



Broula King Enterprises Pty Ltd

ABN: 97 645 933 599

Rehabilitation Risk Assessment

for the

Broula King Gold Mine

May 2023





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Contents

	Page
1. SCOPE.....	4
2. METHODOLOGY.....	5
3. REHABILITATION RISK ASSESSMENT	8

TABLES

Table 1	Risk Assessment Participants	6
Table 2	Qualitative Consequence Rating	7
Table 3	Qualitative Likelihood Rating	7
Table 4	Qualitative Risk Rating	7
Table 5	Rehabilitation Risk Assessment	8

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1. Scope

The following rehabilitation risk assessment was undertaken generally in accordance with:

- Australian Standards HB 203:2006, AS/NZS 4360:2004 and AS/NZS ISO 31000:2018 Risk Management – Principles & Guidelines; and
- NSW Resources Regulator’s *Rehabilitation Risk Assessment Guideline* dated 2 July 2021.

This risk assessment has been designed in consideration of Schedule 8A of the *Mining Regulation 2016*, which requires the holder of a mining lease to conduct a rehabilitation risk assessment that:

- identifies, assesses and evaluates the risks that need to be addressed to achieve the following in relation to the mining lease:
 - the rehabilitation objectives;
 - the rehabilitation completion criteria;
 - for large mines—the final land use as spatially depicted in the final landform and rehabilitation plan; and
- identifies the measures that need to be implemented to eliminate, minimise or mitigate the risks.

In addition to the above, the holder of a mining lease must conduct a rehabilitation risk assessment:

- for a large mine—before preparing a rehabilitation management plan;
- for a small mine—before preparing the rehabilitation outcome documents for the mine;
- whenever a hazard is identified under Clause 6(3) (of Schedule 8A)—as soon as reasonably practicable after it is identified, and
- whenever given a written direction to do so by the Secretary.

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2. Methodology

The following risk assessment was undertaken generally in accordance with *Australian Standards HB 203:2006, AS/NZS 4360:2004 and AS/NZS ISO 31000:2018 Risk Management – Principles & Guidelines*.

This risk assessment has been prepared in consideration of the *Rehabilitation Management Plan* for Broula King Gold Mine (the Mine). Risks to achieving the rehabilitation objectives and rehabilitation completion criteria outlined in Section 4 of the *Rehabilitation Management Plan*, as well as the final landform outlined in Section 5 of the *Rehabilitation Management Plan*, were identified and assessed jointly by Broula King Enterprises Pty Ltd (the Company) and R.W. Corkery & Co. Pty Limited (RWC) during the preparation of this plan. **Table 1** presents a list of participants involved with the preparation of this risk assessment.

Site-specific threats to rehabilitation were assessed based on observations of site-specific conditions and threats to rehabilitation observed during site inspections and reported in previous environmental assessments for the Mine. This risk assessment was completed with consideration of existing controls as well as those risk controls outlined in the *Rehabilitation Management Plan*.

For each identified risk to rehabilitation, potential adverse outcomes were identified and allocated a risk rating based on the potential consequences and likelihood of occurrence. **Tables 2, 3 and 4** present the consequence, likelihood and risk rating used during this analysis. Where risks were determined to be unacceptable, namely those risks classified as “Moderate” or above, a Trigger Action Response Plan has been developed and is presented in Section 10 of the *Rehabilitation Management Plan*.

Tables 5 and 6 presents the results of the risk analysis assuming the implementation of standard mitigation measures and those outlined within this RMP. Proposed controls and/or assessments are indicated by *italicised red text*.

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Table 1
Risk Assessment Participants

Date	Name	Company	Position	Role in Risk Assessment	Risk Assessment Version
30/05/2023	Darryl Young	Broula King Enterprises Pty Ltd	Director	Content Expert, Participant	1.3
30/05/2023	Jack	R.W. Corkery & Co. Pty Limited	Senior Environmental Consultant	Participant	1.3
30/05/2023	Sophia	R.W. Corkery & Co. Pty Limited	Graduate Environmental Consultant	Participant	1.3

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Table 2
Qualitative Consequence Rating

Level	Descriptor	Description
1	Negligible	No detrimental impact on the final land use is measurable or envisaged.
2	Minor	An event which could have temporary and minor effects on the suitability of the final land use.
3	Moderate	An event which would create substantial temporary or minor permanent damage to the suitability of the final land use.
4	Major	An event which could have a substantial and permanent consequence to the suitability of the final land use.
5	Severe	A major event which could cause severe damage to the suitability of the final land use with actual or potential loss of credibility with key stakeholders, environmental liability, regulatory intervention, national publicity/complaints, or could close the operation prematurely.

Note: Rating modified after AS ISO 31000:2018 Risk Management – Guidelines

Table 3
Qualitative Likelihood Rating

Level	Descriptor	Description
A	Certain	Is an ongoing occurrence or will occur under all conditions
B	Almost Certain	Is expected to occur in most circumstances
C	Likely	Will probably occur in most circumstances
D	Possible	Will probably occur under favourable circumstances
E	Unlikely	May occur, but only under favourable circumstances
F	Rare	Not expected to occur, unless subject to exceptional circumstances
G	Very Rare	Theoretically possible but not expected to occur

Source: Rating modified after HB 89:2012 – Figure B7

Table 4
Qualitative Risk Rating

Likelihood	Consequences				
	1 Negligible	2 Minor	3 Moderate	4 Major	5 Severe
A Certain	M	H	H	VH	VH
B Almost Certain	M	M	H	VH	VH
C Likely	M	M	H	H	VH
D Possible	L	M	M	H	H
E Unlikely	L	L	M	M	H
F Rare	L	L	L	M	M
G Very Rare	L	L	L	L	M

Risk Rating: L = Low, M = Moderate, H = High and VH = Very High

Source: Modified after HB 89:2012 – Figure B8

3. Rehabilitation Risk Assessment

Table 5
Rehabilitation Risk Assessment

Risk	Risk Control	Final Land Use Domain										Where Addressed in RMP			
		Domain A: Native Ecosystem	Domain F: Water Management Areas	Domain G: Water Storage (Excluding Final Void)	Domain H: Heritage Area	Domain I: Infrastructure	Domain J: Final Void								
Insufficient skills and experience of rehabilitation personnel.	Engagement of specialists consultants to address issues.	L (F3)	L (F3)	L (F3)	L (F3)	L (F3)	L (F3)								7, 10
Lack of clearly defined responsibilities.	Responsibilities as defined in the <i>Rehabilitation Management Plan</i> .	L (G3)	L (G3)	L (G3)	L (G3)	L (G3)	L (G3)								7
Insufficient funding for or prioritisation of rehabilitation activities.	Rehabilitation cost estimate and security bond.	L (F3)	L (F3)	L (F3)	L (F3)	L (F3)	L (F3)								7, 10
Active Mining Phase of Rehabilitation															
Inappropriate biological resource (e.g. subsoil, topsoil, vegetative material, seedbank) salvage and maintenance practices.	Growth medium stockpile construction and extraction procedures. Growth medium and organic material stockpile signposting.	L (F3)	N/A	N/A	N/A	N/A	N/A								
Limited pre-existing and stockpiled biological resources for use (e.g. topsoil, woody debris).	Presence of stockpiled growth medium.	L (F3)	N/A	N/A	N/A	N/A	N/A								
Adverse meteorological conditions during salvage of biological resources.	Meteorological monitoring. Rehabilitation planning / scheduling.	L (F3)	N/A	N/A	N/A	N/A	N/A								
Adverse geochemical/chemical composition of materials such as overburden, processing wastes, topsoils and subsoils.	<i>Waste Rock Characterisation Analysis Procedure.</i> <i>Contaminated Site Assessment Procedure.</i> <i>Hazardous Materials Assessment Procedure.</i>	M (E4)	M (E4)	M (F4)	N/A	L (F3)	N/A								
Handling and containment of geochemical and geotechnically unsuitable process residue and reject materials.	<i>Waste Rock Characterisation Analysis Procedure.</i> <i>Geotechnical assessment prior to relinquishment.</i>	M (F4)	M (F4)	M (F4)	M (F4)	L (F3)	N/A								
Adverse surface and/or groundwater quality and quantity.	Erosion and sediment control structures. <i>Contaminated Site Assessment Procedure.</i>	M (F4)	M (F4)	M (F4)	M (F4)	N/A	M (F4)								
Decommissioning Phase of Rehabilitation															
Impacts on heritage items.	Presence of security fencing.	N/A	N/A	N/A	L (G4)	N/A	N/A								
Hazards associated with retained infrastructure.	<i>Hazardous Materials Assessment Procedure.</i> <i>Engineer assessment of structures prior to relinquishment.</i>	N/A	L (F3)	L (F3)	L (F3)	L (F3)	N/A								
Material and waste products from the demolition process retained on the final landform.	<i>Hazardous Materials Assessment Procedure.</i>	L (F1)	L (F1)	L (F1)	L (F1)	L (F1)	L (F1)								
Groundwater accumulation in former underground workings (e.g. potential for fill and spill or impacts on regional ground water users).	None.	N/A	N/A	N/A	L (F3)	N/A	N/A								
Exposure or access to underground workings.	Security fencing and safety bunds.	N/A	N/A	N/A	M (G5)	N/A	N/A								

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Risk	Risk Control	Final Land Use Domain										Where Addressed in RMP	
		Domain A: Native Ecosystem	Domain F: Water Management Areas	Domain G: Water Storage (Excluding Final Void)	Domain H: Heritage Area	Domain I: Infrastructure	Domain J: Final Void						
Habitation of structures and/or underground workings by native fauna (e.g. bats).	Inspection prior to any demolition works.	N/A	N/A	N/A	L (D1)	N/A	N/A						
Landform Establishment Phase of Rehabilitation													
Unstable landform due to erosion and/or mass movement issues associated with inappropriate design and/or quality assurance during landform construction.	Geotechnical assessment to be completed prior to relinquishment.	H (D4)	L (F3)	L (F3)	L (F3)	L (F3)	L (G4)						
Exposure or release of geochemical and/or geotechnically adverse material associated with containment design and construction, including capping/cover system.	Contaminated Site Assessment Procedure. Waste Rock Characterisation Analysis Procedure.	M (F5)	M (F5)	M (F5)	M (F5)	M (F5)	N/A						
Lack of availability of suitable materials for construction of final landform features, including encapsulation or capping of adverse material	Presence of residual stockpiled material. Suitable external source of material to be identified.	M (E4)	N/A	M (E4)	M (E4)	M (E4)	N/A						
Final landform unsuitable for final land use (e.g. unstable landform).	Rehabilitation trials and monitoring.	M (E3)	L (G2)	L (G2)	L (G2)	L (F3)	L (G2)						
Landform aspect not suitable for intended plant species.	Rehabilitation monitoring program.	L (G2)	N/A	N/A	N/A	N/A	N/A						
Growth Medium Development Phase of Rehabilitation													
Inappropriate physical and structural properties of substrate.	Soil Characterisation Assessment. Ecosystem Function Analysis monitoring.	L (E2)	N/A	N/A	N/A	L (F3)	N/A						
Subsoil and topsoil deficit for rehabilitation activities.	Presence of stockpiled growth medium.	L (E2)	N/A	N/A	N/A	N/A	N/A						
Substrate inadequate to support revegetation or agricultural land capability (e.g. lack of organic matter, nutrient deficiency, lack of soil biota, adverse soil chemical properties, exposed hostile geochemical materials, and any other factors impeding the effective rooting depth).	Importation of VENM.	M (E4)	N/A	N/A	N/A	N/A	N/A						
Ecosystem and Land Use Establishment Phase of Rehabilitation													
Lack of availability and quality of target seed resources, including genetic integrity.	Ecosystem Function Analysis monitoring. Identification of commercial suppliers.	L (F2)	N/A	N/A	N/A	N/A	N/A						
Poor seed viability or seed dormancy.	Ecosystem Function Analysis monitoring.	L (F3)	N/A	N/A	N/A	N/A	N/A						
Ant and insect predation of seed.		L (E2)	N/A	N/A	N/A	N/A	N/A						
Weed infestation associated with both introduction and control (or lack thereof).	Regular inspection and control programs. Rehabilitation monitoring program.	L (E2)	N/A	N/A	N/A	N/A	N/A						
Adopting inappropriate or inadequate rehabilitation techniques, including equipment fleet.	Existing and future rehabilitation research and trials. Rehabilitation personnel induction and training.	M (F4)	L (G3)	N/A	L (G3)	N/A	N/A						
Inappropriate revegetation species mix for targeted final land use.	Identification and characterisation of analogue sites. Ecosystem Function Analysis monitoring.	L (E2)	N/A	N/A	N/A	N/A	N/A						
Adverse weather and climatic influences (e.g. drought; intense rainfall events; bushfire and climate change).	Meteorological monitoring. Rehabilitation planning/scheduling	H (C4)	N/A	N/A	N/A	L (F2)	N/A						
Areas not available for revegetation during optimal seasonal conditions.		L (E2)	N/A	N/A	N/A	N/A	N/A						
Lack of habitat structures for colonisation or use.	Ecosystem Function Analysis monitoring.	M (D2)	N/A	N/A	N/A	N/A	N/A						
Ecosystem and Land Use Development Phase of Rehabilitation													

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Risk	Risk Control	Final Land Use Domain										Where Addressed in RMP	
		Domain A: Native Ecosystem	Domain F: Water Management Areas	Domain G: Water Storage (Excluding Final Void)	Domain H: Heritage Area	Domain I: Infrastructure	Domain J: Final Void						
Hazards associated with retained infrastructure.	Presence of security fencing. Presence of bunds. Maintenance of operational infrastructure. <i>Site Relinquishment Engineering Assessment.</i>	L (G4)	N/A	L (G4)	L (G4)	L (G4)	L (G4)						
Adverse weather and climatic influences (e.g. drought; intense rainfall events; bushfire and climate change).	Meteorological monitoring. Rehabilitation planning / scheduling.	H (C4)	N/A	N/A	N/A	L (F2)	N/A						
Substrate inadequate to support revegetation or agricultural land capacity.	<i>Soil Characterisation Assessment.</i> Ecosystem Function Analysis monitoring. Presence of stockpiled growth medium. Importation of VENM.	M (E4)	N/A	N/A	N/A	N/A	N/A						
Post-closure water quality and quantity issues.	<i>Retained water management infrastructure.</i> Rehabilitation monitoring program. <i>Contaminated Site Assessment Procedure.</i>	N/A	M (E4)	M (E4)	N/A	N/A	N/A						
Damage to rehabilitation (e.g. fauna, domestic stock, vandalism, vehicular interactions, bushfire).	Existing security and stock-proof fencing. Rehabilitation monitoring program.	M (E4)	N/A	N/A	N/A	L (E2)	N/A						
Re-disturbance of established rehabilitation areas.	Rehabilitation planning / scheduling.	L (F3)	N/A	N/A	N/A	L (E2)	N/A						
Insufficient establishment of target species and limited species diversity.	Ecosystem Function Analysis monitoring. Passive recruitment.	M (E3)	N/A	N/A	N/A	N/A	N/A						
Erosion and failure of landform, drainage and water management/storage structures.	Engineered water management infrastructure. Visual inspection program.	M (F4)	L (F2)	M (E3)	N/A	L (F2)	M (F4)						
Lack of infrastructure to support intended final land use (e.g. bunding, fences).	Rehabilitation relinquishment inspection.	L (G3)	N/A	L (G3)	M (G5)	L (G3)	M (G5)						
Lack of resources for rehabilitation maintenance.	Rehabilitation cost estimate and security bond. Rehabilitation planning / scheduling.	L (F2)	L (F2)	L (F2)	L (F2)	L (F2)	L (F2)						

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