BALRANALD MINERAL SANDS MINE

NSW Biodiversity Management Plan

July 2025

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Abbreviations

Term	Definition
APZ	Asset Protection Zone
BMP	Biodiversity Management Plan
Consent	Development Consent SSD-5285
DCCEEW	Department of Climate Change, Energy the Environment and Water
DPHIE	Department of Planning, Housing and Infrastructure and Environment
DPI	Department of Primary Industries
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMS	Environmental Management Strategy
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GPS	Global Positioning System
HMC	Heavy mineral concentrate
HSEC	Health, Safety, Environment and Community
HSECMS	Health, Safety, Environment and Community Monitoring System
Iluka	Iluka Resources Limited
ISO	International Standard Organisation
LLS	Local Land Services
Mine	Balranald Mineral Sands Mine
NSW	New South Wales
PIRMP	Pollution Incident Response Management Plan
SDP	Site Disturbance Procedure
Stage 1	Comprises the first stage of disturbance to be offset in accordance with Table 7 of Development Consent SSD-5285
WA	Western Australia
WIRES	Wildlife Information, Rescue and Education Service

Contents

Appendices

Tables

Figures

Plates

1. Introduction

1.1. Purpose of this document

This Biodiversity Management Plan (BMP) has been prepared for Iluka Resources Limited (Iluka) to satisfy Schedule 3, Condition 17 and Schedule 5 Condition 3 of NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) development consent (SSD-5285) for the Balranald Mineral Sands Mine, New South Wales.

This BMP has been prepared in accordance with the Guideline for the preparation of Environmental Management Plan Guidelines (DIPNR 2004). This BMP includes:

- the measures to manage the remnant native vegetation and fauna habitat for West Balranald Mine – Stage 1 offset area (Stage 1) and the integration of rehabilitation with these measures;
- detailed biodiversity management measures and the integration of rehabilitation;
- a Malleefowl management and monitoring sub-plan; and
- the identification of potential risks to successful implementation, contingency measures and responsibilities for implementation, monitoring and review.

The BMP is applicable to all activities associated with West Balranald Mine - Stage 1 offset area, including construction, operations, rehabilitation and associated infrastructure and activities consistent with the NSW Development Consent (SSD-5285) as modified (MOD4). Should Iluka undertake additional construction activities not considered in the West Balranald Mine – Stage 1 footprint and/or the Nepean Mine, a revised BMP will be prepared prior to commencement of construction to include management measures and monitoring relevant to the site for approval by the Department of Planning, Housing and Infrastructure(DPHI), in accordance with Schedule 2, Condition 17 of Development Consent (SSD-5285).

The conditions of consent to which the BMP relates to and where they are addressed are presented in Table 2.

1.2. Objectives

The BMP has been prepared to:

- guide those undertaking ground disturbance activities to ensure appropriate management measures, implementation, monitoring and evaluation to minimise biodiversity impacts;
- provide direction on the management and mitigation of biodiversity impacts where they are identified and cannot be avoided;
- integrate implementation of biodiversity management with rehabilitation to the greatest extent practicable;
- detail the environmental monitoring that is required to evaluate the efficacy of each environmental management measure; and
- fulfil the approval requirements as outlined in Section 2.

The BMP has also been designed to integrate specific measures for two species, comprising Malleefowl (*Leipoa ocellata*) and Corben's Long-eared Bat (*Nyctophilus corbeni*), listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and endangered and vulnerable respectively under the *Biodiversity Conservation Act 2016* (BC Act). Specific measures for these species are required by the Commonwealth approval (EPBC 2012/6509).

1.3. Mine description

Iluka have approval to develop a mineral sands mine in south-western New South Wales (NSW), known as the Balranald Mineral Sands Mine(the Balranald Mine). It includes construction, open-cut mining, primary processing, and rehabilitation of two linear mineral sand deposits, known as the West Balranald and Nepean deposits, located approximately 12 kilometres (km) and 66 km north-west of the town of Balranald (Balranald town), respectively. The Balranald Mine also included undertaking an approved bulk sampling activity at the West Balranald deposit with the removal of up to 100,000 tonnes (t) of mineral ore to trial the use of underground mining methods (Figure 1.1).

Development consent (SSD-5285) was granted for the Balranald Mine by a delegate of the NSW Minister for Planning under the EP&A Act on 5 April 2016 (herein referred to as the consent). Approval was also granted under the EPBC Act (EPBC 2012/6509) by a delegate of the Commonwealth Minister for the Environment on 6 January 2017 (herein referred to as the Commonwealth approval). The EIS was supported by a Biodiversity Assessment prepared by Niche Environment and Heritage Pty Limited in 2016 (Niche 2016).

Since the consent was granted, Iluka undertook some of the approved bulk sampling activity between 2016 and 2020, involving the extraction of the mineral ore from depth using trial underground mining within the approved disturbance area of the West Balranald deposit. On 21 December 2022, Iluka were granted approval to modify the consent (MOD1) to expand the underground mining trial which includes an additional area of disturbance to the approved Balranald Mine area to enable primary processing of the ore into heavy mineral concentrate (HMC) and transport of HMC offsite for secondary processing at Iluka's other facilities.

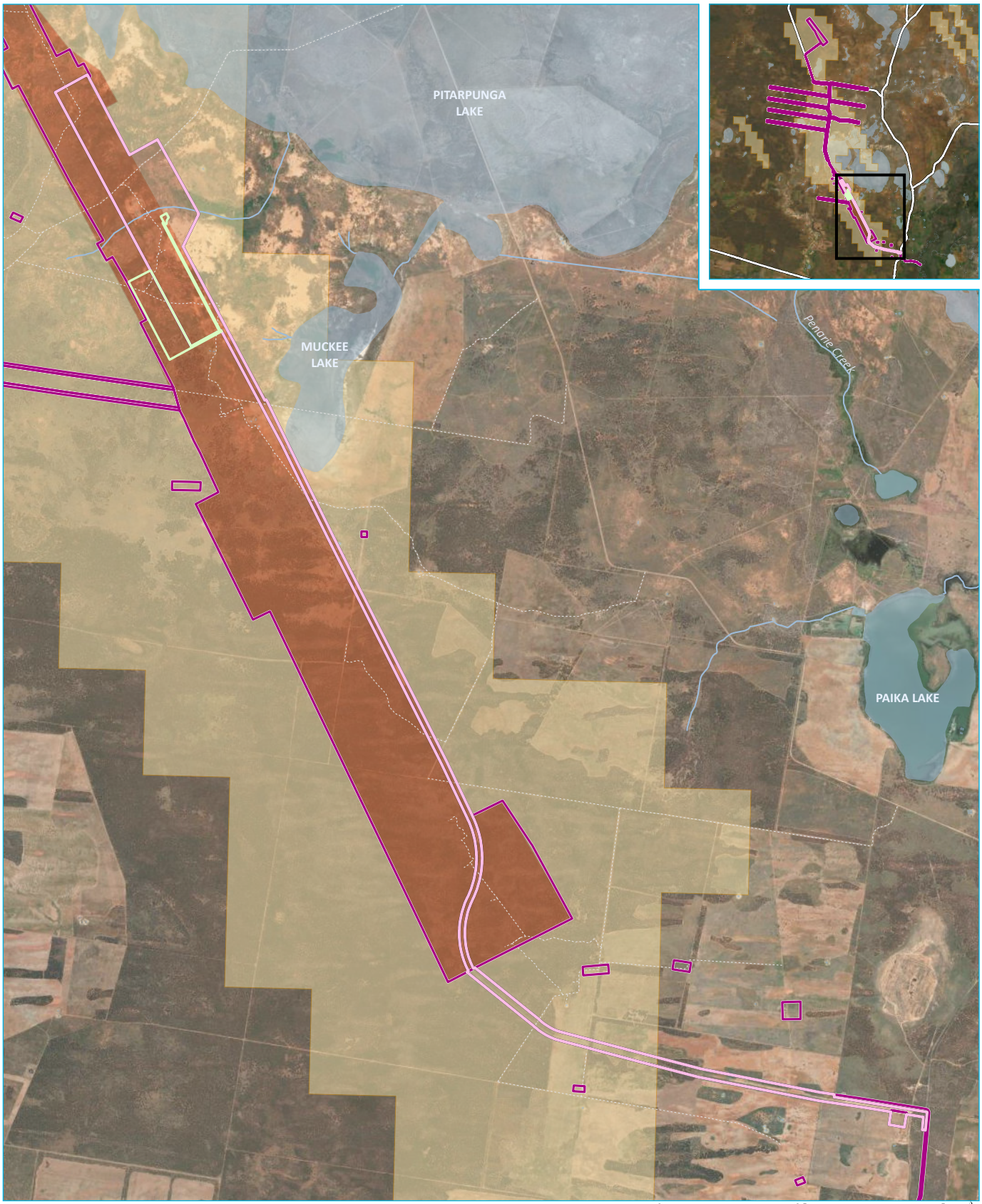
On 16 July 2025, Iluka were granted approval to modify the consent (MOD4) to develop a solar farm and Battery Energy Storage System (BESS). The solar farm development included approximately 70Ha of additional disturbance within the approved EIS boundary. The additional disturbance has been accounted for in the Stage 1 offset area (Table 7 of the Consent).

1.4. Consents, authorisations and licenses

Iluka's current consents, authorisations and licenses relevant to West Balranald Mine are provided in Table 1.

Table 1 - Consents, authorisations and licences

Type	ID	Date of grant	Duration
Exploration Licence	EL7450	February 2010	11 years
Development Consent	SSD-5285	April 2016	16 years
Commonwealth approval	EPBC 2012/6509	January 2017	29 years
Mining Lease	ML1736	May 2016	21 years
Mining Lease	ML1855	June 2023	21 years
Environment Protect Licence	EPL20795	June 2016	Renewed annually



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Source: EMM (2025); Iluka Resources (2025); ESRI (2025); DFSI (2017); GA (2011)

0 2.5 5 km

GDA 1994 MGA Zone 54

N

KEY

- EIS Approved Balranald Mineral Sands Mine (SSD-5285)
- MOD1 underground mining area
- MOD4 solar farm boundary

Existing environment

- Existing track
- Watercourse/drainage line
- Waterbody
- Exploration Licence (EL7450)
- Mining Lease (ML1736)
- Mining Lease (ML1855)

Regional context of the Balranald Mine

Balranald Mineral Sands Mine
West Balranald Mine- Stage 1
State Biodiversity Management Plan
Figure 1.1

EMM
creating opportunities

2. NSW approval requirements

This BMP has been prepared to fulfil the requirements of Schedule 3, Condition 17 and Schedule 5, Condition 3 of SSD-5285 approval.

The conditions of SSD-5285 relevant to this BMP and where they have been addressed is provided in Table 2.

Table 2 - Conditions of approval reference table

Schedule	Condition	Condition requirement	Plan reference	Demonstration of how the plan addresses condition requirements
3	17 (a)	This plan must be prepared in consultation with BCS.	-	Consultation will be undertaken with the Biodiversity, Conservation and Science Directorate (BCS) Directorate of the Department of Planning and Environment following lodgement of this BMP for assessment. Details of the consultation will be provided in the final BMP.
	17 (b)	This plan must describe the short, medium and long term measures that would be implemented to:	Section 4	Description of the Short, medium and long-term measures to be implemented for the Balranald Mine- Stage 1.
		• manage the remnant vegetation and fauna habitat on the site; and	Section 5	Short and medium to long-term measures are provided to manage remnant vegetation and fauna habitat within and adjacent to West Balranald Mine – Stage 1 during construction and operation.
		• integrate the implementation of	Section 5	As West Balranald Mine – Stage 1 forms part of a

Schedule	Condition	Condition requirement	Plan reference	Demonstration of how the plan addresses condition requirements
		biodiversity management to the greatest extent practicable with the rehabilitation of the site.		larger footprint that will operate over multiple years, rehabilitation measures are provided and focus on the salvage and storage of topsoil and fauna habitat features.
	17 (c)	This plan must include a detailed description of the measures that would be implemented over the next 3 years for:	-	
		• minimising the amount of clearing within the approved development footprint as far as practicable;	Section 5.2	Avoidance measures have been incorporated into mine design, and avoidance areas will be protected for the life of the mine.
		• rehabilitating and revegetating temporary disturbance areas;	Section 5.3	West Balranald Mine – Stage 1 does not have any temporary disturbance areas. All areas will be used for the construction of roads, buildings and active mining areas. A summary of the rehabilitation program applicable to West Balranald Mine – Stage 1 is provided in this plan.
		• protecting vegetation and fauna habitat outside the approved	Section 5.4	Measures are provided to prevent inadvertent damage to retained native

Schedule	Condition	Condition requirement	Plan reference	Demonstration of how the plan addresses condition requirements
		disturbance area on-site;		vegetation and habitats.
		• enhancing the quality of existing vegetation and fauna habitat on site;	Section 5.5	Weed and pest management measures are provided to enhance the quality of native vegetation and fauna habitat in the avoidance area.
		• maximising the salvage of resources within the approved disturbance area – including vegetative and soil resources – for beneficial reuse on site;	Section 5.6	Topsoil and some felled timber will be salvaged and appropriately stored for use in rehabilitation in later mine stages.
		• collecting and propagating seed;	Section 5.6	Seed collection and propagation is not proposed at this stage. Rather, seed will be collected in topsoil. If natural regeneration from the topsoil is insufficient, seeding collection and propagation will be investigated.
		• minimising the impacts on fauna on site, including undertaking pre-clearance surveys (with an emphasis on tree hollows, raptor nests and Malleefowl mounds) and	Section 5.7 Section 5.8	Pre-clearance surveys will be undertaken at Malleefowl mounds to confirm that breeding has concluded prior to their clearing. Pre-clearance surveys will be completed at each clearing front to identify tree hollows and nests

Schedule	Condition	Condition requirement	Plan reference	Demonstration of how the plan addresses condition requirements
		implementing a fauna rescue strategy;		and facilitate a staged clearing process to minimise the risk of injury or fatality.
		• managing salinity using best practice dryland salinity management revegetation measures;	Section 5.9	Revegetation will be undertaken using best practice methods.
		• controlling weeds and feral pests;	Section 5.10	Control measures are provided in this BMP for weeds, feral pest and predator management.
		• controlling erosion;	Section 5.11	Erosion and sediment will be managed in accordance with the Water Management Plan.
		• controlling access; and	Section 5.12	Vehicles and plant will be restricted to existing access tracks, with the exception of during vegetation clearing.
		• bushfire management.	Section 5.13	Bushfire will be managed in accordance with the Emergency Control and Response Plan.
	17 (d)	This plan must include a specific Malleefowl management and monitoring plan, consistent with the National Manual for the Malleefowl Monitoring System and the National Recovery Plan for Malleefowl.	Section 6.13	A monitoring-plan consistent with the National Manual for the Malleefowl Monitoring System and Action 9.2 of the National Recovery Plan for Malleefowl is provided. Specific Malleefowl management measures are

Schedule	Condition	Condition requirement	Plan reference	Demonstration of how the plan addresses condition requirements
				provided in Section 5.7.1.
	17 (e)	This plan must include a seasonal program to monitor and report on the effectiveness of these measures.	Section 2.6 Section 6	Specific monitoring measures are provided for each management measure.
	17 (f)	This plan must identify the potential risks to the successful implementation of the biodiversity management plan, and include a description of the contingency measures that would be implemented to mitigate against these risks.	Section 3	This plan includes a risk assessment for all potential biodiversity impacts relating to West Balranald Mine – Stage 1. Contingency measures are provided for each management and performance measure.
	17 (g)	This plan must include details of who would be responsible for monitoring, reviewing, and implementing the plan.	Section 2.3 Section 2.12	The Senior Environmental Representative is ultimately responsible for monitoring, reviewing and implementing the plan. Responsibilities for each management action are also provided.

Schedule	Condition	Condition requirement	Plan reference	Demonstration of how the plan addresses condition requirements
5	3	The Applicant shall ensure that the management plans required under this consent area prepared in accordance with any relevant guidelines, and include:	-	This BMP has been prepared in accordance with Guideline for the preparation of environmental management plans (DIPNR, 2004).
	3 (a)	• detailed baseline data	Section 3.1	This BMP is prepared with consideration of the detailed baseline data on biodiversity values and impacts identified in *Balranald Mineral Sands Project: Biodiversity Assessment for the Environmental Impact Statement* (Niche Environment and Heritage, 2016), *Balranald Mineral Sands Project Modification 1 Supplementary Biodiversity Assessment* (EMM, 2022a) and *Balranald Modification 1 EPBC Act Biodiversity Assessment Report* (EMM, 2022b).
	3 (b)	A description of: • the relevant statutory requirements (including relevant approval, license or lease conditions;	Section 1.4 Section 7	This BMP includes a description of all relevant statutory requirements, management measures, performance measures and suggested adaptive control measures.

Schedule	Condition	Condition requirement	Plan reference	Demonstration of how the plan addresses condition requirements
		• any relevant limits or performance measures/criteria; and • the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures.		
	3 (c)	A description of the measures that would be implemented to comply with the relevant statutory requirements, limits or performance measures/criteria.	Section 1.4 Section 4, 5 & 7	As above.
	3 (d)	A program to monitor and report on the: • impacts and environmental performance of the development; and • effectiveness of any management measures (see c above).	Section 2.6 Section 7	An environmental monitoring program is proposed in this BMP. Specific monitoring measures have been developed to assess the performance of each management measure proposed.
	3 (e)	A contingency plan to manage any unpredicted impacts and their consequences.	Section 7	Potential adaptive control measures are proposed for each management measure in the unlikely event of

Schedule	Condition	Condition requirement	Plan reference	Demonstration of how the plan addresses condition requirements
				unpredicted outcomes.
	3 (f)	A program to investigate and implement ways to improve the environmental performance of the development over time.	Section 2.6 Section 2.10 Section 2.12	The environmental monitoring and auditing programs will assess the efficacy of management measures over time. Ways to improve environmental performance will be assessed during review of the BMP.
	3 (g)	A protocol for managing and reporting any: • incidents; • complaints; • non-compliances with statutory requirements; and • exceedances of the impact assessment criteria and/or performance criteria.	Section 2.8 Section 2.9 Section 2.10	This BMP includes protocols for incidents, complaints and non-compliances/exceedances.
	3 (h)	A protocol for period review of the plan.	Section 2.12	The BMP will be reviewed following annual reviews, audits, reportable incidents and any modification to the development consent or commencement of West Balranald Mine - Stage 2 and/ or Nepean Mine, whichever comes first.

2. Environmental management system

2.1. Balranald Mineral Sands Mine Environmental Management Strategy

Iluka's Environmental Management Strategy (EMS) has been developed to fulfil the relevant conditions in the NSW consent (SSD-5285) by providing a strategic framework for environmental management including all environmental management plans (EMPs), strategies and programs prepared for the Mine. The EMS establishes the overarching framework for the monitoring and environmental management of activities undertaken. The EMS incorporates the principles of continuous improvement and is consistent with the five pillars of International Standard Organisation (ISO) 14001: Environmental Management Systems. This BMP is a sub-plan of Iluka's EMS for the Mine.

This Section provides a summary of the EMS components required by *Guideline for the preparation of environmental management plans* (DIPNR, 2004).

2.2. Environmental policy

The Iluka HSEC policy is publicly available at http://www.iluka.com/ and provides a declaration of the importance Iluka places on conducting its business safely, without detrimental health effects and with regard to the community and the value of the natural environment.

2.3. Roles and responsibilities

Roles and responsibilities, relevant to the environmental management under this BMP are outlined in Table 3.

Table 3 – Roles and responsibilities

Role	Accountabilities
Operations Manager	• Ensure business plans align with wider sustainability objectives and targets. • Promote a culture of accountability and risk awareness, ensuring corrective and preventive actions are completed. • Promote active participation in Environment & Community matters in general. • Provide effective resources to implement the management system within the operation / function. • Ensure overall compliance to the EMS & HSECMS within the operation/function.
Environment, Rehabilitation and Community Relations (ERCR) Superintendent	• Provide advice/support to the operation for achievement of ongoing environmental compliance. • Inform, investigate and provide advice for environmental issues, non-compliances and incidents to the Operations Manager. • Support the preparation of environmental reports in compliance with corporate and regulatory requirements. • Review and oversee the implementation of the EMS, EMPs and procedures in accordance with corporate and regulatory requirements. • Ensure regular review environmental risk assessments with operational team members and other stakeholders as required. • Oversee rehabilitation planning and implementation. • Respond to and report on community complaints in consultation with the Operations Manager. • Conduct internal compliance audits of applicable regulatory approvals, licences and other legislation for the mine.

Role	Accountabilities
	• Liaise with government regulators and other stakeholders on environment and community matters. • Develop procedures required for effective environmental management of the operation.
Environmental Advisor	• Manage the environmental monitoring database. • Collate data and prepare written reports for environmental and community performance reporting. • Implement and review the EMS, EMPs and procedures in accordance with corporate and regulatory requirements. • Assist and provide advice to the Environmental Technician in collection of environmental monitoring data. Inform the creation of procedures required for effective environmental management of the operation. • Conduct site environmental inspections and audits to identify issues and report findings to the ERCR Superintendent. • Assist in achieving compliance with regulatory requirements related to environmental management as required by the ERCR Superintendent. • Participate in the review and development of environmental risk assessments. • Conduct internal compliance audits of applicable regulatory approvals, licences and other legislation for the mine and advise the ERCR Superintendent of any non-compliances. • Manage site waste removal and treatment requirements.
Environmental Technician	• Conduct the environmental monitoring required by the approved EMPs for the mine. • Follow procedures for environmental monitoring accurately and consistently. • Collect and record raw data accurately and consistently for all compliance monitoring. • Maintain calibration records of all equipment and ensure within manufacturers specifications. • Conduct site environmental inspections and report issues identified to ERCR Superintendent. • Assist with on ground environmental improvement works.
Suitably Qualified Environmental Professional	• Conduct pre-clearance surveys for Malleefowl in accordance with Survey Guidelines for Australia's threatened birds (DEWHA, 2010). • Conduct inspection of active or potentially active Malleefowl mounds at the end of breeding season (February) to confirm that breeding has concluded. • Conduct pre-clearance surveys of Corben's Long-eared Bat habitat and identify all suitable hollow-bearing trees more than 1 m above the ground to create a database of the hollows cleared for reporting purposes. • Conduct inspection of all felled hollow-bearing timber. • Prepare a clearing report for each clearing front within Corben's Long-eared Bat habitat, which will document the dates when non-hollow trees, trees with hollows below 1 m height and trees with hollows above 1 m height were cleared. • Prepare a clearing report to document all raptor and Malleefowl nests destroyed during clearing activities. For all Malleefowl nests cleared the document will use the National Malleefowl Monitoring System and provide the data to the National Malleefowl Monitoring Database.

Role	Accountabilities
	• Conduct pest and predator monitoring every three years.
Rehabilitation Advisor	• Coordinate the planning and implementation of the rehabilitation in accordance with the Rehabilitation Management Plan and applicable procedures. • Coordinate the rehabilitation monitoring programs including engagement of specialised consultants. • Ensure that rehabilitation resources are managed effectively to ensure the success of the rehabilitation. • Prepare rehabilitation related documents and maintain the spatial data base. • Liaise with government regulators and other stakeholders on all rehabilitation matters.
Site Employees and Contractors	• Understand and comply with the Iluka EMS, HSEC policy and supporting standards. • Accept accountability to ensure personal safety and the health and safety of others and protect the environment. • Identify, assess and control risks prior to undertaking any activity. • Actively challenge or refuse to work in unsafe conditions or where unacceptable impact to the environment or community may occur. • Intervene to prevent incidents. • Actively participate in HSEC meetings, initiatives, risk assessments and monitoring programs. • Report all incidents and near hits immediately. • Correct or isolate hazardous situations in the workplace. • Understand and follow the local emergency procedures. • Comply with and suggest improvements to site documentation, processes and procedures.

2.4. Training and awareness

Iluka have a standard for training and awareness (Standard 3: Training and Awareness) to ensure employees and contractors are appropriately trained and are competent to perform their work.

During these inductions, key points of environmental value will be identified and all measures relevant to SSD-5285 for the protection of biodiversity during construction and operation will be presented.

The Iluka induction and a West Balranald Mine site-specific induction shall be undertaken prior to commencement of works. Inductions (excluding visitor induction) shall be undertaken every two years or more frequently as required.

Processes are developed and implemented by sites, operations, projects or functions to identify, prioritise and plan the fulfilment of training needs commensurate with HSEC risks. Processes shall include (at a minimum):

- development of a training needs analysis, including the identification of training needs for all employees and contractors within the area, operations, Project or function;
- delivery of training and maintaining currency;

- methods and criteria for the determination of competency; considering training, education, skills and experience; and
- evaluation of the effectiveness of training processes and programs.

Training attendance, inductions and competency shall be recorded. Employee and contractor records shall be maintained, and attendance recorded in the Iluka Training Management System.

2.5. Emergency contacts and procedures

Iluka will maintain a Pollution Incident Response Management Plan (PIRMP) in accordance with Condition R1.1 of Environment Protection Licence 20795. The PIRMP outlines the process for responding to environmental emergencies in a timely and effective manner and adopting appropriate measures for the control and recovery from emergencies. Where appropriate, environmental emergency response procedures will be integrated with the Emergency Control and Response Plan.

Preparedness for emergencies by staff, personnel, contractors and service providers will be undertaken in accordance with on-site training requirements whereby personnel will be appropriately trained in the use of emergency response equipment and procedures, and will be made aware of their responsibilities should such an event occur. A list of external agencies that may be required in the event of an emergency is presented in Table 4.

On detection of an actual or potential environmental incident which may endanger personnel, property or the environment Iluka shall:

- alert the Iluka area supervisor to the location and nature of the emergency;
- control and/or contain any release to the environment if safe to do so;
- evacuate all personnel to the nearest muster point if there is threat to human health and ensure all personnel are accounted for;
- ensure the emergency is responded to;
- notify the site Emergency Response team and/or Emergency Services as required;
- handover control to the site Emergency Response team and/or Emergency Services on arrival and assist as directed;
- Initiate clean up and recovery; and
- hold an emergency response debrief.

Table 4 – External agency contact details

Name	Contact details	Location
Police	000 03 5898 4980	Balranald
Ambulance	000	Balranald
NSW Rural Fire Service	000	Balranald
Fire and Rescue NSW	000 03 5890 6612	Balranald
Hospitals	03 5071 9800	Balranald District Multi-Purpose Health Service
	03 5033 9300	Swan Hill District Hospital (emergency)
	03 5022 3333	Mildura Base Hospital (emergency)
NSW State Emergency Service	13 25 00	www.ses.nsw.gov.au
NSW Poisons Information Centre	13 11 26 (24-hour hotline)	www.poisonsinfo.nsw.gov.au
NSW Environment Protection Authority (EPA)	13 15 55	www.epa.nsw.gov.au
NSW Resources and Energy – Resources Regulator	1300 814 609	www.resourcesregulator.gov.au
SafeWork NSW	13 10 50	www.safework.nsw.gov.au
Balranald Shire Council	03 5020 1300	Balranald

2.6. Environmental monitoring

Environmental monitoring is proposed to evaluate the efficacy of each environmental management measure (Section 5 and Section 6). The method, frequency and duration of monitoring is provided, with defined performance targets and potential adaptive control measures identified. Follow-up action will be required in the event that adaptive control measures do not result in achieving the performance target. Monitoring records will be kept by Iluka and consolidated during environmental auditing (Section 2.11). Monitoring results will be analysed to determine the efficacy of control measures during review of this BMP (Section 2.12).

2.7. Adaptive control measures

In the unlikely event that performance targets are not satisfied, Section 7 outlines potential adaptive control measures and the responsibility for implementation of these procedures and their outcomes.

2.8. Incident reporting

An incident is defined as a set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in NSW Development Consent (SSD-5285).

Following the Group Guideline -Hazard Incident Emergency Classification (GUI1135), incidents of serious actual or potential consequence must be immediately notified to the Environment, Rehabilitation and Community Relations (ERCR) Superintendent (or equivalent environment representative) and site Operations Manager or their delegate.

The ERCR Superintendent (or equivalent environment representative) shall then:

- Determine if the incident is a 'notifiable incident' for notification to a Regulator.
- Consult with the Operations Manager or their delegate and the Environment Manager to agree on incident classification and notification requirements.
- Complete the notification within the legislated timeframes.
- Determine if the incident is a 'reportable incident' for inclusion in reports to the Regulator.

The reporting of incidents will be conducted in accordance with Schedule 5, Condition 6 of NSW Development Consent (SSD-5285) and in accordance with the protocol for industry notification of pollution incidents under Part 5.7 of the Protection of the *Environment Operations Act, 1997*.

Iluka will immediately notify the Department and any other relevant agencies immediately after the authorised person becomes aware of the incident and set out the location and nature of the incident. The DPHI can be notified of incidents via the Major Projects Website https://pp.planningportal.nsw.gov.au/major-Projects and the NSW EPA can be notified by telephoning the hotline on **131 555.**

The incident report will:

- describe the date, time and nature of the exceedance/incident;
- identify the cause (or likely cause) of the exceedance/incident;
- describe what action has been taken to date; and
- describe the proposed measures to address the exceedance/incident.

2.9. Complaints management

Iluka will maintain an enquiries and community complaints hotline for the Balranald Mine (Phone **1800 305 993** or email balranald.community@iluka.com). The community hotline will be publicly advertised on the Iluka website Balranald engagement hub.

Community complaints will be managed in accordance with Iluka's EMS and Social Performance standard (Group Standard 02 – Social Performance).

Iluka's Stakeholder and Community Engagement Management Plan for the Balranald operation provides additional requirements regarding stakeholder engagement and consultation.

In the event a complaint or inquiry is made by an external party the nominated Iluka employee (dependent on the nature of the complaint) will be directed on the course of action in consultation with the Senior Manager.

A record of the event will be entered into the HSEC electronic management system. Any actions arising from the event will be tracked to ensure the event is dealt with appropriately.

Community inquires and complaints will be recorded. The following information will be captured:

- the date and time;
- the method by which the complaint or inquiry was made;
- any personal details of the complainant if provided;
- the nature of the complaint or inquiry;
- the action taken by Iluka in relation to the complaint or inquiry, including any follow-up contact with the proponent; and
- if no action was taken by Iluka, the reasons why no action was taken.

The record will be kept for at least 4 years.

The Stakeholder and Community Engagement Management Plan includes a grievance resolution process to enable Iluka to respond appropriately and respectfully to any issues raised by stakeholders (including internal stakeholders).

A complaints register is available on the Iluka community engagement hub website https://www.iluka.com/community-engagement/balranald and kept up to date on a monthly basis.

2.10. Non-compliances

In accordance with Schedule 5, Condition 2 of the Consent, over the life of the Mine, Iluka will assess and manage risks to ensure that there are no exceedances of the criteria and/or performance measures outlined in Schedule 3 of NSW Development Consent (SSD-5285).

Where any exceedance of these criteria and/or performance measures occurs, as soon as practicable Iluka will:

- take all reasonable and feasible measures to ensure that the exceedance ceases and does not recur;
- consider all reasonable and feasible options for remediation and a submit a report to the DPHI describing these options and preferred remediation measures or other course of action; and
- implement remediation measures as directed by the Secretary of the DPHI.

In accordance with Schedule 5, Condition 6A of the Consent, non-compliances will be reported to DPHI within seven (7) days of becoming aware of the non-compliance. Notification will be in writing via the Departments Major Projects Website and detail the reasons for the non-compliance and what actions have been, or will be, undertaken to address the non-compliance.

Any non-compliances identified during the previous calendar year will be reported in the Annual Review. The Annual Review will also outline the actions which were, or are being undertaken to manage future compliance.

An Independent Environmental Audit report will assess the environmental performance of the Mine and assess whether it is in compliance with the requirements of NSW Development Consent (SSD-5285) (Section 2.11).

Iluka may also raise an internal incident for a non-compliance shall the non-compliance be classified as an incident according to Iluka's hazard, incident and emergency classification guideline *(Group Guideline- Hazard, Incident & Emergency Classification GUI1135).*

2.11. Environmental auditing

Within 12 months of the commencement of construction, and every three years thereafter, a full Independent Environmental Audit will be undertaken, as required by Schedule 5, Condition 8 of SSD-5285.

The Independent Environmental Audit will:

- assess the environmental performance of the Mine and assess whether it complies with the requirements of all relevant approvals;
- review the adequacy of any approved strategy, plan or program required under all relevant approvals; and
- recommend measures or actions to improve the environmental performance of the Mine and/or any strategies, plans or programs required under the relevant approvals.

A copy of the Independent Environmental Audit, along with the response to any recommendations contained in the audit report, will be provided to DPHI and made available on the Iluka website.

2.12. Review of the BMP

Review of this BMP is within three months of the submission of:

- the annual review;
- a reportable incident;
- an environmental audit; or
- any modification to SSD-5285.

Where a review is provided with revisions, a revised document must be submitted to DPHI for approval within four weeks.

A detailed review of the BMP will be undertaken at commencement of West Balranald Mine - Stage 2 and/or Nepean Mine, whichever comes first.

3. Environmental impacts and risk

3.1. Potential impacts

3.1.1. Plant community types

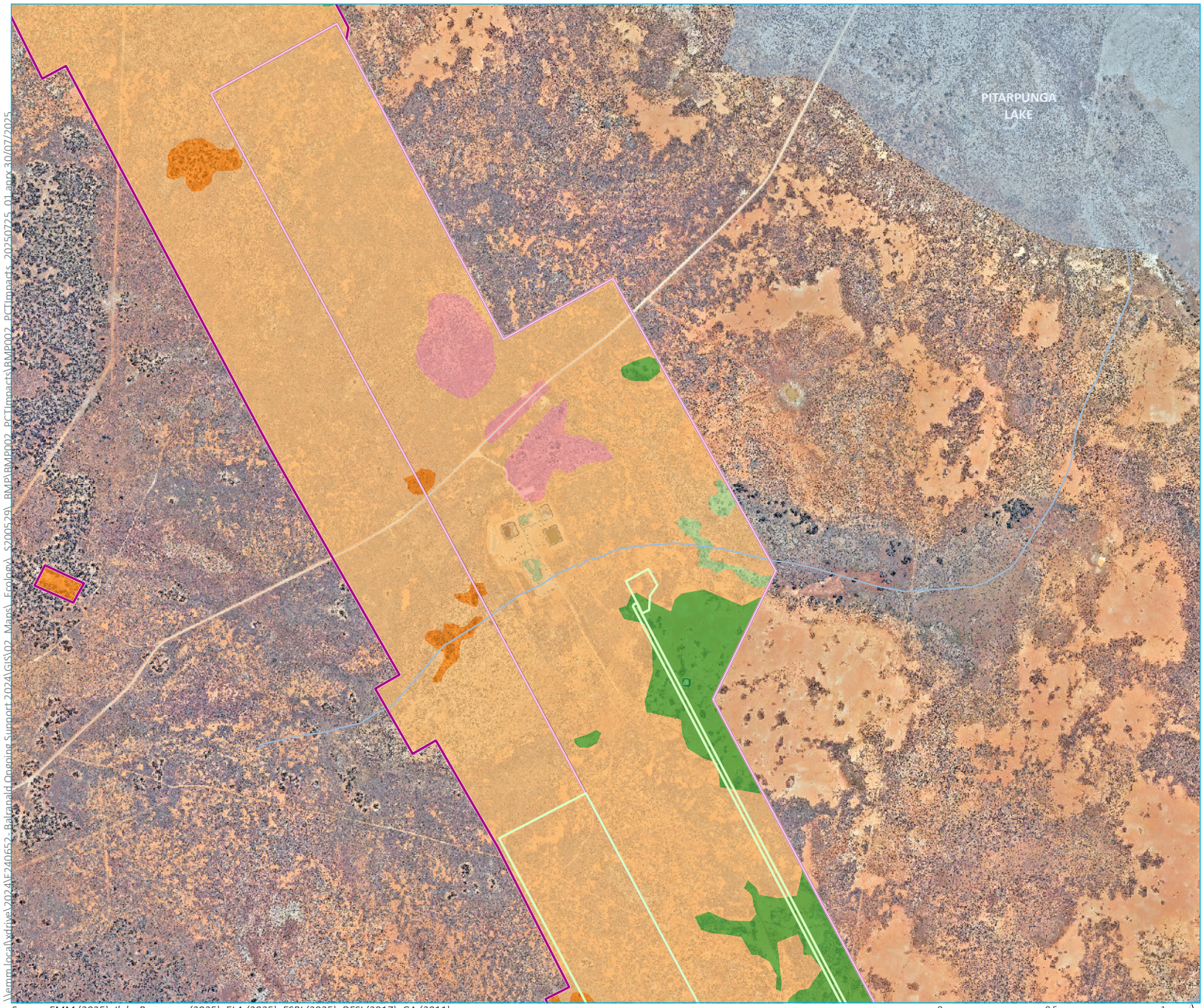
Direct impacts on resulting from West Balranald Mine – Stage 1 comprise the:

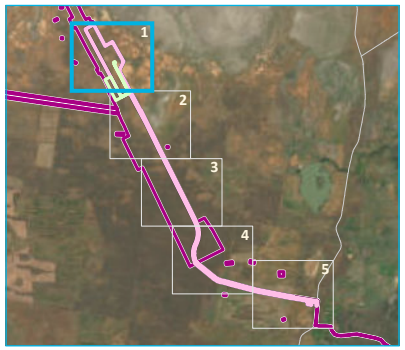
- permanent loss of habitat from native vegetation clearing;
- removal of breeding and shelter habitat;
- injury or fatality of individuals during clearing;
- vehicle strike from plant or vehicle collision; and
- habitat fragmentation.

West Balranald Mine – Stage 1 will directly impact 632.9 ha of native vegetation (Table 5 and Figure 3.1), comprising eight plant community types (PCTs). 108 ha of cleared land will also be disturbed.

Table 5 – Direct native vegetation clearing impacts – West Balranald Mine – Stage 1

Plant community type	Direct impact (ha)
15 – Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	1.4
154 – Pearl Bluebush low open shrubland of the arid and semi-arid plains	409.5
159 – Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW)	22.9
166 – Disturbed annual saltbush forbland on clay plains and inundation zones mainly of south-western NSW	48.4
170 – Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	111.5
171 – Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	37.7
221 – Black Oak – Pearl Bluebush open woodland of the sandplains of the semi-arid warm and arid climate zones	1.5
Total direct impact (ha)	**632.9**





KEY

EIS Approved Balranald Mineral Sands Mine (SSD-5285)

MOD1 underground mining area

MOD4 solar farm boundary

Existing environment

Minor road

Watercourse/drainage line

Named waterbody

Plant community type

Cultivated grain crops/cleared weedy fallow/ developed

15 | Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)

153 | Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones

154 | Pearl Bluebush low open shrubland of the arid and semi-arid plains

159 | Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW)

170 | Chenopod sandplain mallee woodland/ shrubland of the arid and semi-arid (warm) zones

Plant community type impacts
Map 1 of 5

Balranald Mineral Sands Mine
West Balranald Mine- Stage 1
State Biodiversity Management Plan
Figure 3.1

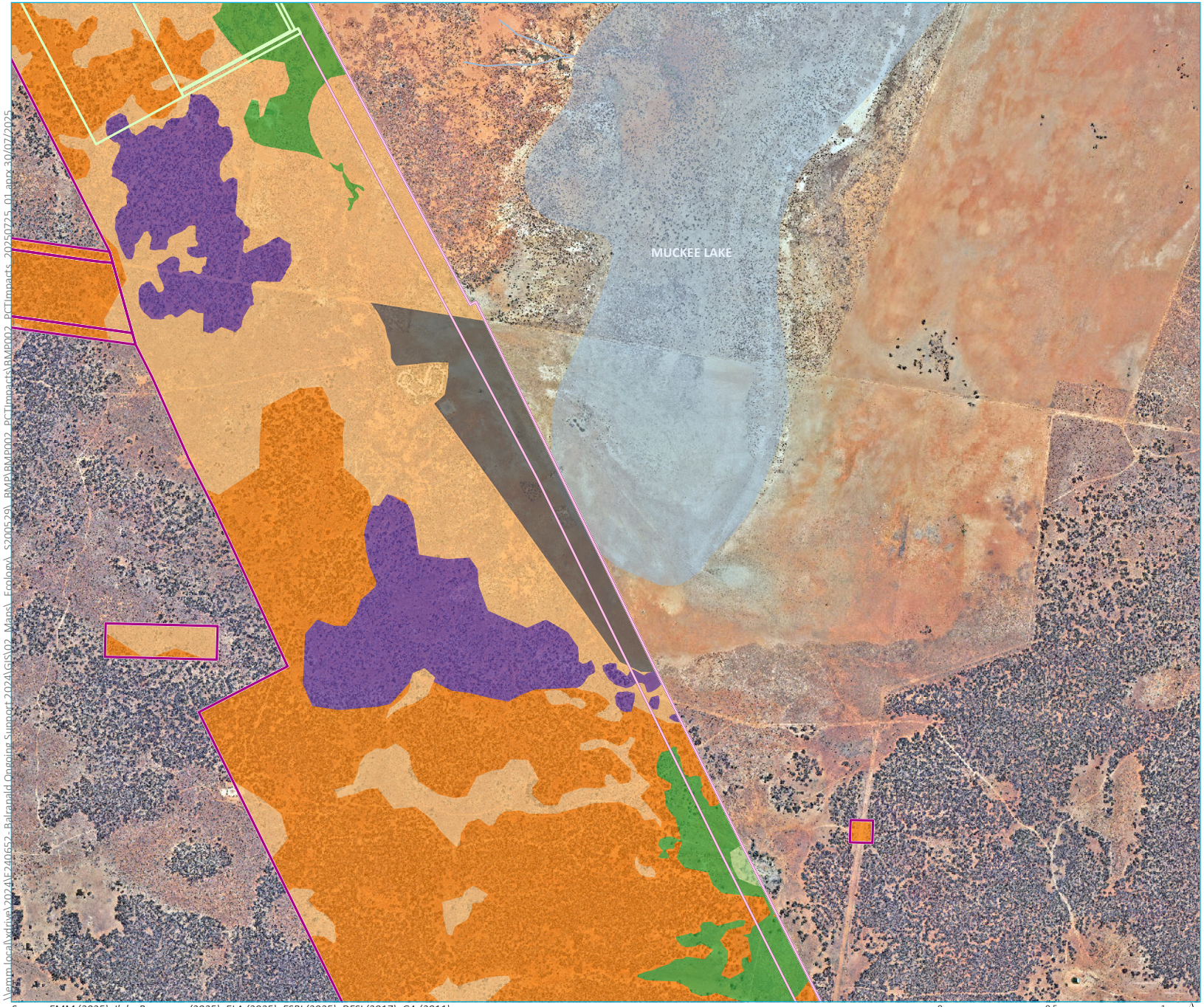
Source: EMM (2025); Iluka Resources (2025); ELA (2025); ESRI (2025); DFSI (2017); GA (2011)

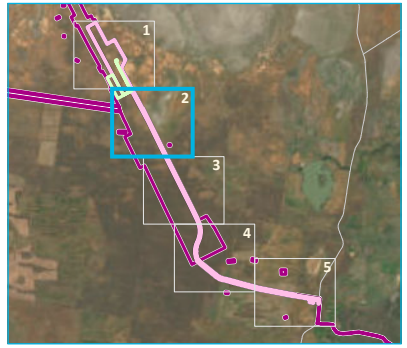
0 0.5 1 km

GDA 1994 MGA Zone 54

N

EMM creating opportunities





KEY

- EIS Approved Balranald Mineral Sands Mine (SSD-5285)
- MOD1 underground mining area
- MOD4 solar farm boundary
- Watercourse/drainage line
- Named waterbody

Plant community type

- Cultivated grain crops/cleared weedy fallow/ developed
- 15 | Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- 153 | Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones
- 154 | Pearl Bluebush low open shrubland of the arid and semi-arid plains
- 170 | Chenopod sandplain mallee woodland/ shrubland of the arid and semi-arid (warm) zones
- 221 | Black Oak- Pearl Bluebush open woodland of the sandplains of the semi-arid warm and arid climate zones

Plant community type impacts
Map 2 of 5

Balranald Mineral Sands Mine
West Balranald Mine- Stage 1
State Biodiversity Management Plan
Figure 3.1

Source: EMM (2025); Iluka Resources (2025); ELA (2025); ESRI (2025); DFSI (2017); GA (2011)

0 0.5 1 km

GDA 1994 MGA Zone 54

N

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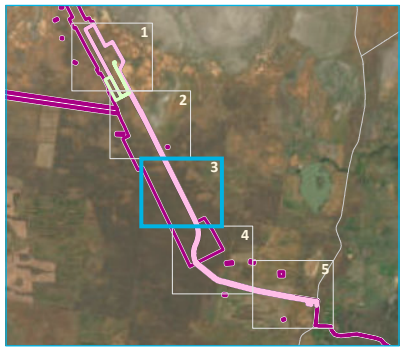
EMM
creating opportunities



KEY

EIS Approved Balranald Mineral Sands Mine (SSD-5285)

MOD1 underground mining area

MOD4 solar farm boundary

Plant community type

Cultivated grain crops/cleared weedy fallow/ developed

153 | Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones

154 | Pearl Bluebush low open shrubland of the arid and semi-arid plains

170 | Chenopod sandplain mallee woodland/ shrubland of the arid and semi-arid (warm) zones

171 | Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion

Source: EMM (2025); Iluka Resources (2025); ELA (2025); ESRI (2025); DFSI (2017); GA (2011)

0 0.5 1 km

GDA 1994 MGA Zone 54

N

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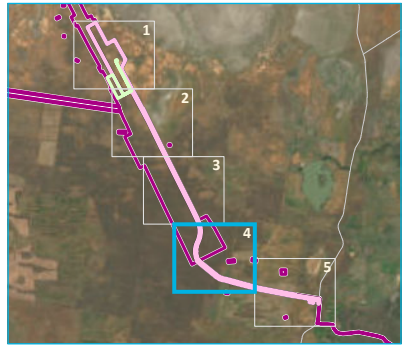
Plant community type impacts
Map 3 of 5

Balranald Mineral Sands Mine
West Balranald Mine- Stage 1
State Biodiversity Management Plan
Figure 3.1

EMM
creating opportunities



KEY

EIS Approved Balranald Mineral Sands Mine (SSD-5285)

MOD1 underground mining area

MOD4 solar farm boundary

Plant community type

Cultivated grain crops/cleared weedy fallow/ developed

170 | Chenopod sandplain mallee woodland/ shrubland of the arid and semi-arid (warm) zones

171 | Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion

Source: EMM (2025); Iluka Resources (2025); ELA (2025); ESRI (2025); DFSI (2017); GA (2011)

0 0.5 1 km

GDA 1994 MGA Zone 54

N

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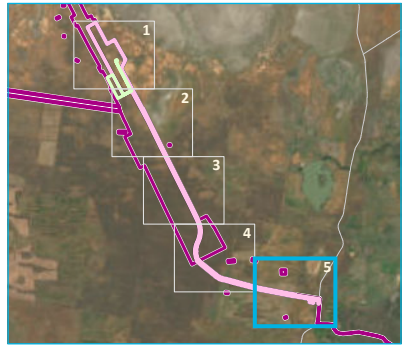
Plant community type impacts
Map 4 of 5

Balranald Mineral Sands Mine
West Balranald Mine- Stage 1
State Biodiversity Management Plan
Figure 3.1

EMM
creating opportunities



KEY

EIS Approved Balranald Mineral Sands Mine (SSD-5285)

MOD1 underground mining area

MOD4 solar farm boundary

Existing environment

Major road

Minor road

Plant community type

Cultivated grain crops/cleared weedy fallow/ developed

0 | Refer to EMM Vegetation layer dated 08/10/2024

170 | Chenopod sandplain mallee woodland/ shrubland of the arid and semi-arid (warm) zones

171 | Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion

Source: EMM (2025); Iluka Resources (2025); ELA (2025); ESRI (2025); DFSI (2017); GA (2011)

0 0.5 1 km

GDA 1994 MGA Zone 54

N

Plant community type impacts
Map 5 of 5

Balranald Mineral Sands Mine
West Balranald Mine- Stage 1
State Biodiversity Management Plan
Figure 3.1

EMM creating opportunities

3.1.2. Threatened species

Four vulnerable species listed under the *Biodiversity Conservation Act 2016* (BC Act) have been recorded in West Balranald Mine – Stage 1 (Figure 3.2), comprising:

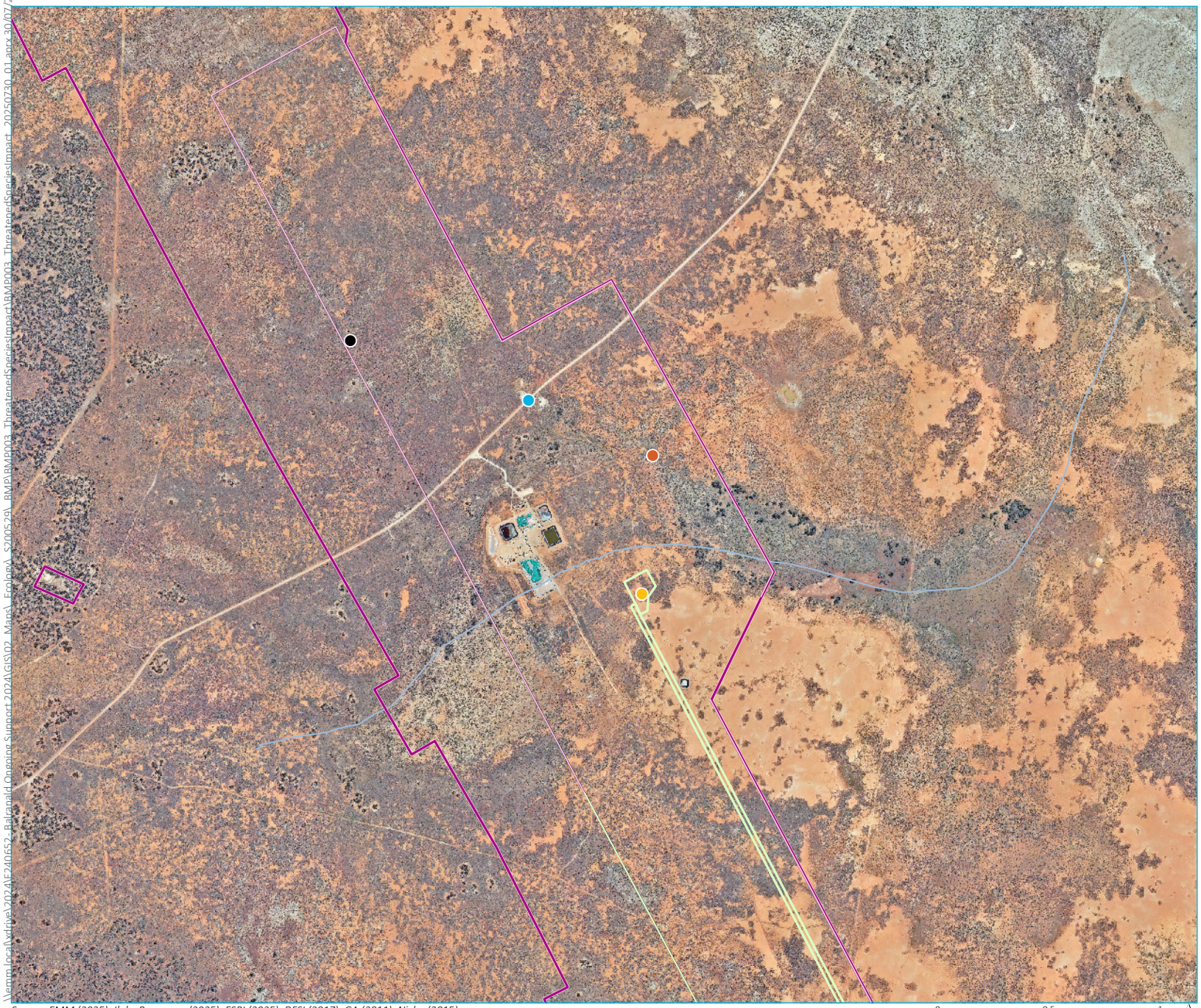
- Inland Forest Bat (Vespadelus baverstocki);
- Redthroat (Pyrrholaemus brunneus);
- Spotted Harrier (Circus assimilis); and
- White-fronted Chat (Epthianura albifrons).

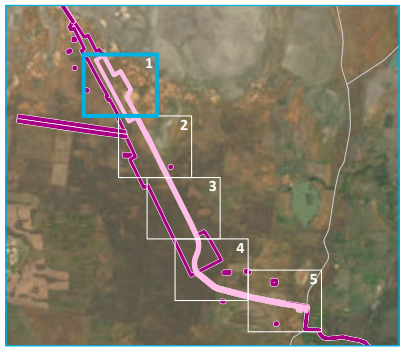
While not recorded in this location, PCTs 170 and 171 represent habitat for Malleefowl, while PCTs 170, 171 and 221 represent habitat for Corben's Long-eared Bat and, as such, they are likely to occur. Mallefowl are listed as an endangered species under the BC Act and vulnerable species under the EPBC Act, while Corben's Long-eared Bat is listed as a vulnerable species under both the BC and EPBC Acts. No more than 151 ha of Malleefowl and Corben's Long-eared Bat habitat will be directly impacted by West Balranald Mine – Stage 1.

Indirect impacts are predicted in retained habitat adjacent to West Balranald Mine – Stage 1 during mine construction and operation. Such impacts will largely operate on a short to medium timeframe (i.e. the six year life of the current approved operations and will be minimised through the implementation of management measures (Section 5 and Section 6).

Potential indirect impacts during construction and operation may comprise:

- disruption to species breeding cycles of through increased noise, dust and light;
- degradation of retained habitat adjoining construction and operational areas through erosion, sedimentation, dust deposition and increased edge-effects (e.g. weed invasion); and
- changes in vegetation composition and structure in retained habitat due to increased bushfire risk.





KEY

- EIS Approved Balranald Mineral Sands Mine (SSD-5285)
- MOD1 underground mining area
- MOD4 solar farm boundary

Threatened species

- Inland Forest Bat (*Vespadelus baverstocki*)
- Redthroat (*Pyrrholaemus brunneus*)
- Spotted Harrier (*Circus assimilis*)
- White-fronted Chat (*Epthianura albifrons*)

Existing environment

- Minor road
- Watercourse/drainage line

Source: EMM (2025); Iluka Resources (2025); ESRI (2025); DFSI (2017); GA (2011); Niche (2015)

0 0.5 1 km

GDA 1994 MGA Zone 54

N

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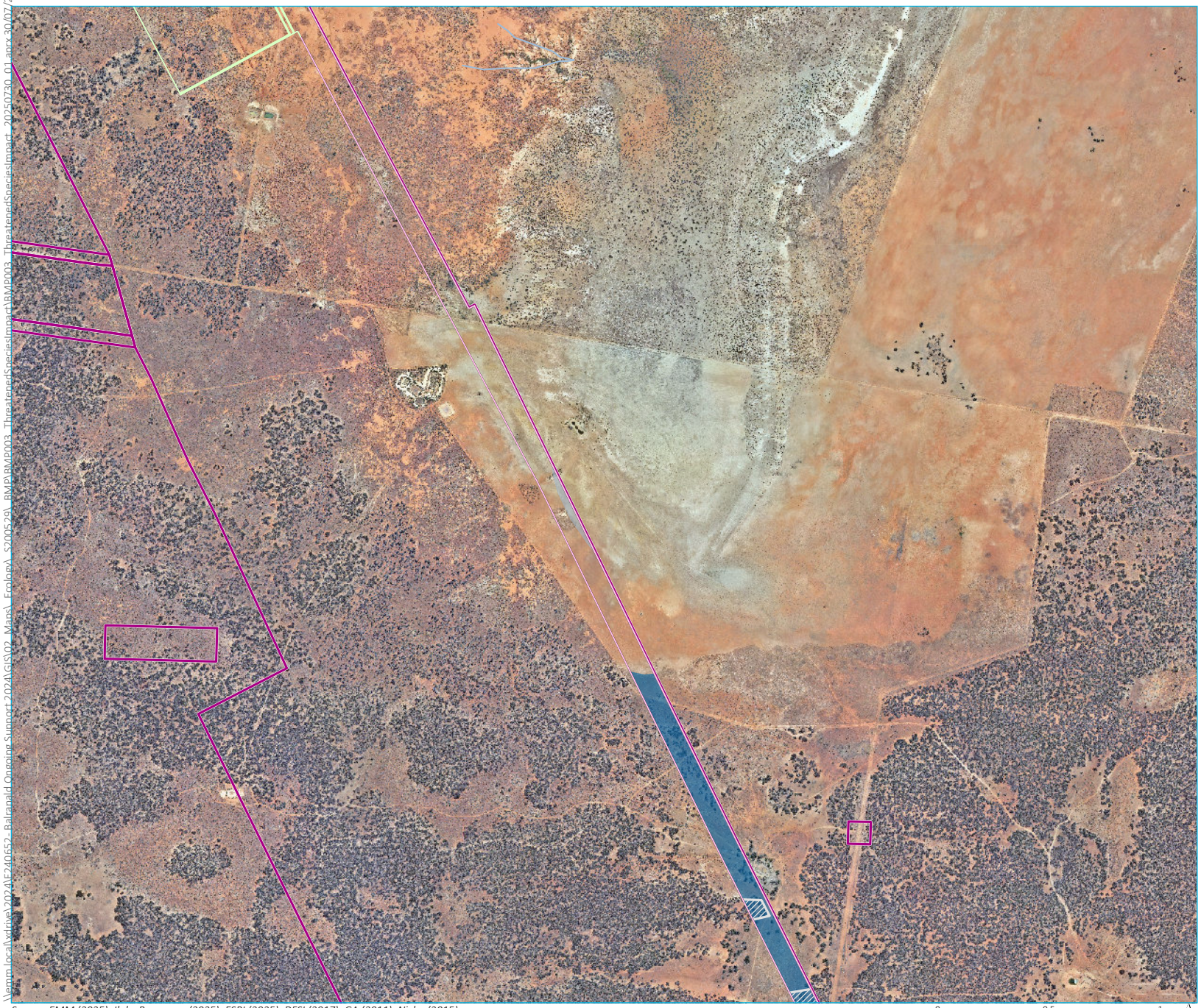
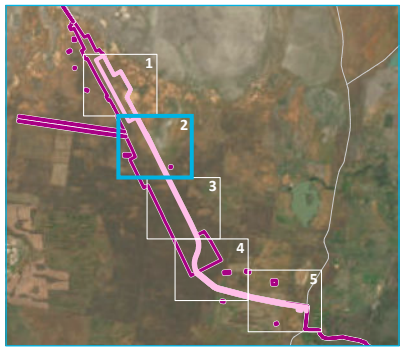
Threatened species impacts
Map 1 of 5

Balranald Mineral Sands Mine
West Balranald Mine- Stage 1
State Biodiversity Management Plan
Figure 3.2

EMM
creating opportunities





KEY

- EIS Approved Balranald Mineral Sands Mine (SSD-5285)
- MOD1 underground mining area
- MOD4 solar farm boundary
- Corben's long-eared bat habitat
- Malleefowl habitat

Existing environment

- Watercourse/drainage line
- Named waterbody

Source: EMM (2025); Iluka Resources (2025); ESRI (2025); DFSI (2017); GA (2011); Niche (2015)

0 0.5 1 km

GDA 1994 MGA Zone 54

N

Threatened species impacts
Map 2 of 5

Balranald Mineral Sands Mine
West Balranald Mine- Stage 1
State Biodiversity Management Plan
Figure 3.2

EMM
creating opportunities

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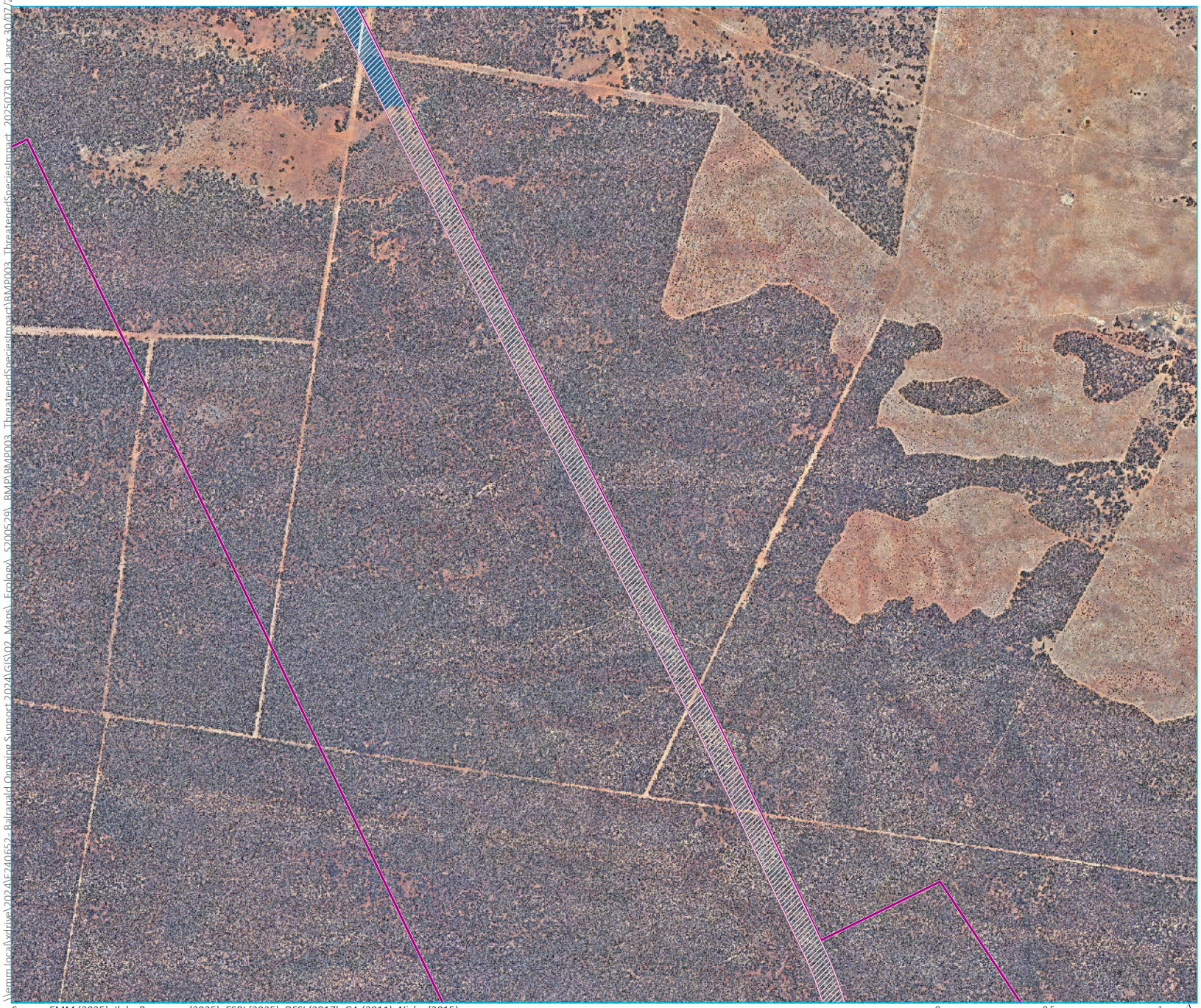

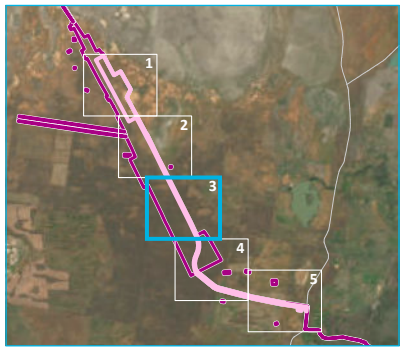

KEY

- EIS Approved Balranald Mineral Sands Mine (SSD-5285)
- MOD1 underground mining area
- Corben's long-eared bat habitat
- Malleefowl habitat

Source: EMM (2025); Iluka Resources (2025); ESRI (2025); DFSI (2017); GA (2011); Niche (2015)

0 0.5 1 km

GDA 1994 MGA Zone 54

N

Threatened species impacts
Map 3 of 5

Balranald Mineral Sands Mine
West Balranald Mine- Stage 1
State Biodiversity Management Plan
Figure 3.2

EMM
creating opportunities

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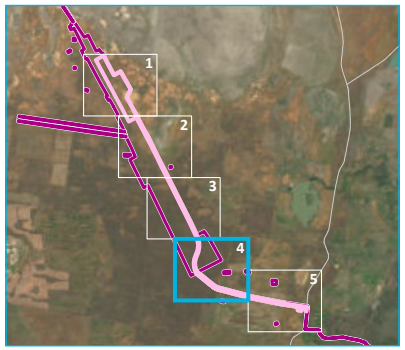

KEY

- EIS Approved Balranald Mineral Sands Mine (SSD-5285)
- MOD1 underground mining area
- Malleefowl habitat

Source: EMM (2025); Iluka Resources (2025); ESRI (2025); DFSI (2017); GA (2011); Niche (2015)

0 0.5 1 km

GDA 1994 MGA Zone 54

N

Threatened species impacts
Map 4 of 5

Balranald Mineral Sands Mine
West Balranald Mine- Stage 1
State Biodiversity Management Plan
Figure 3.2

EMM
creating opportunities

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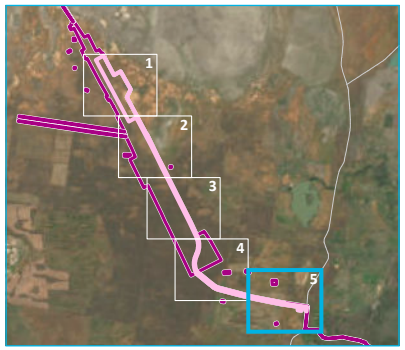

KEY

- EIS Approved Balranald Mineral Sands Mine (SSD-5285)
- MOD1 underground mining area
- Corben's long-eared bat habitat

Existing environment

- Major road
- Minor road

Source: EMM (2025); Iluka Resources (2025); ESRI (2025); DFSI (2017); GA (2011); Niche (2015)

0 0.5 1 km

GDA 1994 MGA Zone 54

N

Threatened species impacts
Map 5 of 5

Balranald Mineral Sands Mine
West Balranald Mine- Stage 1
State Biodiversity Management Plan
Figure 3.2

EMM
creating opportunities

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3.2. Risk criteria

A risk assessment has been completed for each potential direct and indirect impact identified in Section 3.1. The purpose of the risk assessment is to:

- provide management measures specific to the type and level of risk to biodiversity relating to West Balranald Mine – Stage 1; and
- minimise the likelihood of the risk occurring, thereby reducing consequences to acceptable levels.

The risk assessment has been undertaken in accordance with the risk matrix presented in Plate 1.

Risk Ranking	Consequence	Negligible (NE)	Minor (MI)	Moderate (MO)	Significant (SI)	Major (MA)
Likelihood	Injury / Illness	No first aid treatment required	First aid treatment with no disability	Medical treatment with no disability	Permanent disabling or lost time injury / illness	Fatality or severe permanent disabling injury / illness
	Environmental	Limited damaged to minimal area of low significance	Minor effects on biological or physical environment	Moderate short term effects but not effecting ecosystem function.	Serious medium term environmental effects	Very serious long term environmental impairment of the ecosystem system function
	Stakeholder	Low level repairable damage to common place structures	Minor medium term social impacts on local population. Most repairable.	Ongoing social issues. Permanent damage to items of cultural significance.	Ongoing serious social issues. Permanent damage to items of cultural significance	Very serious widespread social impacts. Irreparable damage to highly values items
	Business or Production	<$100K	$100K - $1M	$1M - $10M	$10M - $100M	>$10M
Almost Certain (A)	Event is expected to occur in most circumstance at least once per month	M	H	VH	E	E
Likely (B)	Event will probably occur in most circumstance at least once a year	M	H	H	VH	E
Possible (C)	Event should occur at some time at least once in 5 years	L	M	H	H	VH
Unlikely (D)	Event could occur at some time at least once in 25 years	L	M	M	H	H
Rare (E)	Event may occur only in exceptional circumstances less than once in 25 years	L	L	L	M	M

Plate 1 – Risk matrix

3.3. Risk assessment

Table 6 provides a pre-management risk assessment for the potential biodiversity impacts identified in Section 3.1, using the criteria outlined in Section 3.2. The pre-management risk level has informed the development of environmental management measures listed in Section 4 and Section 5, to reduce these risks to an acceptable residual risk level.

Table 6 – Biodiversity risk assessment

Potential impact	Nature of impact	Likelihood	Consequence	Inherent (Pre-management control) risk level	Residual (post-management control, refer Table 9) risk level
Permanent loss of habitat from native vegetation clearing	Direct	Almost certain. 632.9 ha of habitat will be removed for West Balranald Mine – Stage 1.	Significant. Permanent loss cannot be reversed.	Extreme	Very High (Almost certain, moderate)
Injury or fatality of individuals during clearing	Direct	Possible. Threatened fauna are known to be present in areas of identified habitat.	Significant. Threatened fauna may be injured or suffer fatality during clearing operations.	High	Medium (Possible, Moderate)
Vehicle strike from plant or vehicle to threatened species	Direct	Possible. Construction traffic will traverse known threatened fauna habitat.	Significant. Threatened fauna may be injured or suffer fatality during clearing operations.	High	Medium (Possible, Moderate)
Habitat fragmentation	Direct	Likely. West Balranald Mine – Stage 1 is mostly linear in shape and will bisect a large area of contiguous native vegetation.	Moderate. West Balranald Mine – Stage 1 is likely to lead to localised fragmentation effects for threatened species in this area.	High	High (Likely, Minor)
Disruption to species breeding cycles through increased noise, dust and light	Indirect	Possible. Increased noise, dust and light can lead to behavioural avoidance of breeding areas in birds and other species (Hockin et al 1992; Kleist et al 2017).	Moderate. Behavioural avoidance of breeding areas by adult breeding pairs could decrease breeding success of threatened species.	High	Medium (Possible, Minor)

Potential impact	Nature of impact	Likelihood	Consequence	Inherent (Pre-management control) risk level	Residual (post-management control, refer Table 9) risk level
Degradation of retained habitat adjoining construction and operational areas through erosion, sedimentation, dust deposition and increased edge-effects	Indirect	Possible. In areas adjacent to West Balranald Mine – Stage 1 without management erosion, sedimentation, dust and weed invasion could damage surrounding habitat.	Minor. Damage to habitat of threatened fauna.	Medium	Low (Possible, Negligible)
Changes in vegetation composition and structure in retained habitat due to increased bushfire risk	Indirect	Possible. There is a risk of increased bushfire during construction and operation of the mine.	Significant. Occupation of areas by threatened species may decrease from areas that are burnt.	High	High (Possible, Moderate)

4. Management measures

This Section describes the short, medium and long-term measures that will be adopted to:

- manage the remnant vegetation and fauna habitat on the site; and
- integrate the implementation of biodiversity management to the greatest extent practicable with the rehabilitation of the site.

4.1. Short-term measures

Biodiversity management measures will focus on:

- minimising clearing within the disturbance area as far as is reasonably practicable;
- protection of adjacent vegetation and habitat;
- improving vegetation and habitat condition;
- soil and vegetation salvage;
- pre-clearance and clearing procedures;
- weed and feral pest management;
- erosion control;
- access control;
- bushfire management;
- establishment of the Malleefowl management and monitoring program; and
- vegetation and habitat management.

Short-term management measures are detailed in Section 5.

4.2. Medium to long term measures

Medium to long-term measures will focus on rehabilitation. The objective of rehabilitation for West Balranald Mine – Stage 1 is to provide a safe, stable and non-polluting landform. The final landform of the West Balranald Mine – Stage 1 will mainly comprise agricultural grazing land.

Measures implemented in the medium to long term will comprise:

- continuing to protect adjacent vegetation and habitat;
- establishment of a biodiversity offset to ensure no net biodiversity loss;
- weed and feral pest management;
- erosion control;
- access control;

- bushfire management; and
- continuation of the Malleefowl management and monitoring program.

5. Detailed management measures

This Section contains the detailed management measures to be implemented during West Balranald Mine – Stage 1.

5.1. Biodiversity offset

A biodiversity offset for West Balranald- Stage 1 disturbance areas will be established through the NSW Biodiversity Offset Scheme in accordance with Condition 16, Schedule 3 of Development Consent (SSD-5285) to ensure no net loss of biodiversity from the development.

Biodiversity offset credits for stage 1 are required to be retired within 24 months from commencement of disturbance within West Balranald Mine- Stage 1 area. The calculated offset credits account for the loss of Malleefowl and Corben's Long-eared Bat habitat associated with clearing, including PCTs 170 and 171 which represents habitat for Malleefowl, and PCTs 170, 171 and 221 which represents habitat for Corben's Long-eared Bat. The offset will provide long term security of habitat for threatened species and will be managed and enhanced in accordance with an approved Offset Management Plan.

5.2. Minimising clearing in the approved footprint

Design measures have minimised the clearing of native vegetation in the disturbance footprint. An area of PCT 166 was excluded from the additional disturbance footprint during mine design, avoiding impacts on 10.6 ha of this community. In addition, impacts will be avoided on 4.5 ha of PCT 15. This area is in good condition and contains 109 hollow-bearing trees which will also be avoided. The following measures will be implemented to minimise clearing in the approved footprint:

- Impacts on PCT 15 in the additional disturbance area will be avoided.
- All site disturbance activities will be undertaken in accordance with Iluka's Site Disturbance Procedure.
- Awareness and education during the Iluka induction process.

Control measures intend to ensure overall open disturbance is reasonably minimised as far as reasonably practicable. Particular consideration must be given to the advanced clearing of vegetation earlier than would otherwise be necessary in order to avoid clearing during breeding periods, where practicable.

5.3. Rehabilitation

West Balranald Mine – Stage 1 does not have any temporary disturbance areas. All areas will be used for the construction of surface infrastructure, access roads, buildings and active mining.

Rehabilitation will be undertaken in accordance with the Balranald Mineral Sands Rehabilitation Management Plan. The following general strategies and methods are proposed to be implemented prior to and during operations for West Balranald Mine – Stage 1 in order to facilitate an effective rehabilitation program.

- Seed collection from local provenance for use in rehabilitation, where available. Monitoring to inform the success of natural regeneration from soil seed bank and any necessary revegetation works.

- Clearing of vegetation ahead of the mining activities, comprising for low open shrubland areas clearing the understorey with the topsoil layer, while for portions of the access road stockpiling the majority of overstorey timber, while retaining some for habitat-enhancement purposes and/or surface treatment.

- Surface soil stripping, stockpiling, and management, comprising topsoil and vegetation stockpiling; overburden would be maintained in separate stockpile categories (including recording soil type, quality, location, plant community type, weeds present (if any), removal date, storage location and dust suppression treatment (if any)).

- Disturbance areas would be stripped progressively (i.e. only as required).

- Rehabilitation of disturbed areas would be undertaken as soon as practicable after the areas are no longer required and with due regard to geotechnical stability risks.

Topsoil salvage and storage measures are provided in Section 5.6.

5.4. Protection of adjacent vegetation and habitat

To prevent inadvertent clearing or disturbance, all site disturbance activities will be undertaken in accordance with Iluka's *Site Disturbance Procedure* (SDP). The SDP is an Iluka internal permit and disturbance can only be undertaken within the approved disturbance boundary area. The objective of the procedure is to ensure that site disturbance is controlled and all vegetation removal information is recorded. Site disturbance may only proceed once a Site Disturbance Permit has been completed and signed by the relevant Iluka personnel.

5.5. Improving vegetation and habitat condition

Weed and pest management will be conducted, including, establishment of a goat proof fence around the main West Balranald Mine – Stage 1 disturbance footprint, to enhance the quality of native vegetation and fauna habitats (see Section 5.10 Weed and feral pests).

5.6. Timber, vegetation and soil salvage

Timber, vegetation and topsoil will be salvaged and stored for rehabilitation in later mine stages. The aim of topsoil stripping and stockpiling is to maintain or retain biological activity. The below procedures will be followed.

- Overstorey timber would be retained and stockpiled, where practicable the stockpile will remain close to the clearing location, and will be used for habitat enhancement purposes and/or surface treatment.
- Cleared timber being reused for fauna habitat will be applied at a rate consistent with the 'logs' benchmarks for each PCT and be spread throughout rehabilitation areas to replicate natural habitat densities.
- The topsoil (including contained organic material) and subsoil from different vegetation communities will be stockpiled separately where practicable, with records maintained.
- Disturbance areas will be stripped progressively.
- Topsoil management measures are to be used to maintain the viability of the topsoil seedbank.
- Topsoil stockpiles would be retained at a height of no more than 2 m, while subsoil would be stockpiled to a maximum of 10 m dependent on soil properties.
- Vehicle access to stockpiles will be controlled.
- Weed management will be applied to topsoil stockpiles to minimise the accumulation of weed seed in the soil.
- Erosion and sediment controls would be installed around topsoil stockpile areas and regularly maintained.
- Topsoil stockpiles or soil that is directly replaced will be recorded in an inventory. The inventory will include time of placement, material depth, soil type, condition and volumes to ensure known history.
- Topsoil stockpiles would be located in areas that would not be further disturbed by mining activities.

5.7. Pre-clearance and clearing

This section contains:

- specific pre-clearance surveys and clearance measures to satisfy the Commonwealth approval (EPBC 2012/6509) requirements for Malleefowl and Corben's Long-eared Bat; and
- pre-clearance survey and clearance measures for hollow-bearing trees and raptor nests required by SSD 5285.

The measures proposed for Malleefowl are designed to satisfy the requirements of both approvals.

5.7.1. Malleefowl

Pre-clearance surveys

Prior to any impact, pre-clearance surveys for Malleefowl will be conducted by a suitably qualified environmental professional in accordance with *Survey Guidelines for Australia's threatened birds* (DEWHA, 2010) in the West Balranald Mine – Stage 1 disturbance areas Malleefowl habitat (Figure 3.2):

- between September and February (inclusive); and
- re-checked in March, to identify any late emergence of chicks.

The guidelines require area searches for mounds for a minimum of 10 hours per 50 ha survey area unit, or 30 hours of walked transects by 5,000 ha about 1 km apart in suitable habitat.

The following will be recorded during pre-clearance surveys:

- Malleefowl individuals;
- Malleefowl footprints; and
- Malleefowl mounds.

A differential GPS will be used to accurately record the location of Malleefowl mounds. Each mound will be given a unique number, to be installed on a numbered stake, installed 5 m away from the mound. The unique numbering will be used to support monitoring and reporting during the construction and operation period.

Where Malleefowl mounds are recorded, they will be assessed to determine if they are active or potentially active. Nesting activity will be assessed, including:

- nest construction by a breeding pair; and
- nest maintenance (e.g. mounding of sand and replacement of leaf litter) by a male Malleefowl.

Exclusion areas will be established around each active or potentially active Malleefowl mound identified during pre-clearance surveys. The exclusion areas will comprise a 200 m circular buffer around the mound, and will be clearly depicted on clearing plans to prevent inadvertent disturbance. Clearing areas outside the no-go area will be clearly demarcated on the ground (e.g. survey pegs and flagging tape). Each individual mound will be checked by a suitably qualified environmental professional at the end of breeding season (February) to confirm that breeding has concluded.

Clearing procedures

To minimise the risk of adverse impacts on Malleefowl breeding success and the risk of injury or fatality during clearing:

- Malleefowl mounds identified as active or potentially active during pre-clearance surveys will be protected during clearing activities through an exclusion 200 m circular buffer around the mound;
- each active or potentially active mound will be checked by a suitably qualified environmental professional at the end of breeding season (February) to confirm that breeding has concluded and clearing of the nest and exclusion area can start;

- clearing of mounds and the 200 m buffer can occur following confirmation that breeding has concluded at all identified active and potentially active mounds, by a suitably qualified environmental professional. following completion of pre-clearance surveys and identification of 200 m buffers around active or potentially active Malleefowl mounds, clearing of Malleefowl habitat outside the 200 m buffer areas will still occur, even during the breeding season.

5.7.2. Corben's Long-eared Bat

Pre-clearance surveys

Pre-clearance surveys will be conducted by a suitably qualified environmental professional in Corben's Long-eared Bat habitat (Figure 3.2) in the West Balranald Mine – Stage 1 disturbance areas. Pre-clearance surveys will record all suitable hollows more than 1 m above the ground within Corben's Long-eared Bat habitat with a differential GPS and marked with flagging tape for clearing. In addition, the following data will be recorded during pre-disturbance surveys:

- the number of hollows;
- size of hollows;
- height of hollow from the ground; and
- opportunistic sightings of individuals.

All suitable hollow-bearing trees more than 1 m above the ground will be uniquely identified to create a database of the hollows cleared for reporting purposes.

Clearing procedures

To minimise the risk of adverse impacts on Corben's Long-eared Bat breeding success, vegetation clearing in Corben's Long-eared Bat habitat will be restricted to the months of November to April (inclusive).

To minimise the risk of injury or fatality on Corben's Long-eared Bat during clearing, the following measures will be implemented:

- all non-hollow trees and trees with hollows below 1 m height within Corben's Long-eared Bat habitat will be cleared first;
- all trees with suitable hollows above 1 m height in Corben's Long-eared Bat habitat will be retained for two nights after surrounding vegetation has been cleared, prior to being felled; and
- all felled hollow-bearing timber will be left in situ for 24 hours to allow hollow-dependent fauna to self-relocate or inspected by a suitably qualified environmental professional.

5.7.3. Tree hollows and nests

Pre-clearance surveys

Pre-clearance surveys to identify tree hollows and nests will be conducted by a suitably qualified environmental professional in the West Balranald Mine – Stage 1 disturbance areas.

Pre-clearance surveys will be concurrent with and use the same methods as Corben's Long-eared Bat pre-clearance surveys (Section 5.7.2). Nests will also be recorded, and if possible, the taxa using the nest (i.e. raptor) will be identified. All hollow and nest-bearing trees surveyed will be marked with a unique identifier to create a database for reporting purposes.

Clearing procedures

Raptor nests will be inspected for nesting activity prior to clearing and during the nesting season (June to January) where possible, to minimise the risk of injury or fatality to raptors (particularly Little Eagle (*Hieraeetus morphnoides*) and Spotted Harrier (*Circus assimilis*)).

Clearing of trees with the potential to host raptor nests will be prioritised for the non-breeding season (i.e. February to May inclusive).

Where clearing is required during the nesting season, and the clearing of an identified active raptor nest will occur, a specialist raptor carer from the Wildlife Information, Rescue and Education Service (WIRES) must be on-site during the clearing of any identified active raptor nests to immediately take any chicks and/or eggs. Iluka will pre-identify specialist raptor carer(s) whose details will be kept on file.

The identification of an active nest will be through ground-based visual inspection, or drone inspection if necessary.

Records will be kept of the fate of any fauna encountered during clearing (e.g. released, injured and taken to vet for care, juvenile taken to the WIRES for care, deceased).

5.7.4. Unexpected threatened species finds procedure

The risk of finding unexpected threatened flora species is negligible as none were recorded during the Biodiversity Assessment for the EIS (Niche Environment and Heritage, 2016) and pre-clearance surveys conducted in West Balranald Mine – Stage 1 in September 2022 (EMM, 2022b).

Four threatened fauna species, comprising Inland Forest Bat, Redthroat, Spotted Harrier and White-fronted Chat have been recorded within West Balranald Mine – Stage 1 (Section 3.1). Malleefowl and Corben's Long-eared Bat habitat is present, and these two species have been recorded in the locality. Accordingly, these species may be encountered during clearing operations.

Several other threatened fauna species were identified as having a moderate to high likelihood of occurrence in the EIS biodiversity assessment (Niche 2015), however were not recorded. Profiles for these species are provided in Appendix B if they are encountered during clearing operations.

In the event of an unexpected threatened species find, the below steps will be taken:

1. **Stop work**.
2. Check the species profiles in Appendix B to determine if the species can be identified.
3. Notify the Senior Environment Representative.
4. Senior Environment Representative will arrange for a suitably qualified environmental professional to assess the likely impact, develop management measures and notify the relevant agency (e.g. BCS, Department of Climate Change, Environment, Energy and Water (DCCEEW) or DPI (Fisheries)).
5. Document the outcome in an unexpected species find report.

If **no impact** is expected:

1. Recommence work and maintain regular inspections.
2. Include species in subsequent toolbox talks and inductions and update the BMP.
3. Document the outcome in an unexpected species find report.

If **an impact** is expected, the below procedures would be followed:

1. Consult with relevant agencies.
2. Obtain approvals, licenses and permits as required.
3. Recommence work once advice is sought and necessary approvals, licenses and permits are obtained.
4. Include species in subsequent toolbox talks and inductions and update the BMP.
5. Document the outcome in an unexpected species find report.

5.8. Measures to limit speed and light spill in Malleefowl and Corben's Long-eared Bat habitats

The following sections provide measures that will be implemented to restrict vehicle speeds and light spill in Malleefowl habitats. These measures are required by EPBC 2012/6509.

5.8.1. Speed limit restrictions

The normal sign-posted speed limit for the site access road is 100 km/h, other than low speed zones near the intersection with Ivanhoe Rd and point of entry into the fixed plant precinct.

During the life-of-mine (including construction and operations) Iluka will implement the following measures to restrict vehicle speeds in Malleefowl habitat:

- safety measures for Malleefowl will be discussed during each staff and contractor induction session;
- if during annual Malleefowl mound surveys (refer Appendix A) an active or potentially active Malleefowl mound is identified within 250m of the access road disturbance boundary, then:
    - if the normal sign-posted speed limit of the access road at the nearest point is 100 km/h, a temporary speed limit reduction to 60 km/h will be introduced:
        - for a distance of 500 m either side of that mound, as measured from the nearest point between the mound and access road; and
        - remain in place until the end of February for that breeding season.
    - if the normal sign-posted speed limit of the access road at the nearest point is ≤60 km/h, no temporary speed limit reduction is required.

  A reduced speed zone will be applied over a longer distance where multiple active mounds are located within 250 m of the access road and overlapping speed limit restrictions applies.

  If an active or potentially active mound is located >250 m from the access road disturbance boundary, then no temporary speed limit reduction is required (i.e. the above mitigation measure is not required);
- warning signs will be installed on access roads in or near Malleefowl habitat;

- if Malleefowl are injured by vehicle or plant, they will be taken to a local veterinarian and/or WIRES for care. Records will be kept of any Malleefowl injuries or mortalities resulting from vehicle or plant collision; and

- if more than two incidences of Malleefowl plant or vehicle strike are recorded within a 12 month period, a review will be conducted into the efficacy of the above controls and consideration of adaptive management measures.

5.8.2. Light spill management

Iluka will implement the following measures during construction and operation to minimise light spill within 200m of identified active Malleefowl mounds:

- designate a 200 m buffer around each identified Malleefowl mound(s);

- minimise the use of artificial lighting in the 200 m buffer; and

- where artificial lighting is required within the 200 m buffer, directional lighting facing away from the Malleefowl mound(s) will be used if safe to do so.

5.9. Salinity management

In the Stage 1 area there is limited recharge of groundwater from direct rainfall due to low rainfall and high evaporation rates meaning that rainfall which wets the soil profile typically evaporates or is transpirated by vegetation or crops. The Loxton-Parilla Sands and the Olney Formation is recharged via through flows from areas to the east of the mine area. The ancient and dry lakes in the vicinity of the mine area (i.e. Tin Tin, Pitarpunga and Muckee lakes) with relatively lower topography and apparent surface salinisation likely experience evaporative losses from the watertable and form localised groundwater discharge features. (*Balranald Mineral Sands Project- Modification of Consent (SSD-5285)- Surface water assessment*, EMM 2022)

The risk of salinity impacts on remnant and rehabilitation areas within the Stage 1 area is considered negligible and therefore no management measures are proposed for salinity.

5.10. Weeds and feral pests

5.10.1. Weed management

Table 7 provides a summary of the weeds in each PCT in the West Balranald Mine Stage 1 area. Most PCTs are relatively weed free. However, PCTs 15, 159 and 166 have moderate to high levels of exotic grasses and forbs, including two high threat weeds that may spread into adjacent vegetated areas during clearing and ground disturbance if not appropriately managed. Accordingly, PCTs 15, 159 and 166 have been identified as weed control zones (Figure 5.1).

Table 7 – Weeds in the West Balranald Mine Stage 1 area

Plant community type	Dominant weed species	High threat weeds
15 – Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Mostly in modified condition due to past tree thinning. Weed abundance is moderate to severe. Dominated by Smooth Musturd (*Sisymbrium erysimoides*).	-
154 – Pearl Bluebush low open shrubland of the arid and semi-arid plains	Heavily grazed and relatively weed free	-
159 – Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW)	Exotic grasses and forbs including Sea Barley (*Hordeum marinum*), Wall Barley (*Hordeum leporinum),* Mediterranean Grass (*Schismus barbatus*), Bathurst Burr (*Xanthium spinosum*), and European Heliotrope (*Heliotropium europaeum*)	Bathurst Burr
166 – Disturbed annual saltbush forbland on clay plains and inundation zones mainly of south-western NSW	Exotic grasses including *Hordeum marinum* and *Hordeum leporinum* along with Capeweed (*Arctotheca calendula*) and Ward's Weed (*Carrichtera annua*).	Ward's Weed
170 – Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Lightly grazed and weeds generally absent	-
171 – Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	Weed cover light except at interfaces with cleared areas	-
221 – Black Oak – Pearl Bluebush open woodland of the sandplains of the semi-arid warm and arid climate zones	Weed cover light except at interfaces with cleared areas	-

No weeds of national significance were identified within the West Balranald - Stage 1 area. The presence of weed species has the potential to have a material impact on re-vegetation and regeneration outcomes. Additionally, any presence of weed species within the surrounding land has the potential to impact on the biodiversity value of the rehabilitated areas. Weed management will be a key component of rehabilitation activities.

Weeds will be managed across disturbed sites through the following control measures:

- a weed inspection of West Balranald – Stage 1 site disturbance areas will be conducted prior to clearing;
- if required, weed control will occur in response to weed inspection;
- herbicide spraying or scalping weeds from topsoil stockpiles prior to re-spreading topsoil;
- rehabilitation inspections to identify potential weed infestations;

- bi-annual weed inspection (in winter and summer, to target high threat weeds) and spraying of identified weed populations of West Balranald – Stage 1 site disturbance areas over the life of the mine (if required);

- inspection process of vehicles and mobile plant prior to site entry. Appropriate wash down and containment of sediment if required at site. Any wash down facilities will be maintained; and

- any use of herbicides will be carried out in accordance with the regulatory requirements.

In the event of new infestations of declared or high threat weeds as a result of construction activities, the relevant control authority will be notified as per the NSW *Biosecurity Act 2015* and *Biosecurity Regulation* 2017.

5.10.2. Feral pest management

Rabbit warrens have been identified within the West Balranald Mine – Stage 1 disturbance area, and other feral animals such as goats, foxes and pigs are known to occur within the locality.

To minimise the risk of erosion, sedimentation and increased edge-effects in retained habitat adjoining construction and operational areas, a goat proof fence has been established around the main West Balranald – Stage 1 site disturbance area (Figure 5.1) with measures to be implemented to manage feral animals and predators during construction and operation.

The following techniques will be employed by a suitably qualified and licensed operator/s when pest animal monitoring identifies a need for control:

- annual baiting for rabbits using 1080 (sodium fluroacetate) and/or fumigation of rabbit burrows;

- mustering, trapping of goats; and

- annual baiting using 1080 (sodium fluroacetate) for foxes and other feral predators (i.e. cats and pigs).

The above pest management measures will be carried out within areas under Iluka's management (Figure 5.1) in conjunction with surrounding landowners and/or lessees where possible to increase the effectiveness of such programs.

Baiting is to be carried out in accordance with the NSW EPA Pesticide Control (1080 Bait Products) Order 2020 issued under section 38 of the *NSW Pesticides Act 1999*.

5.11. Erosion

- Erosion and sediment controls will be implemented for the mine development area in accordance with the site Water Management Plan, designed generally in accordance with the principles described in the series Managing Urban Stormwater: Soils and Construction including Volume 1 (Landcom, 2004) and Volume 2E Mines and Quarries (DECC, 2008) and Volume 2A – Installation of Services and Volume 2C – Unsealed Roads, including the following measures:

- minimising surface disturbance and restricting access to undisturbed areas;

- use of Iluka's SDP that includes specification of area specific erosion and sediment controls;

- installing appropriate erosion and sediment controls prior to disturbance of any land and around soil stockpile areas;

- progressive rehabilitation/stabilisation of disturbance areas;

- storing soil stockpiles at appropriate distances from watercourses;
- soil stockpile batters constructed at a minimum slope of 1:1.7;
- stabilise soil stockpile surfaces with vegetation or hydromulch as soon as practicably possible if required;
- separation of runoff from disturbed and undisturbed areas, where practicable;
- construction of surface drains to control and manage surface runoff;
- reducing the flow rate of water across exposed surfaces and in areas where water concentrates (e.g., through use of coir logs or cross ripping);
- construction of sediment dams to contain runoff up to a specified design criteria; and
- treating rehabilitation areas to promote infiltration (e.g. cross ripping ripping);

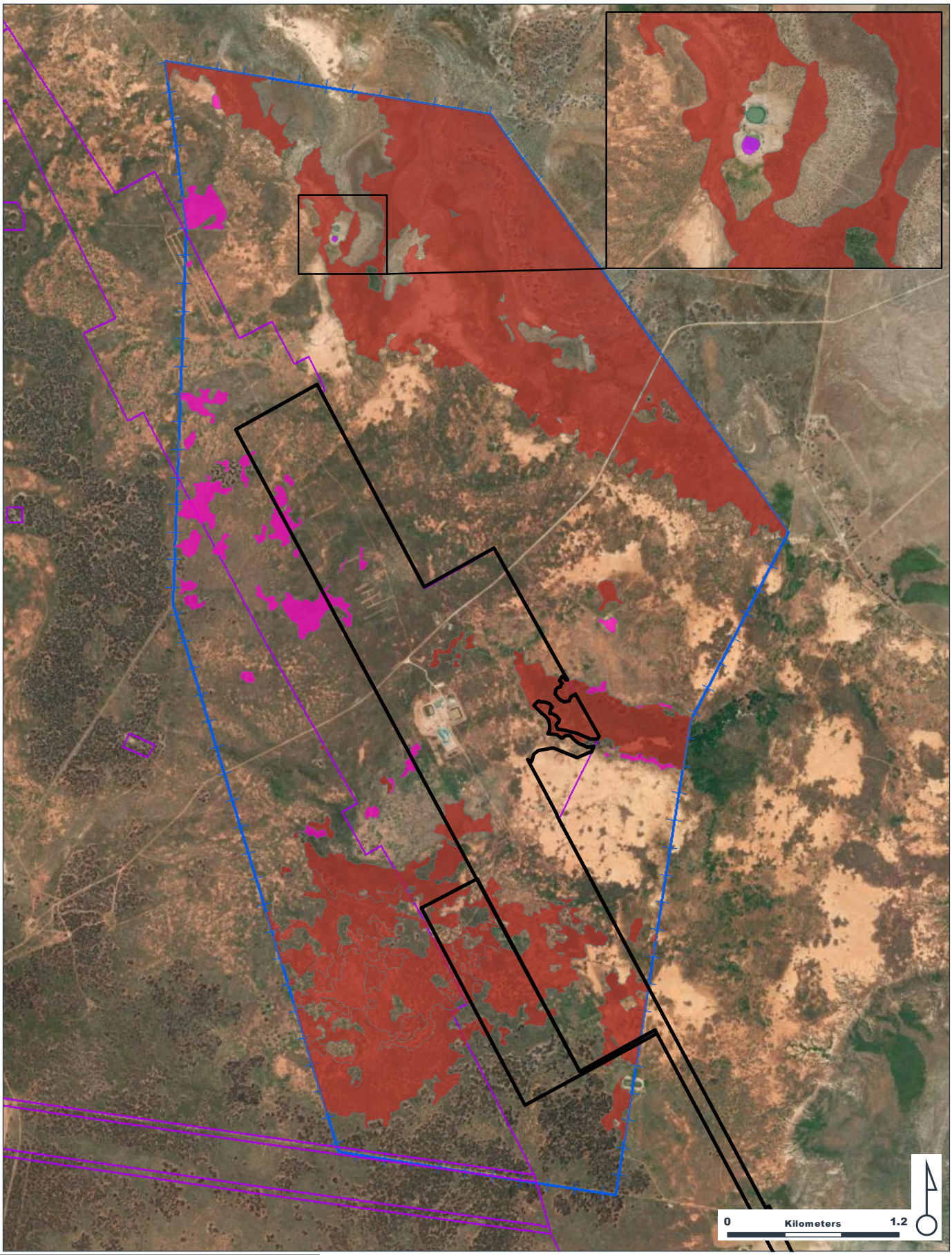
5.12. Access

Measures to control access into retained areas of native vegetation and fauna habitat include:

- use of Iluka's internal SDP for all ground disturbance activities to prevent inadvertent disturbance;
- illustration of avoidance areas and disturbance boundary on all clearing plans;
- delineation of avoidance areas where there is a risk of inadvertent access;
- demarcating of clearing boundaries with pegs and/or flagging tape;
- buffer zones established around potentially active or active Mallee fowl mounds;
- vehicular traffic to remain on formed tracks; and
- worker inductions and awareness training for controlling access into retained areas of native vegetation and fauna habitat.

5.13. Bushfire

Bushfire management measures will be incorporated into Iluka's Emergency Control and Response Plan in relation to the prevention of bushfire (e.g. minimum asset protection zones (APZs), fire response equipment, maintenance of site access roads and boundaries, restrictions on hot works and vegetation clearing during days of extreme or catastrophic fire danger rating).



Legend

Weed management zone PCT

- 15
- 159
- 166

- Approved EIS Disturbance Boundary
- Stage 1 area (Vegetation and Habitat Enhancement Area)
- Goat proof fence (Offsite pest animal and weed management extent)

ILUKA

BALRANALD MINERAL SANDS MINE- STAGE 1
PEST ANIMAL AND WEED MANAGEMENT ZONES

ORIG: B.Isaacs **DRAWN:** Drawn **SCALE (A4):** 1:36,457 **DATE:** 20/07/2025 **DWG No:**

GDA 1994 MGA Zone 54

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6. Monitoring program

A monitoring program (with seasons prescribed, where appropriate) will be implemented to assess the efficacy of the management measures in Section 5. If the results of monitoring show that the management measures have not been effective in achieving performance targets, adaptive management would occur by implementing adaptive control measures. The monitoring program is described in the following sections.

6.1. Minimising clearing in the approved footprint

The following will be monitored to assess the efficacy of measures proposed to minimise clearing in the approved footprint:

- All site disturbance activities will be undertaken in accordance with Iluka's Site Disturbance Procedure.
- The Environmental Advisor will confirm that any exclusion area has been clearly identified on any clearing plans prior to any clearing in the area.
- Clearing areas to be clearly demarcated on the ground by a competent surveyor and consistent with clearing plans.
- A pre-disturbance survey report will be prepared that documents the methods and results of pre-disturbance surveys.
- The results of pre-clearance inspections and report will be reviewed during the Annual Review to determine their efficacy.

Timing: During preparation of Site Disturbance Permit for clearing adjacent to retained areas of PCT 166 and PCT 15.

6.2. Rehabilitation

Rehabilitation monitoring will be conducted as per monitoring measures in the Rehabilitation Management Plan.

Timing: Progressive rehabilitation in accordance with Rehabilitation Management Plan.

6.3. Protection of adjacent vegetation and habitat

The following will be monitored to assess the efficacy of measures proposed to protect adjacent vegetation and habitat:

- All site disturbance activities will be undertaken in accordance with Iluka's *Site Disturbance Procedure*.
- The Environmental Advisor will confirm that any exclusion area has been clearly identified on any clearing plans prior to any clearing in the area.
- Clearing areas to be clearly demarcated on the ground by a competent surveyor and consistent with clearing plans.
- A pre-disturbance survey report will be prepared that documents the methods and results of pre-disturbance surveys.
- The results of pre-clearance inspections and report will be reviewed during the Annual Review to determine their efficacy.

Timing: During preparation of Site Disturbance Permit for each clearing front.

6.4. Improving vegetation and habitat condition

Monitoring to assess the efficacy of measures to improve vegetation and habitat condition will be in accordance with the Rehabilitation Management Plan.

6.5. Timber, vegetation and soil salvage

Topsoil monitoring would be conducted in accordance with the Rehabilitation Management Plan. The following will be monitored to assess the efficacy of measures proposed for timber, topsoil (including vegetation) and subsoil salvage:

- Ensure timber, topsoil and subsoil are stockpiled separately.
- Ensure accurate records are kept of stockpile types, volumes and locations.

Timing: During and post soil and vegetation salvage for each clearing front.

6.6. Pre-clearance and clearing

The following will be monitored to assess the efficacy of measures proposed to protect Malleefowl and Corben's Long-eared Bat prior to and during clearing:

- During preparation of Iluka Site Disturbance Permits for clearing in Malleefowl habitat, the Environmental Advisor will conduct checks to confirm that the 200 m buffer area around active Malleefowl mounds has been clearly identified on clearing plans prior to any clearing (by end of February and prior to impact).
- Clearing areas to be clearly demarcated on the ground by a competent surveyor and consistent with clearing plans.
- During preparation of the Iluka Site Disturbance Permit for clearing active or potentially active Malleefowl mounds, a suitably qualified environmental professional will prepare a Malleefowl pre-disturbance inspection report that confirms (or otherwise) that breeding has concluded (by end of February – and potentially to the end of March if late emerging chicks are identified – and prior to impact).
- A clearing report will be prepared to document all nests (active or inactive) destroyed during clearing activities using the National Malleefowl Monitoring System, including providing the data to the National Malleefowl Monitoring Database (March to end of August, following impact).
- A clearing report will be prepared by the Environmental Advisor for each clearing front within Corben's Long-eared Bat habitat, which will document the dates when non-hollow trees, trees with hollows below 1 m height and trees with hollows above 1 m height were cleared. The report will also document nests to be removed (November to April, inclusive).
- The results of pre-clearance inspections and report will be reviewed during the annual review to determine the efficacy of implemented measures (end of March each year).

Timing: As specified above.

6.7. Measures to limit speed and light spill in Malleefowl habitat

The following will be monitored to assess the efficacy of measures proposed to limit speed and light spill in Malleefowl habitat:

- The number of information sessions on Malleefowl protection per year will be recorded (during the annual review, by end of March each year).
- Plant or vehicle drivers will report details of any Malleefowl injury or mortality to the Environmental Advisor (as required).
- The Environmental Advisor will keep records of any Malleefowl injuries or mortalities resulting from vehicle or plant collision for review during environmental auditing (during the annual review, by end of March each year).

Timing: As specified above.

6.8. Salinity management

Monitoring of groundwater levels in the Loxton Parilla Sands Formation and Shepparton formation will be conducted in accordance with the Water Management Plan. The Water Management Plan includes an adaptive exceedance protocol in response to an exceedance of the hydraulic operating conditions to minimise impacts associated with groundwater mounding.

6.9. Weeds and feral pests

The following will be monitored to assess the efficacy of measures proposed to control weeds and feral pests:

- Records will be maintained of weed infestations, control measures and agency consultation undertaken (as required).
- Inspections for weeds will be undertaken and weeds will be controlled via scalping or chemical spraying (bi-annually, in winter and summer, to target high threat weeds).
- Records of wash down facility maintenance will be kept (concurrent with annual review, by end of March each year).
- Regular inspections of the goat proof fencing and repairing, as required.
- Pest and predator monitoring will be conducted by a suitably qualified environmental professional (every three years following the initial control period, during an appropriate timing for target species).
- Monitoring outcomes will be used to inform adaptive management measures where required to increase the efficacy of control measures (concurrent with every third annual review, by end of March).

Timing: As specified above.

6.10. Erosion

Erosion and sediment control monitoring will be in accordance with the Water Management Plan.

6.11. Access

Monitoring of access control will be completed in accordance with Section 5.12.

6.12. Bushfire

Bushfire monitoring will be in accordance with the Emergency Control and Response Plan.

6.13. Malleefowl monitoring

West Balranald mine - Stage 1 has the potential to impact Malleefowl. Iluka's *Malleefowl Monitoring and Management Sub Plan* (MMMSP) has been prepared in accordance with the guidelines provided in the *National Manual for the Malleefowl Monitoring System* (National Malleefowl Recovery Team, 2020) and the *National Recovery Plan for Malleefowl* (Benshemesh J. , 2007) (Appendix A). The *MMMSP* outlines the life history, distribution and threats to Malleefowl and details measures for the management and monitoring of Malleefowl individuals and mounds.

7. Summary of management and monitoring measures

Detailed management measures presented in Section 5 and monitoring measures in Section 6 are consolidated in Table 8. Performance targets, monitoring measures, timing and responsibility are provided in for each detailed management measure.

Table 8 – Summary of management and monitoring measures

Environmental management activity	Management measures	Monitoring	Performance target	Adaptive control measures	Timing	Responsibility
Minimising clearing in the approved footprint						
Clearing procedures	Impacts on PCT 15 and PCT 166 in the additional disturbance area will be avoided.	As per monitoring Site Disturbance Permit (SDP[1])	As per performance targets in the SDP[1].	As per adaptive control measures in the SDP[1].	During preparation of SDP[1] for clearing adjacent to retained areas of PCT 166 and PCT 15.	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
	All site disturbance activities will be undertaken in accordance with Iluka's Site Disturbance Procedure.					
	Awareness and education during the Iluka induction process.		All staff and contractors are given an environmental induction relevant to this BMP.	N/A		
Rehabilitation						
Rehabilitation	Rehabilitation in accordance with the *Rehabilitation Management Plan.*	As per monitoring measures in the *Rehabilitation Management Plan.*	As per performance targets in the *Rehabilitation Management Plan.*	As per adaptive control measures in the *Rehabilitation Management Plan.*	Construction and operation	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
Rehabilitation	Clearing of vegetation ahead of the mining activities, comprising for low open shrubland areas clearing the understorey with the topsoil layer, while for portions of the access road stockpiling the majority of overstorey timber, while retaining some for habitat-enhancement purposes and/or surface treatment.	As above	As above	As above	As above	As above
	Surface soil stripping, stockpiling, and management, comprising timber, topsoil and vegetation stockpiling; overburden would be maintained in separate stockpile categories (including recording soil type, quality, location, plant community type, weeds present (if any), removal date, storage location and dust suppression treatment (if any)).	As above	As above	As above	As above	As above
	Disturbance areas would be stripped progressively (i.e. only as required) but with due regard to seasonal clearing windows necessitating clearing/stripping earlier than otherwise would be required for progressive disturbance.	As above	As above	As above	As above	As above
Rehabilitation	Rehabilitation of disturbed areas would be undertaken as soon as practicable after the areas are no longer required and with due regard to geotechnical stability risks.	As per monitoring measures in the *Rehabilitation Management Plan.*	As per performance targets in the *Rehabilitation Management Plan.*	As per adaptive control measures in the *Rehabilitation Management Plan.*	Construction and operation	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
Protection of adjacent vegetation and habitat						
Clearing procedures	All site disturbance activities will be undertaken in accordance with Iluka's *Site Disturbance Procedure* (SDP[1]).	As per monitoring in SDP[1]	As per performance targets in the SDP[1].	As per adaptive control measures in the SDP[1].	During preparation of SDP[1] for clearing.	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
	Site disturbance may only proceed once a SDP[1] has been completed and approved by the relevant Iluka personnel.					

Environmental management activity	Management measures	Monitoring	Performance target	Adaptive control measures	Timing	Responsibility
Improving vegetation and habitat condition						
Timber, vegetation and soil salvage	Clearing of vegetation ahead of the mining activities, comprising for low open shrubland areas clearing the understorey with the topsoil layer, while for portions of the access road stockpiling the majority of overstorey timber, while retaining some for habitat-enhancement purposes and/or surface treatment.	As per monitoring measures in the *Rehabilitation Management Plan.*	As per performance targets in the *Rehabilitation Management Plan.*	As per adaptive control measures in the *Rehabilitation Management Plan.*	Construction and operation	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
	Surface soil stripping, stockpiling, and management, comprising timber, topsoil and vegetation stockpiling; overburden would be maintained in separate stockpile categories (including recording soil type, quality, location, plant community type, weeds present (if any), removal date, storage location and dust suppression treatment (if any)).	As above	As above	As above	As above	As above
	Disturbance areas would be stripped progressively (i.e. only as required) but with due regard to seasonal clearing windows necessitating clearing/stripping earlier than otherwise would be required for progressive disturbance.	As above	As above	As above	As above	As above
Pre-clearance procedures						
Pre- clearance surveys	Pre-clearance surveys to identify tree hollows and nests will be conducted by a suitably qualified environmental professional. Pre-clearance surveys will use the same methods as Corben's Long-eared Bat pre-clearance surveys. All nests will also be recorded, and if possible, the taxa using the nest (i.e. raptor) will be identified. All hollow and nest-bearing trees surveyed will be marked with a unique identifier to create a database for reporting purposes.	Pre-disturbance survey report that documents the methods and results of pre-disturbance surveys.	All tree hollows and nests identified and recorded prior to disturbance. All active and potentially active Malleefowl mounds identified and recorded prior to disturbance. Information disseminated to staff and contractors during inductions and onboarding.	N/A	Pre-construction	Environmental Superintendent – Balranald, Environmental Advisor, Suitably Qualified Environmental Professional
	Pre-clearance surveys for Malleefowl will be conducted by a suitably qualified environmental professional in accordance with *Survey Guidelines for Australia's threatened birds* (DEWHA, 2010) in the West Balranald Mine – Stage 1 disturbance areas Malleefowl habitat between September and February (inclusive) and prior to impact.	As above	As above	N/A	As above	As above
Pre- clearance surveys	Exclusion areas will be established around each active Malleefowl mound identified during pre-clearance surveys. The exclusion area will comprise a 200 m circular) buffer around the mound, and will be clearly depicted on clearing plans to prevent inadvertent disturbance. Clearing areas outside exclusion areas will be clearly demarcated on the ground (e.g. survey pegs and flagging tape); each individual mound will be checked by a suitably qualified environmental professional at the end of breeding season (February) to confirm that breeding has concluded and clearing can occur.	Malleefowl mound and buffer locations will be documented during the SDP[1] process. The Environmental Advisor will confirm that the clearing area has been clearly demarcated and is consistent with clearing plans prior to any clearing in the area.	No active or potentially active Malleefowl mounds are cleared during breeding season (September to February inclusive, and potentially up to end of March if late emerging chick are identified).	Clearing should immediately cease in the relevant clearing front and the incident reported in accordance with Section 2.8.	Pre-construction	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
	Active and potentially active mounds will be checked in February (and re-checked in March) by a suitably qualified environmental professional. Upon confirmation breeding has concluded clearing of mounds and removal of the 200 m buffer can occur.	The suitably qualified environmental professional will prepare a Malleefowl pre-disturbance inspection report that confirms (or otherwise) that breeding has concluded.	As above	As above	Pre-construction	Environmental – Balranald, Environmental Advisor

Environmental management activity	Management measures	Monitoring	Performance target	Adaptive control measures	Timing	Responsibility
Pre- clearance surveys	Pre-clearance surveys will be conducted by a suitably qualified environmental professional in Corben's Long-eared Bat habitat (Figure 3.2) in the West Balranald Mine – Stage 1 disturbance areas.	Pre-disturbance survey report that documents the methods and results of pre-disturbance surveys.	All trees with suitable hollows above 1 m height identified and recorded prior to disturbance. Information disseminated to staff and contractors during inductions and onboarding.	N/A	Pre-construction	Environmental Superintendent – Balranald, Environmental Advisor, Suitably Qualified Environmental Professional
	All trees with suitable hollows above 1 m height in Corben's Long-eared Bat habitat will be marked with a unique identifier prior clearing.	A pre-clearance inspection of hollow-bearing trees will be completed as part of SDP[1] in each clearing area. The results of pre-clearance inspections will be reviewed during environmental auditing.	Trees with suitable hollows above 1 m height are retained for two nights after surrounding vegetation has been cleared, prior to being felled.	Clearing should immediately cease in the relevant clearing front and the incident reported in accordance with Section 2.8.	Pre-construction	Environmental – Balranald, Environmental Advisor
Clearing procedures						
Clearing procedures	Malleefowl mounds identified as active or potentially active during pre-clearance surveys will be protected for the duration of the breeding season (i.e. September to the end of February, and potentially up to end of March if late emerging chicks are identified).	A suitably qualified environmental professional will inspect each active and potentially active Malleefowl mound at the end of breeding season (February) to confirm that breeding has concluded. A clearing report will be prepared to document all nests destroyed during clearing activities using the National Malleefowl Monitoring System, including providing the data to the National Malleefowl Monitoring Database.	All active and potentially active Malleefowl mounds are protected for the duration of the breeding season.	Clearing should immediately cease in the 200 m buffer area and the incident reported in accordance with Section 2.8.	Pre-construction and construction	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Suitably Qualified Environmental Professional
Clearing procedures	Each active or potentially active individual mound will be checked by a suitably qualified environmental professional at the end of the breeding season (February, and potentially up to end of March if late emerging chicks are identified) to confirm that breeding has concluded.	As above	As above	As above	As above	As above
	Clearing of mounds and the 200 m buffer can occur following confirmation that breeding has concluded at all identified active and potentially active mounds, by a suitably qualified environmental professional.	As above	As above	As above	As above	As above
	Following completion of pre-clearance surveys and identification of 200 m buffers around active or potentially active Malleefowl mounds, clearing of Malleefowl habitat outside the 200 m buffer areas can occur, even during the breeding season.	As above	As above	As above	As above	As above

Environmental management activity	Management measures	Monitoring	Performance target	Adaptive control measures	Timing	Responsibility
Clearing procedures	All non-hollow trees and trees with hollows below 1 m height within Corben's Long-eared Bat habitat will be cleared first. All trees with suitable hollows above 1 m height in Corben's Long-eared Bat habitat will be retained for two nights after surrounding vegetation has been cleared, prior to being felled. All felled hollow-bearing timber will be left in situ for 24 hours to allow hollow-dependent fauna to self-relocate or inspected by a suitably qualified environmental professional. Raptor nests will be inspected prior to clearing to determine if the nest is active. All trees with suitable hollows above 1 m height in Corben's Long-eared Bat habitat will be retained for two nights after surrounding vegetation has been cleared, prior to being felled. All felled hollow-bearing timber will be left in situ for 24 hours to allow hollow-dependent fauna to self-relocate or inspected by a suitably qualified environmental professional. Raptor nests will be inspected prior to clearing to determine if the nest is active.	A clearing report will be prepared by the Environmental Advisor for each clearing front within Corben's Long-eared Bat habitat, which will document the dates when non-hollow trees, trees with hollows below 1 m height and trees with hollows above 1 m height were cleared. The report will also document nests to be removed.	All trees with suitable hollows above 1 m height are retained for two nights after surrounding vegetation has been cleared, prior to being felled.	Clearing should immediately cease in the relevant clearing front and the incident reported in accordance with Section 2.8.	Construction	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
Clearing procedures	All trees with suitable hollows above 1 m height in Corben's Long-eared Bat habitat will be retained for two nights after surrounding vegetation has been cleared, prior to being felled. All felled hollow-bearing timber will be left in situ for 24 hours to allow hollow-dependent fauna to self-relocate or inspected by a suitably qualified environmental professional. Raptor nests will be inspected prior to clearing to determine if the nest is active.	A clearing report will be prepared by the Environmental Advisor for each clearing front within Corben's Long-eared Bat habitat, which will document the dates when non-hollow trees, trees with hollows below 1 m height and trees with hollows above 1 m height were cleared. The report will also document nests to be removed.	All trees with suitable hollows above 1 m height are retained for two nights after surrounding vegetation has been cleared, prior to being felled.	Clearing should immediately cease in the relevant clearing front and the incident reported in accordance with Section 2.8.	Construction	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
Clearing						
Raptor nests	Raptor nests will be inspected for nesting activity prior to clearing and during the nesting season (June to January) where possible, to minimise the risk of injury or fatality to raptors (particularly Little Eagle and Spotted Harrier). A specialist raptor carer from WIRES is on site during the clearing of any identified active raptor nests to immediately take any chicks and/or eggs.	Records will be kept of the fate of any fauna encountered during clearing (e.g. released, injured and taken to vet for care, juvenile taken to the WIRES for care, deceased).	A specialist raptor carer from WIRES is on site during the clearing of any identified active raptor nests to immediately take any chicks and/or eggs.	Clearing should immediately cease in the relevant clearing front and the incident reported in accordance with Section 2.8.	Construction	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors

Environmental management activity	Management measures	Monitoring	Performance target	Adaptive control measures	Timing	Responsibility
Measures to limit speed and light spill in Malleefowl habitat						
Warning signs, induction materials and temporary speed limit restrictions	Warning signs will be installed adjacent to active and potentially active Malleefowl mounds. Temporary speed limits applied if active or potentially active mounds are identified found within 250m of the access road, in the period between September to February inclusive (and potentially up to the end of March if late emerging chicks are identified).–	Records will be kept of any Malleefowl injuries or mortalities. resulting from vehicle or plant collision and reviewed during environmental auditing	No Malleefowl are struck by vehicles or plant	Review conducted of the speed limit, efficacy of signage and induction materials	Construction and operation	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
	If Malleefowl are injured by vehicle or plant, they will be taken to a local veterinarian and/or WIRES for care. Records will be kept of any Malleefowl injuries or mortalities resulting from vehicle or plant collision.					
Warning signs, induction materials and temporary speed limit restrictions	If more than two incidences of Malleefowl plant or vehicle strike are recorded within a 12 month period, a review conducted of the speed limit and the efficacy of signage and induction materials.	As above	As above	As above	As above	As above
Light spill management	A 200 m buffer will be designated around each identified active Malleefowl mound adjacent to the West Balranald Mine – Stage 1 will be identified.	Malleefowl mound and buffer locations will be documented in the SDP[1]. The Environmental Advisor will confirm that the exclusion area has been identified on plans prior to any clearing in the area.	200 m buffer is clearly identified	N/A	Construction and Operation	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
	Minimise the use of artificial lighting in the 200 m Malleefowl buffer.	An audit of proposed artificial lighting is conducted for the 200 m buffer areas.	Artificial lighting use is minimised as far as practicable near active Malleefowl mounds.	Artificial lighting use is reviewed during each environmental audit and revised as appropriate.	As above	As above
Light spill management	Where artificial lighting is required within the buffer, directional lighting facing away from the Malleefowl mound(s) and retained habitats will be used if safe to do so.	An audit of proposed artificial lighting is conducted for the 200 m buffer areas.	Directional lighting is used when artificial lighting is required within buffer areas and near retained habitats if safe to do so.	Artificial lighting use is reviewed during each environmental audit and revised as appropriate.	Pre-construction and construction	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
Salinity management						
Salinity management	Salinity will be managed in accordance with the Rehabilitation Management Plan.	As per monitoring measures in the *Rehabilitation Management Plan.*	As per performance targets in the *Rehabilitation Management Plan.*	As per adaptive control measures in the *Rehabilitation Management Plan.*	Construction and operation	Manager Environment, Environmental Superintendent – Balranald
Weeds and feral pests						
Weed management	A weed inspection of West Balranald – Stage 1 site disturbance areas will be conducted prior to clearing.	Records will be maintained of weed infestations and control measures undertaken.	Washdown bay is maintained regularly. Existing and new declared weed infestations are controlled at the boundary of the construction area and retained habitats.	If weed control is unsuccessful, consider carrying out follow-up weed control or an alternative control method.	Construction and operation	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
	If required, weed control will occur in each weed management zone prior to clearing.					
	Inspection and cleaning of vehicles, plant and equipment before entry to the site.					
	Herbicide spraying or scalping weeds from topsoil stockpiles prior to re-spreading topsoil.					
	Rehabilitation inspections to identify potential weed infestations.					

Environmental management activity	Management measures	Monitoring	Performance target	Adaptive control measures	Timing	Responsibility
Weed management	Bi-annual weed inspection (in winter and summer, to target high threat weeds) and spraying of identified weed populations of West Balranald – Stage 1 site disturbance areas over the life of the mine (if required).	Records will be maintained of weed infestations and control measures undertaken.	Washdown bay is maintained regularly. Existing and new declared weed infestations are controlled at the boundary of the construction area and retained habitats.	If weed control is unsuccessful, consider carrying out follow-up weed control or an alternative control method.	Construction and operation	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
	Inspections of rehabilitated areas for declared and high-threat weeds will be undertaken and weeds controlled via chemical spraying, fire management, grazing management and hygiene management as appropriate.					
	Inspection of vehicles and mobile plant on site entry. Appropriate wash down and containment of sediment if required. Wash down facilities will be maintained.					
	Any use of herbicides will be carried out in accordance with the regulatory requirements.					
	Weed control will be undertaken in a manner that will minimise soil disturbance.					
Feral pest management	Goat proof fencing will be established around the main West Balranald – Stage 1 site disturbance footprint	Regular inspection of fencing	Reduced density of feral pests and predators in retained habitats.	Increase in control frequency or change of control techniques.	Construction and operation	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
	Feral pest management will be undertaken in consultation with surrounding landholders to identify appropriate bait types for the target species, method and timing of bait delivery, baiting area and frequency.	Pest and predator monitoring will be conducted by a suitably qualified environmental professional every three years.				
Erosion						
Erosion and dust management	Implement erosion and sediment control measures in accordance with the *Water Management Plan.*	As per monitoring measures in the *Water Management Plan.*	As per performance targets in the *Water Management Plan.*	As per adaptive control measures in the *Water Management Plan.*	Construction and operation	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
Access						
Access control	All site disturbance activities will be undertaken in accordance with Iluka's *Site Disturbance Procedure* (SDP[1])	As per monitoring in SDP[1].	As per performance targets in the SDP[1].	As per adaptive control measures in the SDP[1].	During preparation of SDP[1].	Manager Environment, Environmental Superintendent – Balranald, Environmental Advisor, Employees and Contractors
	Site disturbance may only proceed once a SDP[1] has been completed and signed by the relevant Iluka personnel.					
Bushfire						
Fire management	Bushfire mitigation will be in accordance with the *Emergency Control and Response Plan* and Section 5.13 of this BMP.	Bushfire mitigation will be in accordance with the *Emergency Control and Response Plan* and Section 5.13 of this BMP.	As per monitoring measures in *Emergency Control and Response Plan.*	As per performance targets in *Control and Response Plan.*	As per adaptive control measures in *Emergency Control and Response Plan.*	Construction and operation

Notes:

[1] *Iluka's Site Disturbance Permit (SDP[1]) is an internal document used for ground disturbance activities within the approved disturbance boundary.*

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Appendix A Malleefowl management and monitoring sub-plan

Balranald Mineral Sands Project

Malleefowl Management and Monitoring Sub-Plan

Prepared for Iluka Resources

Balranald Mineral Sands Project

Malleefowl Management and Monitoring Sub-Plan

Version	Date	Prepared by	Approved by	Comments
1	24 November 2022	Jennifer Lindsay	Katie Diver	Draft
2	16 January 2023	Katie Diver	Paul Gibbons	Final Draft
3	7 February 2023	Katie Diver	Paul Gibbons	Final
4	8 March 2023	Katie Diver	Paul Gibbons	Final for submission
5	10 May 2023	Katie Diver	Paul Gibbons	Final Draft addressing BCD comments
6	15 June 2023	Katie Diver	Paul Gibbons	Final Draft
7	29 July 2025	Brendan Isaacs	Dave Wright	Final Draft

Approved by

Katie Diver

National Technical Leader - Ecology

15 June 2023

Level 3 175 Scott Street

Newcastle NSW 2300

Table of Contents

Appendices

Figures

Photographs

Tables

1. Introduction

1.1. Purpose

This Malleefowl Management and Monitoring Sub Plan (MMMSP) has been prepared for Iluka Resources Limited (Iluka) to satisfy Condition 17(d) of NSW *Environmental Planning and Assessment Act 1979* consent (SSD-5285) for the Balranald Mineral Sands Mine (the Balranald Mine), New South Wales (NSW).

This MMMSP forms an appendix to the Balranald Mineral Sands Mine – West Balranald Mine Stage 1 Biodiversity Management Plan (EMM, 2022), hereafter referred to as the BMP. This MMMSP has been prepared in accordance with:

- Objective 9 of the *National Recovery Plan for Malleefowl* (Benshemesh, 2007), namely 'Monitor Malleefowl and develop an adaptive management framework at monitoring sites'; and
- the National Malleefowl Monitoring Manual: Edition: v2020_01 (National Malleefowl Recovery Team, 2020).

The sites selected as part of this monitoring program are intended to form part of the National Malleefowl Monitoring System.

Monitoring Malleefowl in relation to the Balranald Mine provides an opportunity to satisfy aim 2 of the National Malleefowl Monitoring System, namely '*interpret breeding density trends in the light of management practices and environmental variables*'.

This MMMSP proposes a Before-After Control-Impact (BACI) experimental design (Section 3.1.5) which aims to assess breeding activity trends proximal to the Balranald Mine over time. The monitoring program also assesses trends in key Malleefowl threats (Section 2.5) and their management over time as part of the BMP.

This MMMSP includes:

- a description of Malleefowl (*Leipoa ocellata*) ecology, habitat and distribution, and key threats to the species; and
- a detailed description of the monitoring program, including the different monitoring protocols recommended for Malleefowl.

1.2. Project background

Management actions that would benefit Malleefowl are detailed in Chapter 6 of the BMP. The efficacy of the management measures in Chapter 6 of the BMP will be analysed and adapted where required.

Iluka have approval to develop a mineral sands mine in south-western New South Wales (NSW), known as the Balranald Mineral Sands Mine (the Balranald Mine). It includes construction, open-cut mining, primary processing, and rehabilitation of two linear mineral sand deposits, known as the West Balranald and Nepean deposits, located approximately 12 kilometres (km) and 66 km north-west of the town of Balranald (Balranald town), respectively. The Balranald Project also included undertaking an approved bulk sampling activity at the West Balranald deposit with the removal of up to 100,000 tonnes (t) of mineral ore to trial the use of underground mining methods (Section 3.1.4).

Development consent (SSD-5285) was granted for the Balranald Project by a delegate of the NSW Minister for Planning under the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 5 April 2016 (herein referred to as the consent). Approval was also granted under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (EPBC 2012/6509) by a delegate of the Commonwealth Minister for the Environment on 6 January 2017 (herein referred to as the Commonwealth approval). The project EIS was supported by a Biodiversity Assessment prepared by Niche Environment and Heritage Pty Limited in 2016 (Niche 2016).

Since the consent was granted, Iluka undertook the approved bulk sampling activity between 2016 and 2020, involving the extraction of the mineral ore from depth using trial underground mining within the approved disturbance area of the West Balranald deposit. On 21 December 2022, Iluka were granted approval to modify the consent (MOD1) to expand the underground mining trial which includes an additional area of disturbance to the approved Balranald Mine area to enable primary processing of the ore into heavy mineral concentrate (HMC) and transport of HMC offsite for secondary processing at Iluka's other facilities. The expansion was approved under a modification to the development consent (SSD-5285 MOD1) and is hereafter referred to as West Balranald Mine – Stage 1.

On 16 July 2025, Iluka were granted approval to modify the consent (MOD4) to develop a solar farm and Battery Energy Storage System (BESS). The solar farm development included approximately 70Ha of additional disturbance within the approved EIS boundary. The additional disturbance has been accounted for in the Stage 1 offset area (Table 7 of the Consent).

1.3. Malleefowl assessment background

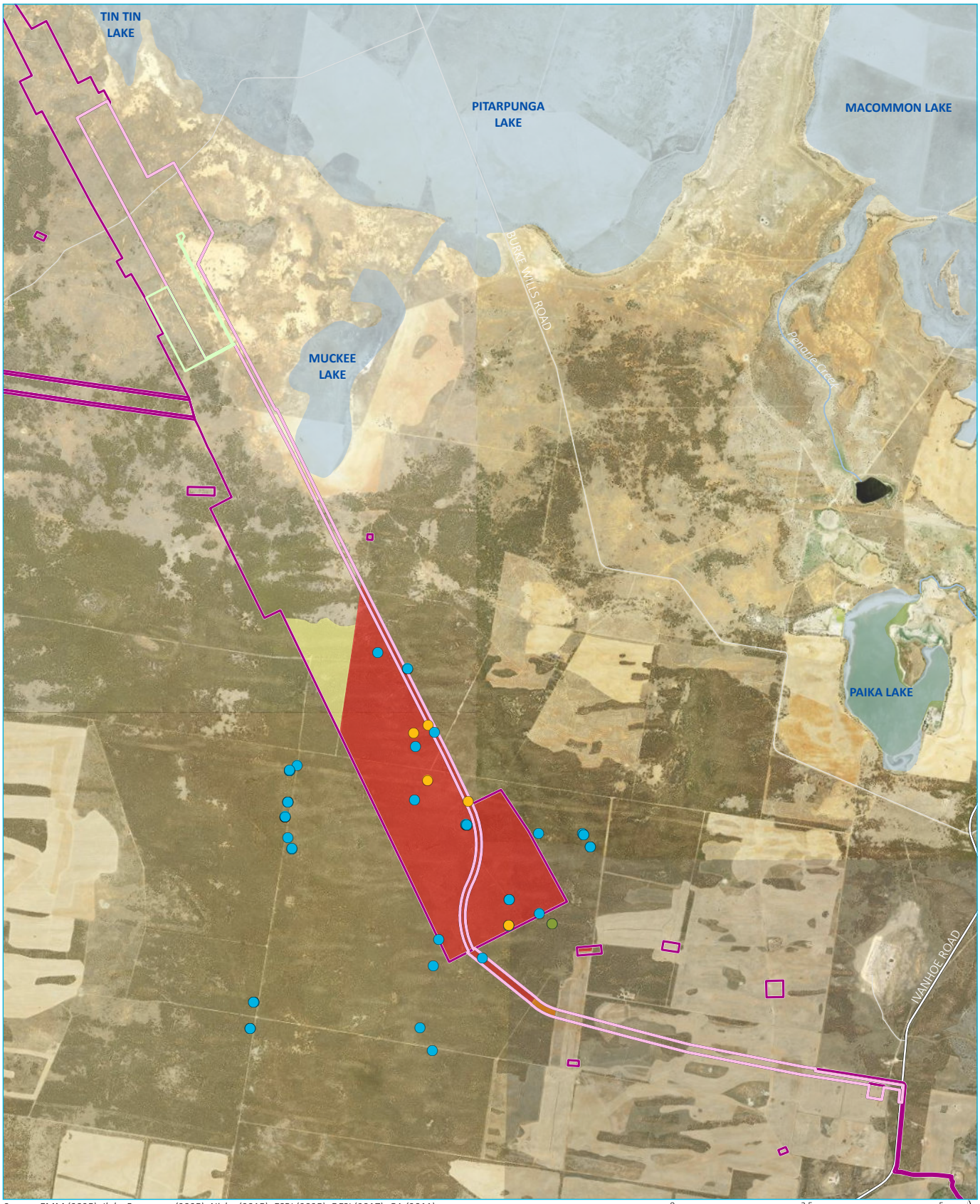
Malleefowl are listed as an endangered species under the *Biodiversity Conservation Act 2016* (BC Act) in NSW and as a nationally vulnerable species under the EPBC Act. Accordingly, impacts on Malleefowl were assessed in a Biodiversity Assessment (Niche Environment and Heritage, 2015) for the Balranald Project in 2015.

The Biodiversity Assessment was a supporting document to two Environmental Impact Statements (EIS), comprising:

- a State Significant Development application under Part 4 Division 4.1 of the EP&A Act; and
- an application under Section 130(1) and 133 of the EPBC Act.

As a whole, the Commonwealth approved Balranald Mine was declared a controlled action, with the controlling provisions being impacts on threatened species listed under the EPBC Act, one of which was Malleefowl. The approved Balranald Mine was estimated to clear 2,544 hectares (ha) of Malleefowl habitat. West Balranald Mine - Stage 1 will remove up to 140 ha of this habitat (Figure 1.1).

This MMMSP has been developed for West Balranald Mine - Stage 1. Should Iluka undertake additional construction at the West Balranald Mine and/or the Nepean Mine, this MMMSP will be revised during updating of the BMP and prior to commencement of construction, in accordance with Schedule 2, Condition 17 of Development Consent (SSD-5285).



Source: EMM (2025); Iluka Resources (2025); Niche (2015); ESRI (2025); DFSI (2017); GA (2011)

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KEY

EIS Approved Balranald Mineral Sands Mine (SSD-5285)

MOD1 underground mining area

MOD4 solar farm boundary

Recorded Malleefowl locations

- Malleefowl (Niche 2015)
- Active Malleefowl mound (Niche 2015, EMM 2022)
- Potentially active Malleefowl mound (OEH 2013, Ecotone 2013, Niche 2015, EMM 2022)

Malleefowl habitat potential

- Very High
- High
- Moderate

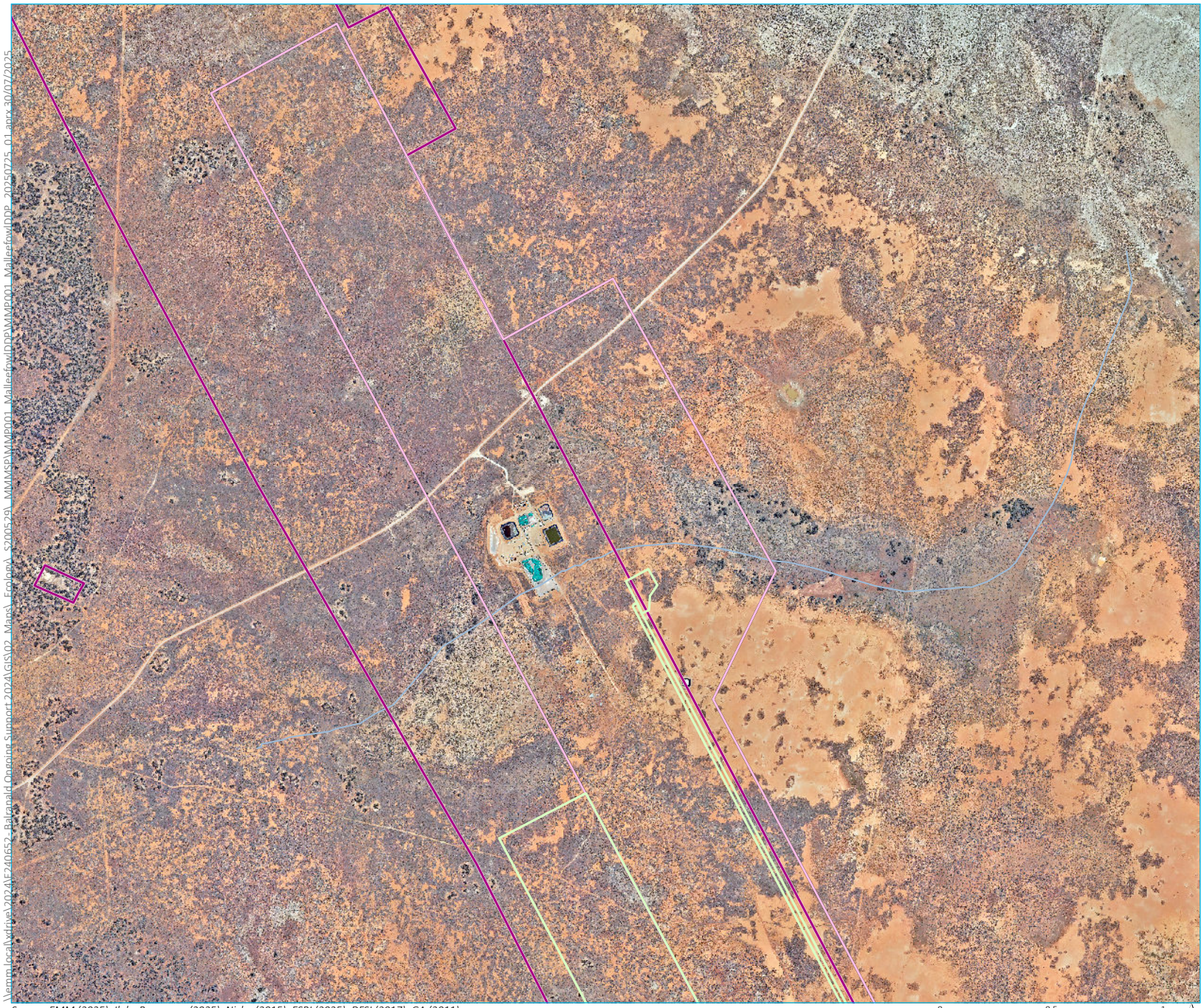
Existing environment

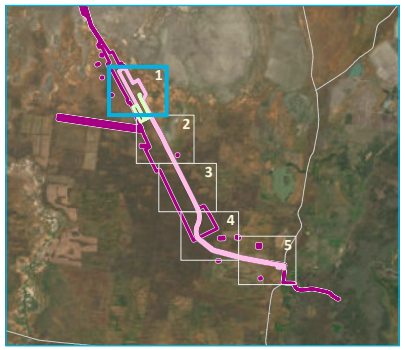
- Major road
- Minor road
- Named watercourse
- Named waterbody

Malleefowl habitat across the Balranald Mine overview

Balranald Mineral Sands Mine
Malleefowl Monitoring Plan
Figure 1.1

EMM
creating opportunities





KEY

- EIS Approved Balranald Mineral Sands Mine (SSD-5285)
- MOD1 underground mining area
- MOD4 solar farm boundary

Existing environment

- Minor road
- Watercourse/drainage line

Source: EMM (2025); Iluka Resources (2025); Niche (2015); ESRI (2025); DFSI (2017); GA (2011)

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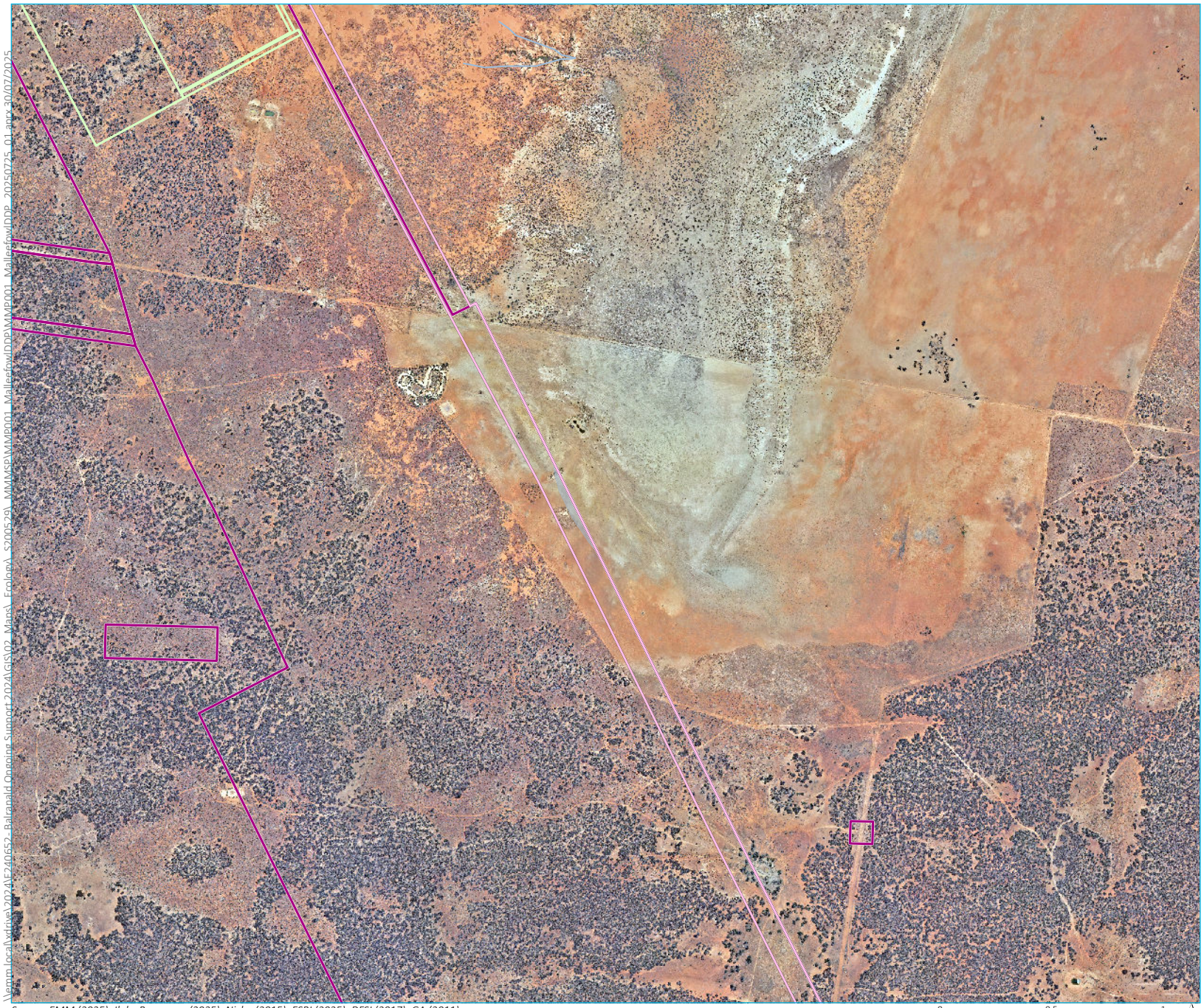
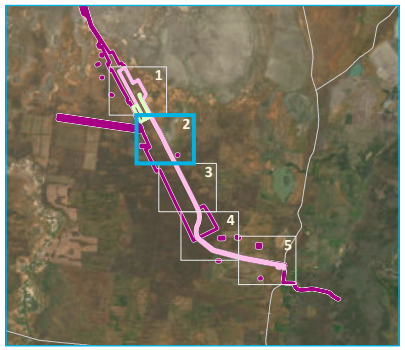
Malleefowl habitat across the Balranald Mine
Map 1 of 5

Balranald Mineral Sands Mine
Malleefowl Monitoring Plan
Figure 1.1

EMM
creating opportunities





KEY

- EIS Approved Balranald Mineral Sands Mine (SSD-5285)
- MOD1 underground mining area
- MOD4 solar farm boundary

Existing environment

- Watercourse/drainage line
- Named waterbody

Malleefowl habitat potential

- Moderate

Source: EMM (2025); Iluka Resources (2025); Niche (2015); ESRI (2025); DFSI (2017); GA (2011)

0 0.5 1 km

GDA 1994 MGA Zone 54

N

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Malleefowl habitat across the Balranald Mine
Map 2 of 5

Balranald Mineral Sands Mine
Malleefowl Monitoring Plan
Figure 1.1

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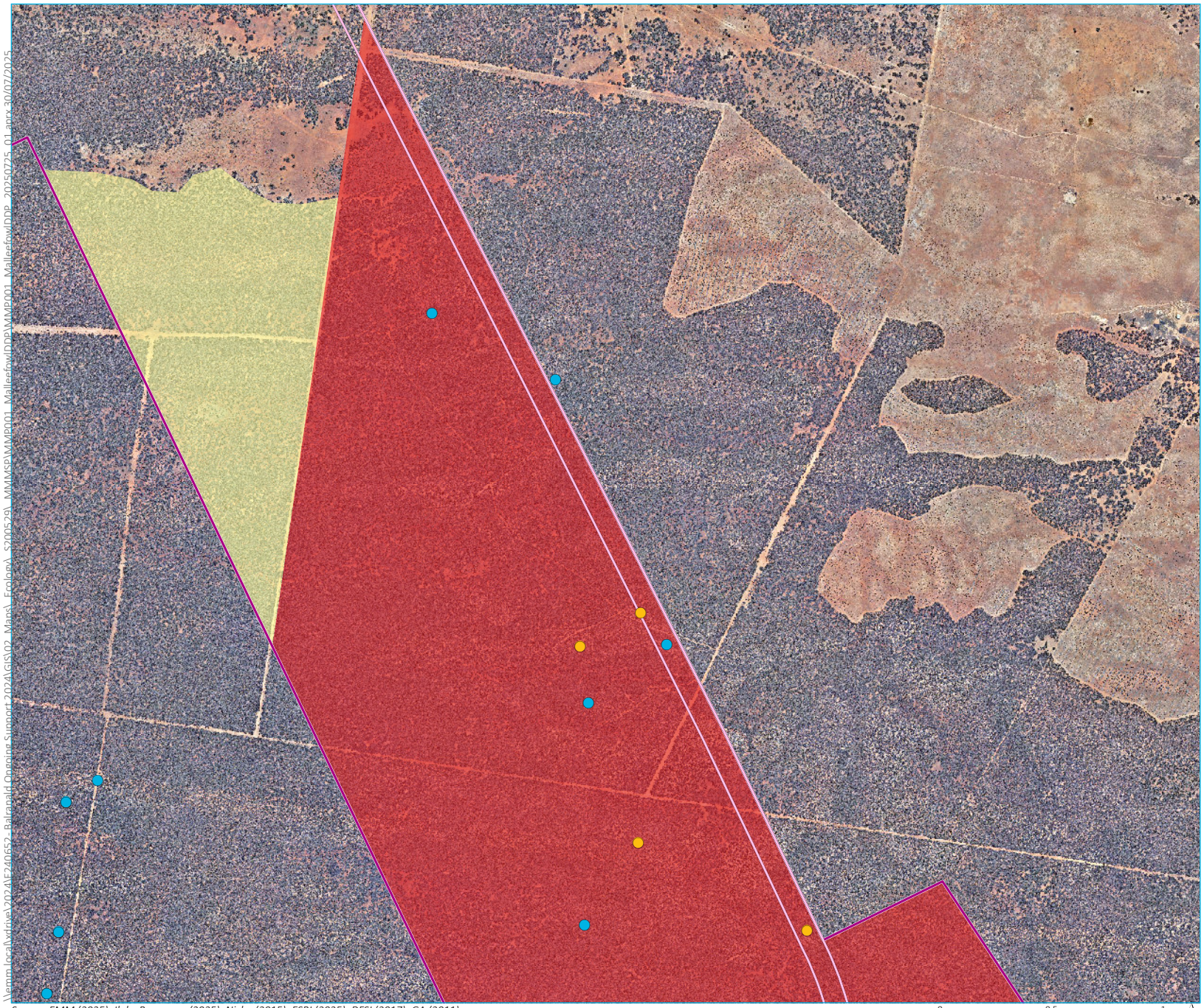

KEY

- EIS Approved Balranald Mineral Sands Mine (SSD-5285)
- MOD1 underground mining area
- MOD4 solar farm boundary

Recorded Malleefowl locations

- Active Malleefowl mound (Niche 2015, EMM 2022)
- Potentially active Malleefowl mound (Ecotone 2013, OEH 2013, Niche 2015, EMM 2022)

Malleefowl habitat potential

- Very High
- Moderate

Source: EMM (2025); Iluka Resources (2025); Niche (2015); ESRI (2025); DFSI (2017); GA (2011)

0 0.5 1 km

GDA 1994 MGA Zone 54

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Malleefowl habitat across the Balranald Mine
Map 3 of 5

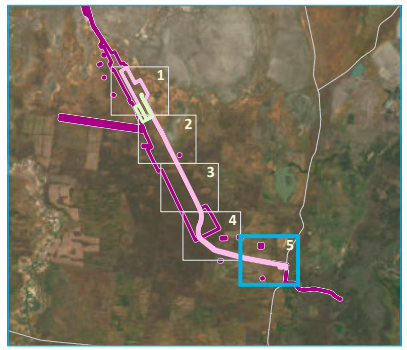
Balranald Mineral Sands Mine
Malleefowl Monitoring Plan
Figure 1.1

EMM
creating opportunities

Malleefowl habitat across the Balranald Mine
Map 4 of 5

Balranald Mineral Sands Mine
Malleefowl Monitoring Plan
Figure 1.1

EMM
creating opportunities



KEY

- EIS Approved Balranald Mineral Sands Mine (SSD-5285)
- MOD1 underground mining area
- MOD4 solar farm boundary

Existing environment

- Major road
- Minor road

Source: EMM (2025); Iluka Resources (2025); Niche (2015); ESRI (2025); DFSI (2017); GA (2011)

0 0.5 1 km

GDA 1994 MGA Zone 54

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Malleefowl habitat across the Balranald Mine
Map 5 of 5

Balranald Mineral Sands Mine
Malleefowl Monitoring Plan
Figure 1.1

EMM
creating opportunities

2. Malleefowl biology and ecology

The *National Recovery Plan for Malleefowl* (Benshemesh, 2007) provides a detailed description of Malleefowl, including its conservation status, distribution and abundance, preferred habitat, ecology and key threats.

2.1. Species ecology

2.1.1. Species description

Malleefowl is a large mound-building and ground-dwelling bird. Individuals grow to 55–60 cm and weigh up to 2.5 kg. The species can be identified by its short bill, flat head and short, broad wings. Its head and neck are grey, the chin is chestnut and the throat and chest are white with a central black stripe (see Photograph 2.1). Although distinctly marked, Malleefowl are well camouflaged within their mallee habitat and are most easily seen when at their nest mounds (OEH, 2022). The species is known for its keen hearing and eyesight, which enables it to detect threats in advance (OEH, 2022). Malleefowl is listed as endangered under the BC Act and vulnerable under the EPBC Act.

2.1.2. Life history

Malleefowl pairs are generally monogamous, breeding and nesting in the same area annually except for in drought years (Benshemesh, 2007). Malleefowl is unique in that it uses external sources to incubate its eggs (Benshemesh, 2007). The pair will construct a large mound of sand (usually 3–5 m in diameter and 1 m high) filled with up to one cubic metre of moist litter (see Photograph 2.2). After breeding, the male will maintain the condition of the mound to regulate the incubation temperature to around 34 degrees, with the female only returning to the nest to lay (Benshemesh, 2007).

Malleefowl tend to renovate old mounds rather than construct new mounds each year, each old mound has the potential to be active in the following breeding season (Benshemesh, 2007; Benshemesh, 2007; National Heritage Trust, 2016; National Malleefowl Recovery Team, 2020).

Egg laying usually begins in September and extends through mid to late summer. Early in the breeding season, heat from the microbial decomposition of leaf litter within the mound is utilised to incubate the eggs, while heat from the sun is also utilised later in the season (Benshemesh, 2007). The female lays 15–25 eggs on average, with the incubation period of eggs around 60 days, dependent on nest temperature. On average, 80 percent of the eggs hatch if undisturbed by predators (Benshemesh, 2007).

Chicks begin hatching and emerging from mounds in November, with most chicks emerging before January. The chicks hatch buried underneath up to a metre of sand, taking up to 15 hours to surface unaided (Benshemesh, 2007). After hatching, the chicks receive no parental care, but can thermoregulate, run and feed themselves efficiently almost immediately. Chick mortality is very high over the first few weeks after hatching at around 80% over the first 10 days (Benshemesh, 2007). Most chicks succumb to predation or starvation. After this initial period, the individual reaches breeding age at 3–4 years old and have an average longevity of 15 years (Benshemesh, 2007).

Photograph 2.1 Malleefowl (DPE 2022)

Photograph 2.2 Malleefowl mound (DPE 2022)

2.2. Habitat

Malleefowl habitat predominantly consists of mallee communities on sandy to sandy-loam soils, particularly those woodlands consisting of tall, dense and diverse vegetation in areas of higher rainfall (300–450 mm mean annual rainfall) (OEH, 2022). Malleefowl have been shown to spend most of their time in native vegetation, with minimal movement onto agricultural land (Stenhouse & Moseby, 2023). While individuals utilise mallee woodlands with a spinifex understorey, shrubby understoreys are preferred. The species is occasionally found in other eucalypt woodlands.

A Malleefowl pair can occupy a range of up to 500 ha and predominantly forage on the seeds, buds, flowers and fruits of herbs and various shrubs, insects and cereals if available (OEH, 2022).

While Malleefowl have been known to occupy areas within five years of fire, higher densities occur in areas of older vegetation due to the increased diversity of food and nest resources (Benshemesh, 2007).

2.3. National distribution and abundance

The original distribution of Malleefowl extended across Australia, with the species widespread in every mainland state except Queensland (Benshemesh, 2007). Substantial range contraction has occurred over the past century, particularly in arid areas. Within New South Wales (NSW), the stronghold for the species remains the mallee country in the south-west of the state, around Mallee Cliffs National Park, extending east to Balranald and as far north as Mungo National Park (OEH, 2022). Smaller populations continue to persist outside of this area; however, the extent and status of these populations are unknown.

2.4. Breeding density

Radio-tracking studies (Benshemesh, 1992) have shown that over the course of a year, the birds may range over one to several square kilometres and that home-ranges overlap considerably. During the breeding season, males spend most of their time in the vicinity of their nests and consequently male home-ranges are usually much smaller than those of their mates at these times, and may rarely overlap with other males (Benshemesh 2007).

2.5. Threats

The *National Recovery Plan for Malleefowl* (Benshemesh, 2007) lists the key known and potential threats to Malleefowl. Threats relevant to the mine comprise clearing of optimal habitat, predation by feral animals and fire. These threats are discussed in the following sections.

2.5.1. Clearing, fragmentation and isolation

Malleefowl are generalist feeders, relying on a diversity of food shrubs rather than an abundance of a single species. This indicates that different food resources are important at different times and locations, which enables a continuous food supply throughout the year. Clearing of optimal Malleefowl habitat can reduce the availability of food resources throughout the year and leads to fragmentation of remnant populations into a large number of smaller populations, with little opportunity for dispersal between them.

Numerous mining operations have been proposed in mallee areas of NSW, SA, Victoria and WA. Vegetation removal for mining can disturb the soil substrate which may have long lasting effects despite revegetation.

Fragmentation and isolation of remaining habitat leads to increased vulnerability to local extinction by a range of processes that may decrease overall fitness of a population or deplete numbers of individuals (Benshemesh, 2007). Fragmentation also further exacerbates the effects of bushfire on Malleefowl populations (Section 2.5.3).

2.5.2. Predation

Predation by introduced fox and other predators is a major cause of Malleefowl mortality. Foxes in particular are known to predate on Malleefowl at all life stages and are the only documented predator of Malleefowl eggs (Benshemesh, 2007). Predation results in the largest mortality during the first few days of the Malleefowl's life, with an estimated mortality of 80% within the first 10 days (Benshemesh, 2007).

2.5.3. Fire

Large-scale fires are a major threat to Malleefowl and many other mallee-dependant birds. Due to the species' predominantly ground-dwelling nature and its inability to fly long distances, populations of Malleefowl can be suddenly eliminated from vast areas that are burnt. Additionally, recovery and recolonisation in burnt areas to pre-burn densities tends to be slow, requiring 30 to 60 years in most instances (Benshemesh, 2007).

3. Monitoring program

3.1. Monitoring framework

3.1.1. Framework

The Malleefowl monitoring program is structured in accordance with the *National Manual for National Malleefowl Monitoring Manual* (National Malleefowl Recovery Team, 2020)

Monitoring will occur on an annual basis between September and February to target the peak season of Malleefowl breeding activity. Monitoring will include a site selection survey to identify the final location of monitoring sites (Section 3.2.1) and an annual monitoring event thereafter. All monitoring should be undertaken during the breeding and nesting season, by a suitably qualified environmental professional.

Monitoring should, as a general rule, not occur immediately following rainfall when prints are less obvious or completely washed away. In this case, monitoring should be delayed for a few days.

3.1.2. Monitoring objectives and questions

In accordance with the *National Malleefowl Monitoring Manual* (National Malleefowl Recovery Team, 2020), the primary aim of this monitoring program is to track changes in the number of breeding birds inhabiting selected sites across the project area. The monitoring program objectives been developed in accordance with SMART (specific, measurable, achievable, relevant and timely) principles (Table 3.1).

Table 3.1 – Application of SMART principles to monitoring objectives

Principle	Objective
Specific	Collect Malleefowl baseline population data and breeding activity proximal to the mine area using the methods specified in the *National Malleefowl Monitoring Manual.*
Measurable	Apply a BACI (before/after, control/impact, experimental design to determine if the mine is resulting in a decline in breeding activity and population numbers by greater than 10% in any one monitoring event.
Achievable	Implement additional management measures and corrective actions to stabilise breeding and population numbers in the event that a decline greater than 10% in any monitoring period is observed.
Relevant	Provide data for the National Malleefowl Monitoring Program and the National Malleefowl Monitoring Database (NMMD) in order to further the recovery objectives for the Malleefowl, as outlined in the *National Recovery Plan for Malleefowl* (Benshemesh, 2007).
Timely	Monitor Malleefowl on an annual basis, consistent with the *National Malleefowl Monitoring Manual.*

Where appropriate, the BMP and MMMSP have been designed for consistency with the aims of the *National Malleefowl Recovery Plan* (discussed in Table 3.2).

Table 3.2 – consistency of MMMSP with *National Malleefowl Recovery Plan*

National Malleefowl Recovery Plan Goal	Consistency of MMMSP
1. Reduce permanent habitat loss	Section 6.2 of the BMP provides rehabilitation measures that would address permanent Malleefowl habitat loss.
2. Reduce the threat of grazing pressure on Malleefowl populations	Section 6.4 of the BMP includes a commitment to establishing a goat proof fence around the main West Balranald – Stage 1 site disturbance area (Figure 6.1) with measures to be implemented to manage feral animals and predators during construction and operation.
3. Reduce fire threats	Section 7.12 of the BMP provides measures to manage bushfire risk, which would also reduce fire risk to Malleefowl.
4. Reduce predation	Section 6.4 of the BMP includes a commitment to manage feral animals and predators during construction and operation, which would reduce predation risk to Malleefowl.
5. Reduce isolation of fragmented populations	Section 6.2 of the BMP provides rehabilitation measures that would reduce Malleefowl habitat fragmentation caused by vegetation clearing for the mine.
6. Promote Malleefowl-friendly agricultural practices	This is a broader aim of the recovery plan that is not applicable to the project.
7. Reduce Malleefowl mortality on roads	Section 7.7 of the BMP provides speed limit restriction measures designed to reduce Malleefowl mortality on roads.
8. Provide information for regional planning	Collection and of data in accordance with the *National Malleefowl Monitoring System* and submission to the *National Malleefowl Monitoring Database* provides information that will assist with regional planning.
9. Monitor Malleefowl and develop and adaptive management framework	Section 3.5 of this MMMSP describes the proposed adaptive management framework.
10. Determine the current distribution of Malleefowl	This is a broader aim of the recovery plan that is not applicable to the mine.
11. Examine population dynamics: longevity, recruitment and parentage	This is a broader aim of the recovery plan that is not applicable to the mine.
12. Describe habitat requirements that determine Malleefowl abundance	An analysis of habitat requirements driving Malleefowl abundance will be provided in reports associated with the MMMSP (see Section 3.4).
13. Define appropriate genetic units for management of Malleefowl	This is a broader aim of the recovery plan that is not applicable to the project.
14. Assess captive breeding and re-introduction of Malleefowl	This is a broader aim of the recovery plan that is not applicable to the mine.
15. Investigate infertility and agrochemicals	This is a broader aim of the recovery plan that is not applicable to the mine.
16. Facilitate communication between groups	Section 6.7.1 of the BMP provides a commitment to discussing safety measures for Malleefowl during each staff and contractor induction session. Submission of monitoring data to the *National Malleefowl Monitoring Database* facilitates communication on local trends in Malleefowl breeding to the recovery team.
17. Raise public awareness through education and publicity	Section 6.7.1 of the BMP provides a commitment to discussing safety measures for Malleefowl during each staff and contractor induction session.
18. Manage the recovery process	This is a broader aim of the recovery plan that is not applicable to the mine.

3.1.3. Research questions

Monitoring will aim to answer the following questions.

- Is vegetation clearing, increased noise and lighting resulting in a negative impact on Malleefowl breeding activity adjacent to the West Balranald Mine – Stage 1?

- Is fox and feral predator control under the BMP having a positive impact on Malleefowl breeding activity?
- Are bushfires having a negative impact on Malleefowl breeding activity?
- Are Malleefowl constructing new nests in rehabilitation areas?

3.1.4. Site definition

Consistent with the *National Malleefowl Monitoring Manual* (National Malleefowl Recovery Team, 2020), a "site" is defined as a 2 x 2 km area (i.e. 400 ha) in which all Malleefowl mounds, both active and inactive, will be identified and monitored. Three sites are proposed to be monitored for this MMMSP; the final locations selected during the site selection surveys (Section 3.2.1). Sites will be located in known Malleefowl habitat (e.g. PCT 170 and 171), in areas where mounds have been previously identified, as shown on Figure 1.1.

Final sites selected will have a minimum density of five mounds[1] to allow for season-to-season movements of Malleefowl within their territory and to provide sufficient monitoring data.

3.1.5. Experimental design

The MMMSP is based on a BACI experimental design. In BACI studies, the aim is to assess whether any trend in the response variable (e.g. abundance of mating Malleefowl pairs) at sites that have had a direct impact (e.g. mine development) differs after impact to that measured beforehand and to any global trend (i.e. that observed at control sites which were assumed not to be impacted). This type of robust, scientifically based design is critical to ensuring potentially costly adaptive management and corrective actions are only undertaken when a real impact is detected.

To support the BACI experimental design, control and impact sites will be nested within a 2 x 2 km site, with the eastern or western site edge abutting the West Balranald Mine – Stage 1 access road. Mounds within 100 m of West Balranald Mine – Stage 1 will be classified as potential impact sites, and mounds greater than 500 m from West Balranald Mine – Stage 1 will be classified as control sites. Ideally, impact sites will be located in areas that are directly adjacent to, but would not be directly disturbed by, construction activities. In the event that impact monitoring sites require clearing, new impact sites would be selected. A biostatistician will review the experimental design to ensure that it is robust enough to conduct meaningful statistical analysis that informs an adaptive management structure.

Monitoring will detect if any trends in the potential impact sites are also detected at the control sites, in which case it could be concluded that:

- the trends detected are global and therefore not directly attributable to the mine development, based on the assumption that the impact is restricted to the impact sites; or
- the trends detected are restricted to impact sites and are likely to be attributable to the mine development.

3.2. Monitoring program

This monitoring program has been developed to conform to the *National Malleefowl Monitoring Manual* (National Malleefowl Recovery Team, 2020). In accordance with the Manual, all surveys and monitoring will be conducted with the use of CyberTracker software.

3.2.1. Site selection survey (initial search)

A site selection survey is required to finalise the three sites selected for monitoring. Ideally, the site selection survey would be completed no later than 1 week prior to the commencement of construction and within the breeding season (i.e. September to February).

[1] Five mounds were deemed sufficient after an analysis of Malleefowl mound records within and surrounding the Balranald Project and due to the overlapping ranges of Malleefowl of 1 – 7 km^2 (Benshemesh, 2007).

Site selection surveys will comprise a mix of aerial surveys using drones to identify mounds, followed by ground surveys to enable data collection. Drones will be equipped with GPS to record mound locations.

Aerial transects will be flown in a pre-programmed flight path over each site, with the field of view overlapping to provide 100% coverage. Drones will be flown at a minimum altitude of approximately 20 m. It is noted that the Biodiversity, Conservation and Science Directorate (BCS) of the Department of Planning, Housing and Infrastructure(DPHI) are monitoring Malleefowl using drones, and they would be consulted during preparation of this plan on flight pattern and minimum height to maximise mound identification. Flights will occur between 9 am and 4 pm to reduce the shadow effect and false positives being recorded.

The drone pilot will record the GPS position of the mound.

To aid in confirmation of active mounds, drone thermal imaging will be utilised to check the mounds mapped in the baseline survey of the site.

The survey will be conducted before dawn to gain the greatest temperature difference and timed between September and February to capture the peak breeding season. The drone pilot will view the thermal imagery and capture still images of any mound hotspots.

Benshemesh and Emison (1996) and Thompson et al. (2015) trialled this method and concluded that the methodology was feasible, cost-effective and capable of covering vast areas.

Each mound identified aerially will then be visited on foot to collect mound data (Section 3.2.2).

3.2.2. Ground surveys

As per the National Malleefowl Monitoring Manual (National Malleefowl Recovery Team, 2020), the following information will be recorded at each mound identified in the sites:

- date and who collected the data;
- site and mound number;
- a GPS reading recorded in WGS84 datum;
- if the mound was sought and found;
- if mounds require a new tag or stake;
- mound profile and dimensions;
- Malleefowl activity (i.e. the occurrence of litter trails or any other signs that may indicate the mound is being prepared for breeding);
- prints or tracks on the mound (ie Malleefowl, Fox, Kangaroo, other); and
- any relevant notes.

Further detail on mound status and long unused mounds is provided in the following sections.

Mound status

Mound status will be recorded as one of the following:

- active mound: mounds currently being used by Malleefowl as an incubator for their eggs and are likely to contain eggs;
- leaf litter present: a mound that has been opened up and contains leaf litter but where nesting activity appears to have not taken place;

- inactive: mounds where it appears that no activity has taken place and X-sticks left during last monitoring period have not been disturbed; or
- long-unused mounds: see criteria below.

If a mound is assessed as active, monitors will conduct a search in a 20 m radius around the mound looking for signs of predation such as evidence of eggs or eggshells and feathers.

Data can be recorded using the monitoring sheet provided in Attachment A.

Long unused mounds

According to the *National Malleefowl Monitoring Manual* (National Malleefowl Recovery Team, 2020), the process of determining whether a long unused (extinct) mound should be monitored annually requires assessment against using the following criteria:

- have a rim height of less than 10 centimetres;
- have no obvious signs of Malleefowl visitation;
- have no history of ever being active; and
- have had a photo and measurements recorded.

If a mound meets the above criteria, it will not be monitored for the next four years. The mound will require monitoring in the fifth year, following removal from the monitoring schedule. The mound will be monitored in accordance with the standard monitoring procedure (Section 3.2), after which point it may again be reassessed against the exclusion criteria.

Mounds found by chance during routine monitoring (even if presumed as long unused mounds) will require full monitoring before any recommendations for assessment. Extinct mounds require clear designation within the database, and only those designated will be monitored every fifth year.

3.3. Monitoring schedule

Each identified mound will be monitored on an annual basis, with the exception of extinct mounds (Section 3.2.2). Monitoring will occur for the duration of West Balranald Mine – Stage 1, with revision of the plan prior to the commencement of Stage 2.

3.4. Monitoring data and reports

Raw data will be provided to the National Malleefowl Monitoring Program following each annual monitoring event.

A detailed baseline monitoring report will be prepared to document:

- final site selection;
- baseline survey methods; and
- baseline survey results, including raw datasheets.

An annual report will be written in Year 2 of the monitoring program and will continue to Year 5. Annual reports will be submitted to BCS within three months of the completion of annual monitoring.

3.5. Adaptive management framework

Data analysis by a biostatistician will be included in the Year 3 annual report, which will review all data collected to date, and provide an analysis against the monitoring objectives and questions (Section 0). The efficacy of the management measures in Chapter 6 of the BMP will be analysed and adapted where required. Consistent with the monitoring objectives and questions (Section 0), management measures would be revised in the event that:

1. Vegetation clearing, increased noise and lighting are negatively impacting Malleefowl breeding activity adjacent to the West Balranald Mine – Stage 1; and/or

2. Fox and feral predators are negatively impacting Malleefowl breeding activity; and/or

3. Bushfires are negatively impacting Malleefowl breeding activity.

3.6. MMMSP review

This MMMSP has been developed for West Balranald Mine – Stage 1. Should Iluka undertake additional construction at the West Balranald Mine and/or the Nepean Mine, this MMMSP will be revised during update of the BMP and prior to commencement of construction, in accordance with Schedule 2, Condition 17 of Development Consent (SSD-5285).

In the event that the MMMSP is revised for additional construction, the outcomes of the monitoring from Stage 1 will be used to inform its revision. It is also noted that the *National Malleefowl Recovery Plan* is currently being revised. Should this occur during the life of the project, the MMMSP would be revised to align with monitoring and management objectives.

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Appendix A Malleefowl monitoring datasheet

DATE: **SITE:** **NAME(S):**

Nest Number	Sought (v/x)	Found (v/x)	Staked (v/x)	Tagged (v/x)	Active (Y/N)	Profile (see below)	X sticks (see below)	Scraped (Y/N)	Eggshell (n/s/l)	Fire since last monitored? (Y/N	Prints				Scats				Outer nest surface (n/s/l)					Inner nest surface (n/s/l)					Dimensions (cms)				Photo taken (Y/N)	X sticks replaced (Y/N)	Notes: - location notes that may help others find the mound - general notes regarding the mound itself - time since and evidence of bushfire (if applicable)
											Malleefowl	Fox	Kangaroo	Other (specify)	Malleefowl	Fox	Kangaroo	Other (specify)	Crust	Moss	Herb	Shrub	Tree	Crust	Moss	Herb	Shrub	Tree	Perimeter	Rim	Height (North)	Height (South)			

	Parameter	Description
General	Date	
	Names of monitors	
	Dummy Run/Real Data	
	Site	
Mound	Mound Number	
	Sought and found	
	sought and not found	
	New mound	
	Not sought	
	Staked	permanent identification stake bearing site and mound number
	Tagged	permanent tag attached to stake showing site and mound codes
Signs	Active	mounds that are currently being used as an **incubator for their eggs and are likely to contain eggs**
	Mound Profile	1. Typical crater with raised rims (typical of inactive mounds)
		2. Mound fully dug out (crater slopes steeply)
		3. Mound with litter (thick layers of litter evident on the surface, possibly mixed with sand)
		4. Mound mounded up (no crater) (typical of active but unopened Malleefowl mound)
		5. Mound that has a sandy crater with a peak in the centre (typical of an active mound in the process of being closed by Malleefowl)
		6. Mound low and flat without peak or crater (typical of an extinct mound, or a deliberately flattened mound late in breeding season to capture solar heat)
	Xsticks (crossed -sticks) on arrival	Two to Three sticks (about 50cm long x 2 cm wide) placed in a cross at the centre of inspected mound
		- present and undisturbed
		- disturbed but still present
		- absent
	Scraped	Monitors to disturb a small area of sand on the rim of the mound to compare with neighbouring undisturbed areas of sand
		- if monitor-disturbed area is not visibly distinct the mound is scraped
		- if monitor-disturbed area is visibly distinct the mound is not scraped and has not been worked by Malleefowl within the last day (can also be affected by recent wind or rain)
	Eggshell	none
		some - where one or a few fragments are visible
		lots - where more than 10 fragments are clearly visible and conspicuous
	Prints	Malleefowl - usually 10 -12 cm in length and more symmetrical than other birds
		Fox
		Kangaroo
		Other - Native and introduced species (dog, cat, rabbits, goats, human, sheep, etc)
	Scats	Malleefowl -
		Fox - provide an index of abundance of this predator within the area (remove scats from mound)
		Kangaroo
		Other - Native and introduced species (dog, cat, rabbits, goats, human, sheep, etc)
	Lerp	none
		some - a few, but less than 10
		lots - where more than 10 can be seen
None / Some / Lots Table	Crust Out	Outer surface of the mound, extending from the top of the rim to the perimeter of the mound
		None
		Some - well defined crust over less than one third of the outer mound
		Lots - heavy crust over more than one third of the outer mound surface
	Crust In	Inner surface of the mound (ie crater)
		None
		Some - well defined crust over less than one third of the inner mound
		Lots - heavy crust over more than one third of the inner mound surface
	Moss Out	None
		Some - well defined moss over less than one third of the outer mound
		Lots - heavy moss over more than one third of the outer mound surface

	Parameter	Description
	Moss In	None
		Some - well defined moss over less than one third of the inner mound
		Lots - heavy moss over more than one third of the inner mound surface
	Herb Out	None
		Some - less than 10 individual herbs over outer mound surface
		Lots - more than 10 individual herbs over outer mound surface
	Herb In	None
		Some - less than 10 individual herbs over inner mound surface
		Lots - more than 10 individual herbs over inner mound surface
	Shrub Out (includes Triodia (ie Spinifex or Porcupine Grass)	None
		Some - less than one third of the outer mound surface covered with shrubs or Triodia
		Lots - more than one third of the outer mound surface covered with shrubs or Triodia
	Shrub In (includes Triodia (ie Spinifex or Porcupine Grass)	None
		Some - less than one third of the inner mound surface covered with shrubs or Triodia
		Lots - more than one third of the inner mound surface covered with shrubs or Triodia
	Tree Out	None
		Some - up to three trees (>2m high) growing on the outer mound surface
		Lots - more than three trees (>2m high) growing on the outer mound surface
	Tree In	None
		Some - up to three trees (>2m high) growing on the inner mound surface
		Lots - more than three trees (>2m high) growing on the inner mound surface
Dimensions	How to Measure	Insert pole at the northern edge of outer perimeter, stretching a measuring tape across to the southern side of the mound
	Height (cm)	Height is measured by averaging two measurements taken from the southern outer edge: Height North - sight across the mound along the tops of both rims to the pole and reading its height Height South - hold tape so it touches both rims and measure vertical distance between tape and ground at southern perimeter
	Crater Depth (cm)	Crater Depth - measured as vertical distance from base of crater to the tape when held straight across both rims
	Perimeter Diameter (cm)	distance across the mound from outermost limits of the mound
	Rim Diameter (cm)	distance across the mound from the top of the northern rim to the southern rim
Photographs	Bearing	preferably taken from the north point, but a clear vantage including the entire mound is required
	Information	A card clearly showing site number, mound number, month and year should be placed on the mound in the foreground of the photograph
Notes	Active Mounds	conduct a search within a 20m radius looking for signs of predation (i.e. eggs/eggshells/feathers) or any additional observational notes
GPS Readings		

Appendix B Threatened species profiles

Table B.1 Threatened fauna profiles

Common name	Scientific name	BC Act	EPBC Act	Profile location
Chestnut Quail-thrush	*Cinclosoma castanotus*	Vulnerable	-	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10168
Corben's Long-eared Bat	*Nyctophilus corbeni*	Vulnerable	Vulnerable	Table B.2
Grey -crowned Babbler	*Pomatostomus temporalis temporalis*	Vulnerable	-	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10660
Grey Falcon	*Falco hypoleucos*	Endangered	Vulnerable	Table B.3
Hooded Robin	*Melanodryas cucullata*	Vulnerable	-	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10519
Inland Forest Bat	*Vespadelus baverstocki*	Vulnerable	-	Table B.4
Jewelled Gecko	*Strophurus elderi*	Vulnerable	-	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10230
Little Eagle	*Hieraaetus morphnoides*	Vulnerable	-	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20131
Little Pied Bat	*Chalinolobus picatus*	Vulnerable	-	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10159
Major Mitchell's Cockatoo	*Cacatua leadbeateri*	Vulnerable	Endangered	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10116
Malleefowl	*Leipoa ocellata*	Endangered	Vulnerable	Table B.5
Mallee Worm-lizard	*Aprasia aurita*	Endangered	-	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10060
Pied Honeyeater	*Certhionyx variegatus*	Vulnerable	-	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10156
Plains-wanderer	*Pedionomus torquatus*	Endangered	Critically Endangered	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10588
Rainbow Bee-eater	*Merops ornatus*	-	Marine Migratory	Table B.6
Red Throat	*Pyrrholaemus brunneus*	Vulnerable	-	Table B.7
Regent Parrot	*Polytelis anthopeplus monarchoides*	Endangered	Vulnerable	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10644
Sandy Inland Mouse	*Pseudomys hermannsburgensis*	Vulnerable	-	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10688
Southern Ningaui	*Ningaui yvonneae*	Vulnerable	-	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10560

Common name	Scientific name	BC Act	EPBC Act	Profile location
Spotted Harrier	*Circus assimilis*	Vulnerable	-	Table B.8
Varied Sitella	*Daphoenositta chrysoptera*	Vulnerable	-	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20135
Western Blue-tongue Lizard	*Tiliqua occipitalis*	Vulnerable	-	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10807
White-fronted Chat	*Epthianura albifrons*	Vulnerable	-	Table B.9
Yellow-bellied Sheathtail bat	*Saccolaimus flaviventris*	Vulnerable	-	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10741

B.1 Corben’s Long-eared Bat

Table B.2 Corben’s Long-eared Bat (*Nyctophilus corbeni*)

Vulnerable (EPBC Act, BC Act)	
The south eastern form of the Greater Long-eared Bat is also known as Eastern Long-eared Bat and has only recently been recognised as a distinct species Corben's Long-eared Bat. It is uniformly dark grey-brown. The ears are about 3 cm long and larger than the head. It has a low ridge of skin running between the eyes and across the nose. It has a head and body length of 5 - 7 cm and weighs about 14 grams (OEH 2023g).	  Corben’s Long-eared Bat (ALA 2023)

B.2 Grey Falcon

Table B.3 Grey Falcon (*Falco hypoleucos*)

Endangered (BC Act); Vulnerable (EPBC Act)	
The Grey Falcon is a medium-sized, compact, pale falcon with a heavy, thick-set, deep-chested appearance. It is smaller than the Peregrine Falcon but similar in shape and flight, although with longer wings. Upperparts are uniform light grey, shading to blackish on the primaries, forming conspicuous dark wing tips. The tail has narrow blackish bars. The chin, throat and cheeks are white, and the rest of the underbody is pale grey. The eye-ring, cere and base of the bill are bright orange-yellow, and the tip of the bill black (OEH 2023a).	 Grey Falcon (COG 2022)

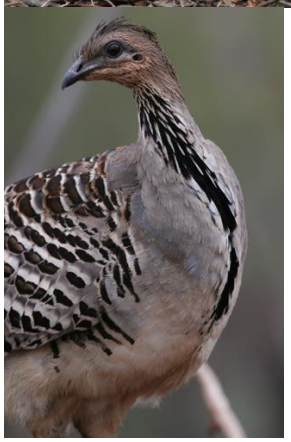
B.3 Inland Forest Bat

Table B.4 Inland Forest Bat (*Vespadelus baverstocki*)

Vulnerable (BC Act)	
The Inland Forest Bat is one of a number of small (3 to 7 grams) insectivorous bats in the genus Vespadelus. It is generally sandy-brown above, with the underparts being paler (cream to pale brown). Identification is difficult, with overlap in size and fur colouration with some species occurring in the same area, particularly Southern Forest Bat *V. regulus* and Little Forest Bat *V. vulturnus*. These species can be separated by cranial measurements, genetic typing, or for males, glans penis morphology. Identification based on echolocation calls is also difficult, as there is considerable overlap in the frequency of the calls, particularly with the Little Forest Bat (OEH 2023b).	 Inland Forest Bat (OEH 2023b)

B.4 Malleefowl

Table B.5 Malleefowl (*Leipoa ocellata*)

Endangered (BC Act); Vulnerable (EPBC Act)	
The Malleefowl is a large (60 centimetres long, 43 centimetres high and weighing between 1.5 and 2.5 kilograms), distinctive, ground-dwelling bird. It possesses robust, powerful legs, a short bill and a flattish head while the wings are short, broad and rounded at the tip. The head and neck is greyish above, topped with black, the chin is chestnut and the throat and chest are white with a central black stripe. A crest extends from the front of the crown to the nape, and is raised when the bird is alarmed. The upper body is boldly barred and is fringed and streaked grey, white, black and rufous. The lower breast and belly are cream. Although strikingly marked, Malleefowl are particularly well camouflaged in the dappled light of their mallee habitat. Most easily seen at their nest mound, this species usually quietly walks away from observers and rarely flies. The most frequently heard call is loud booming made by the male, usually from on or near its mound (OEH 2023f).	  Malleefowl (OEH 2023f)

B.5 Rainbow Bee-eater

Table B.6 Rainbow Bee-eater (*Merops ornatus*)

Migratory/Marine (EPBC Act)	
The Rainbow Bee-eater is a medium-sized bird with males measuring 25 cm in length and the females 22 cm. The wingspan is 34 cm in the male and 31 cm in the female. The adults have green or blue-green colouring on the forehead and chestnut on the back of the head. The upper part of the back is bright green, merging to light blue on the lower part of the back to the base of the tail. The tail is black with blue edging on the upper surface and two long, wire-like central feathers (termed streamers) that project beyond the tip of the tail. The tail-streamers of females are shorter and thicker, and have broader tips, than those of the male Rainbow Bee-eaters have a long, slender and decurved black bill, red iris, dark grey skin around the eye and blackish legs and feet. There is bright green and light blue colouring on the upper surface of the wings, with chestnut colouring on the secondary feathers and dark brown primary feathers, light green colouring on the breast that becomes paler on the belly and that changes to light or pale blue from the lower belly to the base of the tail. The juveniles can be predominately distinguished by their dull colouring and the absence of the tail-streamers (DCCEEW 2022).	 Rainbow Bee-Eater (eBird 2023a)

B.6 Red Throat

Table B.7 Red Throat (*Pyrrholaemus brunneus*)

Vulnerable (BC Act)	
The Red Throat is a small, generally nondescript bird of inland shrublands. It is generally dark grey-brown above and paler and greyer below, while there is contrasting off-white feathering in front of the eye. The tail is darker and has a prominent white tip, which is particularly obvious in flight. The male has a distinctive rufous throat patch, while in the female this is off-white or cream (OEH 2023c).	 Red Throat male (top) and female (bottom) (eBird 2023b)

B.7 Spotted Harrier

Table B.8 Spotted Harrier (*Circus assimilis)*

Vulnerable (BC Act)	
The Spotted Harrier is a medium-sized, slender bird of prey having an owl-like facial ruff that creates the appearance of a short, broad head, and long bare yellow legs. The upperparts are blue-grey with dark barring, and the wingtips are black. The face, inner-wing patch, and underparts are chestnut. The long tail is boldly banded, with a wedge-shaped tip. Juveniles are mottled and streaked ginger and brown, with prominent ginger shoulders, fawn rump and banded tail (OEH 2023d).	 Spotted Harrier (eBird 2023c)

B.8 White-fronted Chat

Table B.9 White-fronted Chat (*Epthianura albifrons*)

Vulnerable (BC Act)	
The White-fronted Chat is an endemic Australian passerine bird, 12 cm in length and weighing approximately 13 g. It has a short slender bill, long spindly legs, a short square-tipped tail and rounded wings. Classified as a honeyeater it is most similar in form to its close relatives, the Orange Chat, Yellow Chat and Crimson Chat from which it is easily distinguished by its black and white colouration. The male's plumage is more striking than the females; juvenile plumage is most similar to the female. A distinctive 'tang, tang' is used as a contact call between White-fronted Chat individuals (OEH 2023e).	 White-fronted Chat male (top) and female (bottom) (OEH 2023e)

B.9 Appendix references

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