Rehabilitation Management Plan

Glenella Quarry Mining Project (ML1692)
Glenella Quarry Pty Ltd

Report Date 13 June 2022

Prepared by:

Michael Howe
Managing Director

Summary Table

Name of Mine:	Glenella Quarry
RMP Commencement Date:	30 June 2022
MP Revision Dates and Version Numbers:	Version 1: 12 June 2022 Version 2: 12 December 2022 Version 3: 18 September 2023
Mining Lease:	ML 1692: expiry 23/09/2034
Lease holder:	Glenella Quarry Pty Ltd

Part 1 – Introduction to the Glenella Quarry Mining Project

1.1 History of Operations:

Approval for the extraction of the resources within the Glenella Quarry was granted in 1984 by both Boorowa Shire Council and Cowra Shire Council to Glenella Aggregates Pty Ltd (DA 4/84 and DA 23/84 respectively) for the extraction of gravel. The operation conducted by Glenella Aggregates focussed primarily on the extraction and sale of a white quartz pebble and limited quantities of basalt with production limited to approximately 10 000tpa. Since assuming control over the operation of the quarry in November 2005, Glenella Quarry Pty Ltd has increased the quantity and range of materials produced from the Quarry to a total of approximately 140 000tpa, including production of quartz pebble, sand, clay and basalt.

1.2 Current Development Consents, Leases and Licences:

The current development consents for Glenella allow for sales of up to 200 000 mtpa with the Cowra and Hilltops Shire (previously Boorowa Shire) consents being valid until Aug 27, 2047, and Sep 25, 2047 respectively.

In addition, Glenella's Mining License, ML1692, for group 1,2 & 5 mineral groups is valid until 23rd September 2034.

Table 1 presents the consents, authorisations and licences held in relation to the Quarry. **Figure 1** displays the boundary of ML 1692 and the layout of the key components of the Quarry.

Table 1

Glenella Quarry Current Consents and Licences

Consent/ Licence	Issuing Body	No.	Grant Date	Expiry Date	Purpose of Approval
Development Consent	Cowra Shire Council	73/2007	27/08/2007	26/08/2047	Production Increase
Development Consent	Boorowa Shire Council	117/06	25/09/2007	24/09/2047	Production Increase
Environment Protection Licence	EPA	20632	28/07/2015	Not Applicable	Extractive Activities Crushing, Grinding or Separating
Mining Lease	DRE	ML 1692	23/09/2015	22/09/2036	Quarry Extraction Operations
Source: Glenella Quarry Pty Ltd					

It is noted that the Company holds ML 1692 for Group 1 (Gold), Group 2 (Ores of Silicon) and Group 5 (Clay Minerals).

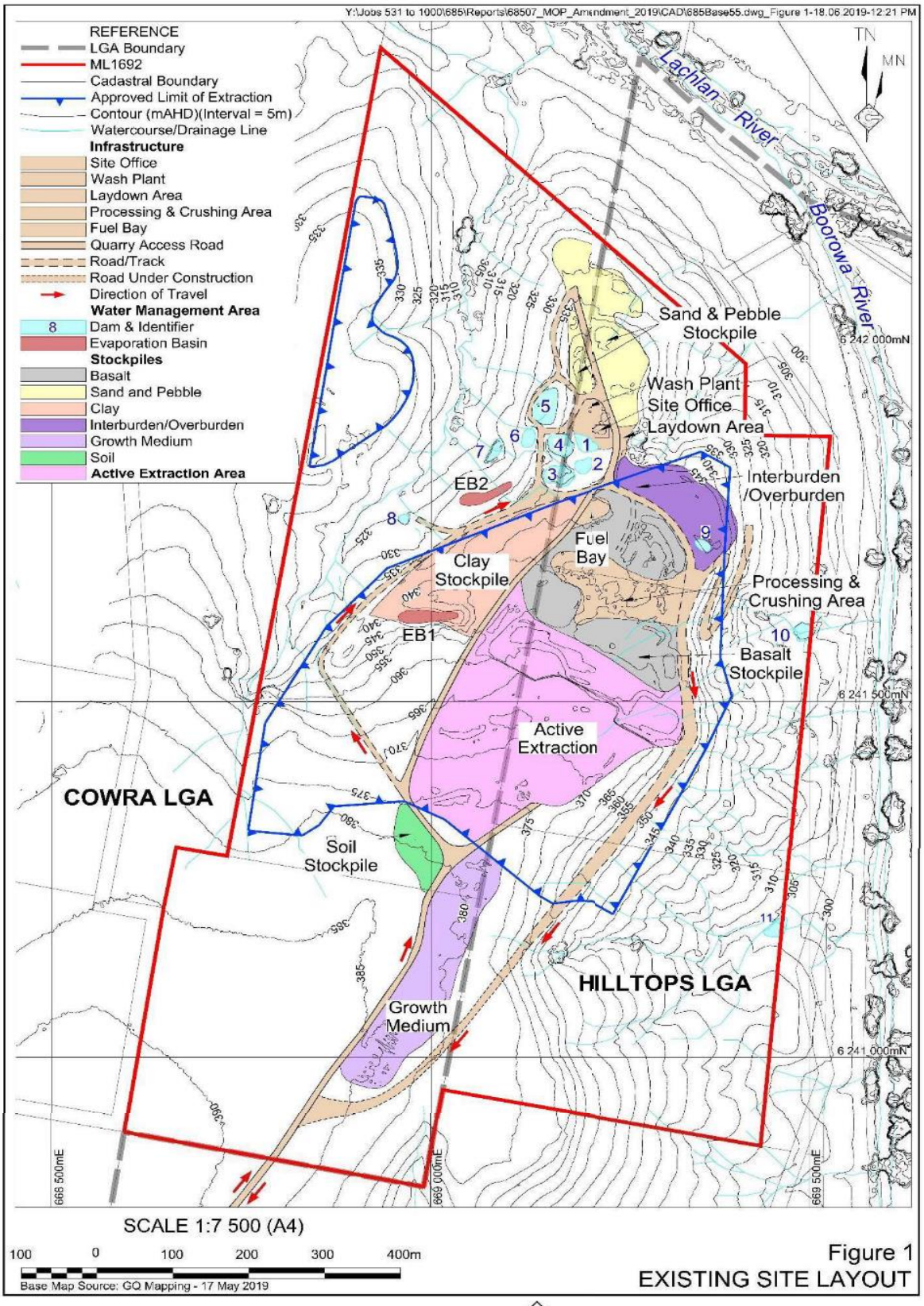


Figure 1
EXISTING SITE LAYOUT

R.W. CORKERY & CO. PTY. LIMITED

1.3 Land Ownership and Land Use:

In accordance with the rural setting, land use surrounding the Project Site is predominantly grazing with some rotation cropping of cereals and other crops. No other land use of note on surrounding properties has been recorded by the Company during its consultation program with local landowners and residents.

The Quarry is contained entirely within the "Glenella" property, owned by the Managing Director of Glenella Quarry Pty Limited, Michael Scott Howe. Land ownership surrounding the Quarry is shown in **Figure 2**. The closest residences to the Quarry are also shown in **Table 2**.

1.3.1 Land Ownership and Land Use Figure:

In accordance with the rural setting, land use surrounding the Project Site is predominantly grazing with some rotation cropping of cereals and other crops. No other land use of note on surrounding properties has been recorded by the Company during its consultation program with local landowners and residents.

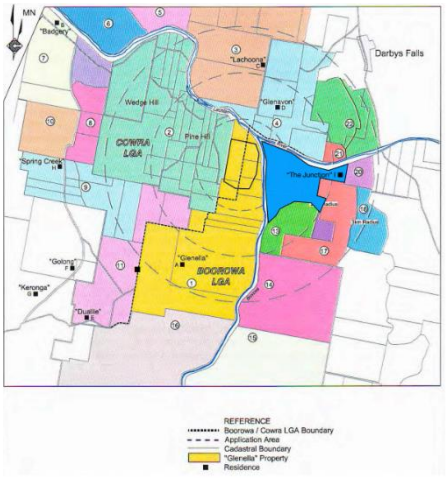
The Quarry is contained entirely within the "Glenella" property, owned by the Managing Director of Glenella Quarry Pty Limited, Michael Scott Howe. Land ownership surrounding the Quarry is shown in **Figure 2**. The closest residences to the Quarry are also shown in **Table 2**.

Table 2

Residences Surrounding the Project Site

Residence Identifier (Name) (see Figure 4.4)	Distance to Nearest Proposed Extraction Activity (m)	Distance to Proposed Processing Plant / Product Storage Area (m)	Comments
A ("Glenella")	1850	2600	Project-related; no activities visible.
B ("Badgery")	1950	4900	Extraction and processing activities topographically shielded.
C ("Lachoona")	1650	2000	Visually exposed to existing extraction and processing activities.
D ("Glenavon")	1000	1250	Topographically and / or shielded from all activities adjacent, southerly hill and / or vegetation.
E ("Duallie")	3700	4300	Topographically shielded; no activities visible.
F ("Golong")	3150	4350	Topographically shielded; no activities visible.
G ("Keronga")	4050	5250	Topographically shielded; no activities visible.
H ("Spring Creek")	2200	3950	Topographically shielded; no activities visible.
I (The Junction")	1930	2065	Residence is topographically shielded; no activities visible.

1.3.1 Land Ownership and Land Use Figure 2



2 Part 2 – Final Land Use

2.1.1 Regulatory Requirements for Rehabilitation:

Regulatory requirements specifically affecting progress towards the post mining land use are detailed in **Table 3**.

Table 3
Regulatory Requirements for Rehabilitation

Source Document	Subject	Rehabilitation Requirement
Cowra Development Consent 73/2007	General	2. The quarry operation shall be undertaken generally in accordance with: ii) Environmental Impact Statement for the Glenella Quarry, prepared by R.W. Corkery & Co Pty Limited dated 30 April 2007.
	Flora and Fauna Management Plan	24. Rehabilitation measures are to be employed to establish vegetative cover on constructed drainage channels and other disturbed sites immediately following construction. The re-spreading of topsoil to a minimum depth of 50mm shall be applied prior to re-vegetation of sites. For temporary short-term cover, exotic grasses and cover crop species are most effective because of their rapid germination and growth and ready availability of seed. For long term cover, native grasses, shrubs and trees will be more appropriate.
	Compliance Reporting	30. The Applicant must lodge an Environmental Management Report (EMR) with Cowra Shire Council…before 30 June each year…The EMR must: – report on progress in respect of rehabilitation completion criteria.
Boorowa Development Consent 117/06	General	2. The quarry operation shall be undertaken generally in accordance with: ii) Environmental Impact Statement for the Glenella Quarry, prepared by R.W. Corkery & Co Pty Limited dated 30 April 2007.
	Flora and Fauna Management Plan	24. Rehabilitation measures are to be employed to establish vegetative cover on constructed drainage channels and other disturbed sites immediately following construction. The re-spreading of topsoil to a minimum depth of 50mm shall be applied prior to re-vegetation of sites. For temporary short-term cover, exotic grasses and cover crop species are most effective because of their rapid germination and growth and ready availability of seed. For long term cover, native grasses, shrubs and trees will be more appropriate.
	Compliance Reporting	30. The Applicant must lodge an Environmental Management Report (EMR) with Boorowa Shire Council…before 30 June each year…The EMR must: – report on progress in respect of rehabilitation completion criteria.
Mining Lease 1692	MOP	3(a) Mining operations must not be carried out otherwise than in accordance with a Mining Operations Plan (MOP) which has been approved by the Director-General.
	Rehabilitation	7. Any disturbance as a result of activities under this lease must be rehabilitated to the satisfaction of the Director-General.
		14(d) Temporary access tracks must be rehabilitated and revegetated to the satisfaction of the Director-General as soon as reasonably practicable after they are no longer required under this lease.

2.1.2 Final Land Use Options Assessment:

Current land use on properties surrounding the Quarry is predominantly grazing with some rotation cropping of cereals and other crops. **Table 4** provides the final land use strategy for each domain.

In summary, the nominated post-mining land use goals for the Quarry are:

- to implement successful design and rehabilitation of landforms to ensure structural stability and free drainage of water (except for stock dams).
- to ensure rehabilitation blends with the surrounding landscape as much as possible, through a final land use of predominantly agricultural/grazing activities, with some nature conservation including habitat corridors targeting drainage lines.
- to retain areas of the Quarry amenable to future agricultural activities including water storage dams.

2.1.3 Final Land Use Statement:

Final land use will be predominantly agricultural/grazing activities, with some nature conservation including habitat corridors targeting the batter area and drainage lines.

2.1.4 Final Land Use and Mining Domains:

The post-mining land use is displayed on **Plan 4**.

Table 4
Final Land Use Strategy

Domain (refer Figure 1)	Final Land Use
1 Infrastructure Areas	The domain will be rehabilitated to rural land consistent with the surrounding landscape. All mine-related infrastructure and any structures not being retained in the final landform are to be removed.
3 Water Management Area	Dams are to remain in the landscape as farm dams.
4 Interburden / Overburden Emplacement Area	Interburden and overburden will be used to progressively backfill the extraction void.
5 Stockpile Area	All stockpiled products will be sold, with no product to remain on site after quarry operations cease.
6 Void	Interburden/overburden will be used to progressively backfill the extraction void, with no void retained in the final landform. The final landform will be shaped so as to partially re-create the north-south oriented ridgeline which runs parallel to the Boorowa River. Subsoil and topsoil will be placed on the shaped landform. The topsoil will be sown with appropriate pasture species, and native vegetation will be established on steeper slopes of the final landform. Tree trunks and branches will be placed on the landform to provided habitat for native fauna.

3 Part 3 – Rehabilitation Risk Assessment

3.1 Environmental Risk Assessment:

The approach to the analysis of risk was generally in accordance with Australian Standards HB 203:2006 and AS/NZS 4360:2004. This environmental risk analysis has also been reviewed and updated generally in accordance with *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines*. It is noted that a review of risks associated specifically with threats to rehabilitation are addressed further in **Table 13** and **Part 11**.

Tables 5, 6 and **7** present the consequence, likelihood and risk rating used during this analysis. **Table 8** presents the results of the risk analysis incorporating the mitigation measures that have previously been proposed within the *Environmental Impact Statement* (EIS) (RWC, 2007). The risk consequences have been determined largely upon review of the outcomes of the assessments completed for the quarry in the 2007 EIS.

Table 5
Qualitative Consequence Rating

Level	Descriptor	Description
1	Negligible	No detrimental impact on the environment is measurable or envisaged.
2	Minor	An event which could have temporary and minor effects on the environment, such as a non-reportable environment incident.
3	Moderate	An event which would create substantial temporary or minor permanent damage to the environment, such as a reportable incident not likely to result in prosecution.
4	Major	An event which could have a substantial and permanent consequence to the environment such as an environmental incident which would result in prosecution, adverse local publicity and community complaints.
5	Severe	A major event which could cause severe damage to the environment 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/NZS ISO31000:2009 Risk Management - Principles and Guidelines	

Table 6
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	Might occur at some time.
E	Unlikely	Could occur at some time.
F	Rare	May occur only in exceptional circumstances.
G	Very Rare	Theoretically possible but not expected to occur.
Source:	Rating modified after HB 89:2012 – Figure B7	

Table 7
Qualitative Risk Rating

Likelihood	Consequences				
	Negligible 1	Minor 2	Moderate 3	Major 4	Severe 5
A (Certain)	M	H	H	VH	VH
B (Almost Certain)	M	H	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
Note: Rating modified after HB 89:2012 - Figure B8					

Table 8
Key Rehabilitation-related Risks

Issue	Exploration	Land preparation, vegetation and topsoil stripping	All construction activities including earth moving	Quarry development and extraction	Use / maintenance of roads, track and equipment	Overburden emplacement management	Product stockpiling and handling	Processing facilities and infrastructure	Residue Storage Facility management	Water management including storage event contingencies	Hazardous materials and fuel, handling / spills management	Sewerage	Rubbish disposal	Rehabilitation activities	Rehabilitated land and remaining features
Air pollution, dust / other	L(2E)	L(2E)	M(2D)	M(2D)	M(2D)	M(3E)	M(3E)	M(3E)	L(2E)	L(2E)	NA	NA	L(2E)	M(2D)	L(2E)
Erosion / sediment minimisation	L(2E)	M(2D)	M(2D)	M(1C)	M(3E)	M(3E)	M(3E)	M(3E)	L(2E)	M(2C)	L(2E)	L(2E)	L(2E)	M(2C)	L(2E)
Surface water pollution	L(2E)	L(2E)	M(2D)	L(2E)	M(1C)	L(2E)	L(2E)	M(3E)	M(2C)	M(2C)	L(2E)	L(2E)	L(2E)	M(2D)	L(2E)
Groundwater pollution	L(2F)	M(3E)	M(3E)	L(2F)	L(2E)	L(2E)	L(2F)	L(2F)	L(2E)	L(2F)	L(2F)	L(2F)	L(2E)	L(2E)	L(3F)
Contaminated or polluted land	L(2F)	L(2F)	L(2F)	L(2F)	L(2G)	L(2E)	L(2G)	L(2G)	L(2E)	L(2G)	M(3D)	M(3D)	L(1E)	M(3D)	L(2E)
Acid Mine Drainage & Salinity	L(2G)	L(2G)	L(2F)	L(3F)	L(2G)	L(2E)	M(3E)	L(2G)	L(2E)	L(2E)	NA	NA	NA	L(2G)	L(2G)
Threatened flora protection	M(2D)	M(2D)	M(2D)	M(2D)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2F)	L(2F)	L(2E)	L(2E)	L(2E)	L(2E)
Threatened fauna protection	L(2E)	M(2D)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2F)	L(2F)	L(2E)	L(2E)	L(2E)	L(2E)
Weed control and management	L(2E)	M(2D)	L(2E)	L(2E)	L(2E)	L(2E)	L(2G)	L(2G)	L(2E)	L(2E)	NA	NA	L(2E)	M(2C)	M(2B)
Operational noise	M(2D)	M(2D)	M(2C)	M(2C)	M(2D)	L(2E)	M(2C)	M(2C)	L(2E)	L(1F)	L(1F)	L(1F)	L(1E)	M(2C)	NA
Vibration and air blast	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)

Visual amenity, stray light	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)
Aboriginal heritage	L(2E)	L(2E)	L(2E)	L(2G)	L(2E)	L(2E)	L(2G)	L(2G)	L(2G)	L(2G)	L(2G)	L(2G)	L(2G)	L(2E)	L(2E)
Non- Aboriginal heritage	L(2E)	L(2E)	L(2E)	L(2G)	L(2E)	L(2E)	L(2G)	L(2G)	L(2G)	L(2G)	L(2G)	L(2G)	L(2G)	L(2E)	L(2E)
Bushfire	M(4E)	M(4E)	M(4F)	M(4F)	M(4F)	L(2E)	L(4G)	L(4G)	L(2E)	L(4G)	L(4G)	NA	L(4G)	M(4F)	M(4F)
Mine subsidence / Settlement	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydrocarbon contamination	L(3F)	L(3F)	L(3F)	L(3F)	L(3F)	L(2E)	L(3F)	L(3F)	L(2E)	L(3F)	M(2D)	NA	L(2E)	L(2F)	L(2F)
Spontaneous Combustion	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	L(2E)
Public safety	L(2E)	L(2E)	L(2E)	M(4F)	M(4F)	L(2E)	L(2E)	M(4F)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	M(3E)
Soil Availability on Site	L(2E)	M(3D)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2E)	L(2G)	L(2G)	L(2G)	M(3E)	M(3E)

4 Part 4 – Rehabilitation Objectives and Rehabilitation Completion Criteria

4.1.1 Rehabilitation Objectives and Rehabilitation Completion Criteria:

The Company's rehabilitation objectives for the quarry can be defined in the short-term and long-term.

In the short term, the objective will be to stabilise all earthworks, drainage lines and disturbed areas no longer required for mine-related activities in order to minimise erosion and the generation of sediment-laden water. Erosion control will be achieved through use of appropriate sediment fencing and the early establishment of groundcover.

In order to achieve the nominated post extraction land use goals, the long-term objectives of rehabilitation activities are as presented in **Table 9**. In summary, the objectives are as follows.

- Provide for the removal of all mining-related infrastructure not required for the agreed final land use.
- Create a low maintenance, geotechnically stable and safe landform that is non-polluting and commensurate with the surrounding landforms.
- Provide for a growth medium suitable for the establishment and retention of the nominated vegetation communities.

Rehabilitation objectives, performance indicators, completion criteria, monitoring / measurement methods and justification for each phase of rehabilitation are further developed in **Table 10**.

Table 9
Rehabilitation Objectives and Targets

Phase[1]	Objective	Target
Site Decommissioning (Surface Infrastructure)	Decommission and remove all surface infrastructure (unless required for a lawful post-mining land use).	All surface infrastructure removed (unless required for a lawful post mining land use).
Landform Establishment	Provide a low maintenance, geo-technically stable and safe landform that is suitable for the proposed final land use.	Geotechnical assessment indicates that the rehabilitated Quarry final landform is stable.
	Provide a non-polluting landform.	Surface water quality monitoring results indicate that the landform is non-polluting. Pollution will be considered against the definition provided by Section 120 of the *Protection of the Environment Operations Act 1997*.
	As much as practically possible, construct final landform to integrate with the surrounding landscape.	Create and profile the slopes of the rehabilitated Quarry to achieve a maximum slope of 18° (as presented in **Plan 4**).
Growth Medium Development (Soil Management)	Where available, provide a cover of soil over landforms that will enable the establishment of, and sustain, the nominated vegetation.	Soil depth and chemistry is to be consistent with comparable analogue sites. Rehabilitation monitoring confirms that the established vegetation communities are self-sustaining.
	Where insufficient topsoil is available, the final landform remains stable though the placement of weathered basalt and/or scalps.	The areas treated with weathered basalt and/or scalps are non-eroding with limited vegetation (similar to natural basalt outcrop).
Land Relinquishment	Allow for the relinquishment of the mining tenements and the return of the security lodged over the Mining Lease within a reasonable time after the end of the mine life.	Within 10 years of final rehabilitation.
Note 1: Further description and discussion on rehabilitation 'Phases' is provided in Section 6.0		

Performance indicators and completion criteria provide a means by which the progress of rehabilitation proposed to be completed can be measured to quantitatively demonstrate the successful achievement of a biophysical process, i.e. the standards that are to be met by successful rehabilitation.

Rehabilitation indicators and performance criteria are inter-related as a performance indicator is an attribute of the biophysical environment (e.g. percentage cover of native vegetation, pH, slope, soil depth etc.) that can be used to approximate the progression of the biophysical process against a defined end point, i.e. the completion/relinquishment criterion.

Table 10 provides the performance indicators and completion criteria developed for the quarry to achieve the nominated rehabilitation objectives.

Table 10
Rehabilitation Performance Indicators and Completion Criteria

Objective	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency	Justification/ Source	Progress at start of RMP	Expected Completion	TARP Ref No.[1]
Phase 1 – Decommissioning								
No decommissioning activities applicable over the next 3-year forward plan.								
Phase 2 – Landform Establishment								
Domain 1 – Infrastructure Area, Domain 3 – Water Management Area, Domain 4 Interburden / Overburden Emplacement Area, Domain 5 Stockpile Area								
No landform establishment activities over the next 3-year forward plan.								
Domain 6 – Void								
Stable, permanent and non-polluting landform established.	Presence of erosion / sedimentation.	No 'active' erosion or sedimentation visible.	Monitoring reports, including photographs included in Annual Review.	Single occurrence following completion of final landform establishment (unless further earthworks required).	Best practice management	Not Commenced	In progress at completion of MOP	5
Phase 3 – Growth Medium Development								
Domain 1 – Infrastructure Area, Domain 3 – Water Management Area, Domain 4 Interburden / Overburden Emplacement Area, Domain 5 Stockpile Area								
Domain 6 – Void								
Establish soil / growing medium suitable for establishment of native and improved pasture.	Compacted surfaces ripped along contour.	Photographs of ripped areas.	Photographs reported through Annual Review.	Following ripping.	Leading Practice (DRET, 2011 – Section 5: Final Rehabilitation	Not Commenced	On going	-
	Minimum growth medium depth of 100mm over all disturbance areas.	Small 'test pit' dug and photographed to show final soil depth. Report indicates	Photographs of test pit reported through	Following spreading of soil.		Not Commenced	On going	3

Objective	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency	Justification/ Source	Progress at start of RMP	Expected Completion	TARP Ref No.[1]
		required thicknesses achieved.	relinquishment report.					
	Key soil characteristics generally within the range of pre-disturbance soil characteristics.	Analysis of soil samples (1 bulk sample per ha) record parameters as follows. • pH – 6.0 to 9.0.	Soil analysis report included in relinquishment report.	Following spreading of soil and annually thereafter.		Not Commenced	On going	4
Phase 4 – Ecosystem and Land Use Establishment								
Domain 1 – Infrastructure Area, Domain 3 – Water Management Area, Domain 5 Stockpile Area								
No ecosystem and land use establishment activities applicable to these domains during the 3-year forward programme.								
Domain 6 – Void and Domain 4 Interburden / Overburden Emplacement Area								
Establishment of vegetation communities with a similar species composition to the existing native and improved pasture surrounding the quarry.	Revegetation with appropriate pasture species mix in accordance with species in grazing areas surrounding the Quarry.	Revegetation monitoring reports confirming that, after 2 years from planting, the applied pasture species mix represents >50% of the total projected foliage cover.	Monitoring and recording of established species (including photographs) reported through Annual Review.	Once revegetation activities are complete, monitoring will be undertaken annually for a minimum of 5 years.	Leading Practice (DRET, 2011 –Section 5: Final Rehabilitation).	Not Commenced	TBD	6
	The rehabilitated area does not constitute an erosion hazard.	Total projected foliage cover is greater than 50% but targeting 70% cover or equivalent to analogue sites not disturbed by extractive industries.				Not Commenced	TBD	5
	Weeds are not competing or impacting on rehabilitated area.	Revegetation monitoring confirms that, after 2 years, weeds represent less than 30% of projected foliage cover or equivalent to analogue sites not disturbed by extractive industries.				Not Commenced	TBD	6

Objective	Performance Indicator	Completion Criteria	Rehabilitation Monitoring Methodology	Monitoring Frequency	Justification/ Source	Progress at start of RMP	Expected Completion	TARP Ref No.[1]
	Grazing by native and domestic fauna not adversely impacting on ecosystem development.	Domestic grazing animals are excluded from the rehabilitation area (except if controlled grazing is required for ecosystem development). Feral and native animal control programs implemented if required.				Not Commenced	TBD	7
Note 1: See **Table 11**								

4.1.2 Rehabilitation Objectives and Rehabilitation Completion Criteria – Stakeholder Consultation:

Community Consultation

The Applicant undertakes community consultation through contact, as required with surrounding landowners. The Company is committed to a genuine, proactive and constructive consultation program with its neighbours given its intention to be part of the local community for in excess of 30-years.

Consultation with Aboriginal Groups:

Consultation was undertaken with local Aboriginal stakeholder groups for the preparation of Aboriginal Heritage studies for the current increase in production process the company is progressing.

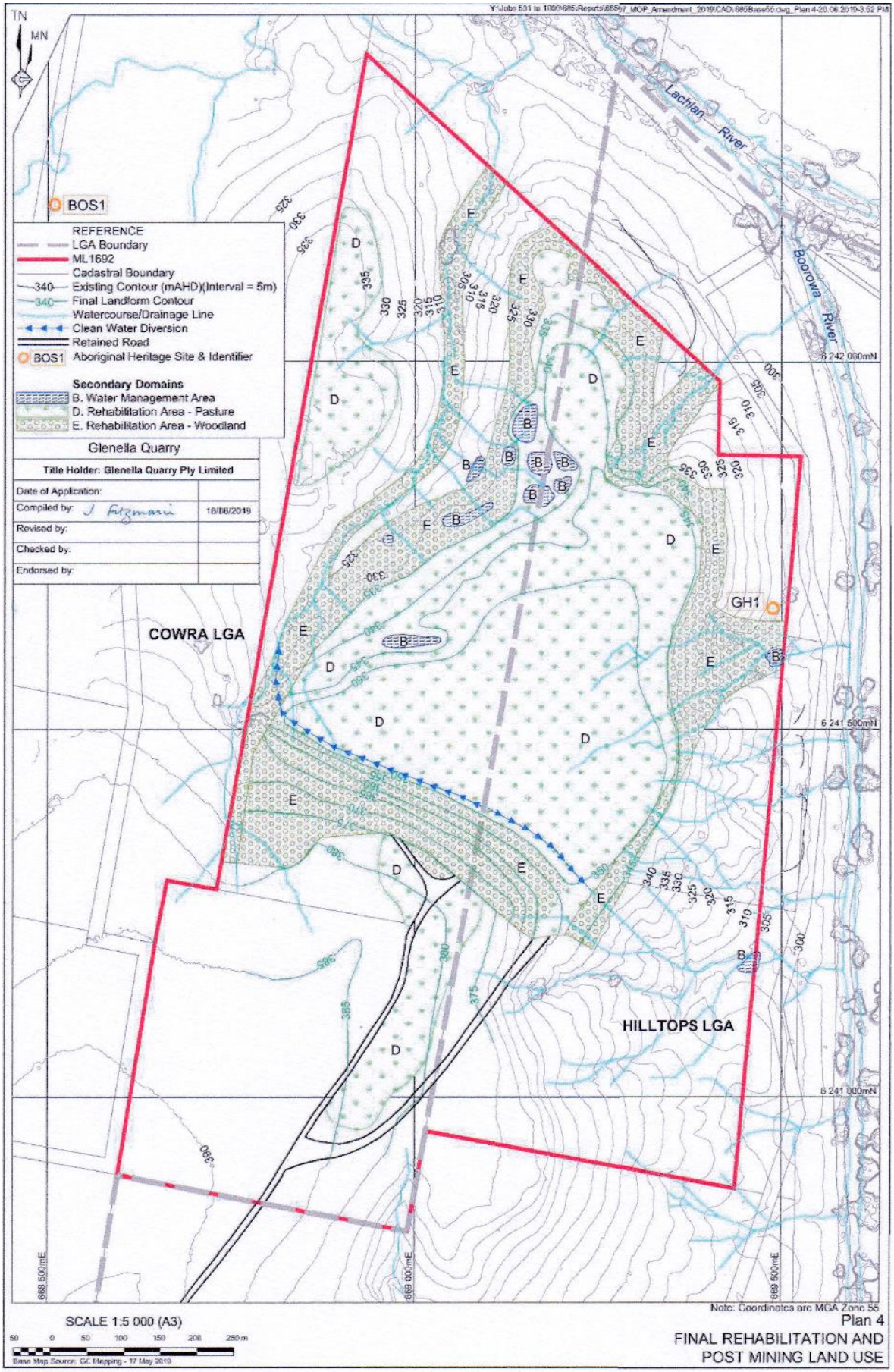
Government Agency Consultation:

The Company maintains periodic contact with the following agencies relating to matters administered by these agencies.

- Resources Regulator;
- EPA;
- Cowra and Hilltops Local Government Authorities;
- NRAR - Water (regarding water meter installation and compliance only).

5 Part 5 – Final Landform and Rehabilitation Plan

Plan 4 below shows the Final Landform and Post Mining Land Use. Please view in conjunction with **Figure 1**.


TN
MN
Lachlan River
Boorowa River
BOS1
REFERENCE
LGA Boundary
ML1692
Cadastral Boundary
340 Existing Contour (mAHD)(Interval = 5m)
340 Final Landform Contour
Watercourse/Drainage Line
Clean Water Diversion
Retained Road
BOS1 Aboriginal Heritage Site & Identifier
Secondary Domains
B. Water Management Area
D. Rehabilitation Area - Pasture
E. Rehabilitation Area - Woodland
Glenella Quarry
Title Holder: Glenella Quarry Pty Limited
Date of Application:
Compiled by: J Fitzmaurice 18/06/2019
Revised by:
Checked by:
Endorsed by:
COWRA LGA
HILLTOPS LGA
GH1
6 242 000mN
6 241 500mN
6 241 000mN
668 500mE
669 000mE
669 500mE
SCALE 1:5 000 (A3)
50 0 50 100 150 200 250 m
Base Map Source: GC Mapping - 17 May 2019
Note: Coordinates are MGA Zone 55
Plan 4
FINAL REHABILITATION AND
POST MINING LAND USE

6 Part 6 – Rehabilitation Implementation

6.1. Life of Mine Rehabilitation Schedule:

The RMP Form and Way document states that this section should describe the rehabilitation schedule over the life of the mine, from the commencement of the RMP until lease relinquishment. The life of mine rehabilitation schedule is to include a series of plans illustrating the proposed mine layout and sequence of progressive rehabilitation across the leasehold area at a minimum of five-yearly intervals until completion of mining and achievement of the final land use.

Detailed mine planning is completed annually and outlines proposed mining/disturbance and rehabilitation areas. Detailed figures will be prepared as part of the Annual Rehabilitation Report and Forward Program, with these outlining activities over the next three years.

6.2. Phases of Rehabilitation and General Methodologies:

The phases in the rehabilitation process commence after completion of active mining / use of a component area. The rehabilitation phases progress through logical steps ending when the land is able to meet its nominated end land use in a sustainable way and can be relinquished.

The rehabilitation hierarchy used in this RMP follows the guidance provided in Explanatory Note 2(h) of ESG3, which references six separate phases as follows.

Active Mining Phase:

The RMP Form and Way document states in the context of rehabilitation, land associated with mining domains is considered 'active' for the period following disturbance until the commencement of rehabilitation.

Stage 1: Decommissioning:

Decommissioning will include the cessation of infrastructure usage, disconnection of remaining services, demolition and removal from site and remediation of any contamination will also be undertaken during this phase.

Removal of infrastructure associated with mining activities including preparation plants, hard stand areas, buildings, contaminated materials, hazardous materials. This phase of rehabilitation may also include studies and assessments associated with decommissioning and demolition of infrastructure or works carried out to make safe or 'fit for purpose' built infrastructure to be retained for future use following lease relinquishment.

Stage 2: Landform Establishment:

The landform establishment phase involves the earthworks required to construct and/or profile all or part of each domain to the approved final landform. The constructed landform should be suitable for the proposed final land use and blend, as far as practicable with the adjacent topography. This stage also includes the construction of any drainage structures needed for the area.

The RMP Form and Way document states that this phase of rehabilitation should include the processes and activities required to construct the approved final landform (as per the Development Consent and for the approved Final Landform and Rehabilitation Plan).

In addition to profiling the surface of rehabilitation areas to the approved final landform profile this phase may include works to construct surface water drainage features. The landform design and construction part of this phase incorporates gradient, slope, aspect and drainage.

Stage 3: Growth Media Development:

The growth medium development phase involves the placement of oxidised overburden, subsoil and available topsoil on the final landform and preparation of the surface for revegetation. Soil preparation may include ameliorant application (e.g. gypsum) and ripping or scarifying the surface.

This phase of rehabilitation consists of activities required to establish the physical, chemical and biological components of the substrate required to establish the desired vegetation community. This phase may include spreading the prepared landform with topsoil and/or subsoil and/or soil substitutes; applying soil ameliorants to enhance the physical, chemical and biological characteristics of the growth media, and actions to minimise loss of growth media due to erosion.

Stage 4: Ecosystem and Land Use Establishment:

The ecosystem and land use establishment phase involves the establishment and maintenance of vegetation on the completed landform. The criteria for completion of ecosystem and land use establishment in areas identified for agricultural use will depend on the type of agriculture to be undertaken and may include establishment of suitable pasture species.

For vegetated land uses this rehabilitation phase includes establishing the desired vegetation community (e.g. Seeding or tube stocking) and implementing land management activities such as weed control. This phase of rehabilitation may also include habitat augmentation such as installation of hollow logs etc.

Stage 5: Ecosystem and Land Use Development:

The ecosystem and land use sustainability phase occurs once monitoring illustrates the achievement of relevant performance indicators with respect to ecosystem development and the stability and function of built structures such as water management structures. Areas of the landform may remain within this phase for extended periods whilst progress is made towards achieving completion criteria. This phase of rehabilitation consists of the activities to manage maturing rehabilitation areas on a trajectory to achieving rehabilitation objectives, completion criteria and the Final Landform and Rehabilitation Plan. Completion criteria for this phase will include components of floristic structure, nutrient requirements, recruitment and recovery, community structure and function which are the key elements of a sustainable landscape.

Stage 6: Rehabilitation Completion - Land Relinquishment:

This final phase of rehabilitation occurs where a rehabilitation area has achieved the final land use for the mining area as stated in the approved rehabilitation objectives and the approved rehabilitation completion criteria and spatially depicted in the approved Final Landform and Rehabilitation Plan. Rehabilitation areas may be classified as complete when the NSW Resources Regulator has determined in writing that rehabilitation has achieved the final land use following submission of the relevant application by the lease holder.

On achievement of the nominated closure criteria for ML 1692, the land will be relinquished and the rehabilitation security held by DRE released in full for that component of the final landform.

These subsections summarise the risks and opportunities for rehabilitation associated with the active mining phase across the mining domains. The subsections have been prepared in accordance with the RMP Form and Way document.

6.2.1.1 Soils and Materials

Glenella has existing topsoil stockpile management procedures to maintain the quality of topsoil for subsequent use in rehabilitation. These procedures will continue to be implemented for the Life of Mine (LoM). Materials management and monitoring techniques to be adopted in this strategy are outlined below:

- Material characterisation of topsoil and subsoil will be undertaken at an appropriate scale across the proposed disturbance area, prior to pre-stripping activities or the re-handling of long-term topsoil stockpiles.
- Wherever practicable, topsoil is to be transferred directly from stripping location to areas that have been reshaped for rehabilitation, eliminating the need for storage and re-handling.
- Topsoil stripping is closely monitored to ensure that only the top layer of topsoil or suitable subsoils is taken.
- Where the stockpiling of topsoil is necessary due to the unavailability of shaped areas for direct return, stockpiles will be generally less than 3 metres high to retain biological activity within the topsoil.
- Stockpiles to be kept longer than 3-months will be sown with a suitable cover crop to minimise soil erosion and the invasion of weed species.
- Topsoil and subsoil stripping activities are to be restricted during adverse weather conditions to minimise the potential for dust generation.
- Topsoil and subsoil will be stripped using appropriate equipment (e.g. dozer or scraper).
- Topsoil and subsoil layers will be assessed and managed so that they can be appropriately reapplied in areas to be rehabilitated.
- Topsoil stockpiles are to be located away from traffic areas and at an appropriate distance from watercourses.
- Appropriate sediment controls will be installed around topsoil stockpiles.

- Where required, machinery used to handle and transport topsoil shall be washed down prior to and at the completion of works to minimise the transfer of weeds.
- Weed growth will be monitored and subsequently controlled if necessary.
- Prior to re-spreading, any weed growth will be scalped from the top of the stockpiles to minimise the transport of weeds into rehabilitated areas.
- Stockpiles will be appropriately identified to minimise the potential for inadvertent use or disturbance.

Overall, it is expected that there will be sufficient topsoil. The soil budget is based on the current proposal to respread 100 mm of topsoil and growth medium on all rehabilitation areas.

Glenella will revise the soil balance periodically.

6.2.1.2 Flora

Vegetation establishment for pasture and native woodland rehabilitation areas will preferentially use local provenance seed for direct seeding or tubestock propagation. Native seed is sourced from a local supplier and is collected from indigenous native grasses, shrubs and trees where possible.

Alternatively, revegetation works may be delayed until sufficient stocks of local provenance species are available.

Existing vegetation communities and recorded occurrences of threatened species have been identified as *White Box, Yellow Box and Blakley's River Gum.*

Rehabilitation efforts will focus on the abovementioned tree species for the establishment of native woodland for conservation purposes in final landform drainage lines and batters.

6.2.1.3 Fauna

Where appropriate and practical, structures such as tree hollows, logs and other woody debris will be incorporated into the final landform to augment the habitat value of the native vegetation corridors. Logs and large rocks will be emplaced where appropriate to construct denning habitat for fauna.

6.2.1.4 Rock / Overburden Emplacement

Following progressive removal of vegetation and soils, overburden will generally be blasted, removed by excavator and truck, and emplaced both, in-pit behind mining and in out of pit dumping areas. Blasting is undertaken in accordance with the Glenella Blast Management Plan.

General principles for overburden emplacement at spoil dumps are:

- Limit the height of dump to within the final landform design; and
- Grade dumps to direct water away from the tip face to maintain face stability.

6.2.1.5 Waste Management

Recycling and disposal of waste at Glenella focuses on the correct handling, storage, segregation and reuse of materials. Glenella recycles waste wherever possible, to reduce the amount of waste destined for landfill.

Waste will be managed in accordance with the following waste management hierarchy principles:

- Waste avoidance;
- Waste re-use;
- Waste recycling; and
- Waste removal and disposal.

Waste oils are stored and collected by waste oil recyclers from time to time. Monthly housekeeping inspections are undertaken at Glenella, to monitor implementation of the Waste Management Plan.

6.2.1.6 Geology and Geochemistry

Geochemical analysis of basalt and clay was undertaken by Geos Mining in 2021 as part of a step out drilling program and subsequent Mineral Resource Estimate (MRE).

As a result, testing of overburden and interburden materails, do not present a risk to rehabilitation.

Consequently, overburden dumping operations do not require any selective handling or other management measures to mitigate salinity or acidity risks for spoils near the rehabilitated surface of emplacement areas.

6.2.1.7 Material Prone to Spontaneous Combustion

Glenella does not have material that is prone to spontaneous combustion.

6.2.1.8 Tailings Dam Waste Management

Fine rejects comprise a majority of tailings (fines less than 2 mm). Fine tailings are collected in a series of tailings dams and excavated or pumped out from time to time. The Tailings are stored, dried in evaporation basins. Dried reject material is back loaded from the Run of Mill (ROM) area using the articulated dump trucks and is either placed within the active dumps or used as fill material on running surfaces.

6.2.1.9 Erosion and Sediment Control

Erosion and sedimentation at Glenella is managed in accordance with the Erosion and Sediment Control Plan which:

- Provides a framework for erosion and sediment control during the construction, operation and rehabilitation phases;
- Is consistent with the requirements of Managing Urban Stormwater: Soils and Construction, Volumes 1 (Landcom 2004) and Volume 2E (DECC 2008), or its latest version;
- Identifies activities that could cause soil erosion, generate sediment or affect flooding;
- Describes measures to minimise soil erosion and the potential for the transport of sediment to downstream waters, and manage flood risk;
- Describes the location, function, and capacity of erosion and sediment control structures and flood management structures;
- Fulfils the statutory conditions of relevant Glenella approvals and licences; and
- Describes what measures would be implemented to maintain these structures over time.

During and following ground disturbance, structures such as sediment dams, sediment fences and catch drains will be utilised as appropriate to manage runoff water and manage erosion and sedimentation. Weekly site inspections are carried out to ensure the effectiveness of erosion and sediment control structures. Additional stabilisation works for these areas may include reshaping, amelioration of dispersive soil, revegetation, fencing, and weed control.

6.2.1.10 Ongoing Management of Biological Resources for Use in Rehabilitation

Seed Collection and Propagation

Native revegetation activities in rehabilitation areas will preferentially use local provenance seed for direct seeding or tube stock propagation at Glenella.

Given the overall volume of seed required is quite small overall, Glenella has selected a local rehabilitation specialist/contractor, Ecoscape, to source targeted native grass, shrub and tree seed varieties in line with identified indigenous varieties in and around the greater Glenella property.

Soil seed bank management undertaken at Glenella are outlined below:

- Stockpiles will be generally less than 3 metres high to retain biological activity within the topsoil.
- Stockpiles to be kept longer than 3 months will be sown with a suitable cover crop to minimise soil erosion and the invasion of weed species.
- Weed growth will be monitored and subsequently controlled if necessary.

6.2.1.11 Mine Subsidence

There are no underground mining operations associated with Glenella.

6.2.1.12 Management of Potential Cultural and Heritage Issues

Aboriginal and Cultural Heritage

Aboriginal Cultural Heritage for Glenella is managed in accordance with the Aboriginal Cultural Heritage Management Plan that includes management strategies for registered Aboriginal sites within the greater Glenella property.

Glenella has been the site of approximately four Aboriginal Heritage surveys over the past 20-years and as such the entirety of the property and its surrounds have been thoroughly investigated.

- Development of an Aboriginal cultural heritage awareness training where and when required for staff and contractors;
- Use of a spatial data system to manage Aboriginal and cultural heritage sites;
- Protection of sites remaining in situ and sensitive areas outside the Approved Disturbance Area; and
- Implementation of the management commitments as part of development consent processes.

Historic Heritage

There are no European Heritage sites on the Greater Glenella property as determined by multiple surveys over the last 20-years.

6.2.1.13 Exploration Activities

Glenella has completed exploration activities on the greater Glenella property and surrendered EL 6616 in 2021.

6.2.2 Decommissioning

Glenella will decommission fixed plant, built infrastructure and services progressively when infrastructure items and plant become redundant. Not all mining related infrastructure will be removed at mine closure as items such as dams, workshop and internal access roads will be maintained for post mining agricultural usage. Decommissioning activities include:

- Disconnection of all above ground and buried services and removal of associated infrastructure;
- Removal of all certain infrastructure and plant;
- Removal of all wastes and hazardous materials; and
- Removal (or onsite remediation) of any contaminated soils in accordance with a contaminated land assessment (where required).

6.2.2.1 Site Security

Glenella implements a variety of control strategies to minimise the potential for public safety incidents at the site, including the following:

- Glenella is a controlled site with all visitors required to report to the office areas on arrival, sign in and be accompanied whilst on site;
- Access points to control areas have cameras, and the remainder of the access points are secure with locked gates and fencing. The front gates, and only road access to the operation, are locked every night and over weekends if shifts are not being conducted;
- There is a near constant owner/staff present on site;
- Safe operation of all mining equipment and processes are undertaken in accordance with the existing Mine Safety Management System;
- Hazardous substances are managed on site in licenced facilities to ensure safe handling and storage;

6.2.2.2 Infrastructure to be Removed or Demolished

Glenella will decommission and remove all built infrastructure not required for the final landform or to be used for post mining agricultural activities during the mine closure phase. Decommissioning activities will be done in consultation with the Resources Regulator, and ideally, in accordance with a decommissioning plan that will be used as a guide for sequencing and the process of infrastructure removal.

Decommissioning of mine infrastructure will include:

- Glenella site wash plant operation control building;
- All Mobile Plant will be removed from site;
- Mine infrastructure area workshop and stores (industrial buildings);
- Conveyors;
- Product ROM stockpiles;

- Pipe and associated plant plumbing; and
- Thickener tank; and
- Mineral processing equipment.

6.2.2.3 Buildings, Structure and Fixed Plant to be retained

Glenella's approved final land use currently includes the retention of some infrastructure. However, infrastructure which is determined to be beneficial for future uses (e.g. workshop buildings, fuel storage and toilet block) may be left in place, subject to approval by the Resources Regulator and any other relevant regulatory agency. Some water management structures will remain post closure as per the current approved final landform. A Geotechnical Assessment will be carried out by a suitably qualified engineer to verify that the water infrastructure retained on site is long-term stable.

6.2.2.4 Management of Contaminated Material

Hazardous materials including bulk diesel fuels and chemicals are contained in bunded storage areas to minimise the potential for accidental spills. Additional management measures include:

• Inspecting and maintaining equipment and plant including the conveyor networks regularly to minimise potential for leaks associated with equipment failures in line with the Glenella Mechanical Maintenance Control Plan.

6.2.2.5 Hazardous Materials Management

Hazardous materials and dangerous goods used at Glenella include gases for cutting and welding and diesel fuels. Dangerous goods and explosives are managed in accordance with the relevant legislation.

No explosive materials are stored on site at Glenella.

Bulk diesel located at Glenella is stored in a 30 000 litre bunded above-ground storage tank.

Hard copies of the Safety Data Sheets are held on site with every employee having access to electronic copies via our Safety Champion App and in line the Glenella Mine Safety Management Plan.

6.2.2.6 Underground Infrastructure

Not applicable to Glenella.

6.2.3 Landform Establishment

Landform establishment is the process of shaping the final landform to a safe, stable and free draining landform that is appropriate for the desired final land use and consistent with the surrounding landscape.

The final shaped landform will be constructed in accordance with the requirements of this document. Rehabilitation will be undertaken progressively, generally commencing as soon as practicable following the completion of mining related activities.

The general landform design and construction process for the site is outlined below:

Landform Design Inspections

- Area Selection to ensure planned areas are as per the approved RMP;
- Design compliance to identifying any potential non-conformances prior to commencing work in order to ensure the landform design (ie final landform design and drainage) meets requirements of the RMP and Development Consent Approval;
- Design Finalisation and Approval to ensure plans (i.e, final landform, cut/fill volumes, contours, drainage) have been developed by a suitably qualified person.
- Inspection: to ensure compliance with final landform plan as per the RMP and relevant Development Consents.

6.2.3.1 Water Management Infrastructure

There are a number of water management structures on the Glenella site. It is intended that all will remain for stock watering in the post mining environment.

Local erosion and sediment control measures will be implemented during this process. Prior to demolition and closure activities, Erosion and Sediment Control Plans detailing the specific inspection maintenance and revegetation will be implemented.

Surface water runoff in rehabilitation areas will be managed through a series of contour furrows, graded banks and waterways. Surface runoff will be staged through the water management system to minimise peak flows, reducing the required size of structures and the erosive potential of the flows. This involves the construction of some water detention structures to contain runoff. Structures are sized for the final rehabilitation profile and vegetation and some major structures will not be finalised until the contributing catchment has been fully rehabilitated.

Any required post-closure water treatment solutions will be identified and further developed as part of detailed closure planning. For specifics on designs and strategies to minimise channel and slope identified and fall is confirmed using survey pickups or drone data. All non-conformances should be reworked, rechecked and closed out.

6.2.3.2 Final Landform Construction: General Requirements

The below description outlines how the final landform will be constructed to minimise the risk of potential issues to rehabilitation.

Key design considerations associated with the construction of the final landform at Glenella include:

- Final landform slopes will be generally battered to an average of 18 degrees to minimise erosion risk.
- Overburden emplacement areas will include variation in vertical relief in order to prevent extended ponding of surface water as well as create a profile that is commensurate with the natural local topography.
- The final landform will generally be designed to direct runoff away from the final voids and into the Boorowa and Lachlan River catchments.
- Drainage structures will be designed to minimise scouring associated with anticipated runoff. Where practicable, drainage lines will be designed to be commensurate with surrounding natural landforms.

Elements such as drainage paths, contour drains, ridgelines, and emplacement areas will be shaped, as much as practical, to undulating profiles in keeping with natural landforms of the surrounding environment. Contour and catch drains are designed to collect surface runoff from revegetation or disturbed areas. Existing sedimentation dams will be incorporated into the final landform to collect runoff from rehabilitated areas and the dam capacities are designed to allow time for suspended sediment to settle out.

6.2.3.3 Final Landform Construction: Stockpiling Areas and Tailings Dams

Stockpiling Areas

Information regarding final landform construction of overburden emplacement areas has been captured in **Section 6.2.3.2** above.

Tailings Dams

The tailings dams will be cleaned and rehabilitated where required for stock watering dams in the post mining environment.

6.2.3.4 Final Landform Construction: Final Void & Highwall

This section outlines the key design features and processes associated with the final void approved to remain in the final landform.

The proposed final landform created by the progressive replacement of removed overburden and silts to completed sections of the extraction area. The final landform would be formed so as to partially re-create the north-south oriented ridgeline which runs parallel to the Boorowa River. A slight depression would be left at the southern end of the generally re-created ridge and constructed as a drainage channel to nearby tributaries of the Lachlan and Boorowa Rives. To assist in management of erosion, dams could be constructed within the drainage line. The final slopes of the recreated landform would be similar to those currently observed but would not exceed 18 degrees to reduce the risk of erosion and maximise sustainable vegetation growth.

The existing drainage lines and features within the upper reaches of BT1 to BT6 and LT1 would generally be reinstated in the final landform.

Water storage and drainage features constructed for water management within the Project Site would be retained to reduce erosion risk and provide a stock water supply within the final landform.

No void would be retained in the final landform and as such, no safety bund or similar would be constructed.

A surface drainage network will be established across overburden emplacement areas to divert the bulk of surface water away from the final voids so as to maximise replenishment of the local catchment areas. The need for ongoing post-mining maintenance of drainage structures will be assessed and appropriate measures will be included within the detailed Mine Closure Plan.

6.2.4 Growth Medium Development

Surface preparation activities for rehabilitated areas will commence as soon as practicable following the completion of mining activities. The general surface preparation activities to be undertaken at Glenella include:

- Prior to the commencement of rehabilitation of the shaped overburden surface, representative samples will be taken to characterise the nature of the spoil material to determine the potential limitations to rehabilitation and sustainable plant growth. Results from this process will be used to determine specific amelioration techniques (e.g. addition of gypsum, lime, organic matter etc.) that may be required for spoil to overcome potential limitations for landform stability, vegetation establishment and growth;

- Soil ameliorants will be applied where appropriate;
- In areas to be returned for future agricultural use, measures such as additional soil amelioration works or further application of topsoil (or suitable alternative) may be required;
- Suitable erosion control measures will be implemented to minimise soil loss from areas undergoing rehabilitation;
- Where appropriate and practical, structures such as tree hollows, logs and other woody debris will be incorporated into the final landform to augment the habitat value of the proposed vegetated corridors; and
- The installation of appropriate habitat structures (e.g. ponds) will be undertaken where practical.

Topsoil and/or subsoil/growth medium (or a suitable alternative) will be spread directly onto the prepared substrate at a nominal depth of 100 mm following installation of appropriate erosion and sediment controls. The growth medium and ameliorants will be spread evenly along the contour. Following application of soils and required ameliorants, the rehabilitation area is re-ripped along the contour. This allows for the partial mixing of topsoil, ameliorants and overburden, and provides surface roughness to improve infiltration and seed/soil contact. Ripping would be conducted along the contour when the soil is moist (immediately prior to sowing of seed stock) to increase infiltration and minimise runoff generation.

6.2.5 Ecosystem and Land Use Establishment

This section outlines the methodologies to establish appropriate vegetation communities for the intended final land use. The approved future land use for Glenella use involves a mix of:

- Predominately Agricultural Grazing; and
- Native woodland for conservation purposes in and around drainage lines.

Key steps for Glenella's Ecosystem and Land Use Establishment are outlined below:

Seeding plan where:

- Seeding plan provided to the Contracting company to ensure correct seed species are sourced.
- Specifications and materials are provided to the Contractor and community establishment areas are pegged (if required).
- Seed mix and fertiliser application rates are determined, which will include the use of cover crops.
- Ripping and seeding confirmation that the area has been seeded with correct mix and at required rate and that area has been ripped to specification (i.e depth, spacing and contouring).

Rehabilitation completion which ensures:

Tree species to be used in rehabilitation are outlined in **Section 6.2.1.2**. This species list is reviewed and revised based on rehabilitation monitoring results.

Rehabilitation campaigns are planned so that seeding coincides with favourable conditions in spring and autumn. Opportunistic sowing may occur in summer and winter if areas become available and weather conditions are predicted to be favourable for germination.

The timing of seeding may be postponed avoiding seeding and planting in adverse conditions or where sufficient provenance seed is not available. Where seeding with the final seed mix is delayed, prepared rehabilitation areas will be sown with a suitable cover crop to minimise dust generation and erosion. Key species for cover crops in Central West, with successful results to date at Glenella thus far, is Rye Corn.

Cover crops can be sown by themselves for short-term erosion / dust control.

Additionally, cover crops control and / or increase organic matter in poor structured and / or infertile soils / spoils. Cover crops are commonly included in perennial pasture mixes to provide initial (rapid) cover, increased organic matter and mulching (moisture conservation) whilst the long-term species are establishing; and in tree / shrub mixes (using a very low sowing rate) to provide short-term erosion control.

Open Grassland

Revegetation may involve the use of both native and suitable exotic pasture species for the establishment of grasslands (pasture), with pockets of native vegetation, which will be utilised as shelter for livestock.

Native Woodland

Vegetation establishment in native woodland rehabilitation areas will preferentially use local provenance seed for direct seeding or tube stock propagation. Native seed is collected from indigenous native grasses, herbs, shrubs and trees and sourced locally where possible.

Where adverse seasonal conditions (i.e. drought) affect the availability of local provenance seed, supplementation with non-local provenance seed may be required. Alternatively, revegetation works may be delayed until sufficient stocks of local provenance species are available.

Revegetation will generally focus on established flora species located on the lower Lachlan and Boorowa River flats.

Corridors/Shelter Belts Rehabilitation

Rehabilitation at Glenella will comprise native tree lots and corridors, primarily on the drainage lines for the purpose of stock shade and shelter, and habitat. Local provenance species will be used during rehabilitation where suitable. Species will be selected based on suitability to local conditions, desired function and speed of growth.

6.2.6 Ecosystem and Land Use Development

Activities associated with the ecosystem and land use development phase of rehabilitation are generally ongoing maintenance, land management activities and rehabilitation monitoring. Maintenance at rehabilitated areas will include, but not be limited to:

- Weeds and pest animal control;
- Managing bushfire risks;
- Minor earthworks to remediate any significant erosion features, including contour banks and diversion channels;
- Infill planting and/or seeding to meet vegetation community requirements; and
- Maintaining erosion and sediment controls.

Rehabilitation monitoring will be undertaken until it can be demonstrated that rehabilitation areas have met all conditions for relinquishment. Rehabilitation monitoring is discussed in **Section 8**.

6.3. Rehabilitation of Areas Affected by Subsidence:

There is no mine subsidence associated with the quarry operations at Glenella.

7 Part 7 – Rehabilitation Quality Assurance Process

Phase	Key Quality Assurance Steps	Current Record Status (in place/still required)	Procedures/Documentation
Active Mining	Competent Staff for active mining and rehabilitation	Records in place Competency Matrix	Position Description
	Up-to-date Mine Plans	RMP, ARN and Forward Program	Mine Plan - MSMP
	Topsoil and Growth Medium stockpiles surveyed	Location of stockpiles known Figure 1	Survey Plans of Locations
	Regular Inspections of erosion and sediment controls	Weekly Inspections conducted (Safety Champion)	Water Management Plan Erosion and Sediment Control Plan MSMP
	Weed Management	Regular, weekly, Inspections.	Weed Management Plan
	Weed Spraying Records	Records Kept	Weed Management Plan
	Batter Regeneration	Regular Inspections and photographic evidence	RMP

Phase	Key Quality Assurance Steps	Current Record Status (in place/still required)	Procedures/Documentation
Decommissioning	Inspection and Demolition Reports to confirm all infrastructure has been removed	Required until closure.	To be addressed in Mine Closure Plan to be developed within 5 years of Mine closure
	Removal of Waste	Waste Records	
	Testing to ensure any contamination/hazardous substances have been appropriately remediated	Required until closure	
	Public Safety risks are assessed during decommissioning	Signage, Access Controls/ Fencing	

Phase	Key Quality Assurance Steps	Current Record Status (in place/still required)	Procedures/Documentation
Landform Establishment	Landform Establishment. Quality Assurance Sign off of constructed landforms, slopes and water drainage structures	Records of Batter Establishment	Monitoring Rehabilitation Procedure.
	Records of Capping Depth	Still Required	RMP
	Records of Batter Formation and Regeneration	Currently in Place	RMP
	Slopes, geotechnical and stability assessment required for Final Closure Plan	Regular Inspections but to be covered in further detail in Mine Closure Plan	Monitoring Rehabilitation
	Void Water Management Assessment to be completed as part of Mine Closure Plan	To be covered in Mine Closure Plan	Mine Closure Plan to be prepared within 5 years of Mine Closure
Growth Medium Establishment	Soil assessment for future rehabilitation areas	Required prior to Rehabilitation	RMP
	Topsoil and Growth Media Register	Location of stockpiles is known (surveyed)	RMP
	Stockpile Management	Height, Weeds and Erosion	RMP Soil and Erosion Control Plan

Phase	Key Quality Assurance Steps	Current Record Status (in place/still required)	Procedures/Documentation
Ecosystem and Land Use Establishment	Documentation of planting and seeding activities including: • Date of planting; • Weather conditions; • Seed mix; • Seeding rate; • Fertiliser rate; • Records of rehabilitation resources such as topsoil/growth media, seed, habitat structures etc.	Records in place	Seeding Contractor Quotes and Records
	Regular inspections of rehabilitated areas to allow for early identification of threats	Weekly Inspections (Safety Champion)	RMP MSMP
	Regular Monitoring of Rehabilitated areas	Weekly Inspections. Analogue site and pictorial evidence	RMP MSMP
	Continual Environmental Monitoring	Ongoing. To be reviewed closer to final closure.	
	Weed and Feral Animal monitoring and management	Weekly Inspections Weed Management Records	
Ecosystem and Land Use Development	Rehabilitation Monitoring to Monitor Success of Rehabilitation	Criteria Assessed in Annual Rehabilitation Monitoring	Procedure Preparation of the Annual Rehabilitation Plan/Forward Program
	Regular site inspections to allow for early identification of rehabilitation threats	Weekly Inspections	
	Weed Management	Records Kept	

8 Part 8 – Rehabilitation Monitoring Program

Analogue Site Baseline Monitoring:

An "Enviroguard" (multi-faceted environmental monitoring system, including cameras) has been situated on the Northern Eastern boundary to the operational footprint. The unit is situated purposely in such a location to serve as the rehabilitation analogue recording point for the Eastern Batter which takes a picture daily at a set time during daylight hours so as to provide a time series, and thus record, of the rehabilitation of the Eastern Batters which is the major rehabilitation set piece over the next 3-years.

Rehabilitation Establishment Monitoring:

Time lapse and periodic photography has been employed from several analogue points to create and continually populate the rehabilitation establishment phase in relation to revegetating sections of the batter network, predominately on the Eastern side of the operational void.

An electronic file is being maintained to this end.

Measuring Performance Against Rehabilitation Objectives and Rehabilitation Completion Criteria:

Part 4- **Table 10** provides guidance for measurement for performance in achieving rehabilitation objectives and rehabilitation completion criteria.

9 Part 9 – Rehabilitation Research, Modelling and Trials

Rehabilitation Monitoring:

Rehabilitation monitoring will focus upon determining whether progress towards achieving the relevant performance indicators and completion and relinquishment criteria presented in Section 4 and **Table 10** is being achieved. **Table 10** also presents the proposed rehabilitation monitoring methodology and frequency for each indicator and criteria identified.

Research and Rehabilitation Trials:

Rehabilitation trials will be undertaken in relation to establishment of pasture on backfilled extraction areas as follows.

- Trialling of the various types of overburdens and/or interburden as subsoil and methods of pasture establishment e.g. use of existing topsoil or application of a pasture, shrub and tree seed mix.
- Different soil treatment methodologies to encourage pasture establishment.

Should any trials be further investigated, these will be presented within the relevant Annual Review(s) and, if successful, the RMP will be amended to reflect changes in rehabilitation practice.

10 Part 10 – Intervention and Adaptive Management

10.1 Threats to Rehabilitation:

Section 3.1 of this document presents an assessment of environmental risks associated with the quarry. Similarly, this subsection presents an analysis of the specific risks or threats to rehabilitation within the quarry. This analysis of threats to rehabilitation has been prepared broadly in accordance with the requirements of *AS/NZS ISO31000:2009 Risk Management – Principles and Guidelines.*

In summary, threats to rehabilitation were identified based on the performance indicators and relinquishment criteria identified in **Table 10**. For each threat, potential adverse outcomes were identified and allocated a risk based on the potential consequences and likelihood of occurrence. Risks were determined based on implementation of industry standard mitigation measures and the Company's rehabilitation commitments (summarised in **Section 3** and **Table 8**). 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 10.2.

Table 7 summarises the risk matrix used during this analysis. **Table 11** presents the results of the risk analysis.

Table 11
Analysis of Rehabilitation Threats

Rehabilitation Threat	Potential Adverse Outcome	Risk Rating (Likelihood and Consequence)
Failure to disconnect services / remove infrastructure.	Unable to complete rehabilitation or establish the identified final land use.	L(2E)
Failure to remove hazardous materials.	Unable to complete rehabilitation or establish the identified final land use.	L(2E)
Failure to address contamination.	Contaminated land present.	M(3E)
Final landform not safe and stable.	Landform is not free-draining / water is pooling.	M(3D)
Respread soil does not conform to completion criteria.	Insufficient soil available for rehabilitation.	L(3F)
	Inadequate soil thickness applied to final landform.	M(2D)
	Soil not capable of sustaining vegetation.	M(2D)
Sediment and erosion control structures inadequate or fail.	Final landform is a source of pollution.	M(3E)
Incorrect species established on final landform.	Species mix on final landform does not conform to applied species mix or analogue site.	M(2D)
Failure of vegetation establishment operations.	Vegetation does not become established on final landform.	M(2D)
Weed or pest management fails.	Weeds and pests become established and require significant resources to manage.	M(2D)
Vegetation community is not self-sustaining.	Final landform requires significantly more management than analogue sites.	M(3E)

10.2 Trigger Action Response Plan

Table 12 presents the Trigger Action Response Plan for each of the rehabilitation threats and potential adverse outcomes identified in **Table 11** as having a risk rating of moderate or above. **Table 12** also provides individual reference numbers for each Trigger Action Response.

Table 12
Trigger Action Response Plan

Rehabilitation Threat	Potential Adverse Outcome	Trigger	Action/ Response	TARP Ref No
Failure to address contamination.	Contaminated land present.	Contamination assessment identifies contaminated land present within Mine Site.	Recommendations of contamination assessment implemented. Verification monitoring / testing undertaken to confirm contamination has been completely removed.	1
Final landform not safe and stable.	Landform is not free-draining / water is pooling.	Visual inspections identify pooling water / poorly drained areas.	Re-profile slopes or install drainage to provide a stable free-draining landform.	2
Respread soil does not conform to completion criteria.	Inadequate subsoil and topsoil thickness applied to shaped landform.	Test pitting following placement of soil material identifies placed soil thickness not consistent with proposed soil thickness.	Additional soil material spread on the final landform.	3
	Soil not capable of sustaining vegetation community.	Soil parameters not within the identified criteria (see **Table 18**).	Suitably qualified agronomist or soil scientist engaged to prepare a report including a range of recommendation to ensure that the identified criteria are achieved / soil is suitable for sustaining the vegetation community.	4
Sediment and erosion control structures inadequate or fail.	Final landform is a source of pollution.	• Projected total foliage cover is less than 50%. • Surface water monitoring records water quality levels outside of the completion criteria. • Visual inspection indicates that final landform is the source of unacceptable levels of sedimentation or is actively eroding.	Company or contract personnel identify site of erosion / sources of sediment and remediate through additional earthworks, soil works including additional of ameliorants, supplementary revegetation or other stabilisation method. If the above is unsuccessful, a suitably qualified professional in sediment and erosion control will be engaged to prepare an assessment report and recommendations to be implemented.	5

Table 12 (Cont'd)
Trigger Action Response Plan

Rehabilitation Threat	Potential Adverse Outcome	Trigger	Action/ Response	TARP Ref No
Incorrect species established on final landform / Failure of vegetation establishment operations / Weed management fails.	Vegetation does not become established / species mix on final landform does not conform to approved species / analogue site / weeds become established and require significant resources to manage.	Monitoring indicates that target or native species represent less than 70% of total species number and less than 50% projected foliage cover after 2-years from planting and less than 80% of the total species and less than 60% projected foliage cover after 5-years from planting and is also inconsistent with analogue sites.	Suitably qualified agronomist or revegetation / rehabilitation expert engaged to assess reasons for divergence of failure of target or local vegetation establishment and recommend actions to ensure that the final vegetation community corresponds as closely as possible to the target community. Additional actions may include: • sowing of additional seed mix for targeted species or additional local species; • use of seed and mulch mix or other application techniques; • soil amelioration works such as addition of gypsum, lime, fertiliser etc.; and • additional weed control activities (mechanical and / or chemical) and/or pest management as required.	6
Pest management fails.	Pests become established and require significant resources to manage.	Feral animals are present within rehabilitated areas in greater proportions / numbers than analogue sites and / or are impacting upon rehabilitation.	Implement site feral pest control program and monitor success.	7

Table 12 (Cont'd)
Trigger Action Response Plan

Rehabilitation Threat	Potential Adverse Outcome	Trigger	Action/ Response	TARP Ref No
Vegetation community is not self-sustaining.	Final landform requires significantly more management than undisturbed analogue sites.	Monitoring indicates that: • established vegetation is not replacing itself through successive generations; or • weed growth is increasing above a projected foliage cover of 20%; or • noxious weeds are not appropriately controlled.	Suitably qualified agronomist or revegetation / rehabilitation expert engaged to assess reasons for additional management requirements and recommend actions to align management required with that of the analogue sites. Additional actions (to be undertaken in targeted areas) may include: • sowing of additional seed mix for targeted species or additional species endemic to the area; • use of seed and mulch mix or other application techniques; • soil amelioration works such as addition of gypsum, lime, fertiliser etc.; and • additional weed control activities (mechanical and/or chemical) and/or pest management as required.	8

11 Part 11 – Review, Revision and Implementation

This RMP will be reviewed following the receipt of any approvals under the *Environmental Planning and Assessment Act 1979* and/or at least every 12-months prior to expiry.

Additionally, the RMP will be reviewed in the event of the following circumstances:

- as a consequence of an amendment made to the rehabilitation objectives, rehabilitation completion criteria or final landform and rehabilitation plan;
- to reflect any changes to the risk control measures in the rehabilitation management plan that are identified in a rehabilitation risk assessment;
- Whenever directed in writing to do so by the Secretary.

Either a new RMP will be prepared or any adjustments that may arise will be tracked in accordance with the colour coding outlined in the ESG3 guidelines and submitted to the Department for approval.

Implementation:

Table 13 outlines the roles and responsibilities of personnel who have responsibility for monitoring, review and implementation for this RMP.

Table 13
Roles and Responsibilities for RMP Implementation

Role	Responsibilities
Quarry Manager	• Accountable for the overall environmental performance of the operations, including the outcomes of this RMP. • Ensure all employees and/or contractors undertaking rehabilitation activities are fully aware of the methods to be adopted and outcomes required. • Ensure that Quarry planning is compliant with the requirements of the RMP and applicable approvals. • Provide necessary resources required to implement the rehabilitation process outlined within the RMP. Ensure all employees and/or contractors are competent through training and awareness programs. • Ensure the implementation of this RMP, including reporting of non-compliances with the trigger values, and subsequent implementation of the relevant action plan. • Ensure that monitoring, report review and preparation are undertaken as outlined within this RMP and associated management plans. • Report the progress of rehabilitation and monitoring in the relevant Annual Review.
All employees and/or contractors	• Follow directions provided by the Quarry Manager. • Ensure operations are consistent with the plans and objectives detailed in this RMP.