

PECULIAR KNOB IRON ORE MINE

FERAL ANIMAL CONTROL PROGRAMME



Peculiar Knob Iron Ore Mine

Southern Iron Pty Ltd

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REVISION RECORD

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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).

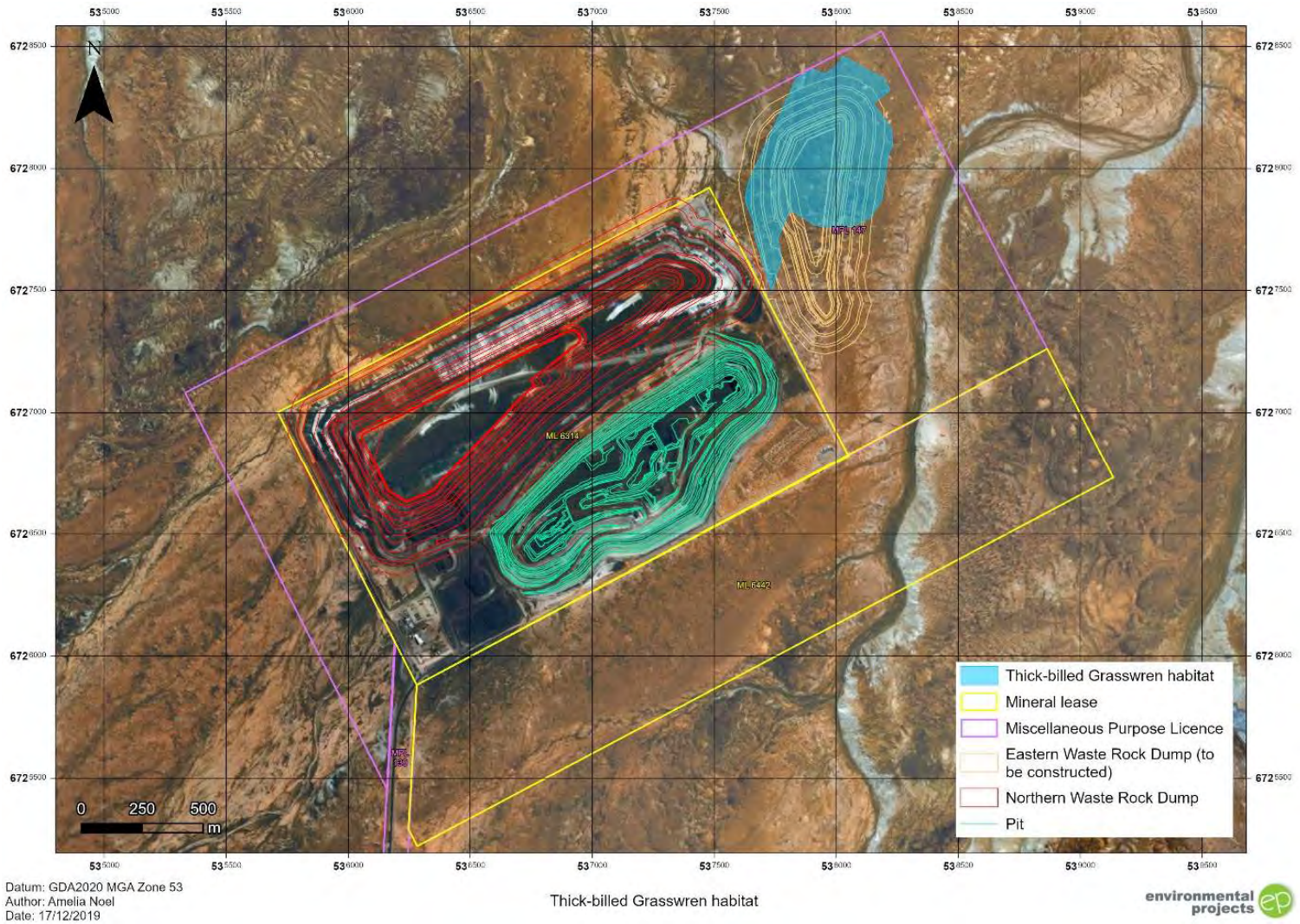


Figure 1-1: Area described by Dr Read as suitable Thick-billed Grasswren habitat (Ecological Horizons 2014)

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.

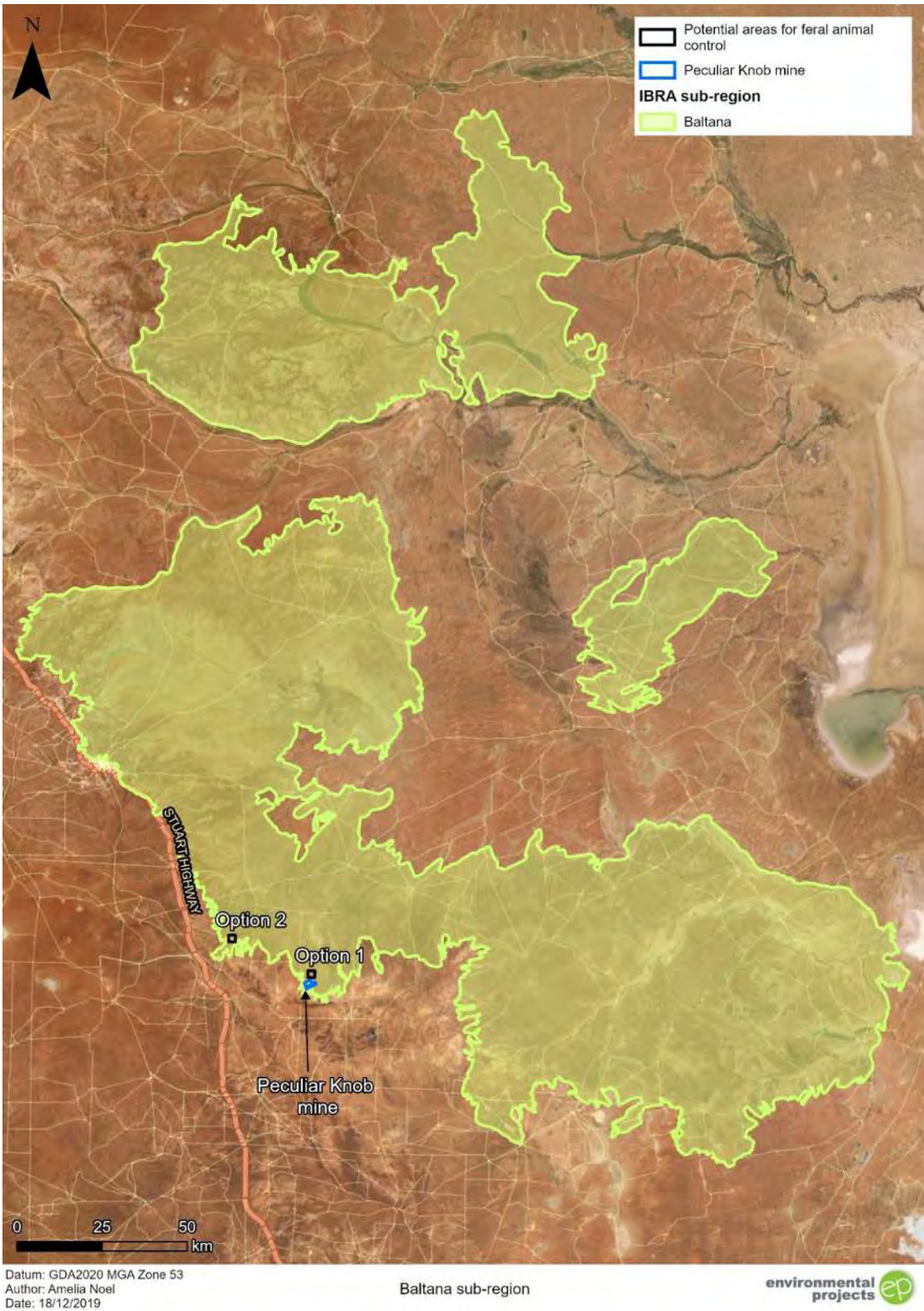


Figure 2-1: Implementation area options within the Baltana sub-region

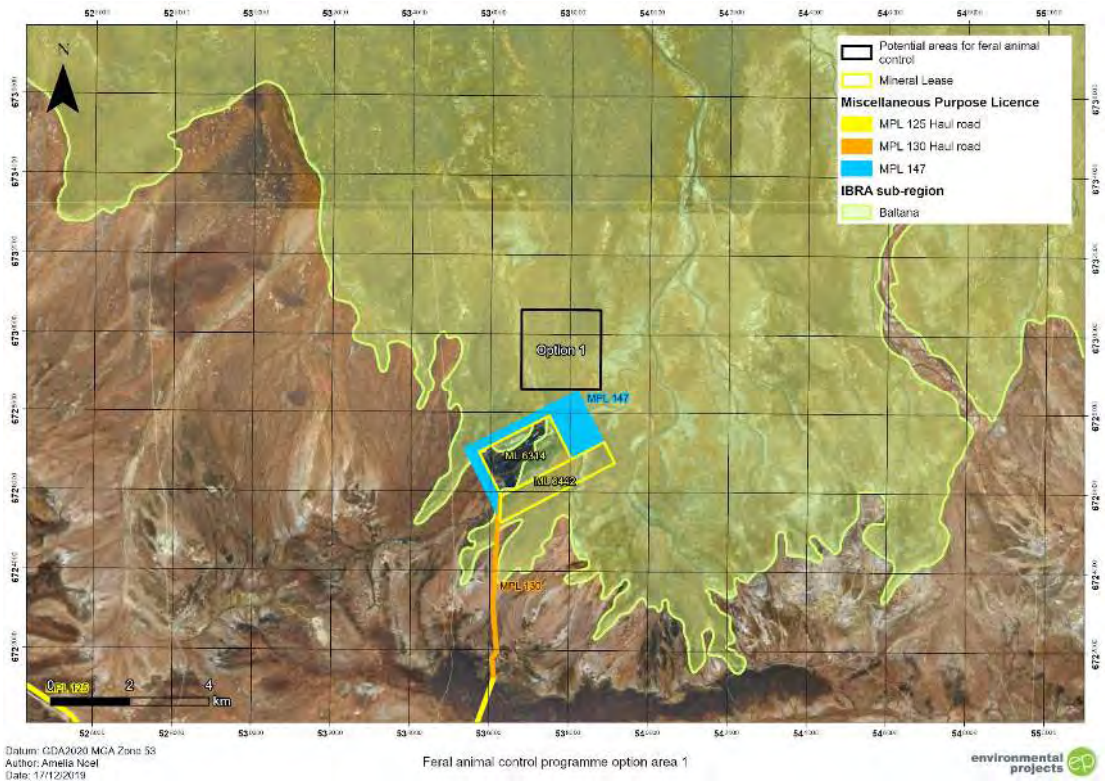


Figure 2-2: Feral animal control programme Option 1 area

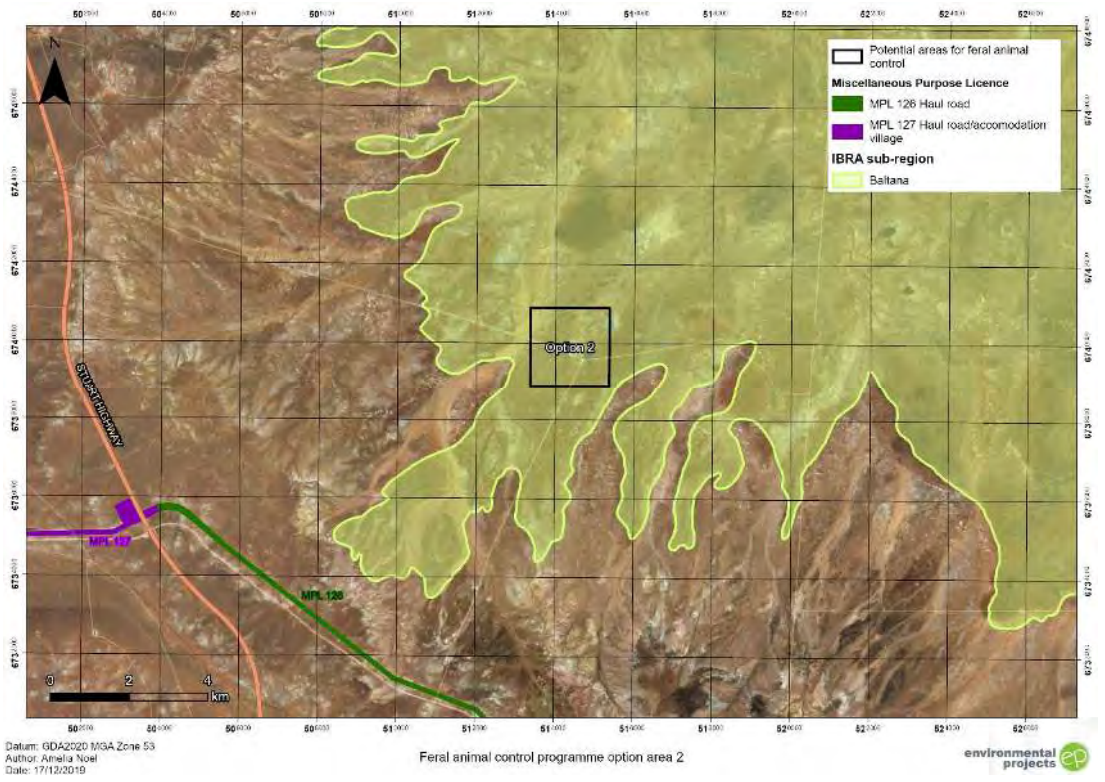


Figure 2-3: Feral animal control programme Option 2 area

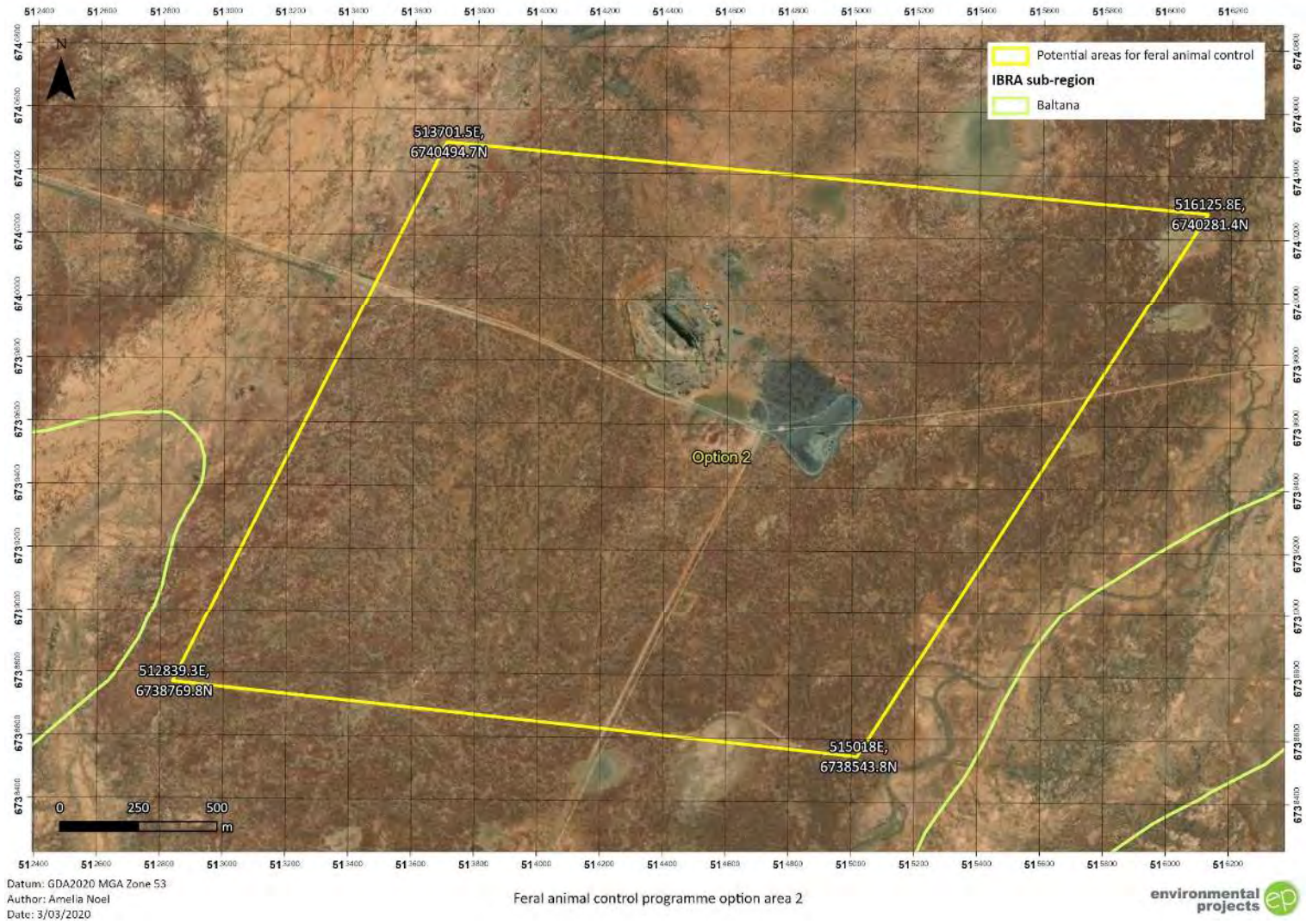


Figure 2-4: Feral animal control programme Option 2 area (detail)

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
<p>FOX <i>Threat abatement plan for predation by the European red fox</i> (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)</p>	<ul style="list-style-type: none"> poison baiting shooting trapping den fumigation or destruction exclusion fencing 	<p>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.</p>
<p>CAT <i>Threat abatement plan for predation by feral cats</i> (Department of the Environment 2015)</p>	<ul style="list-style-type: none"> shooting leg hold traps cage traps 1080 Eradecat baits (WA only) PAPP Curiosity baits grooming trap exclusion fencing. 	<p>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.</p>
<p>RABBIT <i>Threat abatement plan for competition and land degradation by rabbits</i> (Department of the Environment and Energy 2016)</p>	<ul style="list-style-type: none"> poison baiting biological control agents warren ripping and fumigation fencing harbour removal shooting. 	<p>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.</p>

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
			3	3	6	1	3	4		
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.

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ATTACHMENT 1

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**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



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Vegetation Assessment of ML6314 and the surrounding area

Significant Environmental Benefit (SEB)

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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.

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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	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
MLP	Mining Lease Proposal
MPL	Miscellaneous Purposes License
NV Act	<i>Native Vegetation Act 1991</i> (SA)
NV Regulations	<i>Native Vegetation Regulations 2003</i> (SA)
PEPR	Program for Environment Protection and Rehabilitation
PK	Peculiar Knob
SEB	Significant Environmental Benefit

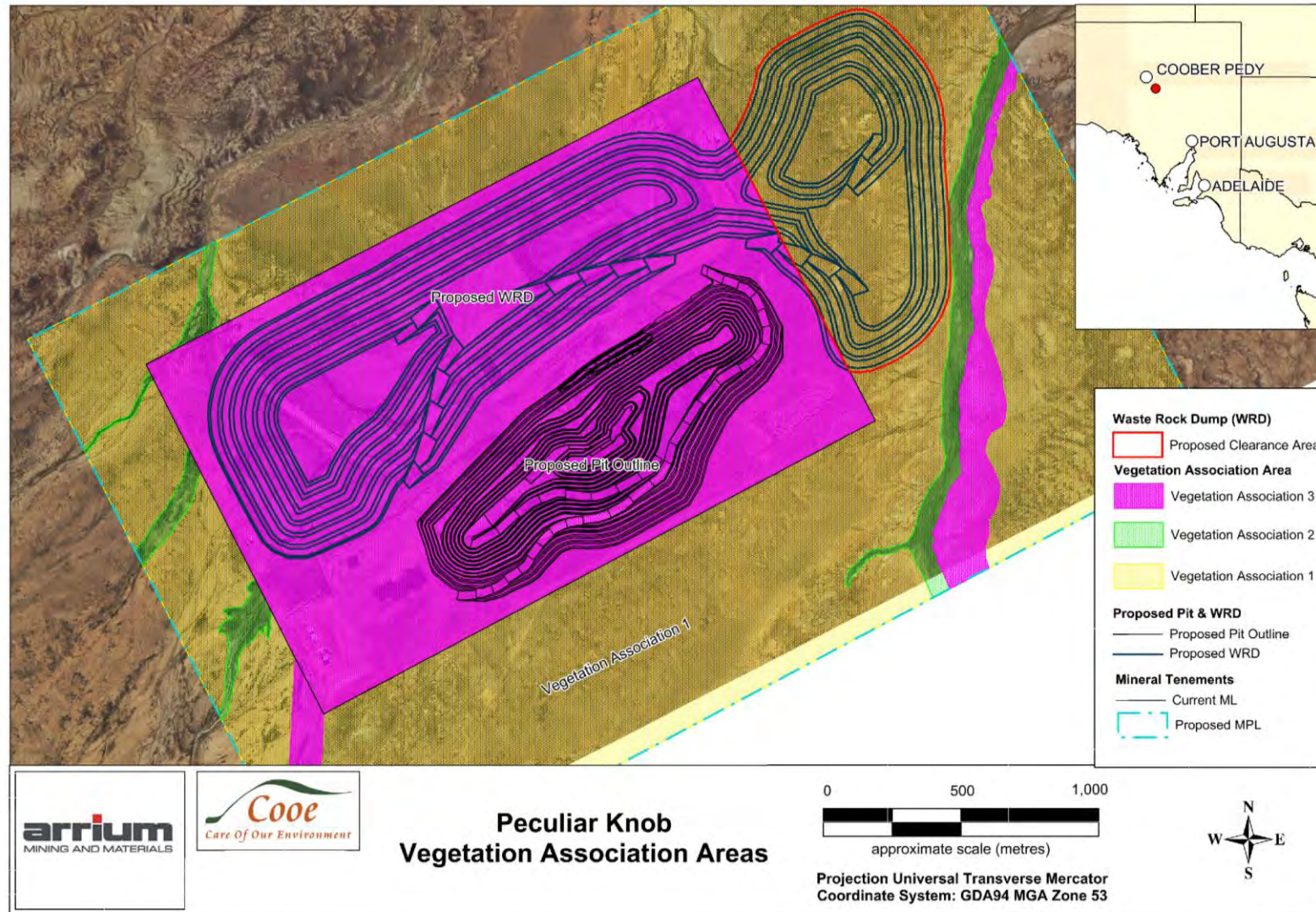
1 Introduction

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	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – 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	<i>Eremophila serrulata</i> <i>Pittosporum angustifolium</i> <i>Santalum acuminatum</i> <i>Senna</i> sp.
Common Understorey species	<i>Abutilon halophilum</i> <i>Astrebla pectinata</i> <i>Atriplex spongiosa</i> <i>Atriplex vesicaria</i> <i>Digitaria brownii</i> <i>Dissocarpus paradoxus</i>

	<i>Enneapogon avenaceus</i> <i>Enteropogon acicularis</i> <i>Eragrostis setifolia</i> <i>Leiocarpa leptolepis</i> <i>Maireana aphylla</i> <i>Maireana ericantha</i> <i>Panicum decompositum</i> <i>Polycalymma stuartii</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Pycnosorus eremaeus</i> <i>Salsola kali</i> <i>Sclerolaena cuneata</i> <i>Sclerolaena diacantha</i> <i>Sclerolaena divaricata</i> <i>Setaria constricta</i>
Emergent species	None recorded
Conservation significant flora species	None recorded
Weed species	<i>Sonchus oleraceus</i> <i>Malvastrum americanum</i>
Condition	<i>Atriplex vesicaria</i> (Bladder saltbush) +/- <i>Maireana ericantha</i> and <i>Sclerolaena cuneata</i> 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	<i>Acacia aneura</i>
Common Understorey species	<i>Senecio lanibracteus</i> <i>Aristida holathera</i> ssp. <i>holathera</i> <i>Astrelba pectinata</i> <i>Atriplex holocarpa</i> <i>Atriplex vesicaria</i> <i>Cullen australasicum</i> <i>Cyperus</i> sp. <i>Enteropogon acicularis</i> <i>Lavatera plebeia</i> <i>Maireana aphylla</i> <i>Maireana</i> sp. <i>Polycalymma stuartii</i> <i>Pycnosorus eremaeus</i> <i>Setaria constricta</i>
Emergent species	None recorded
Conservation significant flora species	None recorded
Dominant weed species	<i>Sonchus oleraceus</i>
Condition	The <i>Cullen australasicum</i> / <i>Senecio lanibracteus</i> 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* vegetation 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	<i>Arabidella glaucescens</i> <i>Atriplex quinii</i> <i>Atriplex vesicaria</i> <i>Pycnosorus eremaeus</i> <i>Salsola kali</i> <i>Sclerolaena cuneata</i> <i>Senecio lanibracteus</i>
Emergent species	None recorded
Conservation significant flora species	None recorded
Weed species	None recorded
Condition	<i>Atriplex vesicaria</i> / <i>Sclerolaena cuneata</i> 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	<i>Leggadina forresti</i>	Forest Mouse
PK004	<i>Planigale gilesii</i>	Giles Planigale
PK004, PK005	<i>Planigale tenuirostris</i>	Narrow-nosed Planigale
PK005, PK006	<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart
PK006	<i>Sminthopsis macroura</i>	Stripe-tailed Dunnart
REPTILES		
PK003, PK004, PK005, PK006	<i>Ctenotus olympicus</i>	Eastern Spotted Ctenotus
PK004	<i>Delma butleri</i>	Unbanded Delma
PK005	<i>Diplodactylus byrnei</i>	Gibber Gecko
PK006	<i>Lerista muelleri</i>	Dwarf Three-toed Slider
PK003	<i>Lialis burtonis</i>	Burton's Snake-lizard
PK004	<i>Menetia greyii</i>	Common Dwarf Skink
PK003	<i>Suta suta</i>	Curl Snake
PK005	<i>Tiliqua rugosa</i>	Sleepy Lizard
BATS		
PK004, PK005	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat

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

Location	Species	Common Name
PK003, PK004	<i>Amytornis textilis</i>	Thick-billed Grasswren
PK003, PK004, PK005, PK006	<i>Anthus novaeseelandiae</i>	Richard's Pipit
PK003, PK004	<i>Aquila audax</i>	Wedge-tailed Eagle
PK003, PK004	<i>Calamanthus campestris</i>	Rufous Fieldwren
PK003, PK004	<i>Charadrius australis</i>	Inland Dotterel
PK003, PK004, PK005, PK006	<i>Cincloramphus cruralis</i>	Brown Songlark
PK005, PK006	<i>Dromaius novaehollandiae</i>	Emu
PK003, PK004, PK005, PK006	<i>Epthianura aurifrons</i>	Orange Chat
PK003, PK004, PK005, PK006	<i>Epthianura tricolor</i>	Crimson Chat
PK003, PK004, PK005, PK006	<i>Malurus leucopterus</i>	White-winged Fairywren
PK005, PK006	<i>Ocyphaps lophotes</i>	Crested Pigeon
PK005, PK006	<i>Phylidonyris albifrons</i>	White-fronted Honeyeater
PK005, PK006	<i>Turnix velox</i>	Little Button-quail
PK003, PK004	<i>Vanellus tricolor</i>	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 textilis 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 textilis 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 - <i>Atriplex vesicaria</i> (Bladder saltbush) +/- <i>Maireana ericantha</i> and <i>Sclerolaena cuneata</i> low open shrubland with open gibber	6:1	639.1	56.52	339.12	169.56
Vegetation association 2 - <i>Cullen australasicum</i> / <i>Senecio lanibracteus</i> low shrubland	6:1	18.49	-	-	-
Vegetation association 3- <i>Atriplex vesicaria</i> / <i>Sclerolaena cuneata</i> 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):

$$\text{Payment into NV Fund} = (\text{Land value per ha} \times \text{required SEB in ha}) + (\text{management fee per ha} \times \text{area cleared})$$

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

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

Vegetation Association 2

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

Vegetation Association 3

Species	Common Name	Distribution	Comments
<i>Arabidella glaucescens</i>		R	
<i>Atriplex quinii</i>	Kidney Fruit Saltbush	R	
<i>Atriplex vesicaria</i>	Bladder saltbush	D	Senescing
<i>Pycnosorus eremaeus</i>	Golden Billybuttons	D	
<i>Salsola kali</i>	Buck Bush	M	
<i>Sclerolaena cuneata</i>	Tangled Bindyi	D	Senescing
<i>Sclerolaena lanicuspis</i>	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	<i>Acanthiza katherina</i>	Slender-billed Thornbill	VU	V
AVES	<i>Amytornis textilis modestus</i>	Thick Billed Grass wren	VU	R
AVES	<i>Aphelocephala pectoralis</i>	Chestnut-breasted Whiteface		R
AVES	<i>Apus pacificus</i>	Fork-tailed Swift	M	
AVES	<i>Ardea alba</i>	Great Egret	M	
AVES	<i>Ardea ibis</i>	Cattle Egret	M	
AVES	<i>Charadrius veredus</i>	Oriental Plover	Mi, M	
AVES	<i>Euseyornis melanops</i>	Black-fronted Dotteral		
AVES	<i>Merops ornatus</i>	Rainbow Bee-eater	M	
AVES	<i>Pedionomus torquatus</i>	Plains Wanderer	VU	V
AVES	<i>Pyrrholaemus brunneus</i>	Redthroat		R
REPTILIA	<i>Ctenophorus tjantjalka</i>	Ochre Dragon		
REPTILIA	<i>Ctenotus olympicus</i>	Saltbush Ctenotus		
REPTILIA	<i>Ctenotus strauchii</i>	Short-legged Ctenotus		
REPTILIA	<i>Ctenotus uber</i>	Spotted Ctenotus		
REPTILIA	<i>Diplodactylus byrnei</i>	Pink-blotched Gecko		
REPTILIA	<i>Diplodactylus galeatus</i>	Mesa Gecko		
REPTILIA	<i>Egernia stokesii</i>	Gidgee Skink		
REPTILIA	<i>Gehyra variegata</i>	Tree dtella		
REPTILIA	<i>Heteronotia binoei</i>	Bynoe's Gecko		
REPTILIA	<i>Lerista muelleri</i>	Dwarf Three-toed Slider		
REPTILIA	<i>Ophidiocephalus taeniatus</i>	Bronzeback Snake-lizard	VU	V
REPTILIA	<i>Pogona vitticeps</i>	Central Bearded Dragon		
REPTILIA	<i>Tiliqua rugosa</i>	Sleepy lizard		
REPTILIA	<i>Tympanocryptis intima</i>	Smooth-snouted Earless Dragon		
MAMMALIA	<i>Pseudomys australis</i>	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

