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GRAYMONT

Rehabilitation Management Plan (RMP)

Excelsior Limestone Mine

Date

19 January 2024

Rev02

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Reviewed by — Adam Bishop		**Date —** 8 August 2022
Graymont accepted by — Wayne Wolfe		**Date —** 8 August 2022

Revision History

Rev No.	Description	Prepared by	Reviewed by	Authorised by	Date
A	Draft report	CG	AB	AB	02/08/2022
00	Final report	CG	AB	AB	08/08/2022
01	Update to Life of Mine Rehabilitation Schedule to align with Forward Program Plans 2A-2C	DC	JN	WW	2/6/2023
02	Proposed rehabilitation objectives and final landform and rehabilitation plan replaced with versions approved by the Secretary 21/12/23.	DC	WW	WW	19/1/24

Summary table

Excelsior Limestone Mine – Rehabilitation Management Plan (RMP)	
Name of Mine	Excelsior Limestone Mine
Rehabilitation Management Plan Commencement Date	1 August 2022
Revision Date	19 January 2024
Version number	02
Mining Authorisations (Lease/Licence No.)	PLL 1219, SL 664, MPL 318, ML 1517
Name of lease holder(s)	Graymont (NSW) Pty Ltd
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Name and Contact Details of Environmental Representative	Donald Cheong Level 9, 118 Mount Street North Sydney NSW 2060 02 9458 2921

1. Introduction

1.1 History of operations

Excelsior Limestone Mine, also known as Excelsior Quarry, is owned and operated by Graymont (Excelsior) Pty Ltd. Excelsior Quarry is located on the Mudgee Railway Line, about 10 km north of Capertee Highway.

A brief history of the mine follows:

- The limestone deposit was originally opened up following the construction of the nearby Mudgee Railway Line in the 1870's. Limestone had been used for the lime burning and cement manufacture at the Goodlett Smith Granville cement works, metallurgical flux at Hoskin's Lithgow iron and steelworks and from 1968 by Austen and Butta Pty Limited for its coal mines
- Hyrock operated the quarry from 1980 during which time it was mined full time
- Sibelco acquired the mine in 2011 and operated the quarry to produce limestone for the nearby Charbon lime works as well as providing other lime based products
- In 2016, Sibelco began operating the mine on a campaign basis due to reduced demand for product. Campaign mining is a business strategy whereby mining activities occur at irregular intervals at an ordinarily unmanned site in response to movement in the market. The Charbon Lime works that have historically been a major user of limestone from the mine were placed under care and maintenance in 2015
- In August 2019, Graymont acquired the Excelsior Quarry operations and the Charbon Lime Works from the Australian lime and limestone operations of Sibelco; and
- Graymont restarted operations at Charbon in 2020, and in response mining operations at Excelsior have recommended on a full time basis.

Because of new ownership, Graymont is now responsible for the operation, closure, remediation, and rehabilitation of the Excelsior Quarry. Products from Excelsior Quarry include crushed and sized limestone for the Charbon Lime works located 40 km from the quarry, road base for regional construction and crushed rock aggregate for the western coal mines.

1.2 Current development consents, leases, and licences

Limestone mining at Excelsior Quarry commenced in the 1870s long before any planning scheme was in place and benefits from existing use rights. Since then, a number of development consents have been granted by the local authority. A summary of the current development consents is shown in Table 1.

- On 19 February 2002, Lithgow City Council granted consent to the Development Application DA 450/01 (Quarry Extension Development Consent), which authorised an extension to the existing Pit No. 1 of "Smiths Quarry", with respect to the Crown Land adjoining Portion 111, Northern and Western Boundaries
- Subsequently on 24 May 2011, a modification was granted under section 96 (1a) of the Environmental Planning and Assessment Act 1979, which varied the final quarry limit (the Approved Quarry Area); and
- In 2021 consent was granted by Lithgow City Council under DA 069/21 for disposal of Lime Kiln Dust (LKD) from the Charbon Plant within the pit at Excelsior.

Table 1: Current Consents, leases, and licences

Documentation, Condition or Licence	Approval Authority	Status
DA 201/81 (4 November 1981)	Lithgow City Council	Authorises a crushing plant on Portion 111 subject to conditions.
DA 450/01 (19 February 2002)	Lithgow City Council	Authorises an extension to the existing Pit No. 1 of "Smiths Quarry", with respect to the Crown Land adjoining Portion 111, Northern and Western Boundaries.
Modification to DA 450/01 (24 May 2011)	Lithgow City Council	Authorises the extension of the pit limit to the west and create an overburden emplacement to the south-west, enabling safer benching of the pit walls
DA06921 & EIS (March 2021) for Excelsior Quarry	Lithgow City Council	Allows Lime kiln dust (LKD) to be emplaced in a specific area of the final void for the purpose of backfilling the void with overburden and LKD material.

The Excelsior Quarry operations are subject to numerous titles which authorise mining pursuant to the Mining Act 1992. ML 1517 operates under DA 450/01 from Lithgow City Council. The land the subject of Private Lands Lease No 1219 benefits from the DA 201/81.

Graymont has obtained legal advice which establishes that the quarry benefits from “existing use rights” over titles PLL 1219, SL 664, and MPL 318 and may continue undertaking limestone mining and associated operations at the site without further development consent or assessment.

A summary of the mining leases is provided in Table 2.

Table 2: Mining leases at Excelsior Quarry

Tenement number	Real property description	Authority Area (ha)	Vertical Extent of Authority	Authority Expiry Date	Authority Lessee
Private Lands Lease 1219 (Act 1924)	Lot 111 DP755757, Parish Airly, County Roxburgh, City of Lithgow	20.23	Surface & to unlimited depth	03/10/2030	Graymont (Excelsior) Pty Ltd
Special Lease 664 (Act 1906)	Lot 31, 47, 50, 136, 137 DP755757, Lot 7012 DP1056868, Parish Airly, County Roxburgh, City of Lithgow	35.41	Surface & soil below to depth of 91.44 metres	31/10/2034	Graymont (Excelsior) Pty Ltd
Mining Purposes Lease 318 (Act 1973)	Lot 7012 DP1056868, Parish Airly, County Roxburgh, City of Lithgow	103.3	Surface & soil below to depth of 20 metres	31/10/2035	Graymont (Excelsior) Pty Ltd
Mining Lease 1517 (Act 1992)	Lot 27 DP755757, Lot 7012 DP1056868, Parish Airly, County Roxburgh, City of Lithgow	28.68	Surface & soil below to depth of 100 metres	02/07/2044	Graymont (Excelsior) Pty Ltd

The Excelsior Quarry operations are also subject to environment protection licence (EPL) 953, issued in accordance with section 55 of the Protection of the Environment Operations Act 1997. Within the EPL the "Premises" is defined as "Portions 111, 47, 137, 31, 50, and 27".

EPL 953 authorises the carrying out of the following scheduled activities:

- Crushing, grinding, or separating works greater than 100,000 but less than 500,000 tonnes per year processed; and
- Mining for minerals greater than 100,000 but less than 500,000 tonnes per year produced.

1.3 Land ownership and land use

Table 3 provides an overview of the land ownership and land use of the mining leases.

Table 3: Land ownership and land use

Lease	Real property description	Area (ha)	Historic land use	Current land use/activity	Proposed final land use	Land Tenure	Land Owner	Status	Expiry Date
PLL 1219	Lot 111 DP755757	20.23	Limestone quarrying	Mining and Overburden Emplacement	Mixed native vegetation	Freehold	Graymont (NSW) Pty Ltd	Current	03/10/2030
SL 664	Lot 31, 47, 50, 136, 137 DP755757, Lot 7012 DP1056868	35.41	Limestone quarrying	Mining and Overburden Emplacement	Mixed native vegetation	Leased	Crown	Current	31/10/2034
MPL 318	Lot 7012 DP1056868	103.3			Mixed native vegetation	Leased	Crown	Current	31/10/2035
ML 1517	Lot 27 DP755757, Lot 7012 DP1056868	28.7	Limestone quarrying	Mining and Overburden Emplacement	Mixed native vegetation	Leased	Crown	Current	02/07/2023

1.3.1 Land ownership and land use figure

Figure 1 describes the land ownership and land use in proximity to the mine site.

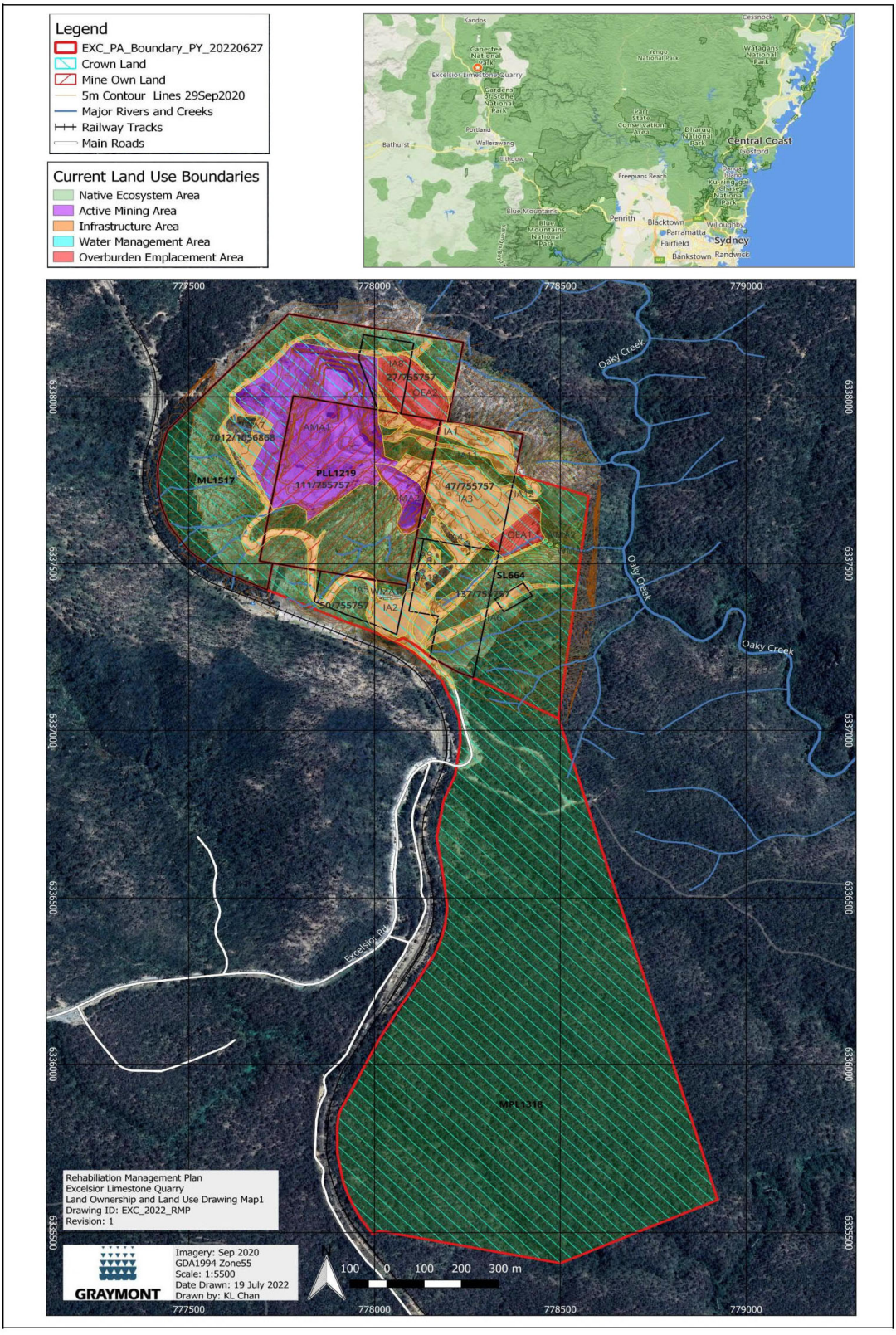

Figure 1: Land ownership and land use

2. Final land use

2.1 Regulatory requirements for rehabilitation

Table 4 outlines regulatory requirements relating to rehabilitation contained in development consent 450/01.

Table 4: Regulatory requirements

Development Consent Condition No.	Conditions	Timing	Addressed in RMP
Condition 12	At least two years prior to the cessation of quarry operations the Applicant shall investigate, determine and report, taking into account of the potential community benefits, on a final strategy for the future use of the quarry site and any general infrastructure components, in consultation with Department of Land and Water Conservation and Lithgow City Council and for approval of the Department of Mineral Resources."	n/a	n/a - Graymont (Excelsior) Pty Ltd will action the above condition in due course

As of July 2022, the *Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2021* introduced a standard set of rehabilitation conditions for all mining leases in NSW. These conditions are now located in Schedule 8A of the Mining Regulation 2016 and commenced on 2 July 2022 for large mines. The new conditions require progressive rehabilitation, rehabilitation risk assessment, annual reporting and detailed rehabilitation management planning, and apply to all of PLL 1219, SL 664, MPL 318 and ML 1517.

A summary of the new rehabilitation conditions is provided in Table 5.

Table 5: Standard Rehabilitation Conditions for Mining Leases under Schedule 8A

Condition No.	Condition Title	Summary	How Addressed
1	Definitions	Defines words and terms used I the schedule	n/a
2	Functions of Secretary – approval of Rehabilitation Outcome Documents	Outlines functions of the Secretary in approving rehabilitation outcome documents and notifying the lease holder	n/a
3	Assessments and documents may relate to more than 1 Mining Lease	Outlines functions of the Secretary in treating multiple leases relating to a single mine as a single lease	n/a
4	Must prevent or minimise harm to the environment	Outlines obligations of the lease holder to prevent or minimise harm to the environment	This plan
5	Rehabilitation to occur as soon as reasonably practicable after disturbance	Outlines obligations of the lease holder to rehabilitate land and water as soon as reasonably practicable after disturbance occurs	This plan
6	Rehabilitation must achieve final land use	Outlines obligations of the lease holder to achieve the final land use	This plan
7	Rehabilitation Risk Assessment	Outlines obligations of the lease holder to document a Rehabilitation Risk Assessment	This plan

Condition No.	Condition Title	Summary	How Addressed
8	Application of division	Outlines the application of Division 3 in relation to rehabilitation documents	n/a
9	General requirements for documents	Outlines the application of Division 3 in relation to the form of rehabilitation documents	n/a
10	Rehabilitation Management Plans for large mines	Outlines obligations of the lease holder in relating to preparing and implementing a Rehabilitation Management Plan	This plan
11	Amendment of Rehabilitation Management Plans	Outlines obligations of the lease holder to amend a Rehabilitation Management Plan when directed	Chapter 11 of this RMP
12	Rehabilitation Outcome Documents	Outlines obligations of the lease holder to prepare Rehabilitation Outcome Documents including: • rehabilitation objectives statement • rehabilitation completion criteria statement; and • final landform and rehabilitation plan	This plan including related submissions
13	Forward Program and Annual Rehabilitation Report	Outlines obligations of the lease holder to prepare a Forward Program and Annual Rehabilitation Report	n/a
14	Amendment of Rehabilitation Outcome Documents and Forward Program	Outlines obligations of the lease holder as to when and how Rehabilitation Outcome Documents and Forward Program may be amended	n/a
15	Times at which documents must be prepared and given	Outlines timing required for preparation of various documents under Schedule 8A	n/a
16	Certain documents to be publicly available	Outlines obligations of the lease holder to make publicly available a Rehabilitation Management Plan, a Forward Program and an Annual Rehabilitation Report	n/a
17	Records demonstrating compliance	Outlines obligations of the lease holder to create and maintain records that demonstrate compliance with Schedule 8A	n/a
18	Report on non-compliance	Outlines obligations of the lease holder to report on a non-compliance with the mining lease or of the Act or Regulation	n/a
19	Nominated contact person	Outlines obligations of the lease holder to nominate a contact person with who the Secretary can communicate in relation to the mining lease	n/a
20	Additional requirements – application for or to modify development consent	Outlines obligations of the lease holder in relation to a modification of or application for development consent	n/a

2.2 Final land use options assessment

As the post mining land use has not been clearly defined in previous approvals or environmental assessment documentation, a post mining land use options assessment has been undertaken and is described in Table 6.

Table 6: Review of post mining land use options assessment

Post Mining Land Use Option	Strengths	Limitations
Option 1 - Mixed native vegetation	Mixed native vegetation is the closest land use to the surrounding National Park. This would blend with the natural environment and have the highest compatibility with surrounding landscape. This option will have the lowest on-going management and maintenance demands once established. It also has the good chance of rehabilitation success being suited to the local conditions, provided appropriate inputs are made with respect to growth medium development, plant selection and maintenance. A long-term self-sustaining sustainable outcome for this option could likely be achieved within 5-10 years after mine closure and rehabilitation.	This option requires a large effort to implement including potentially transport of soil to stabilise some batters and voids and create a suitable growth medium for native vegetation. It would require significant planting of native vegetation tube stock and seed spreading for plant establishment. This option would be vulnerable to climatic factors, fires, and pests particularly in the establishment phase; however, it would be just as vulnerable as the surrounding land and in the long term arguably less vulnerable than alternate land use options.
Option 2 – Landfill (various waste options could be considered)	This option has some merit due to the presence of an existing void that could accommodate a significant quantity of waste. Could provide a higher economic value end use and contribute to solving broader waste management issues. The site has sufficient haulage roads for large vehicles to enter and leave the site safely. Low chance of rehabilitation failure. Resilient to climatic variations, fire, pest, and disease pressures.	Site is remote from large centres and areas of significant waste generation. Detailed analysis would be required of the viability of transporting waste to the site and whether the region needs a new landfill location. This option would be unlikely to appeal to much of the community and other stakeholders. The option at face value seems incompatible with adjoining National Park and This option would not necessarily add to the rehabilitation of the land and would still cause some disturbance making it incompatible with the surrounding natural landscape. Substantial environmental investigations and planning approvals would be required, with unknown likelihood of success. This option my take many years to reach a long-term sustainable outcome and would require a high level of maintenance and management.

Post Mining Land Use Option	Strengths	Limitations
Option 3 – Agricultural Land	This option, while it doesn't suit the surrounding landscape, does fit in with the broader setting of the region as it contains many large agricultural areas. It is unlikely that this option would have much public support from the community and other stakeholders.	This option would require high initial effort to establish growth media and appropriate vegetation transport soil and livestock and may require far greater alteration to the current landscape to make it into the area and to alter the landscape, so it is suitable for agricultural use. This option would be vulnerable to climatic variations, fires, pests, and diseases. It would also add to the vulnerability of the surrounding land to these issues. The achievable level of agricultural land class would need to be assessed and determined by an agronomist, though is likely to be very low and suited only to low intensity agriculture at best. This option would take a very long time to reach a long-term sustainable outcome and would require a high level of maintenance and management. It is unlikely that this option would have much public support from the community and other stakeholders.

2.3 Final land use statement

Mixed native vegetation is currently preferred as the most suitable post mining land use option, being superior to a landfill and agricultural land use due to its compatibility to the surrounding environment, its highly sustainable nature, and low maintenance needs. When a date for mine closure is set in the future, Graymont will consult Council, the Resources Regulator, and the community in relation to the final land use.

It is anticipated that upon completion of workings within the quarry, the ownership, or title of any Graymont owned land will be returned to the crown unless an interested private party is found before this time.

2.4 Final land use and mining domains

2.4.1 Final land use domains

The principal objective for the rehabilitation of Excelsior Quarry is to return the site to a condition where its landform, soils, hydrology, flora, and fauna are self-sustaining and compatible with the surrounding land use. The final land use domains are listed and defined in Table 7.

Table 7: Final land use domains

Final land use domains	Excelsior Limestone Mine
Infrastructure (includes built infrastructure proposed to be retained for future use)	Some roads and tracks will be retained for property access, bushfire fighting and rehabilitation monitoring purposes.
Native Ecosystem	Land dedicated to nature conservation post mine life. The maximum slopes of the landform would be 18° with mid-slope benches to achieve long term geotechnical stability and minimise erosion.
Water Storage	Dams retained as clean water dams for final land use.
Final Void	The final void will be used for stock water. The maximum slopes of the landform would be 18° 1:3 (V:H)) with mid-slope benches to achieve long term geotechnical stability and minimise erosion.

2.4.2 Mining domains

The following are the mining domains at Excelsior Quarry.

Table 8 lists and provide information regarding the current mining domains at Excelsior Quarry.

Table 8: Mining domains

Mining domain	Operation Details
Infrastructure area	This mining domain currently contains equipment and assets including, run of mine (ROM) Stockpiles, administration and employee facilities, secondary crushers & storage bins, weighbridge, workshop and refuelling facilities, water supply and sewage systems, unsealed roads, tracks, electrical power reticulation, telecommunications cables.
Active mining (Open pit void)	The open pit progresses to the south from the existing working face. Open pit mining utilises conventional drill & blast and load & haul techniques to extract limestone. Holes are drilled, loaded with explosives, stemmed with gravel, and blasted to fragment the rock. Depending on production requirements and the rock quality, the blasted material is loaded onto haul trucks and transported to one of the following areas: • ROM pad – rock of suitable quality for calcination is fed direct to the crusher or stored on the ROM pad for later use • To Road-base Production – the rock that is not suitable for calcination is either crushed into road- making materials by the fixed plant, the mobile plant, or stored on the Road Base ROM stockpile; and • To waste – the rock that is not of suitable quality for either application is carted directly to the waste emplacements.
Water storage	The majority of runoff from the active mining area reports to the open pit sump. This area captures dirty water and allows sediment to settle out. The areas outside the main open pit area all drain via sediment catchment dams.
Overburden emplacement area	The following are included in the overburden emplacement areas: • No.1 Overburden Emplacement; located South of the main ROM stockpiles area • No.2 Overburden Emplacement located northeast of No.1 Pit. Part of this area is also used for the storage of LKD as shown in Plan 1: and • No.3 Overburden Emplacement located Southwest of No.1 pit is approved though yet to be established. Graymont's overburden management plan has recently evolved to include substantial backfill of Pit 1, which may reduce or remove the need for establishment of the No.3 overburden emplacement.

3. Rehabilitation risk assessment

The Excelsior Lime Mine has undertaken a rehabilitation risk assessment and identified appropriate controls for potential risks during each mining rehabilitation phase, as listed below.

- Active mining and production
- Decommissioning
- Landform Establishment
- Growth medium development
- Ecosystem establishment; and
- Ecosystem and land use development.

The risk rating was developed in accordance with the likelihood criteria (Table 9), consequence table (Table 10) and risk matrix Table 11). The method and findings of the risk assessment process is presented as a risk register in Table 12.

Table 9: Likelihood criteria

Level	Rating	**Description** This is a subjective judgement based on our knowledge and experience.	Frequency
5	Almost Certain	The event is expected to occur in most circumstances	More than once a year
4	Likely	The event will probably occur in most circumstances	At least once per year
3	Possible	The event should occur at some time	At least once in 3 years
2	Unlikely	The event could occur at some time	At least once in 10 years
1	Rare	The event may only occur in exceptional circumstances	Less than once in 15 years

Table 10: Consequence table

	Rehabilitation, Environment and Community	Health and Safety	Financial
Catastrophic (5)	• Permanent impacts to populations of rare or threatened flora or fauna • Adverse impacts (i.e., damage, destruction, or removal) to state or nationally listed indigenous or non-indigenous heritage item • Complete removal of habitat of threatened species • Significant impairment of ecosystem function • Multiple negative media reports; or • Legal action initiated by members of the community.	• One or more fatalities.	• >$1M business impact.
Major (4)	• Removal, destruction, or loss of whole populations of common native flora and/or fauna • Adverse impacts to non-listed or locally significant indigenous or non-indigenous heritage items; or • Negative media report or multiple community complaints.	• Injury or illness that requires hospitalisation and/or results in permanent impairment.	• $100k-$1M business impact.
Moderate (3)	• Loss of individual of rare or threatened species; or • Moderate impacts on soil, air or water that requires coordinated clean-up; or • Offsite discharges/emissions outside of advised levels (e.g., licence limit, or environmental advisor / consultant advice) with an impact that is short term; or • Individual community complaint.	• Injury or illness more severe than a sprain, strain or superficial wound that requires medical treatment and/or a temporary work restriction (e.g., breaks, fractures, lacerations, burns, torn ligaments).	• $10-$100k business impact.
Minor (2)	• Contamination of any on-site water body or impacts on soil and air quality beyond immediate work area but contained onsite; or • Loss of individuals of common (not threatened) native flora or fauna.	• Sprain, strain, or superficial wound (i.e., bruise, cut, abrasion) that requires medical treatment and/or a temporary work restriction.	• $1-$10k business impact.
Insignificant (1)	• Direct impacts on soil or air within immediate work area and immediately cleaned up with no residual contamination.	• Injury or illness that requires no more than first aid treatment and no work restriction	• $1k business impact.

Table 11: Risk matrix

	CONSEQUENCE						
LIKELIHOOD			**Catastrophic**	**Major**	**Moderate**	**Minor**	**Insignificant**
			5	4	3	2	1
	Almost Certain	5	25 High	23 High	20 High	16 Medium	11 Medium
	Likely	4	24 High	21 High	17 Medium	12 Medium	7 Low
	Possible	3	22 High	18 Medium	13 Medium	8 Low	4 Low
	Unlikely	2	19 Medium	14 Medium	9 Low	5 Low	2 Low
	Rare	1	15 Medium	10 Low	6 Low	3 Low	1 Low

Table 12: Rehabilitation risk assessment

Risk ID	Risk Issue	Description of Risk and Trigger	Risk Rating (pre-Control)			Preventative Controls	Residual Risk			Response actions to be considered if the risk eventuates
			Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating	
1. General										
1.1	Rehabilitation skills	Insufficient skills and experience of rehabilitation personnel affects achievement of closure criteria and final land use goals.	4	3	17	• Ensure relevant site personnel are appropriately trained in rehabilitation planning, design, and review; and • Seek specialist advice when designing and implementing rehabilitation plan.	2	2	5	• Engage experienced staff or contractors to review rehabilitation outcomes, revise plans and develop actions for restoration as required; and • Initiate additional and targeted rehabilitation supervision, monitoring, and reporting.
1.2	Rehabilitation responsibilities	Lack of clearly defined responsibilities leads to poor planning and implementation of rehabilitation activities.	3	2	8	• Define rehabilitation responsibilities in personnel role descriptions and in operational and rehabilitation management plans; and • Assign rehabilitation responsibilities to personnel with the required knowledge, experience, capability, and capacity to ensure successful implementation.	2	2	5	• Review personnel responsibilities and rehabilitation plans; and • Initiate additional and targeted rehabilitation supervision, monitoring, and reporting.
1.3	Rehabilitation funding	Insufficient funding for or prioritisation of rehabilitation leads to poor planning and implementation of rehabilitation activities.	2	3	9	• Rehabilitation targets to be reviewed annually and reported in AEMRs • Set rehabilitation budgets and targets annually; and • Rehabilitation KPIs to be part of management discussions and success reported annually.	1	3	6	• Escalate financial constraints to senior management.

1.4	Rehabilitation success	Rehabilitation monitoring is poorly planned or implemented, leading to poor performance and delays to necessary intervention.	3	3	13	• Implement annual rehabilitation surveys as part of an integrated rehabilitation monitoring program. Monitoring program to:
						  ○ Compare results against rehabilitation objectives and targets;
						  ○ Identify possible trends and continuous improvement
						  ○ Link to records of rehabilitation to determine causes and explain results
						  ○ Assess effectiveness of environmental controls implemented
						  ○ Where required, identify modifications required for the monitoring and rehabilitation program
						  ○ Identify practices or areas requiring research
						  ○ Compare flora species present against original seed mix and/or reference sites
						  ○ Assess vegetation health; and
						  ○ Assess vegetation structure (e.g., upper, mid, and lower storey).
							2	3	9	• Initiate additional and targeted rehabilitation supervision, monitoring, and reporting; and
										• Seek specialist advice and implement targeted rehabilitation response to address the threat.

Risk ID	Risk Issue	Description of Risk and Trigger	Risk Rating (pre-Control)			Preventative Controls	Residual Risk			Response actions to be considered if the risk eventuates
2. Mining / Production										
2.1	Site contamination	Contamination resulting from mining, processing and associated activities impacts the ability to achieve successful rehabilitation and a safe final land use (e.g., storage and use of hydrocarbons/chemicals; drilling fluids; spillage of dirty or produced saline water; brine; sewage etc.).	3	2	8	• Store hazardous materials in covered and bunded containers, in accordance with relevant Australian Standards • Inspect storage areas and assess integrity, as part of weekly environmental inspections • Clean-up spills promptly and dispose of contaminated materials. Undertake follow up validation of clean-up of affected areas, as required • Undertake regular water monitoring to assess contamination risks • Take action to control the contaminant source and remediate affected waters ahead of rehabilitation works • There are no chemicals or environmentally hazardous substances used in quarry/processing operations outside of small amounts of hydrochloric acid and fuel/hydrocarbons • Measures to suppress fugitive dust such as maintenance grading, road repairs after heavy rainfall, compacted surfaces to minimize particle displacement and regular inspections • Hydrocarbons contained within bunded catchment area or within double bunded tanks • Hydrocarbon spill kits are kept onsite • Leachate/runoff from LKD emplacement captured and reused or diverted to Wet Quarry after testing suitable; and • Stormwater diverted around LKD storage.	2	2	5	• Undertake targeted contamination assessment to characterise risks and develop appropriate remedial actions; and • Implement remedial action plan.
2.2	Waste materials storage	Disposal or stockpiling of processing waste materials from the hydration and calcination process including unburnt core, leading to pollution or poor growing conditions, and poor rehabilitation outcomes.	3	3	13	• Test any wastes against relevant acceptance criteria before incorporating into final landform or blending with growth media • Obtain specialist advice from soil scientist, agronomist or similar • Ameliorate materials to overcome physical or chemical constraints; and • LKD emplacement to be separated from mine workings.	2	3	9	• Obtain specialist advice and develop appropriate remedial actions which could include removal or amelioration of unsuitable materials.
2.3	Geotechnical and chemical constraints	Adverse geochemical/chemical composition of materials such as overburden/interburden, processing wastes, subsoils and topsoils	3	3	13	• Test materials against relevant acceptance criteria before incorporating into final landform or blending with growth media • Obtain specialist advice from soil scientist, agronomist or similar; and	2	3	9	• Obtain specialist advice and develop appropriate remedial actions which could include removal or amelioration of unsuitable materials.

Risk ID	Risk Issue	Description of Risk and Trigger	Risk Rating (pre-Control)			Preventative Controls	Residual Risk			Response actions to be considered if the risk eventuates
		and imported cover materials leading to pollution or poor growing conditions, and poor rehabilitation outcomes.				• Ameliorate materials to overcome physical or chemical constraints.				
2.4	Landform development	Mining landform results in complex or unsafe conditions that are inconsistent with final landform goals	3	4	18	• Ensure final landform goals are factored into development and implementation of mine plans; and • Incorporate staged rehabilitation into mine planning.	2	4	14	• Obtain specialist advice and review final landform goals. Amend rehabilitation and closure plans as required.
3. Decommissioning										
3.1	Contamination from waste materials	Contamination resulting from residual wastes and associated activities (e.g., removal of fuel and chemical storage containers, underground fuel tanks, removal of asbestos materials) leading to pollution or poor growing conditions, and poor rehabilitation outcomes.	3	2	8	• Incorporate appropriate procedures for removal of hazardous materials including final verification; and • Employ suitably qualified demolition contractors.	2	2	5	• Undertake validation sampling and analysis of any residual contamination risks and develop appropriate remedial actions; and • Implement remedial action plan.
3.2	Waste material removal	Inadequate clean-up and removal of building and infrastructure materials generates residual wastes, causing ability to achieve closure criteria.	4	2	12	• Conduct final inspection of decommissioning and clean-up with Hold Points and release criteria for demolition contractors; and • Incorporate appropriate hold points and performance criteria and demolition and waste removal contracts.	3	2	8	• Obtain specialist advice and develop appropriate remedial actions which could include removal or amelioration of unsuitable materials.
3.3	Waste storage	Adverse geotechnical and or geochemical issues associated with process waste storage facilities (e.g., tailings, reject emplacements, overburden, and waste rock dumps etc) leading to pollution or poor growing conditions, and poor rehabilitation outcomes.	3	4	18	• Seek specialist geotechnical assessment as part of final landform design; and • Design and construct suitable emplacements for geochemically hazardous materials.	2	4	14	• Obtain specialist advice and develop appropriate remedial actions which could include removal or amelioration of unsuitable materials.
3.4	Demolition and decommissioning of buildings and infrastructure	Inadequate planning and funding of decommissioning activities leads to delays or compromised final landform outcomes.	3	3	13	• Prepare a demolition plan that ensures achievement of the final landform and rehabilitation goals; and • Rehabilitation plans to clearly identify any infrastructure to be retained including for example, services, concrete slabs, roads, and water management infrastructure.	2	3	9	• Obtain specialist advice and develop remedial action plan to address any decommissioning failures and update rehabilitation and closure plans as required.

Risk ID	Risk Issue	Description of Risk and Trigger	Risk Rating (pre-Control)			Preventative Controls	Residual Risk			Response actions to be considered if the risk eventuates
4. Landform Establishment										
4.1	Rehabilitation resources	Use of inappropriate rehabilitation machinery and equipment, compromises ability to achieve rehabilitation outcomes or desired final landform.	3	3	13	• Final landform including roads to be designed by suitably qualified personnel • Hire specialised plant and contractors to undertake major bulk earthworks; and • Supervise rehabilitation activities and intervene promptly if damage or poor performance is occurring.	2	3	9	• Assess damage, develop, and implement remedial actions that could include actions like scarification to soil surfaces, respreading topsoil and resowing seed.
4.2	Landform stability	Instability of highwalls and benches compromises ability to achieve the desired final landform.	3	4	18	• Seek specialist geotechnical advice for final landform design, to specifically advise on measures such as bench and batter widths, heights and highwall stability and protection; and • Consider measures such as scaling or rock bolting to improve long term stability.	2	4	14	• Implement repairs as necessary; and • Obtain specialist advice and review final landform goals. Amend rehabilitation and closure plans as required.
4.3	Landform stability	Final landform instability (e.g., Steep slopes, long slopes, erosion etc.) affecting revegetation and final land use capability.	3	4	18	• Undertake survey of final landforms prior to the placement of subsoil and topsoil, to verify establishment of desired grades and levels; and • Seek specialist advice for advice on aspects such as batter grades, drainage measures, slope lengths and slope curvature, and placement of mid-slope berms and drains.	2	4	14	• Implement repairs as necessary; and • Obtain specialist advice and review final landform goals. Amend rehabilitation and closure plans as required.
4.4	Landform suitability	Final landform unsuitable for intended land use (e.g., Slopes too steep for grazing, large rocks present affecting cultivation, settlement and surface subsidence leading to extended ponding etc.).	3	4	18	• Seek specialist advice and undertake agricultural land capability assessment. Agronomist to advise on aspects of landform development where a final land use of light grazing is sought; and • Quality control of landform preparation to ensure appropriate surface preparation, achievement of desired grades and drainage control.	3	3	13	• Implement repairs as necessary; and • Obtain specialist advice and review final landform goals. Amend rehabilitation and closure plans as required.
4.5	Landform suitability	Landform aspect not properly considered when selecting target plant species, leading to poor rehabilitation outcomes.	4	3	17	• Aspect to be factored into revegetation design (e.g., use more drought tolerant species on exposed north facing slopes). Specialist advice to be sought when preparing revegetation plans.	3	3	13	• Seek specialist advice and revise revegetation program; and • Implement remedial actions such as resowing and implementing a watering program.
4.6	Landform Suitability	Unstable landform due to erosion and/or mass movement issues associated with inappropriate design	5	2	16	• Disturbed land is contoured to limit stormwater ingress • Earth bund is installed and maintained on low side of road to capture surface water flow off the road surface • Heavy vehicle access will be restricted following rainfall events to prevent road surface damage • Vegetation growth encourages on overburden stockpiles	4	1	7	• Implement repairs as necessary; and • Obtain specialist advice and review final landform goals. Amend rehabilitation and closure plans as required.

Risk ID	Risk Issue	Description of Risk and Trigger	Risk Rating (pre-Control)			Preventative Controls	Residual Risk			Response actions to be considered if the risk eventuates
						• Monthly site inspections will assess erosion establishment and trigger repair works as appropriate for stockpiled materials; and • Monthly inspections of mining void				
4.7	Water availability	Water availability inadequate for landform preparation	3	3	13	• If water supply is inadequate for proper landform preparation during earthworks, consider either suspending the action or ordering in supplemental water; and • Design the final landform with passive drainage as far as practicable and incorporate elements to encourage moisture infiltration and reduce runoff.	2	3	9	• Employ specialist contractor to undertake repairs ensuring; and • Obtain supplemental water to utilise during earthworks and landscape forming.
4.8	Dams and drains	Dams or major water conveyance structures inadequately designed or constructed for long term stability	3	4	18	• Final landform to be designed by suitably qualified personnel • Use experienced civil contractors and supervise works during major earthworks or drainage projects • Review of dam safety and integrity to be undertaken as part of final landform geotechnical assessment; and • Construction of major water storages or drains to be supervised and certified by suitably qualified personnel on completion	2	4	14	• Seek specialist civil/geotechnical advice; and • Remedial measures to be implemented where dam or drain integrity is at risk. May involve repairs or complete rebuild.
4.9	Access roads	Poor design or construction of retained access roads (including road drainage) causing ongoing erosion or instability issues	3	3	13	• Final landform including roads to be designed by suitably qualified personnel; and • Use experienced civil contractors and supervise works during major earthworks or drainage projects.	2	3	9	• Review stormwater drainage and assess need for new controls such as earth bunds and cross banks • Install new controls to manage surface water flows • Reconstruct damaged roads; and • Rehabilitate and revegetate disused tracks to stabilise soil surface and minimise the need for ongoing maintenance.
5. Growth Medium Development										
5.1	Soil resources	Poor knowledge and record keeping of subsoil and topsoil resources affects quality or availability of soil materials for rehabilitation.	3	3	13	• Audit and maintain up to date records of material type (topsoil and subsoil) quantity, quality, and locations • Analyse stored topsoil prior to use to establish quality and amelioration requirements. A suitable guide to topsoil quality assessment would be used, e.g., *Guide for Selection of Topdressing Material* (Elliot & Veness, 1981). Test topsoil and subsoil materials • Assess availability of growth media against rehabilitation requirements and develop plans to address deficiencies; and • Conduct trials of blending processing wastes, overburden, and other materials to produce desirable	2	3	9	• Seek specialist advice on growth media development where site resources are inadequate or perform poorly • Work with local suppliers to obtain and import topsoil to address any deficit; and • Ensure imported soil is of suitable quality, weed free and managed and spread to achieve rehabilitation goals.

Risk ID	Risk Issue	Description of Risk and Trigger	Risk Rating (pre-Control)			Preventative Controls	Residual Risk			Response actions to be considered if the risk eventuates
						growing media. Testing to evaluate material physical and chemical properties. Specialist advice should be sought (e.g., agronomist or soil scientist).				
5.2	Soil resources	Inadequate topsoil quality and volume available to achieve the desired final landform and rehabilitation plans	4	4	21	• Store topsoil appropriately to maintain optimum physical and chemical qualities, e.g., stockpile heights to be kept <3m high where practicable • Seed and fertilise stockpiles with an annual cover crop or with desirable native species, to help minimise weed infestation and improve organic matter • If practicable, revegetate topsoil stockpiles with native grasses to generate a seed bank of desirable species • When planning rehabilitation works, use the highest value growth media materials (i.e., topsoils) in situations where they will achieve maximum effect • Minimise wastage of high-quality growing media, e.g., avoid use of topsoils in situations where lower quality materials would suffice, such as in creation of bunds.	3	3	13	• Seek specialist advice on growth media development where site resources are inadequate or perform poorly • Work with local suppliers to obtain and import topsoil to address any deficit; and • Ensure imported soil is of suitable quality, weed free and managed and spread to achieve rehabilitation goals.
5.3	Soil resources	Substrate inadequate to support achievement of native revegetation or agricultural land capability (e.g., inadequate soil depth, adverse soil chemical or physical properties, lack of organic matter, nutrient deficiency, lack of soil biota, and any other factors impeding the effective rooting depth, fertility or moisture holding capacity).	4	4	21	• Seek specialist advice when designing rehabilitation plans • Ameliorate subsoil and topsoil materials as determined necessary by material testing; and • Undertake revegetation trials to assess adequacy of growth media prior to larger scale establishment of growth medium across rehabilitation areas.	3	3	13	• Supplement onsite materials with imported topsoil, fertiliser, and compost/mulch to improve soil fertility, soil biota and to make up deficit in topsoil volumes.
6. Ecosystem Establishment										
6.1	Seed quality	Poor seed viability, seed dormancy or poor germination, reduce revegetation success.	3	3	13	• Conduct germination testing and review of seed spreading and topsoil preparation techniques; and • Monitor revegetation performance.	*2*	*3*	*9*	• Review and adjust seeding rate or species type; and • Source alternate seed supply or increase seeding rate to account for lower germination rates.
6.2	Seed predation	Ant, insect, or bird predation of seed reduce revegetation success.	2	2	5	•	*2*	*2*	*5*	• Increase seeding rates and re-sow as necessary if seed predation is an issue.

Risk ID	Risk Issue	Description of Risk and Trigger	Risk Rating (pre-Control)			Preventative Controls	Residual Risk			Response actions to be considered if the risk eventuates
6.3	Fertiliser	Damage to seed by mixing with fertilisers reduce revegetation success.	2	2	5	• Follow supplier's recommendations; and • Avoid over-fertilising soils where native plants are being established.	*1*	*2*	*3*	• Re-sow as necessary in response to poor germination.
6.4	Destructive weather events	Destructive weather and climatic events (e.g., Drought; intense rainfall events; flood; bushfire etc.) causes damage to landform, soils, or ecology of rehabilitation areas.	3	3	17	• Incorporate preventative measures (e.g. fire breaks, good drainage) into landform design • Incorporate water storage into final landform design to assist resilience to drought and provide water for irrigation during vegetation establishment • Review weather forecasts regularly and adapt revegetation planning accordingly • Suspend revegetation work during extreme drought conditions if alternate water supply cannot be obtained; and • Plan for provision of supplementary water for irrigation always as part of revegetation planning.	*3*	*3*	*13*	• Obtain specialist advice and prepare remediation plan to address significant damage to ecology or landforms bought about due to climatic extremes; and • Implement remedial repairs.
6.5	Rehabilitation resources	Use of inappropriate rehabilitation machinery and equipment compromises ability to achieve rehabilitation outcomes or desired final landform.	3	3	13	• Hire specialised plant and contractors to undertake key rehabilitation tasks, such as seed spreaders, hydromulchers • Final landform including roads to be designed by suitably qualified personnel; and • Supervise rehabilitation activities and intervene promptly if damage or poor performance is occurring.	*2*	*3*	*9*	Assess damage, develop, and implement remedial actions that could include actions like scarification to soil surfaces, respreading topsoil and resowing seed
6.6	Rehabilitation resources	Lack of resources for rehabilitation maintenance leading to failure to achieve rehabilitation and closure criteria.	4	3	17	• Rehabilitation inspection and maintenance to be an integral part of the site's operational management and monitoring system • Undertake formal annual rehabilitation surveys; and • Undertake regular inspections of rehabilitation areas (for example, as part of a weekly environmental inspection) to promptly identify risks and also success factors. Incorporate feedback into future rehabilitation planning.	*3*	*3*	*13*	Engage specialist contractors in rehabilitation and maintenance
6.7	Weeds	Weed infestation associated with both introduction and control (or lack thereof) within rehabilitation areas compromises rehabilitation targets and closure criteria.	4	3	17	• Visually screen rehabilitation seed mix to confirm free of weed seed • Obtain only high-quality compost, mulches or manures that are certified weed free • Undertake weed inspection and control program (at least annually) as part of the Weed Management Plan and routine rehabilitation monitoring • Avoid use of topsoil material from stockpiles infested with weeds; and • Weed management plan developed in consultation with Lithgow City Council, annual surveys and site	*3*	*3*	*13*	• Implement targeted weed eradication program employing specialist contractors.

Risk ID	Risk Issue	Description of Risk and Trigger	Risk Rating (pre-Control)			Preventative Controls	Residual Risk			Response actions to be considered if the risk eventuates
						inspections, scheduled control program as per annual weed survey.				
6.8	Revegetation stresses	Damage or overgrazing from fauna (e.g., kangaroos, feral goats, etc.) and livestock reducing vegetation establishment, reducing stability, and causing erosion.	3	3	13	• Install exclusion fencing; and • Implement feral animal controls in consultation with relevant authorities.	*2*	*3*	*9*	• Implement feral animal controls in consultation with relevant authorities; and • Undertake revegetation repairs.
6.9	Infrastructure	Lack of infrastructure to support intended final land use (e.g., Dams, fences, watering facilities etc.).	3	3	13	• Assess infrastructure needs and incorporate details within the rehabilitation plans; and • Ensure infrastructure needs are accounted for in calculation of rehabilitation bonds.	*2*	*3*	*9*	• Review infrastructure needs as part of long-term monitoring and install new infrastructure as required
6.10	Revegetation species	Inappropriate revegetation species mix for targeted final land use.	3	3	13	• Specialist advice to be sought when preparing revegetation mix. Advice to include consideration of desired final land use, slope/aspect, climatic, soil and other conditions.	*2*	*3*	*9*	• Obtain specialist advice to review the revegetation program and provide advice for revision as necessary; and • Implement remedial planting program.
6.11	Revegetation stresses	Insects and plant disease cause damage to the ecology of revegetation areas.	3	2	8	• Undertake pest inspection as part of routine monitoring.	*2*	*2*	*5*	• Seek specialist advice and implement recommended actions (e.g., pesticide control).
6.12	Revegetation goals	Lack of progress towards achievement of revegetation closure criteria (e.g., integration of native ecosystems with agricultural ecosystems as desired; poor development of target species and species diversity; limited structural development).	3	4	18	• Utilise annual rehabilitation surveys to assess progress towards completion criteria.	*2*	*4*	*14*	• Where revegetation progress is deemed inadequate, investigate the failing to understand the likely causes and develop remedial actions to address deficiencies; and • Seek specialist advice. Ensure that learnings are factored into future rehabilitation planning, processes, and monitoring.
6.13	Geotechnical risks	Geotechnical instability of rehabilitated landforms, e.g., slumping, or cracking compromises ability to achieve the desired final landform	3	4	18	• Assess stability of landforms as part of routine rehabilitation monitoring; and • Record details of any structural defects such as depth and extent of cracking.	*2*	*4*	*14*	• Undertake geotechnical investigation and seek specialist advice for repair of major deformation; and • Repair landforms where deformation is observed to be persistent or worsening, and initiate revegetation.

Risk ID	Risk Issue	Description of Risk and Trigger	Risk Rating (pre-Control)			Preventative Controls	Residual Risk			Response actions to be considered if the risk eventuates
6.14	Erosion and sedimentation	Erosion and loss of topsoil and subsoil compromises revegetation success and achievement of final land use goals	3	4	18	• Assess erosion and sedimentation status as part of routine rehabilitation monitoring. Factors to record include erosion extent, type (sheet, rill, gully) and severity • Review drainage and initiate new drainage works as required to control water flow around or across rehabilitated landscapes • Review bank and waterway grades if scouring is occurring. Consider remedial options such as reducing grades or physically armouring waterway channels • Replace eroded topsoil, re-scarify, and revegetate eroded areas; and • Consider application of spray on soil stabiliser, hydromulch etc for quick effective cover solution, particularly in high erosion hazard areas (e.g., waterways, steep slopes, and batters).	*2*	*4*	*14*	• Observe eroded areas during rainfall to monitor stormwater drainage and identify root cause • Review causes of erosion and implement targeted remedial measures that address the root cause • Seek specialist advice to address major erosion issues such as failing waterways, dam spillways or batter drop structures • Promptly repair and reshape eroded areas to prevent acceleration and progression of the erosion problem; and • Feedback learnings from erosion repairs into future landform and drainage design.
6.15	Dam and drainage failure	Failure of drainage and water management/storage structures, causing significant loss of sediment, damage to infrastructure and landforms.	3	4	18	• Inspect water storages regularly for any signs of compromised integrity, such as tunnelling or tension cracking of dam embankments.	*2*	*4*	*14*	• Seek specialist advice where integrity of major waterways or storage structures is compromised and implement remedial measures promptly.
7. Ecosystem and Land Use Development										
7.1	Destructive weather events	Weather and climatic influences (e.g., drought; intense rainfall events; bushfire etc.) causes damage to landform, soils, or ecology of rehabilitation areas.	4	4	21	• Incorporate drought tolerant species in the Revegetation plan • Develop the landform design to assist climate resilience (e.g., encouraging moisture infiltration) • Develop growth media to maximise moisture retention (e.g., by utilising clayey materials in subsoil development); and • Consider incorporation of micro-relief and microhabitat development in landscape design.	*3*	*4*	*18*	• Obtain specialist advice and prepare remediation plan to address significant damage to ecology or landforms bought about due to climatic extremes; and • Implement remedial repairs.
7.2	Vandalism and unauthorised access	Vandalism causes damage to the landform, soils, or ecology of revegetation areas.	3	3	13	• Maintain security measures and include routine site security monitoring.	*2*	*3*	*9*	• Review security measures and implement additional controls as necessary; and • Repair any damage.
7.3	Vandalism and unauthorised access	Inadvertent or unauthorised access by mining equipment and vehicles causes damage to the landform, soils, or	3	3	13	• Maintain security measures and include routine site security monitoring.	*2*	*3*	*9*	• Review security measures and implement additional controls as necessary; and • Repair any damage.

Risk ID	Risk Issue	Description of Risk and Trigger	Risk Rating (pre-Control)			Preventative Controls	Residual Risk			Response actions to be considered if the risk eventuates
		ecology of revegetation areas.								
7.4	Water quality	Post-closure water quality is unsuited to the final land use or causes ongoing pollution (e.g., acid-drainage, high salinity, high suspended solids etc.).	3	3	13	• Monitor water quality to address any risks identified during mining or landform development; and • Implement additional controls as necessary, such as sediment traps or other source controls.	*2*	*3*	*9*	• Seek specialist advice and implement remedial measures that may include new water treatment measures or removal of contaminant source.
7.5	Revegetation stresses	Insects and plant disease cause damage to the ecology of revegetation areas.	3	2	8	• Monitor vegetation success and plant health to allow quick identification of pest issues.	*2*	*2*	*5*	• Seek specialist advice and implement pest eradication program.
7.6	Revegetation stresses	Overgrazing of pasture rehabilitation areas by livestock and wildlife damages revegetation areas, reducing vegetation establishment, reducing stability, and causing erosion.	3	3	13	• Prevent grazing as far as possible until completion criteria achieved in lands destined for grazing. Exclude stock permanently from native ecosystem areas • Control feral animals to prevent overgrazing; and • Employ fencing or alternative to prevent stock and feral animal access.	*2*	*3*	*9*	• Implement feral animal controls in consultation with relevant authorities • Review efficacy of fencing and implement repairs or install new fencing as required; and • Undertake revegetation repairs.
7.7	Rehabilitation resources	Lack of resources for rehabilitation maintenance leading to failure to achieve rehabilitation and closure criteria.	3	4	18	• Maintain an adequate bond for long term maintenance and regularly review the bond as part of the rehabilitation management plan process; and • Ensure ecosystem development is sufficiently progressed towards final goals before closure criteria are signed off, to minimise need for post-closure maintenance.	*2*	*4*	*14*	• Escalate major rehabilitation and closure risks to senior management and seek additional funding if necessary for targeted maintenance and remedial programs.
7.8	Rehabilitation damage	Re-disturbance of established rehabilitation areas results in failure to achieve rehabilitation and closure criteria.	3	3	13	• Prevent unauthorised access; and • Routinely monitor rehabilitation areas to identify and repair any unwanted disturbance.	*2*	*3*	*9*	• Review efficacy of fencing, security measures and staff training, to ensure rehabilitation goals are widely understood and observed; and • Implement repairs or install new fencing as required
7.9	Fauna mortality	Fauna entrapment and mortality in dams, final void etc due to unsafe landforms.	3	3	13	• Develop a water management plan in conjunction with a decommissioning procedure that details measures like safety and access prevention • Provide fencing around the perimeter of the mine pit and any dangerous water storages to prevent fauna access; and • Design the final landform and water bodies to enable self-rescue of fauna (e.g., shallow gradient ramps for access).	*2*	*3*	*9*	• In the event of fauna mortality or unsafe conditions, review efficacy of fencing and other security measures and implement remedial actions.

Risk ID	Risk Issue	Description of Risk and Trigger	Risk Rating (pre-Control)			Preventative Controls	Residual Risk			Response actions to be considered if the risk eventuates
7.10	Public and stock safety	Unauthorised access past security fence due to poor design or damage of exclusion measures, results in safety risks to people and fauna such as fall from height hazards, unstable slopes, and deep water	3	3	13	• Rehabilitation plan will provide for fencing to be installed around the perimeter of the mine pit to prevent uncontrolled access to this area • Install locked entry gate at site access • Install signage warning of dangers and to deter unauthorised entry; and • Address public and stock safety as part of final landform design and include necessary safety elements such as bench bunds above unsafe edges and fencing.	*2*	*3*	*9*	• In the event of fauna mortality or unsafe conditions, review efficacy of fencing and other security measures and implement remedial actions.

4. Rehabilitation objectives and rehabilitation completion criteria

4.1 Rehabilitation objectives

The rehabilitation objectives were approved by the Secretary on 21 December 2023 (Reference: ROBJ0001334) and are provided below. These approved objectives supersede all proposed objectives referenced in this plan. Further updates will be made to align the plan with the approved objectives in the next revision of the plan.

Rehabilitation Objectives

The following rehabilitation objectives have been approved.

FINAL LAND USE DOMAIN	MINING DOMAIN	SPECIFY OTHER DOMAIN	SPATIAL REF	REHABILITATION OBJECTIVE CATEGORY	REHABILITATION OBJECTIVES
Native Ecosystem	Infrastructure Area		A1	Bushfire	The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.
Native Ecosystem	Infrastructure Area		A1	Groundwater	Groundwater quality at the mine site is similar to background water quality and does not pose a threat of environmental harm
Native Ecosystem	Infrastructure Area		A1	Groundwater	Impacts to groundwater regime are loclised and do not pose a threat of environmental harm
Native Ecosystem	Infrastructure Area		A1	Land and water contamination	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.
Native Ecosystem	Infrastructure Area		A1	Landform stability	The final landform is stable for the long-term and does not present a risk of environmental harm downstream / downslope of the site or a safety risk to the public/stock/native fauna.
Native Ecosystem	Infrastructure Area		A1	Management of waste and process materials	Residual waste materials stored on site (e.g. LKD, biosolids) will be appropriately contained so it does not pose any unacceptable hazards or constraints for intended final land use.
Native Ecosystem	Infrastructure Area		A1	Native revegetation	Levels of ecosystem function have been established that demonstrate the rehabilitation is self sustainable.
Native Ecosystem	Infrastructure Area		A1	Native revegetation	The vegetation composition of the rehabilitation contains species that are commensurate with the native vegetation community Open dry sclerophyll forest found in the local area. The Statement of Environmental Effects: Excelsior Quarry (Craven, Elliston and Hayes, 2001) describes this community with dominant canopy species including Eucalyptus melliodora

FINAL LAND USE DOMAIN	MINING DOMAIN	SPECIFY OTHER DOMAIN	SPATIAL REF	REHABILITATION OBJECTIVE CATEGORY	REHABILITATION OBJECTIVES
					(Yellow box), E. macrorhyncha (Red stringybark), E. fibrosa and E. crebra (Ironbarks), E. rossii (Inland Scribbly Gum), E. blakely (Blakely's Red Gum) and E. albens (While Box).
Native Ecosystem	Infrastructure Area		A1	Native revegetation	The vegetation structure of the rehabilitation is similar to that of the native vegetation community Open dry sclerophyll forest as found in the local area. The Statement of Environmental Effects: Excelsior Quarry (Craven, Elliston and Hayes, 2001) describes this community with dominant canopy species including Eucalyptus melliodora (Yellow box), E. macrorhyncha (Red stringybark), E. fibrosa and E. crebra (Ironbarks), E. rossii (Inland Scribbly Gum), E. blakely (Blakely's Red Gum) and E. albens (While Box).
Native Ecosystem	Infrastructure Area		A1	Removal of infrastructure	All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials
Native Ecosystem	Infrastructure Area		A1	Water approvals	Structures that take or hold water are licensed if required subject to relevant legislation (eg Water Management Act 2000) and water sharing rules
Native Ecosystem	Infrastructure Area		A1	Water quality	Water quality is compatible with the final land use and does not pose a threat of environmental harm
Native Ecosystem	Overburden Emplacement Area		A4	Bushfire	The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.
Native Ecosystem	Overburden Emplacement Area		A4	Groundwater	Groundwater quality at the mine site is similar to background water quality and does not pose a threat of environmental harm
Native Ecosystem	Overburden Emplacement Area		A4	Groundwater	Impacts to groundwater regime are loclised and do not pose a threat of environmental harm
Native Ecosystem	Overburden Emplacement Area		A4	Land and water contamination	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.

FINAL LAND USE DOMAIN	MINING DOMAIN	SPECIFY OTHER DOMAIN	SPATIAL REF	REHABILITATION OBJECTIVE CATEGORY	REHABILITATION OBJECTIVES
Native Ecosystem	Overburden Emplacement Area		A4	Landform stability	The final landform is stable for the long-term and does not present a risk of environmental harm downstream / downslope of the site or a safety risk to the public/stock/native fauna.
Native Ecosystem	Overburden Emplacement Area		A4	Management of waste and process materials	Residual waste materials stored on site (e.g. LKD, biosolids) will be appropriately contained so it does not pose any unacceptable hazards or constraints for intended final land use.
Native Ecosystem	Overburden Emplacement Area		A4	Native revegetation	The vegetation structure of the rehabilitation is similar to that of the native vegetation community Open dry sclerophyll forest as found in the local area. The Statement of Environmental Effects: Excelsior Quarry (Craven, Elliston and Hayes, 2001) describes this community with dominant canopy species including Eucalyptus melliodora (Yellow box), E. macrorhyncha (Red stringybark), E. fibrosa and E. crebra (Ironbarks), E. rossii (Inland Scribbly Gum), E. blakely (Blakely's Red Gum) and E. albens (While Box).
Native Ecosystem	Overburden Emplacement Area		A4	Native revegetation	Levels of ecosystem function have been established that demonstrate the rehabilitation is self sustainable.
Native Ecosystem	Overburden Emplacement Area		A4	Native revegetation	The vegetation composition of the rehabilitation contains species that are commensurate with the native vegetation community Open dry sclerophyll forest found in the local area. The Statement of Environmental Effects: Excelsior Quarry (Craven, Elliston and Hayes, 2001) describes this community with dominant canopy species including Eucalyptus melliodora (Yellow box), E. macrorhyncha (Red stringybark), E. fibrosa and E. crebra (Ironbarks), E. rossii (Inland Scribbly Gum), E. blakely (Blakely's Red Gum) and E. albens (While Box).
Native Ecosystem	Overburden Emplacement Area		A4	Removal of infrastructure	All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials
Native Ecosystem	Overburden Emplacement Area		A4	Water approvals	Structures that take or hold water are licensed if required subject to relevant legislation (eg Water Management Act 2000) and water sharing rules

FINAL LAND USE DOMAIN	MINING DOMAIN	SPECIFY OTHER DOMAIN	SPATIAL REF	REHABILITATION OBJECTIVE CATEGORY	REHABILITATION OBJECTIVES
Native Ecosystem	Overburden Emplacement Area		A4	Water quality	Water quality is compatible with the final land use and does not pose a threat of environmental harm
Final Void	Active Mining Area (Open cut void)		J5	Bushfire	The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.
Final Void	Active Mining Area (Open cut void)		J5	Groundwater	Impacts to groundwater regime are loclised and do not pose a threat of environmental harm
Final Void	Active Mining Area (Open cut void)		J5	Groundwater	Groundwater quality at the mine site is similar to background water quality and does not pose a threat of environmental harm
Final Void	Active Mining Area (Open cut void)		J5	Land and water contamination	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.
Final Void	Active Mining Area (Open cut void)		J5	Landform stability	The final landform is stable for the long-term and does not present a risk of environmental harm downstream / downslope of the site or a safety risk to the public/stock/native fauna.
Final Void	Active Mining Area (Open cut void)		J5	Management of waste and process materials	Residual waste materials stored on site (e.g. LKD, biosolids) will be appropriately contained so it does not pose any unacceptable hazards or constraints for intended final land use.
Final Void	Active Mining Area (Open cut void)		J5	Native revegetation	The vegetation structure of the rehabilitation is similar to that of the native vegetation community Open dry sclerophyll forest as found in the local area. The Statement of Environmental Effects: Excelsior Quarry (Craven, Elliston and Hayes, 2001) describes this community with dominant canopy species including Eucalyptus melliodora (Yellow box), E. macrorhyncha (Red stringybark), E. fibrosa and E. crebra (Ironbarks), E. rossii (Inland Scribbly Gum), E. blakely (Blakely's Red Gum) and E. albens (While Box).
Final Void	Active Mining Area (Open cut void)		J5	Native revegetation	Levels of ecosystem function have been established that demonstrate the rehabilitation is self sustainable.

FINAL LAND USE DOMAIN	MINING DOMAIN	SPECIFY OTHER DOMAIN	SPATIAL REF	REHABILITATION OBJECTIVE CATEGORY	REHABILITATION OBJECTIVES
Final Void	Active Mining Area (Open cut void)		J5	Native revegetation	The vegetation composition of the rehabilitation contains species that are commensurate with the native vegetation community Open dry sclerophyll forest found in the local area. The Statement of Environmental Effects: Excelsior Quarry (Craven, Elliston and Hayes, 2001) describes this community with dominant canopy species including Eucalyptus melliodora (Yellow box), E. macrorhyncha (Red stringybark), E. fibrosa and E. crebra (Ironbarks), E. rossii (Inland Scribbly Gum), E. blakely (Blakely's Red Gum) and E. albens (While Box).
Final Void	Active Mining Area (Open cut void)		J5	Removal of infrastructure	All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials
Final Void	Active Mining Area (Open cut void)		J5	Water approvals	Structures that take or hold water are licensed if required subject to relevant legislation (eg Water Management Act 2000) and water sharing rules
Final Void	Active Mining Area (Open cut void)		J5	Water quality	Water quality is compatible with the final land use and does not pose a threat of environmental harm

4.2 Rehabilitation completion criteria

Proposed rehabilitation objectives and rehabilitation completion criteria as adopted for Excelsior Quarry are detailed in Table 14. Excelsior Quarry will implement various management approaches to ensure that the rehabilitation objectives are achieved. The rehabilitation objectives require that land over which the operations have been carried on:

- Are appropriately restored and landscaped, to the satisfaction of the NSW Resources Regulator, to ensure that the land is properly drained and protected from soil erosion
- It is planted with vegetation appropriate to the area and at a density acceptable to the NSW Resources Regulator. Native vegetation species mix shall be consistent with the dry sclerophyll forest community that surrounds the mine site and is to be developed with reference to the native vegetation identified from a flora and fauna survey in 2001, as listed in the Statement of Environmental Effects dated October 2001. This species mix may be developed to include additional species to achieve the end land use; and
- The final landform is compatible with the surrounding land characteristics.

A summary of the proposed rehabilitation objectives for the mining domain are listed in Table 13.

Table 13: Summary of proposed rehabilitation objectives of the mining domains

Primary Domain	Proposed Rehabilitation Objectives
Infrastructure area	• All non-heritage infrastructure removed to ensure the site is safe and free of hazardous materials • Native ecosystem established; and • Water runoff water quality from the rehabilitated area is within the range of water quality requirements.
Water Management Area	• Establish self-sustaining landform post mine closure as part of the final pit void • Any water run off quality from the wet quarry area is within the range of water quality requirements; and • Establish native ecosystem around the sedimentation pond area
Overburden Emplacement Area	• Landforms will be battered to suitable final land use (1:3) and compatible with surrounding landscape as sustainable native ecosystem. • Establish native ecosystem • Water runoff water quality from the rehabilitated area is within the range of water quality requirements
Active Mining Void (open cut void)	• The area is safe and does not present a hazard to people or the environment.

Table 14 Proposed rehabilitation objectives and completion criteria

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
Infrastructure	Infrastructure area	Removal of redundant infrastructure and industrial equipment and machinery. All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.	Removal of infrastructure and services, including the following: • Buildings, processing infrastructure and industrial equipment • Fuel and chemical tanks and drums in accordance with departmental guidelines • Mining roads • Water pumps and pipelines • Ground water piezometers sealed • Hazardous and contaminated materials • Offices/ laboratory, stores, and workshops; and • No industrial machinery will be on site after the mining closure.	All built infrastructure including utilities removed. Hazards isolated and secured.	• Statement provided, utility service disconnection record/notification • Decommissioning reports; and • Before and after photos.
		Retained infrastructure: All infrastructure that is to remain at the conclusion of mining is in a condition that does not present undue risk to safety or the environment. This includes some working hardstand areas and existing access roads.	• Hardstands and tracks retained in a fit for service condition that is safe and stable; and • Engineering and structural stability reports.	Retained infrastructure is safe, stable, and non-polluting. Hazards isolated and secured.	Engineering report/statement and photos.

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
		Landform and drainage systems: Landforms associated with retained infrastructure are stable with adequate drainage.	• Drainage is adequate • Landforms are safe and stable	Drains are performing under a range of climatic scenarios and are free of appreciable erosion Landforms are safe and stable	Before and after photos, rehabilitation monitoring reports, as-constructed surveys, erosion surveys, independent geotechnical reports (where required) and or erosion modelling reports (where required) that indicate long-term stability of rehabilitated landform.
		Land contamination: Land, water, and soils are free from contamination, compatible with the final land use and pose no threat of environmental harm.	• Wastes and visible indicators of contamination; and • Soils (and where required water) tested and confirmed free of contamination and fit for final land use in accordance with applicable guidelines including the National Environment Protection (Assessment of Site Contamination) Measure (1999)	No visible signs of contamination. Waste materials removed Contamination assessments confirm site is fit for final land use and does not present an ongoing contamination risk.	Land contamination assessment Validation reports

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
Native Ecosystem	Infrastructure area Active mining area Overburden emplacement	Removal of redundant infrastructure: All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.	Removal of infrastructure and services, including the following: • Buildings, processing infrastructure and industrial equipment • Fuel and chemical tanks and drums in accordance with departmental guidelines • Mining roads • Water pumps and pipelines • Ground water piezometers sealed • Hazardous and contaminated materials; and • Offices/ laboratory, stores, and workshops.	All built infrastructure including utilities removed. Hazards isolated and secured.	• Statement provided, utility service disconnection record/notification • Decommissioning reports; and • Before and after photos.
		Land contamination: Land, water, and soils are free from contamination, compatible with the final land use and pose no threat of environmental harm.	• Wastes and visible indicators of contamination are cleaned up; and • Soils (and where required water) tested and confirmed free of contamination and fit for final land use in accordance with applicable guidelines including the National Environment Protection (Assessment of Site Contamination) Measure (1999).	No visible signs of contamination. Waste materials removed Contamination assessments confirm site is fit for final land use and does not present an ongoing contamination risk.	Land contamination assessment Validation reports

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
		Landform establishment: Landform constructed to be safe, stable, non-polluting and support the final land use.	Indicators of landform suitability include: • Slope grade • Landform shape • Indicators of dispersive soil • Soil surface condition • Indicators of erosion; and • Drainage condition	• Slopes regraded to≤ 18^0 • Landform blends with surrounding landscape • Exchangeable Sodium Percentage (ESP) ≤6% for topsoil materials • Absence of gullies >300mm wide or deep or gullies stable; and • Absence of tunnel erosion intake or outlets points.	Before and after photos, rehabilitation monitoring reports, as-constructed surveys, erosion surveys, soil test reports, independent geotechnical reports (where required) and or erosion modelling reports (where required) that indicate long-term stability of rehabilitated landform.

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
		Growth media: Suitable growth media established (topsoil and subsoil) to support desired natural bush land.	Topsoil / subsoil quality, depth, and condition.	• Topsoil and subsoil placed to minimum depths as recommended by rehabilitation specialist. • Ameliorant applied in accordance with soil testing results • Soil condition prepared to encourage moisture infiltration and retention	Topsoil / subsoil quality, depth, and condition.
		Resource recovery: recovery and replacement of landform resources to support ecological outcomes.	Presence of woody debris and rocks: Woody debris and rocks replaced in the final landform as identified in Closure and Rehabilitation Management Plan	Rates as identified in Closure and Rehabilitation Management Plan are achieved.	Rehabilitation monitoring reports

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
		Functionality of soils and vegetation: Soil, landform and vegetation systems tending towards analogue sites.	Rapid rehabilitation survey indicates soil, landform and vegetation systems tending towards analogue sites including for the following indicators: • Vegetation cover (e.g., type, health, abundance, structure) • Weeds (presence, type, severity) • Surface water and drainage (diversion, stability, lining integrity, discharge stability) • Soil physical and chemical characteristics are suitable for the final land use; and • Erosion risks (soil exposure %, presence, type, and severity of erosion e.g., sheet, rill, and gully).	Indicators of soil and vegetation functionality include: • Priority weed numbers absent to very low (<5% cover) • Vegetation cover to >70% and trending towards achieving >90 without the need for active intervention; and • Soils are stable, fertile, and supporting the desired vegetation mix.	• Hydromulch contractor report • Rehabilitation monitoring report • Soil survey report; and • Photos before and after.
		Woodland tree plantings are established on areas disturbed by mining operations.	Approved vegetation community species mix is sown at the specified sowing rate per hectare.	Rehabilitation monitoring reports to confirm that >70% of the total projected foliage cover is achieved.	• Seed mix specification • Rehabilitation monitoring report; and • Photos.
		Vegetation communities are on a trajectory to forming a self-sustaining ecosystem.	Native species diversity is consistent with relevant vegetation community identified by a specialist.	Revegetation monitoring confirms that the desired vegetation community is established with respect to floristic species diversity, abundance, and cover.	Rehabilitation monitoring report

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
			Vegetation self-sustaining.	Monitoring confirms: Evidence of recruitment and successive generations of the planted species; No further active weed control required (beyond that considered necessary at analogue sites or in the region generally).	Rehabilitation monitoring report.
		Bushfire: Management measures will be implemented to minimise bushfire risks in rehabilitation areas.	Bushfire mitigation measures based on advice from the NSW Rural Fire Service have been implemented as necessary including managing fuel loads, maintaining firebreaks and fire-fighting access documented in a Bushfire Management Plan	Bushfire controls implemented.	Bushfire management plan Acknowledgement of RFS
		Vertebrate pests are controlled and excluded from rehabilitation areas.	Faunal exclusion fencing and/or tree guards are installed (where required) to exclude vertebrate pest species from rehabilitation areas / juvenile vegetation.	Presence and damage is recorded and controlled.	Rehabilitation monitoring report
			Vertebrate pest density: Vertebrate pest species presence and densities are monitored, and control programs implemented when required.		Rehabilitation monitoring report

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
Water Storage	Water Management Areas (Dams)	Sediment dams: Dams are desilted and operational equipment removed where retained as clean water dams in the final landform.	Sediments accumulated in mine water and sediment dams will be removed from the dam floor and emplaced in the final void. All ancillary equipment including pumps and pipelines will be removed and services terminated.	Dams desilted and ancillary equipment removed, supported by records.	Inspection report.
		Surface water management structures are designed in accordance with industry standards and guidelines.	Indicators include: • Drains are stable and with adequate capacity to manage design flows • Retained dams have suitably sized spillways • Run-on water diverted around voids to a stable drainage line; and • Any areas of concentrated flow to be lined as necessary to ensure non-erosive flow velocities.	Water management structures are in a stable condition and performing as intended.	As constructed reports.
		Dam water quality: Water quality in retained dams is appropriate for final land use (stock watering and/ or agricultural use).	Water quality indicators include: • No evidence of ongoing water quality impacts from mining • Water quality fit for stock and domestic use	Water quality analysed and proven fit for stock and domestic use. Typical acceptance criteria include: • EC <1500µs/cm • pH 6.5 -8.5 • TSS 50 mg/L; and • Oil and grease 10mg/L No algal blooms	Water quality results

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
		Water licensing: Structures that take or hold water are licensed if required subject to relevant legislation (e.g., Water Management Act 2000) and water sharing rules.	• Investigation of basic water rights and obligations under applicable water legislation; and • Advice from Government Agency.	Water license and applicable volumetric entitlement held where required.	Water license investigation.
Final void	Active Mining Area (Open pit void).	Final void safe, stable, and non-polluting.	• Final void landform designed and constructed in accordance with geotechnical advice • Exclusion fence and bunding in place around void high walls and unsafe landforms;	Geotechnical report Exclusion fence and bunding installed Benches above 490RL will be battered back to <37° and be made stable. Benches between 490RL to 475RL to be revegetated, where appropriate.	Geotechnical and closure reports.
		Rehabilitation of mine void undertaken in accordance with the approved final landform.	• Batter and bench stability • Benches revegetated in accordance with the Rehabilitation and Closure Plan.	Batters reshaped as necessary to achieve design criteria Batters descaled of loose rock Geotechnical report confirms the final void is safe and stable	Geotechnical and closure reports

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
		Water retained in final void is appropriate for final land use (stock watering and/ or agricultural use).	Water quality indicators include: • No evidence of ongoing water quality impacts from mining • Water quality fit for stock and domestic use	Water quality analysed and proven fit for stock and domestic use. Typical acceptance criteria include: • EC <1500µs/cm • pH 6.5 -8.5 • TSS 50 mg/L; and • Oil and grease 10mg/L • No algal blooms	Water quality laboratory results.

4.3 Rehabilitation objectives and rehabilitation completion criteria – stakeholder consultation

The Statement of Environmental Effects (SEE) (2001) prepared for the Development Consent DA 450/01 did not state the proposed final landform for the mine. A consultation process was undertaken during the preparation of the SEE. Consultation with Lithgow City Council requested to address rehabilitation during the preparation of the final closure plan.

5. Final landform and rehabilitation plan

5.1 Final landform and rehabilitation plan – electronic copy

The Final Landform and Rehabilitation Plan was approved by the Secretary on 21 December 2023 (reference FLRP0001245).

The Figures 2 and 3 are electronic copies of the approved inal landform and rehabilitation plan.

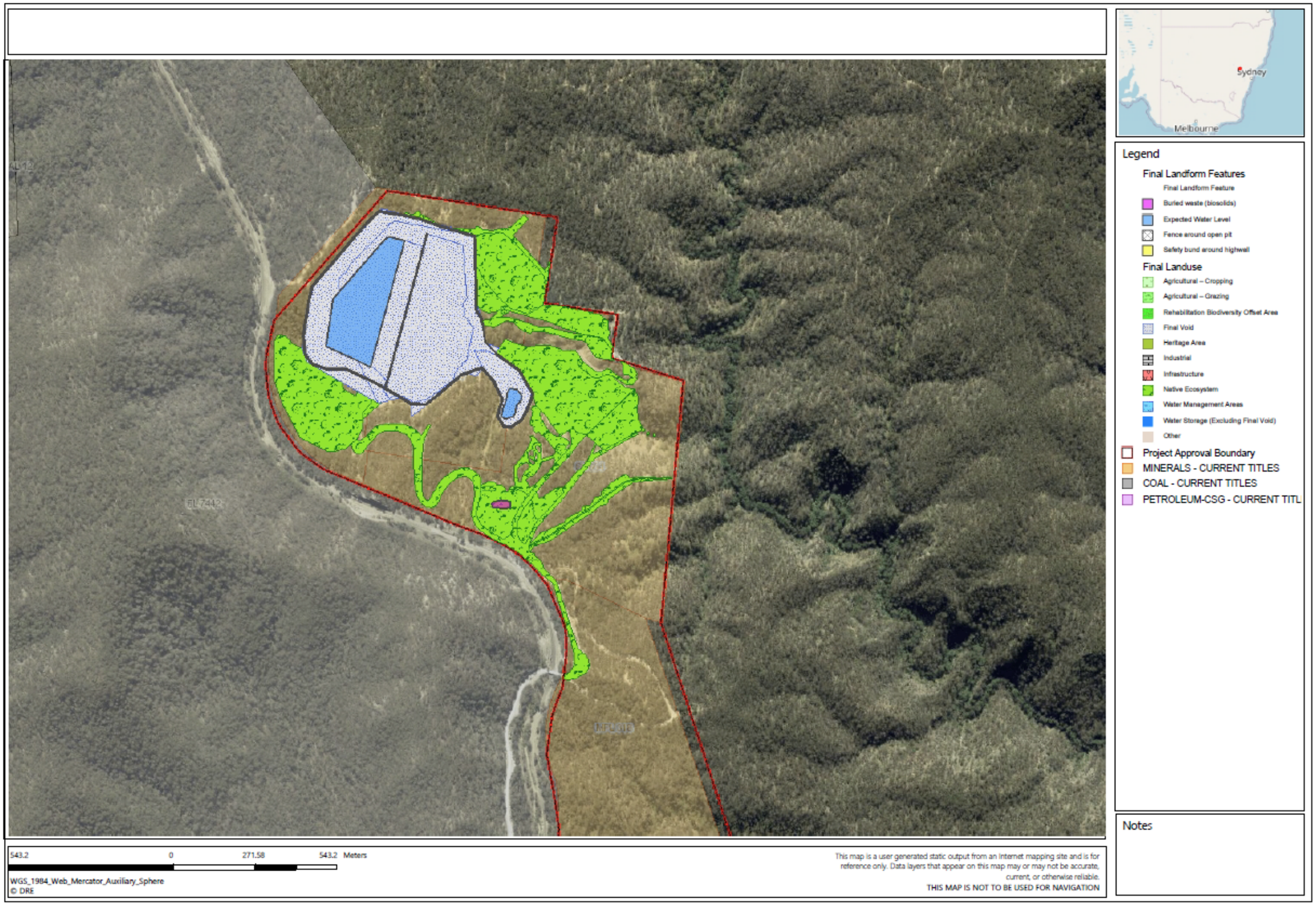

Figure 2 Final landform and rehabilitation plan - Final land use and final landform features

Figure 3 Final landform and rehabilitation plan - Final landform contours

6. Rehabilitation implementation

6.1 Life of mine rehabilitation schedule

Table 15 presents the proposed rehabilitation schedule from 2023 to 2051 at yearly and five-yearly intervals.

Table 15: Rehabilitation mine schedule

Disturbance ID	Area Description	Final Land Use Domain	Area (m^2)	Rehabilitation Phase – as of May 2022	Rehabilitation Start Date	Rehab Status at Mar 2023	Rehab Status at Mar 2024	Rehab Status at Mar 2025	Rehab Status at Mar 2030	Rehab Status at Mar 2035	Rehab Status at Mar 2040	Rehab Status at Mar 2045	Rehab Status at Mar 2050	Year 2051 - Closure
Infrastructure Domain														
IA6	Road - gravel	Native Ecosystem	8,189	Active Mining	2022	Landform Establishment	Growth Media Development	Ecosystem and Land Use Establishment	Rehab Completion	Rehab Completion	Rehab Completion	Rehab Completion	Rehab Completion	Rehab Completion
IA5 SE	Road - gravel	Native Ecosystem	3,757	Active Mining	2023		Landform Establishment	Growth Media Development	Rehab Completion	Rehab Completion	Rehab Completion	Rehab Completion	Rehab Completion	Rehab Completion
IA8	Road - gravel	Native Ecosystem	5,878	Active Mining	2038						Growth Media Development	Rehab Completion	Rehab Completion	Rehab Completion
IA1	Stockpiles - top soil	Native Ecosystem	17,536	Active Mining	2039						Landform Establishment	Rehab Completion	Rehab Completion	Rehab Completion
IA11	Road - gravel	Native Ecosystem	8,832	Active Mining	2040							Rehab Completion	Rehab Completion	Rehab Completion
IA12	Road - gravel	Native Ecosystem	3,507	Active Mining	2040							Rehab Completion	Rehab Completion	Rehab Completion
IA3	Stockpiles - crushed rock	Native Ecosystem	49,980	Active Mining	2043							Growth Media Development	Rehab Completion	Rehab Completion
IA4	Road - gravel	Native Ecosystem	5,037	Active Mining	2044							Landform Establishment	Rehab Completion	Rehab Completion
IA9	Road - gravel	Native Ecosystem	1,899	Active Mining	2045								Rehab Completion	Rehab Completion
IA10	Road - gravel	Native Ecosystem	3,774	Active Mining	2045								Rehab Completion	Rehab Completion
IA5 West	Road - gravel	Native Ecosystem	922	Active Mining	2046								Rehab Completion	Rehab Completion
IA2	Stockpiles - crushed rock	Native Ecosystem	15,377	Active Mining	2047								Ecosystem and Land Use Establishment	Rehab Completion
Overburden Emplacement Domain														
OEA2	Overburden Emplacement Area	Native Ecosystem	28,740	Active Mining	2024			Landform Establishment	Rehab Completion	Rehab Completion	Rehab Completion	Rehab Completion	Rehab Completion	Rehab Completion

Disturbance ID	Area Description	Final Land Use Domain	Area (m^2)	Rehabilitation Phase – as of May 2022	Rehabilitation Start Date	Rehab Status at Mar 2023	Rehab Status at Mar 2024	Rehab Status at Mar 2025	Rehab Status at Mar 2030	Rehab Status at Mar 2035	Rehab Status at Mar 2040	Rehab Status at Mar 2045	Rehab Status at Mar 2050	Year 2051 - Closure
OEA1	Overburden Emplacement Area	Native Ecosystem	12,274	Active Mining	2041							Rehab Completion	Rehab Completion	Rehab Completion
OEA4	Overburden Emplacement Area	Native Ecosystem	92,161	Active Mining	2042							Ecosystem and Land Use Establishment	Rehab Completion	Rehab Completion
OEA3	Overburden Emplacement Area	Native Ecosystem	43,118	Active Mining	2046								Rehab Completion	Rehab Completion
Active mining (Open pit void)														
AMA1	Open pit	Final Void	-	Active Mining							Landform Establishment	Rehab Completion	Rehab Completion	Rehab Completion
AMA2	Wet pit	Final Void	-	-							Landform Establishment	Rehab Completion	Rehab Completion	Rehab Completion

6.1.1 Rehabilitation status year 2023

The infrastructure area (IA6) will commence the landform establishment phase in 2023, refer to Figure 4. This area represents an internal road.

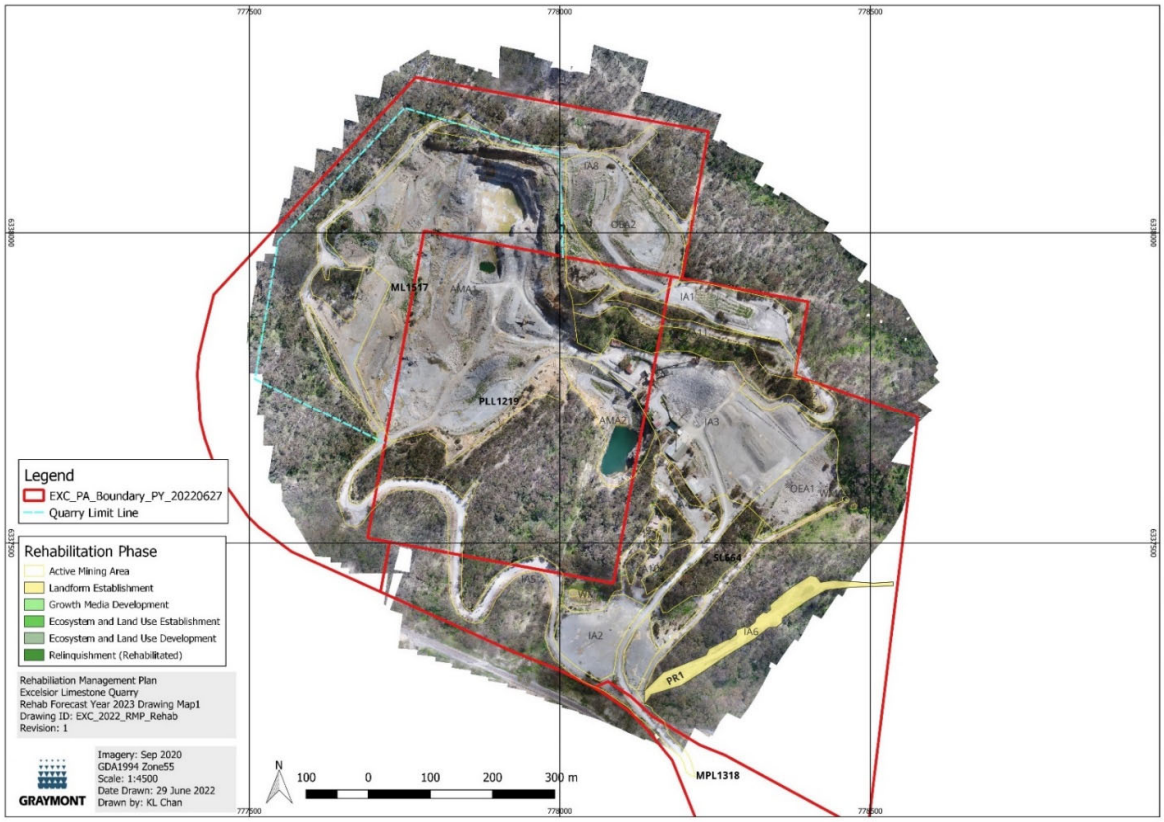

Figure 4: Rehabilitation by the end of 2023

6.1.2 Rehabilitation status year 2024

The infrastructure area (IA6) will progress to the growth media development phase, while the infrastructure area (IA5) marked in the figure as R2 will commence the landform establishment phase.

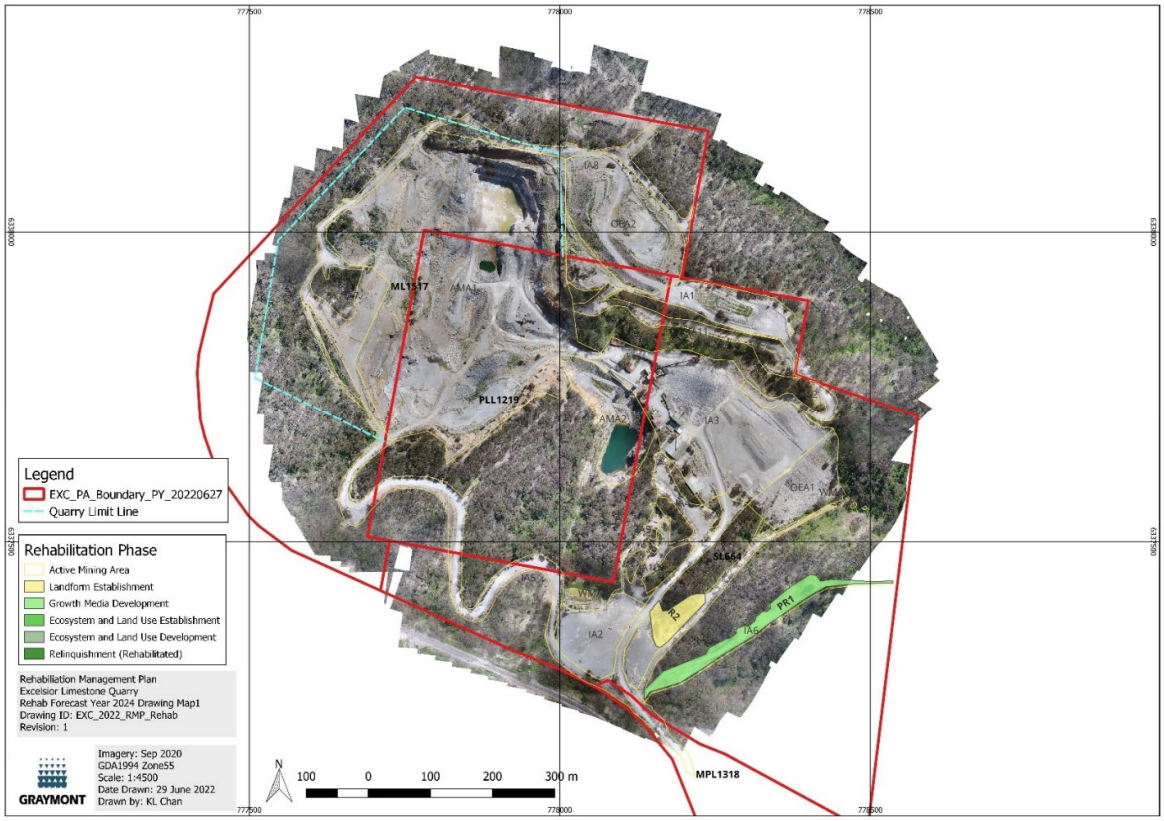

Figure 5: Rehabilitation by the end of 2024

6.1.3 Rehabilitation status year 2025

IA6 is expected to proceed to the ecosystem and land use establishment phase by this year, while R2 is likely to move to growth media development. Overburden Emplacement Area (OEA2) will commence with the landform establishment phase and involves reshaping of the existing overburden emplacement.

Figure 6: Rehabilitation by the end of 2025

6.1.4 Rehabilitation status year 2026-2030

IA6 is expected to achieve rehabilitation completion by 2026. R2 is scheduled to enter the ecosystem and land use establishment phase in 2026 and be completed by 2027. OEA2 is intended to begin the growth media development phase by 2026, progress to the ecosystem and land use establishment and development in 2027 and achieve rehabilitation completion by 2028.

Figure 7: Rehabilitation by the end of 2030

6.1.5 Rehabilitation status year 2031-2035

No further rehabilitation occurs during this time. However, rehabilitation monitoring and maintenance work will continue during this time as per Chapter 8 of this document.

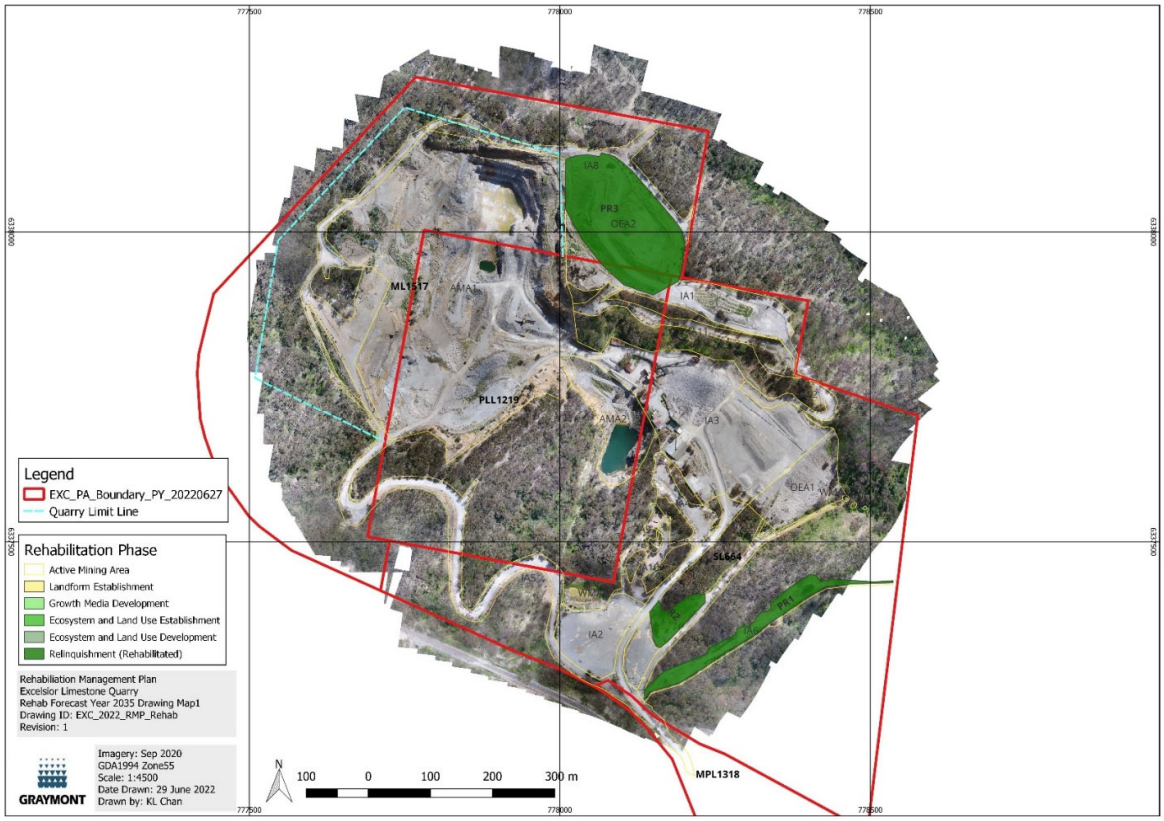

Figure 8: Rehabilitation by the end of 2035

6.1.6 Rehabilitation status year 2036-2040

The infrastructure area IA8, a gravel road, is intended to begin the landform establishment phase in 2039 and then progress to growth media development in 2040. A topsoil stockpile area IA1 will commence the landform establishment phase in 2040.

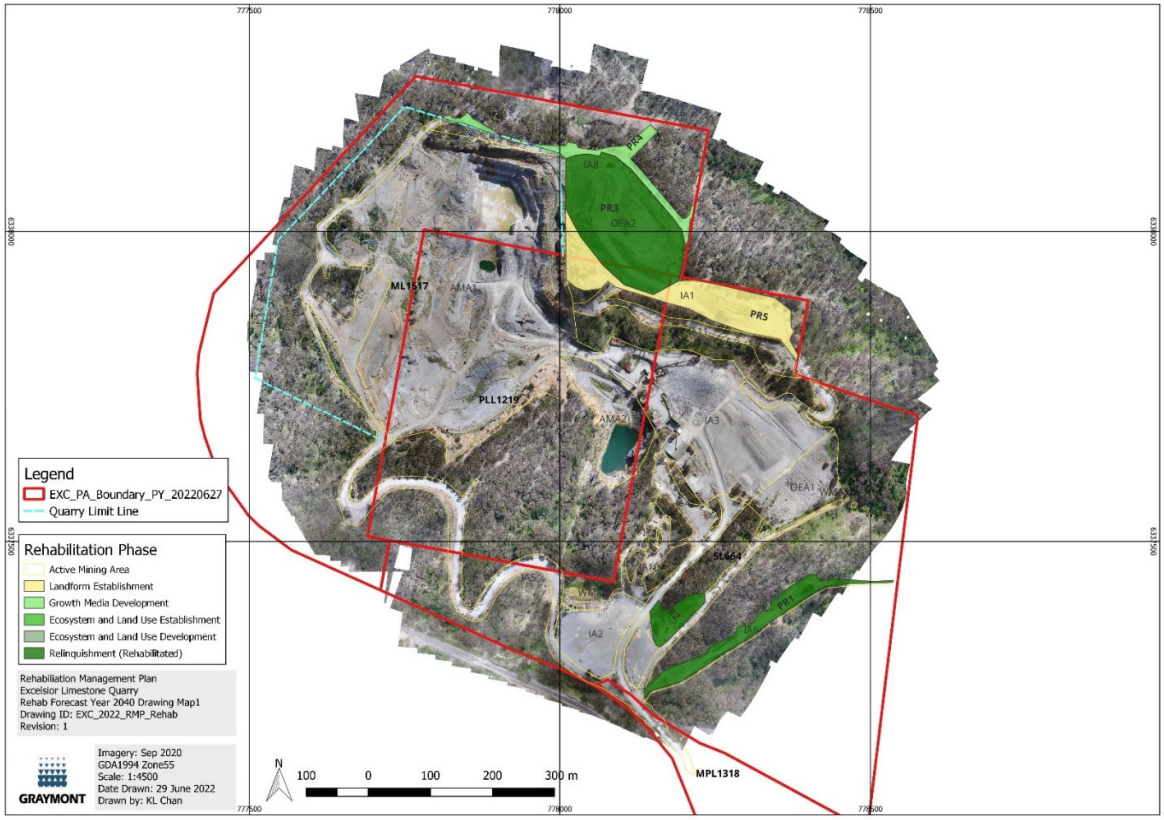

Figure 9: Rehabilitation by the end of 2040

6.1.7 Rehabilitation status year 2041-2045

IA8 will commence ecosystem and land use establishment and development phases in 2041, with the expectation that rehabilitation will be completed by 2042. IA1 will progress to growth media development in 2041, ecosystem and land use establishment in 2042, with rehabilitation completion estimated for 2043. IA11 and IA12 will move into growth media development in 2042 and ecosystem and land use establishment in 2043, with completion estimated for 2044. OEA1 will move into growth media development in 2043, ecosystem and land use establishment in 2044, with completion estimated for 2045.

Figure 10: Rehabilitation by the end of 2045

6.1.8 Rehabilitation status year 2046-2051

It is intended to achieve rehabilitation completion for all the mining disturbed areas by 2051. During the 2046 to 2051 period, monitoring and maintenance activities will be undertaken to ensure rehabilitation success before mining closure.

Figure 11: Rehabilitation by the end of 2051

6.2 Phases of rehabilitation and general methodologies

6.2.1 Active mining phase

The active mining phase for Excelsior Quarry constitutes the rehabilitation and or maintenance activities undertaken during active mining operations (production), including soils and material management, materials handling, environmental monitoring and planning for rehabilitation. This phase also includes management actions taken during operations to manage risks to rehabilitation and enhance rehabilitation outcomes, such as selective handling of waste rock and overburden material.

General methodology

The rehabilitation methodology in this phase is driven by activities and controls focused on soils and materials management, material handling, environmental monitoring and planning for rehabilitation.

Soil and materials management

Develop and maintain a materials and soils balance and database to include the following information:

- Volume of inert capping material, topsoil and subsoil stockpiled
- Location, age, and quality of stockpiles
- Chronology of treatments including weed control and application of cover crop undertaken on the stockpile
- Volume of material, topsoil and subsoil required for application to current and future disturbance areas
- An estimate of the volume of suitable alternative material required to be imported onto site to supplement potential material, topsoil, and subsoil deficits (if required); and
- Record data on the location of the stockpiled material including date stripped, source area, indicative volume, pre-strip plant community type.

Materials and waste handling

Develop specific strategies for mine materials management to address potential geochemical and geotechnical constraints for rehabilitation as follows:

- Continued sampling and testing of overburden/interburden materials during operations to confirm the potential geochemical constraints across the deposit
- Continued sampling to ensure materials are understood (e.g., particle size distribution) and to identify potential changes in material properties; and
- Development of a register of contaminated sites and waste landfill sites areas and where they are located.

Environmental Monitoring

Maintain and document an environmental monitoring program that includes the following environmental matters.

- Surface and groundwater
- Flora and fauna
- Pasture monitoring and or agricultural capacity
- Soil and erosion; and
- Weed assessment and control.

Planning for rehabilitation

When planning for rehabilitation the key focus areas will include:

- Landform establishment
- Topsoil and growth media development
- Revegetation
- Weed management; and
- Record Keeping.

Risk and opportunities

The below matters summarise the site conditions and the risks and opportunities for rehabilitation associated with the active mining phase across the mining domains.

Soils and materials

Topsoil will be stripped and stored separately from subsoil, to enable re-use of topsoil during rehabilitation. The following process will be implemented to ensure the topsoil is maintained in good condition.

- Consolidate existing topsoil

The topsoil onsite is currently located in six stockpiles throughout the site. These stockpiles will be sign-posted to indicate the nature of the material and minimise disturbance. The topsoil stockpiles will eventually be consolidated and stored in the designated topsoil stockpile area.

- Strip new topsoil

Prior to overburden removal activities in a new area, the topsoil will be identified and communicated to operators. Topsoil (including the O horizon) will be stripped separately from the subsoil (overburden) and placed directly into trucks. Topsoil stripping will occur during moist to dry conditions (not wet), to maintain soil structure during excavation works.

- Topsoil stockpiling

Topsoil will be directly transferred and stored in the designated topsoil stockpile area. The height of the stockpiles will be limited to 2m. Handling of topsoil will be kept to a minimum to maintain soil structure.

The designated topsoil stockpile area has been chosen for its physical characteristics, to minimise environmental impacts as follows.

  - The stockpile area is on level-ground with bunding around the perimeter. The area has no effective catchment above, therefore limiting erosion risks
  - The stockpile area is 100m from the nearest drainage line, and approximately 150m from Oaky Creek. Physical controls (e.g., sediment fence) will be installed around the base of the stockpile to minimise erosion and potential offsite movement of silted water
  - The stockpile area is 10m from existing vegetation and outside of the tree line of existing trees
  - The stockpile location will be accessible for weed control

The topsoil stockpile will be sign-posted, to indicate the nature of the stockpile and minimise disturbance.

- Stockpile management

Topsoil stockpiles will be revegetated with sterile black winter ryecorn or other suitable cover crop, to stabilise the soil and maintain biological processes. Weeds on the topsoil stockpile will be routinely sprayed, as part of the site weed management program.

Prior to reuse during rehabilitation, the topsoil will be tested and ameliorated as required.

- Routine inspections

Routine inspections of topsoil stockpiles will be undertaken to identify unexpected disturbance, weeds, and erosion. Rectification works will be raised as actions and tracked in register of soil materials for use in rehabilitation.

- Training

Training will be undertaken to ensure site personnel are aware of the site requirements in relation to topsoil, the importance of topsoil and its value as a resource at mine closure.

- Reporting

The total topsoil volume will be quantified to determine if there will be a topsoil shortage in the future. Topsoil volumes will be reported annually in the Annual Rehabilitation Management Report.

Flora

The vegetation of the native bushland surrounding the disturbed mine site is described as open dry sclerophyll forest with co-dominant tree species Eucalyptus melliodora (Yellow Box), E. macrorhyncha (Red Stringybark), E. fibrosa and E. crebra (Iron Barks), E. rossii (Inland Scribbly Gum) with some individual numbers of E. blakely (Blakely's Red Gum) and E. albens (White Box).

This vegetation community has an understorey of low density containing small trees and shrubs of the following species: Acacia melanoxylon, A. buxifolia (Box Leaf Wattle), A. longifolia (Sydney Golden Wattle), and Persoonia linearis (Narrow Leaf Geebung).

The understory species Acacia melanoxylon grows to a height that made it part of the upper canopy of the forest and in some places, it is clearly emergent. Located on the higher ground towards the limits of the lease area individuals of Xanthorrhoea australis (Grass Tree), Callitris endlicheri (Black Cypress Pine) and Bursaria spinosa (Blackthorn).

Eucalypt regeneration is common in the area, indicative of extensive disturbance associated with timber gathering activities, the existence of the regeneration contributing to the density of the understorey. The coverage by ground cover species varied between the 0% and 100%, depending primarily on the topography.

The main gullies within the study area contain more alluvial soil which provided more suitable growing conditions for groundcover species, while the ridge lines and higher elevated areas contained little to no topsoil and hence the ground coverage in these areas consisted primarily of leaf litter with up to 100% coverage.

Common groundcover species is consistent with other open forest communities within the region. None of the species found on the site are considered threatened, vulnerable, or endangered.

While little information regarding specific surveys within the region is available all the species found are common species to the region with many occurring in similar open forest environments around Lithgow, the Capertee Valley and the Newnes plateau.

There were some areas, primarily in the gully areas at the southern end of the lease that contained infestations of Blackberry, and although not common, Mistletoe on Eucalypts. There were individual plants which appeared to be juvenile Scotch Thistle.

The size, nature, and extent of the limestone reserves in relation to the overburden ratio means that a relatively small area of surface disturbance is required at any one time. To this end much of the lease area has still retained the vegetation as described above.

There is no threatened flora identified to exist at Excelsior. No identified threatened, vulnerable, or endangered flora has been impacted by operations at Excelsior.

Fauna

The fauna of the site was studied in association with the extensions to the lease area applied for and approved in 2001. There have been no additional surveys or investigations with regards to fauna at the site.

With regards to fauna habitat there is a distinct lack of timber on the ground that could be utilised as small mammal habitat. The use of the area for timber collection is highly evident in that the only real timber on the ground is less than 10cm in diameter and is not hollow bearing.

The use of the area by timber getters is also evident in the lack of mature hollow bearing trees that would provide habitat for small arboreal mammals and micro chiropteran bats.

The presence of feral predators such as cats and foxes were observed during the study. Populations of rabbits thrive under the protection of Blackberry stands with good foraging resources of the grasses that fill the gullies associated with the blackberries and the nearby railway land.

The presence of introduced populations is likely to out-compete other species for the limited habitat resources. Two species of frog were identified during the survey. Each of these species were recorded from a small sediment loaded catch dam adjacent to the working quarry. Both species recorded are regarded common to the region.

Two species of snakes that frequent the area were identified. These include the Red-bellied Black Snake and the Copperhead. Lizards, skinks and monitor species were less common over the site with only three sightings of smaller skink species made within the forest community. All species of skinks are common to the region. Searches were made for gecko and monitor species; however, no sightings or traces were identified.

Thirty-eight species of birds were identified. All are considered common within the region. Many of these species are common to areas with contrasting forest and agricultural communities. It is considered that without the contrasting habitat features of these two areas, bird population numbers would be significantly lower.

Seven species of terrestrial and arboreal mammals were observed during the survey, all species being common to the region.

Kangaroos and wallabies were observed during dusk and dawn spotlighting surveys however they retreated to the forested areas outside the lease area during daylight hours when noise from operations at the quarry is audible.

Tree limbs and smooth tree bases were investigated for the marking scratches of possums or koalas. Scats and scratches from the Brush-tailed Possum were recorded within a tall standing Eucalypt to the eastern edge of the lease area. The absence of large hollow bearing mature trees was supported by only being one sighted during the survey.

No species of Micro chiropteran bats were positively identified over the subject site. It is expected that the lack of significant hollow bearing trees within the area would restrict the presence of bats to outside the lease area in adjoining areas where more suitable habitat is likely to exist.

Up to 14 species of bat have been identified as occurring in the local region, primarily to the east around Mount Piper and Baal Bone. Previous research indicates that bat diversity is consistent with available tree hollows with bat numbers concentrated into forested areas. The absence of hollow bearing trees is consistent with the lack of bat species recorded as existing on the site.

There is no threatened fauna identified to exist at Excelsior. No identified threatened, vulnerable, or endangered fauna have been impacted by operations at Excelsior.

Rock/overburden emplacement

The following are included in the Overburden Emplacement Area domain:

- No.1 Overburden Emplacement – this is a historic overburden emplacement that now serves as the southern part of the main ROM stockpile. It is no longer used for overburden emplacement
- No.2 Overburden Emplacement located northeast of No.1 Pit. This area is in its final stages of dumping and has historically been used as a storage area for LKD from Charbon. No further LKD disposal is proposed. The emplacement has been capped to encapsulate the LKD; and
- No.3 Overburden Emplacement located Southwest of No.1 pit is approved though yet to be established. Graymont's overburden management plan has recently evolved to include substantial backfill of Pit 1, which may reduce or remove the need for establishment of the No.3 overburden emplacement.

Overburden will be used to backfill No.1 Pit. LKD disposal will be incorporated within the overburden emplacement within No.1 Pit. LKD and overburden material will be backfilled in layers. The LKD buried in this emplacement area will be generated at Charbon lime plant and transported to Excelsior Quarry before burial in the southern section of the main void. LKD would comprise approximately 4% of total quantity of backfilled material.

Product Stockpile

The quarrying of limestone at Excelsior requires the stockpiling of stone at the start and end points of the mining process. A small short-term stockpile is utilised at the primary crusher located in the pit. Product stockpiles are used to store various grades and sizes of product following crushing to size and washing. These stockpiles are constructed by dumping from road trucks and material handling by front-end loader.

There are two main product stockpile areas. One is located to the immediate north of the washery/office/loading bin area and the other is located off the main access road to the south of the washery area.

Waste Management

By volume the main waste types are overburden material which was discussed earlier. This includes overburden and reject materials that do not meet product specifications. Low grade limestone, unsuitable for kiln stone, is greatly valued as a road base material and finds a ready market reducing the volume of overburden and reject waste.

Other wastes include waste oil, lubricants and degreasers, and general domestic waste, which are disposed offsite at appropriately licensed facilities.

Wastewater from showers and sewage are treated through a septic tank system. Rubbish (domestic waste) is disposed of in bins which are emptied by a licensed waste contractor and are disposed of at the Mudgee waste facility.

As there are no planned changes to the method of operation of the quarry it is not anticipated that there will be any changes to the types or quantities of waste produced at the Excelsior Quarry.

Geology and geochemistry

The Great Dividing Range is on the western limit of the Sydney Basin which, geologically, is comprised of Permo-Carboniferous sedimentary rocks conformably overlain by a sedimentary series, primarily composed of sandstones of Triassic Age.

The Basin consists of a plateau, intersected with erosion valleys. The Capertee Valley is one of the largest of the erosion valleys being some 630 km² in lateral extent and of sufficient depth to expose the underlying Devonian basement rocks which occur at Excelsior in the form of coralline limestone.

No limestone is known to occur within the coal measures or Triassic sediments of the Sydney basin. For this reason, limestone deposits in NSW are generally remote from the east coast markets with the Excelsior deposit being one of the closer reserves.

Karst Systems

Karst is a type of terrain consisting of limestone outcrops and characterised by barren, rocky ground, caves, sinkholes, and underground streams. It results from the eroding effects of surface and underground water on massive soluble limestone.

No limestone karst systems occur at Excelsior Quarry with most of the outcrop limestone already mined. No significant cave systems have been encountered during mining operations to date. The formation of caves is thought to be inhibited by the impervious mantle of shales and conglomerates overlying the limestone.

Monitoring of geotechnical stability of the Excelsior pit and surrounds will be undertaken monthly by nominated local Graymont personnel and annually by a qualified Geologist/Engineer. Geotechnical inspections will address any potential ground stability hazards across the quarry site with reference to:

- Areas of batters or crests that show signs of cracking
- Movement or water seepage from benches
- Subsidence of berm or movement behind crest
- Uncontrolled water runoffs or water pooling on berm or behind crest; and
- Appearance of karst features

Material prone to spontaneous combustion

No issues relating to spontaneous combustion have been identified at the Excelsior site.

Material prone to generating acid mine drainage

Limestone is known to be relatively inert environmentally. It is not commonly associated with water quality risks such as from acid mine drainage or highly erosive soil or crushed rock materials; therefore, there is no need to process or remove waste rock materials to achieve environmental performance outcomes.

Ore beneficiation waste management (reject and tailings disposal)

No tailings or residues are produced at Excelsior Quarry. Lime kiln dust (LKD) produced as a by-product of the nearby Charbon kiln, is disposed with the Excelsior overburden emplacements.

Erosion and sediment control

Erosion is minimised by keeping the operations to defined work areas and roadways. Most erosion occurs on live overburden faces which are being worked or will be worked as the quarry expands.

Sediment from batter erosion is contained by the Wet Quarry and the settling ponds in Excelsior Gully.

Most runoff from the active mining area drains to the quarry sump. This area captures dirty water and allows sediment to settle out. The areas outside the main pit area all drain via sediment catchment dams as described in the EIS.

Water monitoring of discharges from the sediment dams will be undertaken in accordance with the Environment Protection Licence. Currently the licence requires the monitoring of five parameters, against concentration limits as detailed below:

- pH: 6.5-8.5
- Conductivity: 350 µS/cm
- Total suspended solids: 50 mg/L
- Oil and grease: 10mg/L; and
- Nitrate: 3.5 mg/L.

Routine inspections of site will be carried out to identify areas of erosion and appropriate rectification.

Ongoing management of biological resources for use in rehabilitation

Ongoing management for biological resources includes the following activities:

- Sprinkler systems utilised to suppress dust on stockpiles to minimise dust transport to native ecosystems
- Regular inspection of stockpiles
- Topsoil testing from stored stockpiles prior to re-spreading
- Topsoil stockpiles are limited to 2m in height and will be vegetated with an identified appropriate grass species
- Overburden emplacement batters will be vegetated to minimise erosion and dirty water runoff
- Surface water runoff diverted by earthen bunds and drainage channels to pit void
- Surface water runoff collected in pit void is reused onsite or pumped to sediment basins prior to discharge; and
- Scheduled weed control inspections.

Mine subsidence

No issues relating to mine subsidence have been identified at the Excelsior site.

Management of potential cultural and heritage issues

Aboriginal Heritage

No areas or sites of aboriginal heritage have been identified, and it is not expected that any will be found because of operations at Excelsior.

Natural Heritage

The impact on the natural environment from quarrying operations will result in clearing of timber and stripping of topsoil and disturbance of flora and fauna. This impact will be a gradual intrusion of the quarry workings over the life of the operations.

There will be a significant but slow impact on flora and fauna resulting from the slow advance of the quarry faces. However, the quarry site is surrounded by existing vegetation and operations will not cause fragmentation of this vegetation, allowing fauna to utilise existing habitat corridors.

Exploration activities

The geology of the Mining Lease is generally well understood, and there is no scope for any significant further reserves to be discovered. Further drilling may be required to better define existing reserves. This will be discussed with the Resource Regulator – Regional NSW, as required, with all necessary approvals granted, prior to work commencing.

6.2.2 Decommissioning

The decommissioning phase for Excelsior Quarry will include activities associated with removing mining infrastructure and the removal and/or remediation of contaminants and hazardous materials if required. This rehabilitation phase may also include studies and assessments related to decommissioning and demolition of infrastructure or works carried out to make safe or 'fit for purpose' built infrastructure to be retained for future use(s) following lease relinquishment.

A detailed decommissioning procedure will be developed in a future update of this RMP closer to the end of mine life. This will guide activities at the end of the mine operations and detail the resources needed to undertake those activities. The decommissioning procedure will include the process for undertaking decommissioning and closure activities, complying with all legal obligations, and communicating to minimise the risk of safety and environmental incidents. In addition, the decommissioning procedure will outline how all the infrastructure remaining at the end of the mining lease is to be managed and financed into the future and provide opportunity for the community and other stakeholders to provide input.

Generally, the decommissioning procedure will address the following: decommissioning

- Before demolition, all infrastructure should be evaluated in terms of the presence of hazardous substances and land contamination, and appropriate management strategies developed to protect employees, the public and minimise potential environmental harm. This includes the identification of the various waste streams and development of management strategies in accordance with the appropriate waste legislation
- Before demolition activities, undertake or review existing assessments to determine potential heritage approvals and or management measures that may be required; these may include heritage management plans, retention/restoration of buildings, archival recording, and dilapidation studies
- Electricity services to any infrastructure scheduled for demolition will be removed before the start of building demolition works
- Telecommunications, water supply and other services will also be disconnected and removed where practical
- Where services are buried (e.g., pipelines, cables) and their retrieval may lead to further disturbance, the infrastructure may be left in situ (subject to any necessary approvals or agreements) if they don't pose constraints to the final land use. In this situation, the location of the services will be surveyed and marked on the site plan and a suitable caveat developed to provide that they are readily identifiable for future land holders
- All buildings, fixed plant and other infrastructure that are not required as part of the final land use will be demolished and removed. Demolition will be carried out in accordance with the AS 2601—2001, *The demolition of structures*. Approval for demolition will be reviewed closer to the demolition date as the this activity may be exempt under Clause 2.13 (c) of the State Environmental Planning Policy (Resources and Energy) 2021, which states that '*the demolition of a building or structure that is carried out in accordance with Australian Standard AS 2601—2001, The demolition of structures, but only if the building or structure is not, or is not part of, a heritage item, or in a heritage conservation area, identified by an environmental planning instrument,*'; and
- Remaining structures will be surveyed and recorded on a plan, with a suitable caveat developed to provide that they are readily identifiable for future land holders (as appropriate).

Site security

Site security management will include physical and operational measures to promote work health and safety and prevent access by members of the public to site. Physical and operational site security during decommissioning might include:

- Access control – as well as minimal access points, this includes installing suitable security gating so that gates cannot be simply unhinged after hours
- Fencing and barries – the final void will be isolated using a physical barrier around mine void constructed to limit access by people and stock to unsafe areas. A locked gate will be installed as part of the barrier around mine void to permit stock access and allow for irrigation of water from the mine void, as required
- Locks – the site will include lockable storage such as steel tool vaults and containment so that all equipment, tools, metals, and materials can be secured out of sight overnight and when not in use
- Provision and monitoring of risk management, assessment and health and safety protocols; and
- Entry and exit monitoring.

Infrastructure to be removed or demolished

The following items will be removed and or demolished during the decommissioning phase.

- Office buildings and workshops
- Electricity, water, septic system, and telecommunications infrastructure
- Fuel and oil storage facilities and generator
- Crushing and screening plant
- Disused former conveyors, crushers and transfer hoppers
- Concrete pads and footings; and
- Decommission dirty water dams (Drain and removed sediments to make dam clean water or drain and minor earthworks to fill in dam).

Buildings, structures, and fixed plant to be retained

Some roads will be retained for property access, bushfire fighting and rehabilitation monitoring purposes. The structural integrity and possible risk of the proposed retained roads will be verified and addressed by a qualify engineer upon mining closure.

Management of carbonaceous/contaminated material

An area associated with historic biosolids storage and processing has been identified as a potentially contaminated area of the site. For a time, biosolids were transported to site and mixed with lime to produce agricultural soil amendments. Some biosolids remain. Hyrock contained the remaining (less than 500 tonnes) biosolids in a clay layer to prevent migration of leachate and the area has been further capped with fill material. The area will be monitored for signs of contamination and the area will be assessed to determine the risk of leachate migration.

A contaminated site assessment in accordance with requirements of the Contaminated Land Management Act 1997 and Protection of the Environment Operations Act 1997 will be undertaken during the decommissioning phase, and Remedial Action Plans that outline remediation works for any hydrocarbon impacted areas will be developed and implemented, as required.

No new areas of contamination have been identified on-site.

Hazardous materials management

A register of hazardous substances used on site is maintained. The register is updated when new materials are brought into use on site. The site also has access to an online hazardous substance database which can provide detail information on chemicals including SDS's as required. Following the cessation of the mining operation, the following material must be removed from site as required.

- **Fuel Containment:** Both diesel and waste oil fuels are stored in above-ground tanks built to relevant standards. The quantity of diesel stored on site is less than 40Kl
- **Explosives:** Explosives are generally not stored on site. The site does have suitably designed magazines for temporary storage. A site security plan has been developed and implemented
- **Oil & Grease:** Oils and grease are stored adjacent to the main fuel tank within the bunded containment area. Used oils are stored in a tank located in the same bunded area. Used oil is collected by a licensed contractor for disposal; and
- **Gas Bottle Storage:** Gas bottles are stored in a segregated compound of block construction**.**

Underground infrastructure

The Decommissioning procedure will also address the following:

- Removal of remote equipment (e.g., powerlines to remote shafts, ventilation infrastructure, PED lines, services boreholes, pipeline); and
- The need to undertake a hydrological assessment and develop a groundwater management strategy and monitoring (if required). This may require the development of water treatment strategies and subsequent approvals from relevant agencies.

6.2.3 Landform establishment

The landform establishment phase of rehabilitation consists of the processes and activities required to construct the approved final landform as per the Chapter 5 of this document.

Water management infrastructure

There are three existing Water Management Areas at Excelsior Quarry. There will not be construction of any new water management infrastructure; however, maintenance of the existing ones will occur including:

- Removal of excess sediment from the surface dams for future use by the subsequent landowner
- The installation of appropriate sediment and erosion control measures (if required); and
- Water within the final void will be appropriately licensed in perpetuity under the Water Management Act 2000).

Final landform construction: general requirements

During the final landform construction, the following matters will be considered and addressed as relevant:

- Emplacement Areas: Overburden and waste rock emplacement areas are designed to enable progressive rehabilitation of all batter faces and benches prior to bulk waste rock emplacement, thereby minimising the extent of exposed surfaces liable to erode and minimising the magnitude of visual impacts. Emplacement areas will have a drainage system. A monitoring program will be in place to determine the drainage system's effectiveness, including a trigger action response plan (TARP) to address issues
- Final void: The final void on site will remain as part of the final landform. The design and construction will be following the minimum requirements of the development consent, associated environmental assessments/environmental impact statements, and in consideration of the following:
    - A geotechnical assessment should be undertaken to determine the likely long-term stability risks associated with the proposed final landform, including any remaining high walls or low walls. Based on the outcome of this assessment, suitable measures are to be implemented to minimise potential risks and support the final land use
    - Updated surface and groundwater assessments should be undertaken concerning the likely final water level in the void and post-mining water take, including groundwater inflows into the void and surface water capture
    - The final stabilisation and revegetation strategy associated with the final void should be designed and implemented based on the outcomes of the above assessments; and
    - The final void must address any relevant approval requirements of regulatory authorities and demonstrate the satisfaction of licensing requirements under the relevant legislation including the Water Management Act 2000.

Final landform construction: overburden emplacement areas and tailing dams

No tailings dams on site. The overburden emplacement areas would be constructed to progressively form completed outer surfaces that can be progressively covered with subsoil and topsoil and revegetated. As each section of the emplacement would reach its desired level or slope, the surface would be shaped to the required slope and covered with at least 0.6m of overburden and 0.15m of topsoil. The eastern overburden face of No.1 Overburden Emplacement will drain into Excelsior Gully and will be battered to a slope of 1(V):3(H) and benched. The surface of all re-shaped overburden areas will be covered with a layer of topsoil from the topsoil storage areas and seeded with local varieties of native vegetation.

The Excelsior Quarry management would endeavour as much as possible to directly transfer the topsoil to maximise the extent of natural regrowth. In any event, the placed soil would be sown with a pasture mix and each revegetation area isolated from upslope runoff. If appropriate, silt-stop fencing would be erected to collect sediment from the revegetation area until the area is stabilised.

Final landform construction: final voids, highwalls and low walls

Conceptual rehabilitation of the quarry void will consist of profiling overburden batters and quarry faces where the excavation has reached its full lateral extent towards the No.2 overburden emplacement with proposed areas to be re-shaped and rehabilitated at the end of mine life.

Overburden material will be used to profile the quarry faces at a batter of 3(V):1(H). The profiling of the quarry faces will be further achieved by excavating the final overburden faces to a batter of 1(V):3(H) in areas where the topography permits such flatter angles.

Although the open cut mine would remain as a final void on cessation of mining, specific rehabilitation procedures would be employed to ensure its long-term safety and accessibility. These processes would include the following:

- Construction of a minimum 2m high bund or barrier around the perimeter of the void outline to prevent accidental or deliberate passage of vehicles over the edge of the open-cut mine. Areas of disturbance adjacent to the barrier would be sown with a seed mixture comprising native and exotic pasture species, locally occurring shrubs and trees
- Substantial backfilling of the mine void with overburden would reduce the overall site of the residual void and enable some native plant revegetation
- Backfilled overburden in the mine void will be shaped to drain run-off water into the Wet Quarry Catchment; and
- Mine highwalls that are not battered with overburden would be suitably benched to provide a stable landform

Construction of creek/river diversion works

The final landform for Excelsior Quarry does not include construction of any creek or river diversion works.

6.2.4 Growth medium development

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 to ensure achievement of the approved rehabilitation objectives and rehabilitation completion criteria and final landform. During this phase the following activities will be undertaken:

Soil stripping and handling

There is topsoil stored on-site for rehabilitation purposes. Prior to re-spreading of stockpiled topsoil onto reshaped batters and benches, a visual assessment of weed infestation will be undertaken to determine if individual stockpiles require scalping or burial due to their unsuitability as a result of weed infestation. Topsoil and subsoil stockpiles will be treated annually and additionally as required to control weeds, in accordance with the Weed Management Plan. The site HSEQ advisor is responsible for implementation of the Weed Management Plan.

Soil and overburden characterisation will also be undertaken to assess the suitability of the material as a growing media. Soil testing will address chemical factors including pH, electrical conductivity, and general fertility. Physical factors such as texture and degree of stoniness will be assessed in consideration of material suitability as a growing media. Some rock and gravel in the soil profile are desirable to facilitate water penetration deeper into the soil profile and minimise evaporative losses. This is particularly important when rehabilitating for a nature conservation post mine land use.

Surface preparation

Areas to be rehabilitated will be reshaped to achieve the desired landform and checked to ensure that desired batter grades and slope lengths are achieved. Suitable stormwater drainage measures shall be incorporated.

Surfaces will generally be contour ripped to a nominal depth of 300mm to incorporate ameliorants into the overburden and to encourage infiltration of water and improve keying in of topsoil.

Contour scarification of topsoil is undertaken to incorporate soil ameliorants into the plant rooting zone (to a depth of 100mm) and to provide a suitable seedbed for direct seeding. A roughened soil surface also increases rainfall infiltration, reduces run-off, and provides a micro-habitat allowing plants to germinate and establish.

Where possible ripping and scarification will be undertaken when the soil is moist to minimise structural decline and immediately prior to sowing. The respread topsoil surface will be scarified prior to, or during seeding.

Where topsoil resources allow, topsoil will be spread to a nominal depth of 100mm to 150mm on all regraded areas flatter than 1(v):3(h) and 50mm thick on areas steeper than 1(v):3(h).

Amelioration of growing media

Soil testing of topsoil and subsoil will be undertaken and used to determine amelioration requirements and rates. Fertiliser requirements will be assessed for type and rates in accordance with the planned vegetation for each area.

Where topsoil is unavailable or of insufficient quality, some of the site subsoils will be ameliorated to form a suitable growing media. A suitable guide to topsoil quality assessment would be undertaken to assess suitable alternatives such as biosolids, organic growth medium or another substitute, if required. However, the risk of introducing hazards to the establishment of the preferred plant community type (e.g., non-native species, elevated nutrient levels through the application of soil ameliorants) should be evaluated.

Erosion control

Erosion control will focus on reducing the concentration of runoff, increasing infiltration, and providing soil surface cover. Erosion control works will include:

- Amelioration of dispersive soil to minimise the risk of rill, gully, and tunnel erosion and to allow the infiltration of surface water (reduce the amount and velocity of surface water)
- Contour scarification to increase infiltration, reduce flow velocity and to incorporate soil ameliorants
- Ground cover vegetation is established promptly following commencement of rehabilitation works to prevent raindrop and sheet erosion of the overburden emplacements. The seed mixture will include at least three cover crop species that will grow quickly to provide early groundcover, even if that species will not form part of the final, permanent vegetation; and
- Implement erosion and sediment controls in accordance with Managing Urban Stormwater: Soils and Construction Volume 2E, Mines and Quarries (DECC 2008b).

6.2.5 Ecosystem and land use establishment

This phase of rehabilitation consists of the processes to establish the approved final land use following construction of the final landform. For vegetated land uses this rehabilitation phase includes establishing the desired vegetation community and implementing land management activities such as weed control.

At Excelsior Quarry revegetation rehabilitation activities will be undertaking to achieve a Native Vegetation final land use. The seed mix to be used to achieve final land use will be under development as part of the rehabilitation research and trials, refer to section 9.2.

Rehabilitation establishment inspections, monitoring, and maintenance

The following activities will be undertaken to ensure that the juvenile vegetation thrives during this rehabilitation phase:

- Inspections will be conducted no later than three months following the completion of each rehabilitation campaign to determine whether performance issues have occurred or are emerging, which may result in a need for intervention
- Inspections will be conducted to assess soil conditions and erosion, drainage and sediment control structures, runoff water quality, revegetation germination rates, plant health and weed infestation, until vegetation has become well established and the site can be considered stable
- Where possible, use drones or LiDAR to conduct additional inspections and analysis of developing rehabilitation
- Outcomes of inspections will be recorded to implement any required intervention/adaptive management actions as soon as practicable after a monitoring program indicates that rehabilitation performance is unsatisfactory as part of the rehabilitation management and maintenance program; and
- Implement long-term rehabilitation monitoring program and evaluate trajectory of rehabilitation against achieving rehabilitation objectives and rehabilitation completion criteria as per Chapter 8 of this document.

6.2.6 Ecosystem and land use development

This phase of rehabilitation consists of the activities to manage maturing rehabilitation areas on a trajectory to achieving the rehabilitation objectives, rehabilitation completion criteria and final landform and rehabilitation plan.

The aim of this phase is to develop characteristics of functional self-sustaining ecosystems, such as nutrient recycling, vegetation flowering and reproduction, and increasing habitat complexity, and development of a productive, self-sustaining soil profile.

Maintenance and contingency

Maintenance/contingency works in the rehabilitation areas will be completed as required to address any issues of concern or unpredicted impact identified during monitoring. These works will include the following:

- Supplementary seeding of vegetated areas
- Weed and pest control
- Application of soil ameliorants; and
- Additional stabilisation

Supplementary seeding and tube stock planting

In the event that grass cover is initially insufficient to stabilise sloped areas due to slow growth rates (65 – 75% coverage), introduced sterile ground covers such as sterile Japanese Millet or Rye Corn may be used to supplement plantings.

- Supplementary seed broadcasting will be undertaken in areas where growth rates are considered insufficient or unsuccessful following monitoring. The seed for broadcasting will be treated where necessary prior to broadcasting to maximise germination rates
- Supplementary tube stock planting will be undertaken in areas where growth rates are considered insufficient or unsuccessful following monitoring; and
- Supplementary seed broadcasting will focus on ensuring desired shrub density and diversity is established in the rehabilitation areas.

Weeds and pest control

All priority weeds within the Excelsior Quarry will be controlled in accordance with the requirements of the Biosecurity Act 2015. A Weed Management Plan has been implemented. The continued monitoring of priority weeds will reduce the potential for spread and provide control. This program ensures both a proactive and reactive approach to weed management.

Control strategies will include spot spraying in and around vegetation and boom spraying on the more open grasslands.

Predation of seedlings and tube stock by rabbits and kangaroos will be minimised using tree guards. Local Land Services NSW input will be consulted to implement an appropriate pest animal control plan if significant numbers are causing widespread damage to rehabilitation.

Application of soil ameliorants

Soil testing will be undertaken to determine amelioration requirements and rates. This will ensure the soil is ameliorated to ensure an optimum growing medium and further application of fertiliser will not be required.

Additional stabilisation

Additional stabilisation works will be undertaken as required and may include reshaping, the installation of grade stabilisation structures, and amelioration of dispersive soil, revegetation, fencing and de-silting.

Stabilisation works are inspected as part of the Rapid Rehabilitation inspection program (Refer to Chapter 8).

6.3 Rehabilitation of areas affected by subsidence

The section does not apply as Excelsior Quarry is not affected by mine subsidence. No issues relating to mine subsidence have been identified at the site.

7. Rehabilitation quality assurance process

A Rehabilitation Quality Assurance Process (RQAP) will be implemented through the life of the mine and each phase of rehabilitation. The RQAP will ensure that:

- Rehabilitation is being implemented following the nominated methodologies
- Persons responsible for rehabilitation implementation are identified; and
- Identified rehabilitation risks are adequately addressed at each phase of rehabilitation.

Excelsior Quarry will implement the RQAP through every phase of rehabilitation. The RQAP will include inspections, monitoring, and documentation to ensure that each phase of decommissioning and rehabilitation has been completed according to the nominated methodologies before proceeding to the next rehabilitation phase. Risks to rehabilitation are addressed in Chapter 3 of this RMP (rehabilitation risk assessment). The risk assessment is a live document that would be updated to address any emerging risks.

As part of the RQAP, a rehabilitation register will be developed and maintained. The register aims to record success factors and lessons learned from previous reviews to assist future rehabilitation planning and improve outcomes. This register will detail the current rehabilitation status and outline the rehabilitation works undertaken. The RQAP will be managed by the site HSEQ advisor.

The key elements of the rehabilitation quality assurance process and how they would be applied at each rehabilitation phase, are summarised in sections 7.1 to 7.6.

7.1 RQAP – active mining

- Updated mine and rehabilitation plans
- Maintenance of a topsoil inventory to document stripped, stockpiled and re-spread resources
- Scheduled inspections to identify soil and land erosion and adequacy of soil, erosion, and drainage controls
- Weed inspections and maintenance; and
- Documentation of all weed management and eradication programs and follow-up inspections.

7.2 RQAP – decommissioning

- Inspections and demolition reports to confirm all infrastructure has been removed
- Inspections and assessments to ensure any contamination has been appropriately remediated and/or removed; and
- Waste tracking documentation to demonstrate that all wastes are disposed legally.

7.3 RQAP – landform establishment

- Survey and preparation of as constructed drawings of final constructed slopes, landforms, and water drainage structures; and
- Inspection to record the progression of the intended landform.

7.4 RQAP – growth medium development

- Registers of topsoil and/or soil substitute stockpiles including management records (such as stripping/stockpiling dates, weed control, inoculation with microbes, etc.)
- Records of implementation of erosion and sediment controls in accordance with Managing Urban Stormwater: Soils and Construction Volume 2E, Mines and Quarries (DECC 2008b)
- Soil testing results to confirm appropriate soil geochemical parameters for plant establishment; and
- Records of soil replacement depths and methodologies.

7.5 RQAP – ecosystem and land use establishment

Records of revegetation activities undertaken including:

- Date of revegetation actions
- Weather conditions
- Seed mix
- Seeding rate (kg/ha) and/or planting rate (tube stock/ha)
- Fertiliser rate (kg/ha)
- Records of the salvage of all rehabilitation resources including suitable capping materials, topsoils/subsoils, seeds, habitat structures for use in rehabilitation
- Regular site inspections of rehabilitated areas to allow early identification of any emerging threats to rehabilitation
- Rehabilitation monitoring in accordance with Chapter 8 of this plan
- Regular inspections to identify potential weed and feral animal infestations; and
- Documentation of all weed management and eradication programs and follow-up inspections.

7.6 RQAP – ecosystem and land use development

- Rehabilitation monitoring in accordance with Chapter 8 to monitor the success of rehabilitation
- Regular site inspections of rehabilitated areas to allow early identification of any emerging threats to rehabilitation
- Regular inspections to identify potential weed infestations; and
- Documentation of all weed management and eradication programs and follow-up inspections.

8. Rehabilitation monitoring program

8.1 Analogue site baseline monitoring

Future rehabilitation monitoring will compare against suitable local reference sites. Excelsior Quarry will identify the analogue sites around the mine that will be used as a benchmark for the Native Vegetation Final Land Use domain.

8.2 Rehabilitation establishment monitoring

8.2.1 Rapid rehabilitation survey

Graymont has adopted a formalised Rapid Rehabilitation Survey (RRS) process to monitor rehabilitation performance. The RRS process involves an inspection that will be undertaken routinely within each discrete rehabilitation area. The recommended frequency of survey will vary depending on conditions and stage of completion, but typical frequency is:

- Monthly for the first three months during ecosystem establishment; then
- Quarterly through ecosystem establishment and development phases.

Rehabilitation monitoring using the RRS process will continue until the rehabilitation objectives have been met and are substantially trending towards the completion criteria such that active intervention is no longer required, and the area is assessed as stable.

The RRS inspection will record key details of rehabilitation progress, including identification of any emerging risks, activation of triggers for mitigation controls, and noting any corrective actions that may be required. Any identified deficiencies or failures shall be noted, and follow-up actions identified. Success factors will be noted for future reference and to assist in continuing improvement. Guidance on the key rehabilitation risks, and response actions is provided in the Rehabilitation Risk Assessment (RRA) (Chapter 3) and Trigger Action Response Plan (TARP) (Appendix B).

Details to be recorded during the rapid rehabilitation survey include:

- Area inspected
- Date and time of inspection
- Person undertaking the inspection
- Photographic record
- Surface water drainage. Note factors including:
    - Upslope stormwater diversion/management
    - Sheet flow stability
    - Management of concentrated flows including berms and batter drains
    - Stability and adequacy of discharge control and discharge locations
- Soil surface cover and erosion risk:
    - Ground cover %
    - Presence and severity of sheet, rill, and gully erosion
- Assess vegetation cover, health, abundance, type, and structure (qualitative assessment only, not full floristic survey)
- Assess presence of weeds, focus on key weed types; and

- Record specific repair/maintenance actions, with timelines and responsibilities for completion. Include an audit process to follow up and close out corrective actions.

8.2.2 Flora and fauna survey

Graymont will engage a suitably qualified person to undertake a targeted flora and fauna survey annually. The aims of the vegetation survey are:

- Provide a detailed floristic record of analogue sites and rehabilitation areas
- Describe fauna habitat features and opportunistic presence of any native or introduced fauna
- Assess vegetation cover, health, diversity, abundance, structure
- Assess revegetation success and succession towards the target vegetation community and dominant species; and
- Recommend mitigation or improvement works where required, such as supplementary planting, weed control, soil amelioration and erosion control.

Vegetation condition plots

Biometric plots with dimensions 20m x 20m will be established within each rehabilitation management units and permanently marked using star pickets or similar. A minimum of one plot to be established per management unit.

Data will be collected within each 20 x 20 m permanently marked monitoring plot including:

- A list of all visible vascular plant species (to assess recruitment through comparison with the seeding mix species with the total number of native species recruited based on the sum of plot data within each management area)
- A list of species showing evidence of flowering and seed set (to assess reproductively mature flowering or seeding with the total number of reproductive species based on the sum of plot data within each management area)
- A list of species with seedlings and saplings (to assess regeneration with the total number of native species regenerating based on the sum of plot data within each management area)
- An assessment of the cover – abundance of priority weeds (to assess weed management success based on the average of plots data per management area). Cover and abundance to be measured as:
    - Percentage cover (1-5%, then increments of 5% thereafter); and
    - Approximate abundance (density) of each individual species in intervals of 1-10, 20, 50, 100, 500, 1000, 2000 etc.

Ground condition - transects

Percentage ground cover shall be assessed along a 50m transect attached to each biometric plot, using a point intercept method with cover for all ground cover (vegetation, litter, bare soil, rock, cryptogram, woody debris) recorded at intervals of 0.5 m (100 points). The number of intercepts per ground cover type provides an estimate of % cover. The completion criteria should be assessed on the average of all transects within each management area.

The presence of erosion features shall be based on a site walkover across the grade within each management area and the measurement of the depth of any rills or gullies encountered. This would also provide an opportunity to provide a general appraisal of groundcover across the site.

8.2.3 Record keeping

Good record keeping will assist Excelsior Quarry to track rehabilitation planning and progress and improve success. Graymont will maintain the following rehabilitation records:

- Rehabilitation Management Plan (RMP) (this document). The RMP will be reviewed and updated as necessary through the course of mine operations and closure planning and in accordance with Clause 11 of Schedule 8A to the Mining Regulation 2016
- Rehabilitation Risk Assessment. Maintained and updated in accordance with the RRA provided in Chapter 3 and Clause 7 of Schedule 8A to the Mining Regulation 2016
- Annual Rehabilitation Report and Forward Program. Provided annually to the Secretary and prepared in accordance with and Clauses 9 and 13 of Schedule 8A to the Mining Regulation 2016
- Register of soil materials for use in rehabilitation. The register will identify material type, locations, and quantity
- Rapid Rehabilitation Survey Results, included as part of a Rehabilitation Register; and
- Rehabilitation Register to record rehabilitation activity and monitoring. This will detail the current rehabilitation status and outline in detail the rehabilitation methodologies undertaken (including landform preparation, drainage goals, growth media development, surface preparation techniques, and revegetation processes, and any follow up corrective actions). The register shall highlight success factors and lessons learned from previous reviews to assist future rehab planning and improve outcomes. The register would include quality assurance records such as as-built drawings. A photographic log would be kept as part of the rehabilitation register.

8.3 Measuring performance against rehabilitation objectives and rehabilitation completion criteria

Routine inspections as described in Chapter 7 will be used to review progress against the rehabilitation objectives and completion criteria for each rehabilitation domain. A closure checklist will be developed for future inspections targeted at assessing progress against the completion criteria.

9. Rehabilitation research, modelling, and trials

9.1 Current rehabilitation research, modelling, and trials

There are no rehabilitation trials currently being undertaken.

9.2 Future rehabilitation research, modelling, and trials

Very little active rehabilitation of land disturbed by mining has been undertaken in the past at Excelsior Quarry. Consequently, limited information is available on the direct implementation of different rehabilitation techniques and their performance at the site.

In the next three years, a rehabilitation trial will be undertaken to establish native vegetation in the onsite overburden dump and other areas disturbed by mining activities. Two rehabilitation trial plots will be established, one at the No. 2 Overburden Emplacement area (including the former LKD storage area) and one at the old graveyard area (disturbed by former waste storage). Both plots will be 5m x 15m and aim to trial rehabilitation methodologies for factors such as substrate formation, soil amelioration, plant species selection and establishment techniques. Native tree and shrub trial plots would be established to determine how well native vegetation can establish across former mining areas and identify more successful species.

In addition to the above, an inspection by an ecologist will be undertaken to gather information on native vegetation surrounding the Excelsior mine, establish analogue sites for future reference, and advise on preferred plant species mix for rehabilitation areas to be returned to native vegetation.

Aspects of rehabilitation that will be subject to trials and monitoring include:

Plant selection

- Trialling different cover crop applications and various native and improved pasture species, in consultation with an ecologist; and
- Incorporating native trees and shrubs at low density to improve habitat value and observing performance of different species and planting/maintenance techniques.

Timing

- The timing of seed sowing can profoundly influence seedling emergence. Seeding should be undertaken optimally immediately following surface preparation before a surface crust forms; and
- Sowing during different seasons and under different climatic conditions.

Seeding technique

- Use of alternative vegetation establishment techniques, including seeding with conventional farm equipment, hydromulching and tube stock planting; and
- Methods for supplementary planting as required

Regular monitoring of rehabilitation success will be critical to ensure that lessons learned are transferred forward to future rehabilitation works. The rehabilitation monitoring framework is outlined in the Rehabilitation Management Plan.

10. Intervention and adaptive management

Outcomes of the annual rehabilitation surveys are to be recorded, and any mitigation actions identified as part of the inspection, are to be entered into a recording system for implementation. Where necessary, rehabilitation procedures will be amended to continually improve rehabilitation standards.

The monitoring program will:

- Compare results against rehabilitation objectives and targets
- Identify possible trends and continuous improvement
- Link to records of rehabilitation to determine causes and explain results
- Assess effectiveness of environmental controls implemented
- Where required, identify modifications required for the monitoring program, rehabilitation practices or areas requiring research
- Compare flora species present against original seed mix and/or reference sites and/ or RVC
- Assess vegetation health; and
- Assess vegetation structure (e.g., upper, mid, and lower storey).

The following aspects are potential threats to rehabilitation and the closure objectives at Excelsior Quarry:

- Weed infestation
- Grazing of rehabilitation areas by stock
- Revegetation failure
- Soil quality and erosion
- Pests (land and aquatic) infestation
- Fire
- Flood events
- Drought; and
- Uncontrolled land use from trespassers.

A Trigger Action Response Plan (TARP) will be implemented to respond in the event of poor rehabilitation performance or unexpected result. The TARP (Refer to Appendix B) identifies a range of triggers for a number of key rehabilitation activities and provides an action response. The trigger values reflect a trend or change which may affect rehabilitation outcomes and the ability to meet completion criteria for successful rehabilitation.

11. Review, revision, and implementation

This Rehabilitation Management Plan (RMP) will be reviewed annually during the preparation of the Annual Rehabilitation Report.

Prior to rehabilitation works commencing on the site, this document will be reviewed to ensure that works are consistent with the RMP and within current approvals. Where works are not consistent, a discussion will take place with the Resource Regulator to determine if an amendment or new RMP is required.

The Operations Manager for Graymont (NSW) Pty Ltd Australia's Excelsior Quarry is responsible for implementing the RMP.

In addition to the above, the RMP must be amended in accordance with Schedule 8A of the Mining Regulation 2016, as follows:

> ***11 Amendment of rehabilitation management plans***
>
> *The holder of a mining lease must amend the rehabilitation management plan for the mining lease as follows—*
>
> *a) to substitute the proposed version of a rehabilitation outcome document with the version approved by the Secretary—within 30 days after the document is approved,*
>
> *b) as a consequence of an amendment made under clause 14 to a rehabilitation outcome document—within 30 days after the amendment is made,*
>
> *c) to reflect any changes to the risk control measures in the prepared plan that are identified in a rehabilitation risk assessment—as soon as practicable after the rehabilitation risk assessment is conducted, whenever given a written direction to do so by the Secretary—in accordance with the direction.*

Rapid Rehabilitation Survey Form

Appendix A

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Graymont Excelsior– Rapid Rehabilitation Survey Form

Rehab Site ID:	**Rehab stage:**
Date/time of inspection:	**Inspection by:**

Description of status	Existing or emerging risks	Remedial actions, timeframe and responsibility
Vegetation cover (eg type, health, abundance, structure):		
Weeds (presence, type, severity):		
Surface water and drainage (diversion, stability, lining integrity, discharge stability):		
Erosion (soil exposure %, presence, type and severity of erosion (eg sheet, rill and gully):		
Additional notes / key issues / progress since last inspection:		

TARP triggered?

TARP Item	Risk Level	Recommended Mitigation

Photo record:	

Trigger Action Response Plan (TARP)

Appendix B

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Domain	Major Threats to Rehabilitation	Trigger Levels	Response Actions	Evidence Response Action is Adequate	Measures to Address any Identified Impacts	How Impacts will be Monitored	Trigger Reporting to Government
TARP 1 – Water Management Area							
1.1	Infestation from weeds into water management areas	Evidence of noxious weeds	Engage specialist contractor; Coordinate with Local Council programs	Reduction in number of weed plants present Increase number of native species present	Minimisation of weed species (mono-culture) and introduction of varied species Ensure exposed/disturbed ground is kept to a minimum and re-vegetated as soon as practical	Environmental inspections	References: Biosecurity Act 2015; NSW DPI Noxious Weed Declarations
1.2	Flood events	Damage to drainage infrastructure; loss of sediment	Review drainage plans and conduct repairs Install temporary sediment control devices	Control of sediment loss; drainage areas stable	Repair to impacted areas as soon as practical Measure water quality in void	Water monitoring Environmental inspections	Report any events in Annual Environmental Management Report
TARP 2 – Rehabilitation Area							
2.1	Infestation of weeds	Weed Management Plan indicates trigger and response levels	Implement weed control measures in line with the weed management plan; Review effectiveness of plan and update for continuous improvement	Reduction in number of weed plants present Increase number of native species present	Minimisation of weed species (mono-culture) and introduction of varied species Ensure exposed/disturbed ground is kept to a minimum and re-vegetated as soon as practical	Environmental inspections Weed inspections	References: Biosecurity Act 2015; NSW DPI Noxious Weed Declarations

Domain	Major Threats to Rehabilitation	Trigger Levels	Response Actions	Evidence Response Action is Adequate	Measures to Address any Identified Impacts	How Impacts will be Monitored	Trigger Reporting to Government
2.2	Infestation from pests (land and aquatic)	Environmental damage from invasive species	Dependant on species: Trapping; Poisoning; and/or controlled Shooting. Coordinate with local Council programs	Reduction in additional environmental damage	Repair earthworks; Vegetation of disturbed or exposed areas	Environmental Monitoring program	References: NSW DPI
2.3	Fire	Loss of vegetation – leading to sediment loss from exposed areas	Install temporary sediment control devices	Control of sediment loss	Repair to impacted areas as soon as practical Measure water quality in dam	Water monitoring Environmental inspections	Report any events in Annual Environmental Management Report
2.4	Flood events	Loss of sediment, damage to drainage infrastructure and batters	Install temporary sediment control devices	Control of sediment loss	Repair to impacted areas as soon as practical Measure water quality in dam	Water monitoring Environmental inspections	Report any events in Annual Environmental Management Report
2.5	Drought	Loss of vegetation – leading to sediment loss from exposed areas	Install temporary erosion and sediment control devices. Consider watering program	Control of erosion and sediment loss. Vegetation growth improved	Repair to impacted areas as soon as practical Measure water quality in dam	Water monitoring Environmental inspections	Report any events in Annual Environmental Management Report
2.6	Uncontrolled land use from land owners or trespassers	Damage to roads or access points that leads to environmental damage	Increase security on leases	Decrease in erosion and sediment loss at roadways	Maintain access points (locks and gates) Maintain roadways	Environmental inspections	Report any events in Annual Environmental Management Report
2.7	Nutrient deficiency	Lack of vegetation establishment	Soil investigation and further amelioration	Visual indices	Re-application or appropriate fertilizers	Site inspection	Report any adverse findings in Annual

Domain	Major Threats to Rehabilitation	Trigger Levels	Response Actions	Evidence Response Action is Adequate	Measures to Address any Identified Impacts	How Impacts will be Monitored	Trigger Reporting to Government
							Environmental Management Report
2.8	Stability	Mass movement of batters or other rehabilitation areas	Geotechnical assessment. Reshaping Review of safety requirements	No injury or loss of equipment from geotechnical failure	Monitor geotechnical movements (actual or potential)	Geotechnical assessments	Report any events in Annual Environmental Management Report
2.9	Unidentified Contamination	Evidence discovered of previously unidentified contamination	Engage specialist contractor	Contamination remediated and site fit for intended final land use	Remediate site to remove contamination risk	Contamination reporting (soil and water testing)	Report any events in Annual Environmental Management Report
2.10	Grazing of revegetation areas by stock or wildlife	Evidence of vegetation damage from grazing	Implement pest controls. Install suitable fencing or other measures to exclude stock	Visual indication that controls are effective in reducing grazing pressure	Review revegetation plans and undertake supplementary planting where necessary	Revegetation inspections Site inspections	Report any events in Annual Environmental Management Report
TARP 3 – Final Void							
3.1	Evidence of unauthorised access, eg vandalism, cutting of fences, waste dumping. Human and stock safety compromised	Unauthorised Access to unsafe pit areas	Restore security measures	Security measures repaired and access prevented	Check and repair all security measures, fences and gates Increase monitoring of unauthorised access	Monitoring by landowner	Report any events in Annual Environmental Management Report

Domain	Major Threats to Rehabilitation	Trigger Levels	Response Actions	Evidence Response Action is Adequate	Measures to Address any Identified Impacts	How Impacts will be Monitored	Trigger Reporting to Government
3.2	Substantial slumping or mass failure of pit high walls and/or benches	Instability compromises existing safety measures	Review safety measures Engage geotechnical / mining expert	Landform assessed as stable	Restore security measures	Monitoring by landowner	Report any events in Annual Environmental Management Report
3.3	Infestation from weeds	Evidence of noxious weed	Incorporate in Weed Management Plan Coordinate with Local Council programs	Reduction in number of weed plants present	Minimisation of weed species	Environmental inspections	References: Biosecurity Act 2015; NSW DPI Noxious Weed Declarations
3.4	Infestation from pests (land and aquatic)	Environmental damage from invasive species	Dependant on species: Trapping; Poisoning; and/or controlled Shooting. Coordinate with local Council programs	Reduction in the environmental damage	Repair earthworks; Repair security measures	Environmental Monitoring program	References: NSW DPI
3.5	High pH and cemented LKD impacting plant growth	Inability of plants to succeed on the overburden/LDK emplacement area	Cap emplacement area with sufficient overburden material for plant growth	Primary succession of backfilled pit by vegetation	Repair earthworks; measure sediment pH at varied depths to identify closest LKD layer	Environmental inspections	Report any events in Annual Environmental Management Report

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Rehabilitation Management Plan (RMP) Excelsior Limestone Mine

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