	-
Vegetation association 3- *Atriplex vesicaria* / *Sclerolaena cuneata* very open shrubland	6:1	13.91	-	-	-
Total		**671.5**	**56.52**	**339.12**	**169.56**

5.2 Potential Options for Provision of SEB

Where native vegetation is proposed to be cleared, the control and management strategy will be the SEB that is proposed to offset the native vegetation clearance (e.g. at the site of the operations or within the same region of the state) (DMITRE 2012).

Some possible ways SEB may be provided include (DMITRE 2012):

- Acquiring land, protecting and funding ongoing management of those areas (may include the donation to organisations for conservation) and/or undertaking revegetation/restoration activities on that land to re-establish habitats.
- Supporting research into rehabilitation of ecosystems/habitats.
- Supporting regionally based natural resources management projects with a biodiversity focus.
- Removal of threats/management of existing vegetation (e.g. Weed management on roadsides).
- Working with local government or other bodies to undertake environmental remediation or revegetation in areas under the control of such bodies (e.g. Re-establish roadside vegetation).
- Fund/undertake projects in crown estate parks and reserves in the region.
- Targeted feral animal reduction programs aimed at assisting the recovery of specific species.
- Any other approved activities as identified by the proponent that are likely to have a SEB.

If none of the above can be provided, payment into the Native Vegetation Fund may need to be made (see Section 6).

Arrium Mining have already implemented a range of offset strategies for past vegetation clearance. A Biodiversity Offset Strategy was achieved with Nature Foundation SA to address the conservation of the Thick-billed Grasswren (Eastern subspecies) (*Amytornis textilis modestus*) (Nature Foundation SA, 2012). The agreement is to undertake a four year research project and habitat management to achieve a Significant Environmental Benefit. A combination of restoration works, reduction in predation and grazing impacts and monitoring will improve the habitat and viability of the Thick-billed Grasswren.

6 Native Vegetation Fund Payment

In the event that revegetation and rehabilitation of offset areas is unsuccessful, other offset activities should be considered and implemented if necessary, including payment into the Native Vegetation Fund (Table 8). Should a payment into the Native Vegetation Fund be the preferred option to satisfy the SEB, the following formula determines the relative amount to be contributed (DPTI, 2011):

Payment into NV Fund =

(Land value per ha x required SEB in ha) + (management fee per ha x area cleared)

Land value for the Coober Pedy region is set at $20/ha (PB 2012). The management fee of $800 is a flat rate calculated by the Native Vegetation Council.

Table 8. Calculation of SEB compensation for Vegetation Association 1

Vegetation Association	SEB Ratio	Total Estimated Clearance (ha)	Management Fee ($)	Land Value per ha ($)	Offset Area (ha)	Required Payment ($)
1	6:1	56.52	800	20	339.12	51,998.40
Total		**56.52**			**339.12**	**$51,998.40**

Total payment required to satisfy MPLA and operational expansion for SEB is = **$51,998.40**

7 Discussion

The vegetation proposed to be cleared by Arrium Mining as part of the proposed MPL to expand PK operations is of good condition with the majority of the vegetation classified as 6:1 SEB condition ratios. No flora species of state or national significance are found within the surveyed area.

Arrium Mining will be required to revegetate 169.56 ha of on-site land if the proposed MPL surrounding ML6314 is granted and clearing activities are conducted. Arrium Mining has a current program that meet and exceeds the requirements for discharge of funds in-line with the Vegetation Offset Guidelines (DPTI 2011). This is demonstrated with the Thick-billed Grasswren Research Project agreement with the Nature Foundation SA (Nature Foundation SA, 2012) and subsequent variation to the EPBC conditions that no more than 523 ha of the species' habitat is removed from the PK Iron Ore project area.

7.1 Survey Limitations

Due to the limited timeframe and size of the survey sites, the walk-through assessment did not cover the entire area. Subsequently, there may have been species present which were not recorded. Some species were not identified to species level due to a lack of distinguishing features such as seeds and flowers.

8 References

DPTI. 2011. Vegetation Offset Guidelines. Department of Planning, Transport and Infrastructure, Government of South Australia. March 2011.

DWLBC. 2005. Guidelines for a Native Vegetation Significant Environmental Benefit Policy for the Clearance of Native Vegetation Associated with the Minerals and Petroleum Industry. Prepared for the Native Vegetation Council. Department of Water, Land and Biodiversity Conservation, Government of South Australia. September 2005.

EBS. 2007. Flora and fauna assessment, Peculiar Knob. A report by Environmental and Biodiversity Services for Parsons Brinckerhoff.

Kutsche, F and Lay, B. 2003. Field Guide to the Plants of Outback South Australia. Department of Water, Land and Biodiversity Conservation, South Australia.

Moore, P. 2005. A Guide to Plants of Inland Australia. Reed New Holland, NSW.

Nature Foundation SA. 2012. Biodiversity Offset Strategy for Impacts to the Thick-billed Grasswren (Eastern subspecies) (*Amytornis textilis modestus*). Revised Strategy-2nd October 2012.

PB. 2012. Peculiar Knob Iron Ore Mining Project-Mining and Rehabilitation Program. Parsons Brinckerhoff, Adelaide.

SAAL NRM Board. 2010. Regional Natural Resources Management Plan for the SA Arid Lands Natural Resources Management Region. Volume 1-Ten-Year Strategic Plan. South Australian Arid Lands Natural Resources Management Board.

APPENDICES

Appendix A Area coordinates

Datum: GDA94

Date: 17th and 18th of September 2013

Data quality: Approx. 5 metres

Instrument: Garmin Oregon 550

Site	Coordinates							
	NE Corner		NW Corner		SE Corner		SW Corner	
	Easting	Northing	Easting	Northing	Easting	Northing	Easting	Northing
Study area	538222.23	6728728.74	535330.62	6727020	539305.21	6726684.51	536282.2	6725215.7

Appendix B Species Lists

Key
D- Dense
M-Mid-dense
S - Sparse
R -Rare (only 1 or 2 plants observed)

Vegetation Association 1

Species	Common Name	Distribution	Comments
Overstorey/ mid storey			
Eremophila serrulata	Green Emubush	R	Located in minor drainage lines
Pittosporum angustifolium	Native apricot	S	Located in minor drainage lines, heavily grazed
Santalum acuminatum	Quandong	R	Located in minor drainage lines, heavily grazed
Senna sp.		R	
Understorey			
Abutilon halophilum	Desert Lanterns	M	
Abutilon leucopetalum	Desert Chinese Lantern	R	
Aristida contorta	Curly Wire Grass	S	Senescing
Aristida holathera ssp. holathera	Tall Kerosene Grass	S	Senescing
Astrebla pectinata	Barley mitchell grass	D	
Atriplex quinii	Kidney Fruit Saltbush	R	
Atriplex holocarpa	Pop salt bush	S	Senescing
Atriplex lindleyi	Baldoo	S	
Atriplex nummularia	Old Man saltbush	S	
Atriplex spongiosa	Pop saltbush	M	
Atriplex vesicaria	Bladder saltbush	D	
Austrostipa nitida	Rough spear grass	S	Senescing
Convolvulus remotus	Common Bindweed	R	
Cullen australasicum	Tall Scurf-pea	S	Particularly common around minor drainage lines
Digitaria brownii	Cotton Panic Bush	M	
Dissocarpus paradoxus	Ball Bindi	M	Senescing
Dodonaea microzyga	Brilliant Hopbush	R	
Enneapogon avenaceus	Common Bottle Washer	M	
Enteropogon acicularis	Umbrella grass	M	
Eragrostis setifolia	Bristly Love-grass	M	
Erodium cygnorum	Blue Storksbill	S	
Frankenia serpyllifolia	Thyme Sea-Heath	S	
Gunniopsis papillata	Chinnock	S	
Lavatera plebeia	Australian Hollyhock	S	

Species	Common Name	Distribution	Comments
Leiocarpa leptolepis	Pale Plover Daisy	M	Particularly common around minor drainage lines
Lotus cruentus	Red-flowered Lotus	S	
Maireana aphylla	Cotton-bush	M	Particularly common around minor drainage lines
Maireana astrotricha	Low Bluebush	S	
Maireana eriantha	Woolly Bluebush	D	Senescing
Maireana sp.		S	Particularly common around minor drainage lines
Mairenana georgei	Slit-wing Bluebush	S	
Panicum decompositum	Native Millet	M	
Podaxis sp.		R	
Polycalymma stuartii	Poached Egg Daisy	M	
Ptilotus obovatus var. obovatus	Silver Mulla Mulla	M	
Pycnosorus eremaeus	Golden Billybuttons	D	
Rhagodia spinescens	Creeping Saltbush	S	
Rhodanthe floribunda	White sunray	S	
Salsola kali	Soft Roly Poly	M	
Sclerolaena cuneata	Tangled Bindyi	D	
Sclerolaena diacantha	Grey Bindyi	D	Senescing
Sclerolaena divaricata	Pale Poverty Bush	M	
Sclerolaena eriacantha	Silky Bindyi	S	Senescing
Sclerolaena lanicuspis	Woolly Copper Burr	S	Senescing
Senecio lanibracteus	Desert groundsel	S	Particularly common around minor drainage lines
Setaria constricta	Knotty-butt grass	M	
Tecticornia medullosa	Desert Glasswort	S	Particularly common around minor drainage lines
Zygophyllum ammophilum	Sand twinleaf	S	
Weeds			
Sonchus oleraceus	Sow thistle		
Malvastrum americanum	Wild Mulberry		

Vegetation Association 2

Species	Common Name	Distribution	Comments
Overstorey/ mid storey			
Acacia aneura	Mulga	R	Heavily grazed
Understorey			
Senecio lanibracteus	Desert groundsel	D	
Aristida holathera ssp. holathera	Tall Kerosene Grass	M	Senescing
Astrebla pectinata	Barley mitchell grass	D	
Atriplex holocarpa	Pop salt bush	M	Senescing
Atriplex vesicaria	Bladder saltbush	M	
Cullen australasicum	Tall Scurf-pea	D	
Cyperus sp.		M	
Dichanthium sericeum		S	
Enteropogon acicularis	Umbrella grass	M	
Eragrostis setifolia	Bristly Love-grass	S	
Frankenia serpyllifolia	Thyme Sea-Heath	R	
Goodenia berardiana		R	
Gunniopsis papillata	Chinnock	S	
Lavatera plebeia	Australian Hollyhock	M	
Leiocarpa leptolepis	Pale Plover Daisy	S	Senescing
Maireana aphylla	Cotton-bush	M	
Maireana astrotricha	Low Bluebush	S	
Maireana sp.		D	
Polycalymma stuartii	Poached Egg Daisy	M	
Ptilotus obovatus var. obovatus	Silver Mulla Mulla	S	
Pycnosorus eremaeus	Golden Billybuttons	D	
Rhagodia spinescens	Creeping Saltbush	S	
Setaria constricta	Knotty-butt grass	M	Senescing
Weeds			
Sonchus oleraceus	Sow thistle	M	High numbers evident along the deeper sections of the creek

Vegetation Association 3

Species	Common Name	Distribution	Comments
Arabidella glaucescens		R	
Atriplex quinii	Kidney Fruit Saltbush	R	
Atriplex vesicaria	Bladder saltbush	D	Senescing
Pycnosorus eremaeus	Golden Billybuttons	D	
Salsola kali	Buck Bush	M	
Sclerolaena cuneata	Tangled Bindyi	D	Senescing
Sclerolaena lanicuspis	Woolly Copper Burr	M	Senescing

Appendix C Fauna Database Results

Database search results compiled by EBS (2007) for fauna species previously recorded within close proximity to PK (EPBC 1999 Protected Matters Search (DEHWA, SAM 2007).

Class	Species Name	Common Name	Conservation Status	
			Aus	SA
AVES	*Acanthiza katherina*	Slender-billed Thornbill	VU	V
AVES	*Amytornis textilis modestus*	Thick Billed Grass wren	VU	R
AVES	*Aphelocephala pectoralis*	Chestnut-breasted Whiteface		R
AVES	*Apus pacificus*	Fork-tailed Swift	M	
AVES	*Ardea alba*	Great Egret	M	
AVES	*Ardea ibis*	Cattle Egret	M	
AVES	*Charadrius veredus*	Oriental Plover	Mi, M	
AVES	*Elseyornis melanops*	Black-fronted Dotteral		
AVES	*Merops ornatus*	Rainbow Bee-eater	M	
AVES	*Pedionomus torquatus*	Plains Wanderer	VU	V
AVES	*Pyrrholoaemus brunneus*	Redthroat		R
REPTILIA	*Ctenophorus tjantjalka*	Ochre Dragon		
REPTILIA	*Ctenotus olympicus*	Saltbush Ctenotus		
REPTILIA	*Ctenotus strauchii*	Short-legged Ctenotus		
REPTILIA	*Ctenotus uber*	Spotted Ctenotus		
REPTILIA	*Diplodactylus byrnei*	Pink-blotched Gecko		
REPTILIA	*Diplodactylus galeatus*	Mesa Gecko		
REPTILIA	*Egernia stokesii*	Gidgee Skink		
REPTILIA	*Gehyra variegata*	Tree dtella		
REPTILIA	*Heteronotia binoei*	Bynoe's Gecko		
REPTILIA	*Lerista muelleri*	Dwarf Three-toed Slider		
REPTILIA	*Ophidiocephalus taeniatus*	Bronzeback Snake-lizard	VU	V
REPTILIA	*Pogona vitticeps*	Central Bearded Dragon		
REPTILIA	*Tiliqua rugosa*	Sleepy lizard		
REPTILIA	*Tympanocryptis intima*	Smooth-snouted Earless Dragon		
MAMMALIA	*Pseudomys australis*	Plains Mouse	VU	V

Key

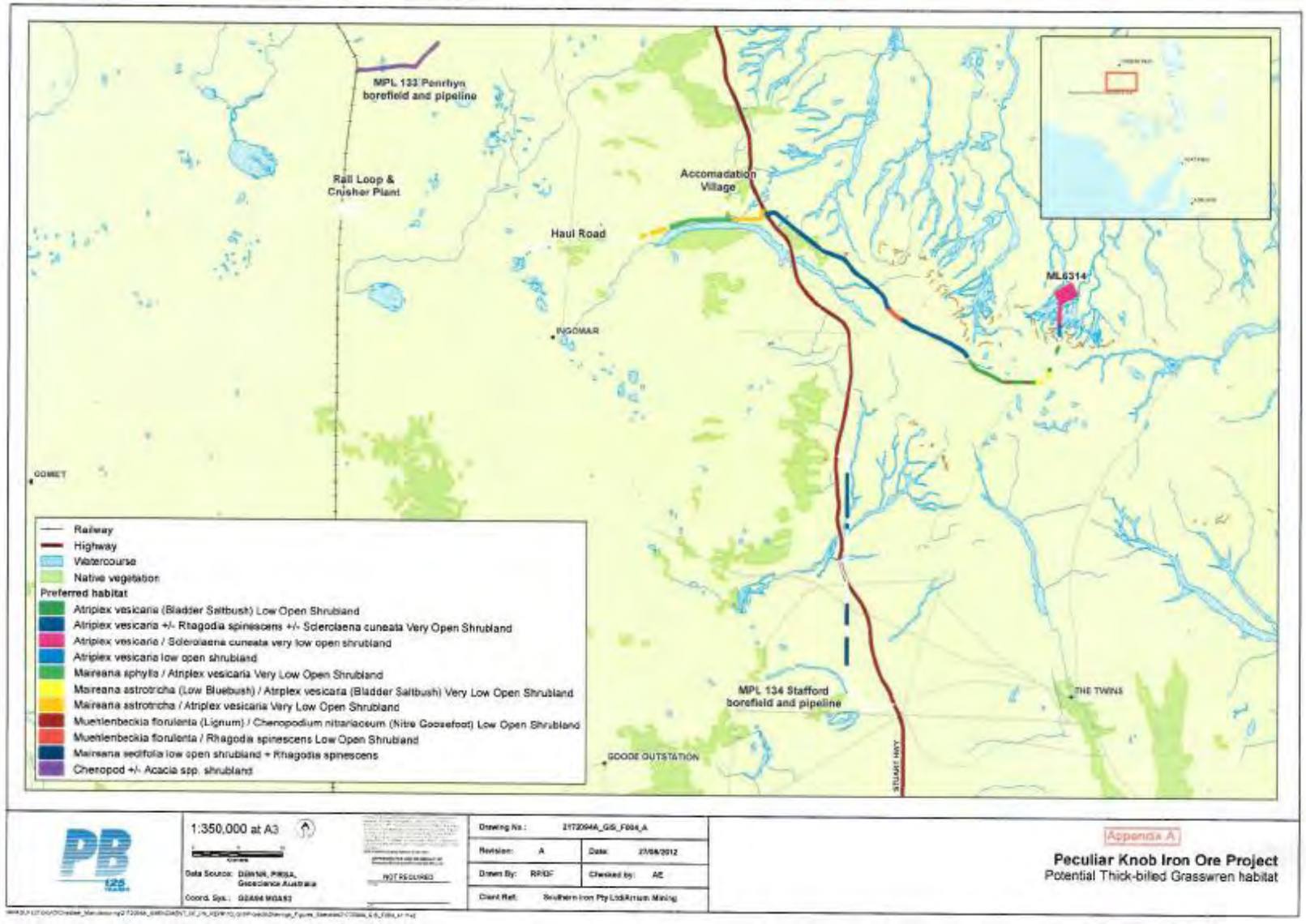
Regions:

Aus = Australia, SA = South Australia

Conservation Rating:

VU-vulnerable, Mi-migratory, M= Marine, V=Vulnerable, R=Rare

Appendix D Potential Thick-billed Grasswren habitat



Appendix E

Feral Animal Control Programme approval

Australian Government

Department of Agriculture, Water and the Environment

Mr Geoff Mills
Environmental Projects
Level 3, 117 King William Street
Adelaide SA 5000

Dear Mr Mills

Expansion of the Peculiar Knob Iron Ore Project, SA (EPBC 2014/7154): Feral Animal Control Plan.

Thank you for submitting, on behalf of Southern Iron Pty Ltd, the above management plan for approval in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Officers of the Department have advised me on the plan and on the requirements of the EPBC Act conditions of approval for the above project. On this basis, and as a delegate of the Minister for the Environment, I have decided to approve the *Feral Animal Control Plan, Rev 4,* dated 4 March 2020. The approved plan must now be implemented.

Condition 11 of the approval means that if Southern Iron Pty Ltd wishes to implement the plan otherwise than in accordance with the approved plan, Southern Iron Pty Ltd must submit a revised *Feral Animal Control Plan* for approval by the Minister.

Should you require any further information please contact Vaughn Cox on (02) 6274 2005 or postapproval@environment.gov.au.

Yours sincerely

Greg Manning
Assistant Secretary
Assessments (WA, SA, NT), Post Approvals and Policy Branch

10 March 2020