pitt&sherry

GRAYMONT

Rehabilitation Management Plan (RMP)

Galong Limestone Mine

Date

8 August 2022

Rev00

Contents

List of figures

List of tables

Appendices

Appendix A — Rapid Rehabilitation Survey Form

Appendix B — Trigger Action Response Plan (TARP)

Prepared by — Carolay Guarin		**Date —** 8 August 2022
Reviewed & Authorised by — Adam Bishop		**Date —** 8 August 2022
Graymont accepted by — Wayne Trenning		**Date —** 8 August 2022

Revision History

Rev No.	Description	Prepared by	Reviewed by	Authorised by	Date
A	First Draft	CG	AB	AB	02/08/2022
C	Second Draft	CG	AB	AB	05/08/2022
00	Final report	CG	AB	AB	08/08/2022

Summary table

Galong Limestone Mine – Rehabilitation Management Plan (RMP)	
Name of Mine	Galong Limestone Mine
Rehabilitation Management Plan Commencement Date	1 August 2022
Revision Date	
Version number	00
Mining Authorisations (Lease/Licence No.)	Mining Leases ML 1496 & ML 1745
Name of lease holder(s)	Graymont (NSW) Pty Ltd
Name and Contact Details of the Mine Manager (or equivalent)	Wayne Trenning Lot 342 Eubindal Road, Galong, NSW 2585. 02 6380 5107
Name and Contact Details of Environmental Representative	Nicole Sullivan Lot 342 Eubindal Road, Galong, NSW 2585. 02 6380 5107

1. Introduction

1.1 History of operations

The Galong Mine operates under the Development Consent T03-025 granted in 2003 for an existing limestone mine operations and related processing and dispatch activities. The consent has been modified four times with the modification T2003-025 MOD4 approved on 27 March 2019. Galong mine also holds an Environmental Protection Licence (EPL) 4660 issued by the NSW Environmental Protection Authority EPA.

Mining of the Galong Limestone deposit commenced in the early 1900s, and the extracted limestone was fired in kilns to produce burnt lime for the building and agricultural industries until approximately 1962. In the late 1960s, campaign mining commenced at the site to produce limestone for road construction.

In June 1993, Barnu Pty Ltd permanently began mining the site and established a crushing and grinding facility on the site of, and extending from, the former open cut. In 1995, Barnu Pty Ltd acquired Placer's interest in the mine and constructed two additional mills over the next five years. As a result, production from the mine increased from approximately 30,000 tonnes between 1994 and 1995 to around 140,000 tonnes during 2000 and 2001.

In 2003 approval was granted for Development Consent DA-317-7-2003-i to construct and operate a limestone kiln to produce 150,000 tpa of quicklime. However, in October 2011, due to the closure of No 6 blast furnace at Pt Kembla, the processing plant, kiln and quarry were placed into "Care & Maintenance", and only Ag & Fine ground limestone and road base products were produced from the Galong site for a number of years.

In May 2012, Sibelco Australia Limited purchased the Galong site from Barnu Pty Ltd, including the processing plant, kiln & limestone quarry, and has recommenced active mining operations. In August 2019, Graymont (NSW) Pty Ltd acquired most of Sibelco Australia's lime operations, including the Galong site. The lime kiln and hydrator are now back in operation.

Rehabilitation of mining related disturbed areas is planned to commence this year. There has been environmental rehabilitation works along the project boundary including tree planting and regeneration. These rehabilitation works are considered to be in the ecosystem and land use development phase.

1.2 Current development consents, leases and licences

The current development consent, leases, licences, and other approvals are shown in Table 1 and Table 2

Table 1: Current Consents, leases, and licences

Documentation, Condition or Licence	Approval Authority	Status
DA-317-7-2003-i	Department of Infrastructure and Planning	Consent for construction and operation of a limestone kiln to produce 150,000 tpa quicklime. Consent incorporates the General Terms of Approval relating to the Part 3A Permit under the Rivers and Foreshores Improvements Act 1948. Approval: 11/12/2003.
DA T2003-025 (as modified)	Hilltops Council	Consent allows mining, processing and storage of limestone product and its transportation from the site for a period of forty years. Approval: 17/12/2003. Expiry date: 16/12/2043.
CD 04-2017	Hilltops Council	Complying development consent issued for the upgrade of processing equipment including hydrator plant and building, material transfer equipment, storage silos, bagging plant feed silo, packaging equipment and weighbridge. Approval: 11/09/17 Expiry date 11/09/2022.
DA 2020/0208	Hilltops Council	For construction and operation of a solar energy system (1MW). Approval: 11/12/2021.
ML 1496	Department of Primary Industries – Mineral Resources	Approval: 16/11/2001. Expiry date: 15/11/2043.
ML 1745	Department of Primary Industries – Mineral Resources	Approval: 16/10/2016. Expiry date: 16/10/2037.
Environmental Protection Licence 4660	EPA	EPL No. 4660. The license was transferred from Sibelco to Graymont on 1st August 2019. Anniversary date is 17th of May.

Table 2: Additional licences

Documentation, Condition or Licence	Approval Authority	Status
U6-95313/07/0	Work Cover	LPG Tanks Cert. Of Plant Item Registration - Investigation into licensing and compliance requirements. Completed in satisfaction of DoP requirements dated 6th March 2010
WAL 30047	NSW Office of Water	Water Access Licence (WAL) - This water access licence is held by Graymont (NSW) Pty Ltd.
40CA411901	NSW Office of Water	Water Supply Works & Water Use Approval - This approval relates to WAL 30047 and is attached to Lot 101 and 102, DP1083781
WAL 28703	NSW Office of Water	Water Access Licence (WAL) - This water access licence is held by Graymont (NSW) Pty Ltd.
40CA411879	NSW Office of Water	Water Supply Works & Water Use Approval - This approval relates to WAL 28703 and is attached to Lot 102, DP1083781

1.3 Land ownership and land use

The Galong Limestone Mine operates within Mining Leases ML 1496 and ML 1745, covering an area of 160 ha and 43.43 ha, respectively. ML 1496 extends over Lot 102 in DP1083781, Lot 139 in DP753593 and Lot 2 in DP1175189, Parish of Bobbara, whilst ML 1745 extends over Lot 102 in DP1083781 and Lot 2 in DP1175189. Graymont (NSW) Pty Ltd is the owner of the land. ML 1496 and ML 1745 are located approximately 20 km southwest of Boorowa and 40 km northwest of Yass. ML 1496 also incorporates about one kilometre of Crown Road reserve.

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

Table 3: Land ownership and land use

Lease	Lot/DP	Land Owner	Area (ha)	Historic land use	Current land use	Proposed final land use	Land Tenure	ML Expiry Date
ML 1496	Lot 102 DP1083781 Lot 2 DP1175189 Lot 139 DP 753593	Graymont (NSW) Pty Ltd	160	Mining since 1900	Mining, processing and storage of limestone product	low intensity grazing and low density woodland	Freehold	15/11/2043
ML 1745	Lot 102 in DP1083781 Lot 2 in DP1175189	Graymont (NSW) Pty Ltd	43.43	Grazing	Stockpiling of various products, mineral processing, and waste emplacement	low intensity grazing and low density woodland	Freehold	21/10/2037

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 contained in Development Consent T03-025 (as modified), and EIS 536/03.

Table 4: Regulatory requirements

Development Consent Condition No.	Condition	Affect Post Mining	Application	Addressed in RMP
5	Environmental Protection The applicant shall implement all practicable measures to prevent and/or minimise harm to the environment that may result from the construction, operation or decommissioning of the development	Before mining	Lot 102 DP1083781	This obligation is not part of the scope of this document.
24	Heritage The applicant shall protect the historic well which is located on the western side of Limestone Creek.	Before and during mining operations	Lot 102 DP1083781	This obligation is not part of the scope of this document.
25	Native vegetation The applicant is to ensure that there will be no native vegetation clearing outside the mining exclusion areas without consent	Before and during mining operations	Lot 102 DP1083781	This obligation is not part of the scope of this document.
53	Flora and Fauna The applicant shall immediately commence a native species replanting program in the areas that will not be disturbed by the mine expansion so that replacement trees will have 40 years of growth and understorey plants will be established by the time the mine ceases.	Before and during mining operations	Buffer Zones	Part 6 – section 6.2 addresses this obligation.
EIS 536/03	Condition	Affect Post Mining	Application	Addressed in RMP
4.3	Flora Disturbance of native vegetation would be minimised and essentially restricted to operational areas. No vegetation would be removed from along Limestone Creek. A revegetation program would be undertaken around the perimeter of the Project site to re-establish and increase the population of native tree and shrub species removed by the development.	Before and during mining operations	Entire Site	Part 6 – section 6.2 addresses this obligation.

Development Consent Condition No.	Condition	Affect Post Mining	Application	Addressed in RMP
4.4	Fauna Native vegetation disturbance would be minimised to operational areas to ensure that potential wildlife habitat is retained. An ongoing pest control program will be undertaken as part of overall management of the Project site and would focus on removing rabbits, feral cats and foxes.	Before and during mining operations	Entire Site	Part 6 – section 6.2 addresses this obligation.

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 ML 1496 and ML 1745.

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
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

Condition No.	Condition Title	Summary	How Addressed
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

The final landform is described in the Environmental Impact Statement (1995) prepared for Development Application DA 25-2003 as the creation of convex/concave slopes to blend with the surrounding natural landform. The final land use is defined in the previous approved MOP as low-intensity grazing and low-density woodland. No further options assessment has been undertaken.

2.3 Final land use statement

The defined final land use is to be low intensity grazing and woodland, which is compatible with the surrounding land use being agriculture including livestock production and cropping.

2.4 Final land use and mining domains

2.4.1 Final land use domains

The principal objective for the rehabilitation of Galong Limestone Mine 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 6.

Table 6: Final land use domains

Final land use domain	Galong Limestone Mine
Infrastructure (includes built infrastructure proposed to be retained for future use)	Some roads will be retained for property access, bushfire fighting and rehabilitation monitoring purposes. The lime kilns and associated lime processing equipment would be retained in operation upon closure of mining activities at Galong.
Agricultural – grazing	Land suitable for low insensitive grazing. The benches of the landform will be battered back to 18-degree slopes with 5m back sloping berms and stabilised using appropriate grasses and native plantings to form a safe and stable landform.
Native ecosystem	Land unsuited to grazing and to be restored to native vegetation post mining. The maximum slopes of the landform would be 18° with mid-slope benches to achieve long term geotechnical stability and minimise erosion.
Water Management	Dams retained as clean water dams for final land use (stock watering and/or agricultural use)
Final Void	The final pit void will naturally fill with water and is estimated to fill to a nominal level of 495 RL. The terminal faces above the final water level in the pit void will be battered back to 37-degree slopes and stabilised using appropriate grasses and native plantings to form a safe and stable landform for livestock to access water storage in the pit void.

2.4.2 Mining domains

Table 7 lists and provide information regarding the current mining domains at GLM site.

Table 7: Mining domains

Mining domain	Galong Limestone Mine
Infrastructure area	The infrastructure area domain includes main access road and internal gravel roads, stockpiles areas, laydown area, electrical substation, mobile crushing area, offices and workshops, and vehicle parking.
Active mining (Open pit void)	An open cut mine covering an area of approximate 2.38 ha. Extraction of raw limestone from the open-cut mine involving conventional drill & blast methods, in-pit mobile crushing and screening equipment and a combination of mobile and fixed plant crushing. The mine currently incorporates one overburden 10m bench and three 12m internal ore production benches extending approximately 50m below original topography / natural surface level.
Water management area	There are four water management areas within the mining site. Surface water runoff is diverted by earthen bunds and drainage channels to northern or southern sediment settlement dams.
Overburden emplacement area	The active overburden and low-grade materials emplacement is located to the west of the open-cut mine.
Beneficiation facility	This mining domain contains the following assets: • TPD Kiln • Screen House & crusher • Live Kiln infeed Stockpile & Conveyors • Dispatch weighbridges • Product storage Silos • Mill Shed including fine grind mill circuits • Fire suppression & Pumping Station • Bag House / Bagged Product Storage • Coal Shed • Coal Mill Room • Mill infeed hopper and conveyors • Mill feed silo • Hydration Plant (including hydration bath, • feed silo) • Material transfer equipment (bucket elevators • conveyors, pneumatic transfer); and • Bagging plant feed silo and packaging equipment.

3. Rehabilitation risk assessment

The Galong 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 8), consequence table (

Table 9) and risk matrix (Table 10). The method and findings of the risk assessment process is presented as a risk register in Table 11.

Table 8: 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 9: 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 10: 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 11: 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; and • Use water trucks on open areas to regularly combat spreading of fugitive material including dust and other contaminants.	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; and • Ameliorate materials to overcome physical or chemical constraints.	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 and imported cover materials leading to pollution or poor growing conditions, and poor rehabilitation outcomes.	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 • Ameliorate materials to overcome physical or chemical constraints.	2	3	9	• Obtain specialist advice and develop appropriate remedial actions which could include removal or amelioration of unsuitable materials.
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. • Obtain specialist advice in designing the final landform.	2	3	9	• Amend rehabilitation and closure plans as required based on expert advice.

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
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	3	13	• 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 inability to achieve closure criteria.	3	3	13	• 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	3	9	• 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.
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.

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
4.2	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	3	9	• 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	3	13	• 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	3	9	• 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	3	13	• 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.	2	3	9	• 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.	3	3	13	• 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.	2	3	9	• 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 and/or quality assurance during landform construction.	4	3	17	• Suitable grass mix will be used for short term stabilization • Environmental specific site inspection undertaken; and • Installation of earthen bund walls and drainage channels to direct surface water runoff to pit void.	2	3	9	• Implement repairs as necessary • Obtain specialist advice and review final landform goals. Amend rehabilitation and closure plans as required
4.7	Water availability	Water availability inadequate for landform preparation	2	3	9	• 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.	1	3	6	• Employ specialist contractor to undertake repairs ensuring; and • Obtain supplemental water to utilise during earthworks and landscape forming.

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
4.8	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	3	9	• 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, eg *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 growing media. Testing to evaluate material physical and chemical properties. Specialist advice should be sought (e.g. agronomist or soil scientist).	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.
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	2	4	14	• Work with local suppliers to obtain and import topsoil to address any deficit; and

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
						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; and • 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. • Seek specialist advice on growth media development where site resources are inadequate or perform poorly				• 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	3	17	• 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.	2	3	9	• 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	• Monitor for predation and consider alternative seasons for plant establishment if significant predation occurs	1	2	3	• Increase seeding rates and re-sow as necessary if seed predation is an issue.
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.

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
6.4	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.	4	4	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.	2	3	9	• 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 • Scheduled weed control program as per weed survey	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
						• Weed survey developed in consultation with Southern Slopes Noxious Plants Authority • Scheduled pest control program in consultation with NSW Local Land Services; and • Controlled grazing will be undertaken, in consultation with the landholder, to preserve Limestone Creek Regeneration area.				
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 (eg 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. • Where revegetation progress is deemed inadequate, investigate the failing to understand the likely causes and develop remedial actions to address deficiencies;	2	3	9	• Seek specialist advice. Ensure that learnings are factored into future rehabilitation planning, processes and monitoring.
6.13	Geotechnical risks	Geotechnical instability of rehabilitated landforms, eg slumping or cracking compromises ability to achieve the desired final landform	3	3	13	• 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	3	9	• 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	3	13	• Assess erosion and sedimentation status as part of routine rehabilitation monitoring. Factors to record include erosion extent, type (sheet, rill, gully) and severity • Review causes of erosion and implement targeted remedial measures that address the root cause. • 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 • Promptly repair and reshape eroded areas to prevent acceleration and progression of the erosion problem; • 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	3	9	• Seek specialist advice to address major erosion issues such as failing waterways, dam spillways or batter drop structures • 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 tunneling or tension cracking of dam embankments.	3	3	13	• 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	3	17	• 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	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.
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

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
										• 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 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.
7.4	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	3	13	• 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	3	9	• 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	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
						• 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).				
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 and rehabilitation completion criteria

The 2003 Galong Mine Expansion EIS and the previous approved MOP provide the following long-term objectives for site rehabilitation.

- To provide a low maintenance, geotechnical safe and stable landform from the open cut mine, which will become water storage for agricultural purposes
- To blend any created landforms outside the open cut mine with the surrounding landforms, as far as practicable; and
- To rehabilitate areas of disturbance with species consistent with the proposed low intensity grazing and woodland end land use.

These general objectives have been used to develop proposed rehabilitation objectives and rehabilitation completion criteria for each mining domain and final land use domain, as outlined in Table 12.

In due course, completion criteria will be further refined during preparation of a detailed decommissioning procedure. However, the general completion criteria and closure standards are as follows:

- Landform shaped to maximize sheet flow and minimize concentration of flow
- Batters shaped equivalent to surrounding slope gradients in the general surrounding area
- Soil surface cover > 70%
- Absence of gullies > 300mm wide or deep or gullies stable
- Water quality in retention structures commensurate with background water quality
- Agricultural land capability classification: mix of the following:
    - Class 3 – Grazing land or land well suited to pasture improvement
    - Class 4 – Land suitable for grazing but not for cultivation; and
    - Class 5 – Land unsuitable for agriculture, or at best suited only to light grazing.

Table 12: Rehabilitation objectives and rehabilitation completion criteria

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
Infrastructure	Infrastructure area Beneficiation Facility	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
Agricultural Grazing	Infrastructure 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 • 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.
		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
		Landform establishment: Landform constructed to be safe, stable, non-polluting and support the final land use.	Indicators of landform suitability include: • Slopes grade • Landforms shape • Indicators of dispersive soil • Soil surface condition • Indicators of erosion • Drainage condition • Compacted hardstands are ripped and rehabilitated	• 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 • Absence of tunnel erosion intake or outlets points • Landform shaped to maximise sheet flow with minimal concentration of flows.	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 light grazing activities.	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	Rehabilitation monitoring reports.
		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 recommended by a rehabilitation specialist.	Rates as identified in Closure and Rehabilitation Management Plan 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 are functional and tending towards analogue sites.	Rapid rehabilitation survey indicates soil, landform and vegetation systems tending towards analogue sites including for the following indicators: • Vegetation cover (eg 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 • Erosion risks (soil exposure %, presence, type and severity of erosion e.g. sheet, rill and gully); and • Land and Soil Capability or Agricultural Land Classification criteria.	Indicative completion criteria are: • 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.
		Grassland and pasture establishment: Grassland and pasture are on trajectory to forming a self-sustaining ecosystem.	Approved grassland and pasture species mix is sown at the specified sowing rate as recommended by agronomist or rehabilitation specialist.	Rehabilitation monitoring reports to confirm that >80% of the total projected foliage cover is achieved.	• Seed mix specification • Rehabilitation monitoring report; and • Photos.

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
			Pasture species established at desired mix and density.	Indicative completion criteria are: • Pasture quantity (herbage mass/ plant height) 700-2900kg DM/ha • Pasture quality meets criteria specified by an agronomist; and • Species composition as approved by agronomist.	• Rehabilitation monitoring reports; and • Agronomist report.
		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.
		Weeds do not pose a risk to rehabilitated land function or biodiversity values.	Annual weed inspections confirm the absence of declared noxious weeds.	No declared noxious weeds present on site.	Annual weed inspection.
		Management measures are 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 fire-breaks and fire-fighting access documented in a Bushfire Management Plan.	Bushfire controls implemented.	Bushfire management plan Acknowledgement of RFS.

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
Native Ecosystem	Infrastructure area Active mining area	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 agricultural activities.	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 are functional and tending towards analogue sites.	Rapid rehabilitation survey indicates soil, landform and vegetation systems tending towards analogue sites including for the following indicators: • Vegetation cover (eg 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 eg 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 fire-breaks 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
Water Management Area	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.

Final Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
		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
		Water licensing: Structures that take or hold water are licensed if required subject to relevant legislation (eg 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 Land Use Domain	Mining Domain	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
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 495RL will be battered back to <37° and be made stable.	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
		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.

4.2 Rehabilitation objectives and rehabilitation completion criteria – stakeholder consultation

The Environmental Impact Assessment (EIS) (2003) prepared for the Development Consent DA 03-025 stated that the final landform for the mine site would aim to blend with the surrounding natural landform. A consultation process was undertaken during the preparation of the EIS.

Consultation did not raise specific issues related to rehabilitation and final land use.

5. Final landform and rehabilitation plan

5.1 Final landform and rehabilitation plan – electronic copy

The Figures 2 and 5 are an electronic copy of the final landform and rehabilitation plan submitted to the mine rehabilitation portal.

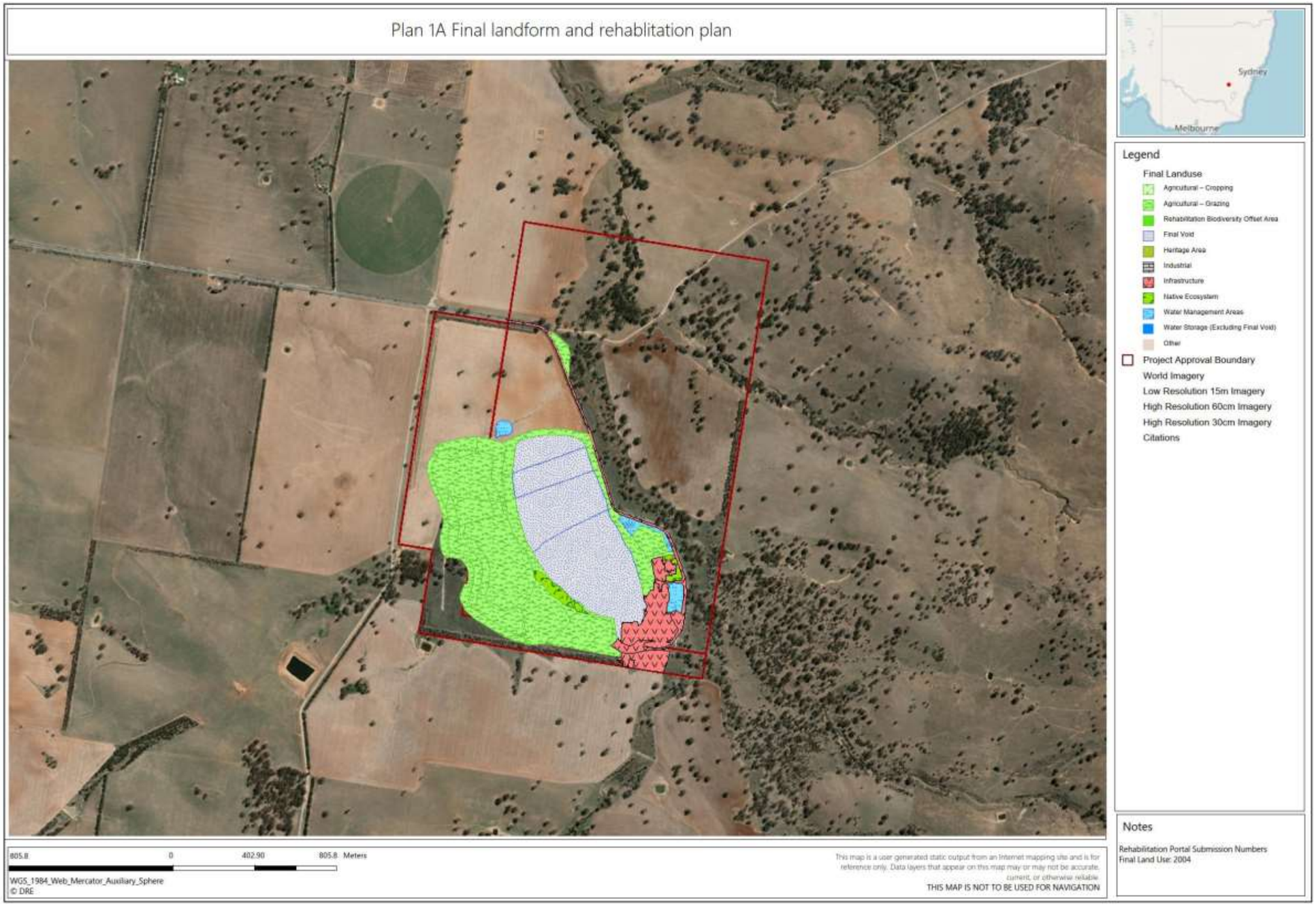

Figure 2 Final landform and rehabilitation plan - Final land use

Figure 3 landform and rehabilitation plan - Final land use (Large scale)

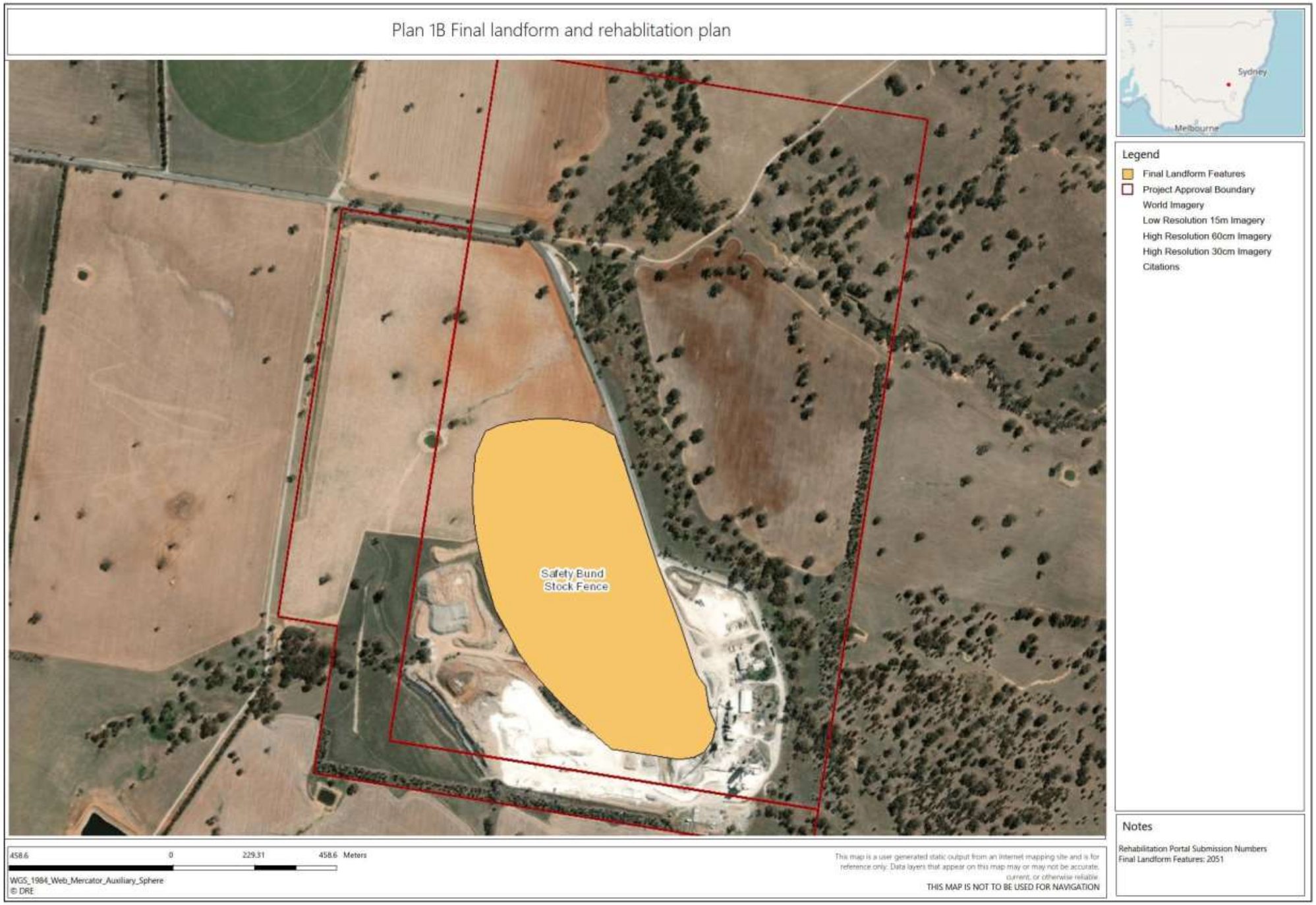

Figure 4 Final landform and rehabilitation plan - Final landform features (Large scale)

Figure 5 Final landform and rehabilitation plan - Final landform contours (Large scale)

6. Rehabilitation implementation

6.1 Life of mine rehabilitation schedule

Rehabilitation of mining related disturbed areas are planned to commence this year. However, most of the rehabilitation activities will take place between 2045 and 2055, refer from Figure 6 to Figure 12.

Environmental rehabilitation works along the project boundary have included tree planting and regeneration as part of a compensatory tree planting commitment in the EIS. These rehabilitation works take the form of perimeter visual screens and are in the ecosystem and land use development phase.

Table 13 presents a summary of the environmental rehabilitation work along the project boundary. These rehabilitation works started in 2000, and it is intended to achieve rehabilitation completion by 2030.

Table 13: Environmental rehabilitation works

Environmental Rehabilitation areas (Internal ID)	Area description	Final land use	Rehabilitation Phase	Rehabilitation Commencement
R1	Northern boundary tree planting	Native Ecosystem	Ecosystem and Land Use Development	2000
R2	Western boundary tree planting	Native Ecosystem	Ecosystem and Land Use Development	2000
R3	Southern boundary tree planting	Native Ecosystem	Ecosystem and Land Use Development	2000
R4	Eastern boundary tree planting	Native Ecosystem	Ecosystem and Land Use Development	2000
R5	Southern boundary tree planting	Native Ecosystem	Ecosystem and Land Use Development	2000
R6	South eastern boundary tree planting	Native Ecosystem	Ecosystem and Land Use Development	2000

Table 14 summarises the proposed rehabilitation commencement and final land use for the overburden emplacement areas. Overburden will be transported and placed progressively to achieve the final landform with graded batters.

The initial focus for rehabilitation is on the western batters first bench (OEA_F1 to OEA_F4) to begin the landform establishment phase between 2022 and 2025. These areas are expected to achieve rehabilitation completion by 2040. Rehabilitation works for the other overburden areas will begin from 2030 to 2047, and it is expected to reach rehabilitation completion by 2050.

Table 14: Overburden emplacement domain

Overburden emplacement (Internal ID)	Area description	Final land use	Rehabilitation Phase	Rehabilitation Commencement
OEA_F1	Western Batter 1	Agriculture - Grazing	Active Mining Area	2022
OEA_F2	Western Batter 2	Agriculture - Grazing	Active Mining Area	2023
OEA_F3	Western Batter 3	Agriculture - Grazing	Active Mining Area	2024
OEA_P1	Western Batter 4	Agriculture - Grazing	Active Mining Area	2025
OEA_P2	Western Batter 5	Agriculture - Grazing	Active Mining Area	2030
OEA_P3	Northern Batter 6	Agriculture - Grazing	Active Mining Area	2035
OEA_P4	Second level batter	Agriculture - Grazing	Active Mining Area	2037
OEA_P5	Overburden Dump Top	Agriculture - Grazing	Active Mining Area	2042
OEA_P6	Overburden Dump Top	Agriculture - Grazing	Active Mining Area	2047

Table 15 summarises the proposed rehabilitation commencement and final land use for the water management areas (dams). WMA1 and WMA2 will have a water management final land use. Rehabilitation works will ensure that the dams are safe for stock watering and/or agricultural use and that the water quality is safe for the same use. WMA3 is an existing small farm dam at the northern end of the emplacement area. It will be consumed by filling for the overburden enmplacement. The dam will be relocated to provide a sediment and water quality function and is designated WMA4.

Table 15: Water management domain

Water Management Area (Internal ID)	Area description	Final land use	Rehabilitation Phase	Rehabilitation Commencement
WMA1	Eastern stockpile sediment ponds	Water Management Area	Active Mining Area	2055
WMA2	Plant sediment ponds	Water Management Area	Active Mining Area	2055
WMA3	North topsoil sediment ponds	Agriculture - Grazing	Active Mining Area	2055
WMA4	North topsoil sediment ponds v2	Water Management Area	Active Mining Area	2055

Table 16 summarises all infrastructure areas, including the proposed final land use and rehabilitation commencement. It is intended to start most of rehabilitation works in the infrastructure area domain in 2050 at the end of mine life.

Table 16: Infrastructure area domain

Infrastructure Area (Internal ID)	Area description	Final land use	Rehabilitation Phase	Rehabilitation Commencement
IA1	Stockpiles - crushed rock	Agriculture - Grazing	Active Mining Area	2050
IA2	Laydown area	Agriculture - Grazing	Active Mining Area	2050
IA3	Electrical Substation	Agriculture - Grazing	Active Mining Area	2050
IA4	Offices and Work Shops	Agriculture - Grazing	Active Mining Area	2050
IA5	Area around offices	Native Ecosystem	Active Mining Area	2050
IA6	Stockpiles - crushed rock	Agriculture - Grazing	Active Mining Area	2050
IA7	Stockpiles - crushed rock	Agriculture - Grazing	Active Mining Area	2050
IA9	Road - gravel	Agriculture - Grazing	Active Mining Area	2050
IA10	Road - gravel	Agriculture - Grazing	Active Mining Area	2050
IA11	Road - gravel	Infrastructure	Active Mining Area	2050
IA12	Road - gravel	Agriculture - Grazing	Active Mining Area	2050
IA13-1	Vehicle Parking	Infrastructure	Active Mining Area	2055
IA13-2	Vehicle Parking	Agriculture - Grazing	Active Mining Area	2050
IA14	Vehicle Parking	Agriculture - Grazing	Active Mining Area	2050
IA15	Road Access to site	Infrastructure	Active Mining Area	2055
IA16	Mobile Crushing Area	Agriculture - Grazing	Active Mining Area	2050
IA17	Road - gravel	Agriculture - Grazing	Active Mining Area	2050

Table 17 shows that the beneficiation facility domain will commence rehabilitation works by the year 2050.

Table 17: Beneficiation facility domain

Beneficiation Facility (Internal ID)	Area description	Final land use	Rehabilitation Phase	Rehabilitation Commencement
BE1	Crushing plant area	Infrastructure	Active Mining Area	2050

Table 18 present a summary of the mining area sections for which a final void is the proposed final land use. It is indented to commence rehabilitation works by 2055.

Table 18: Active mining area domain

Active Mining Area (Internal ID)	Area description	Final land use	Rehabilitation Phase	Rehabilitation Commencement
AMA1	South Main Pit	Final Void	Active Mining Area	2055
AMA2	North Expansion 1	Final Void	Active Mining Area	2055
AMA3	Western Expansion	Final Void	Active Mining Area	2055
AMA4	North Expansion 2	Final Void	Active Mining Area	2055

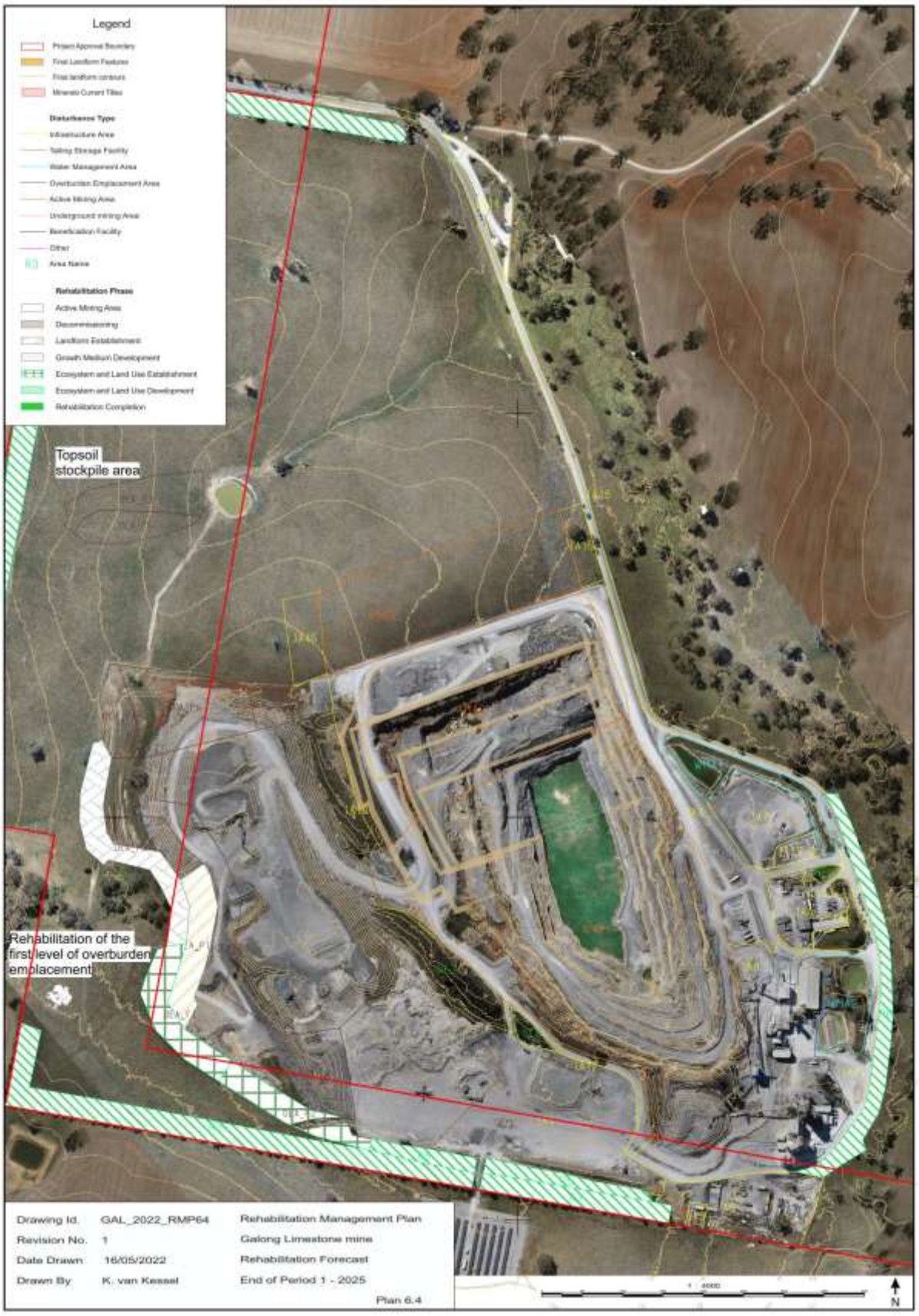

Figure 6: Rehabilitation by the end of 2025

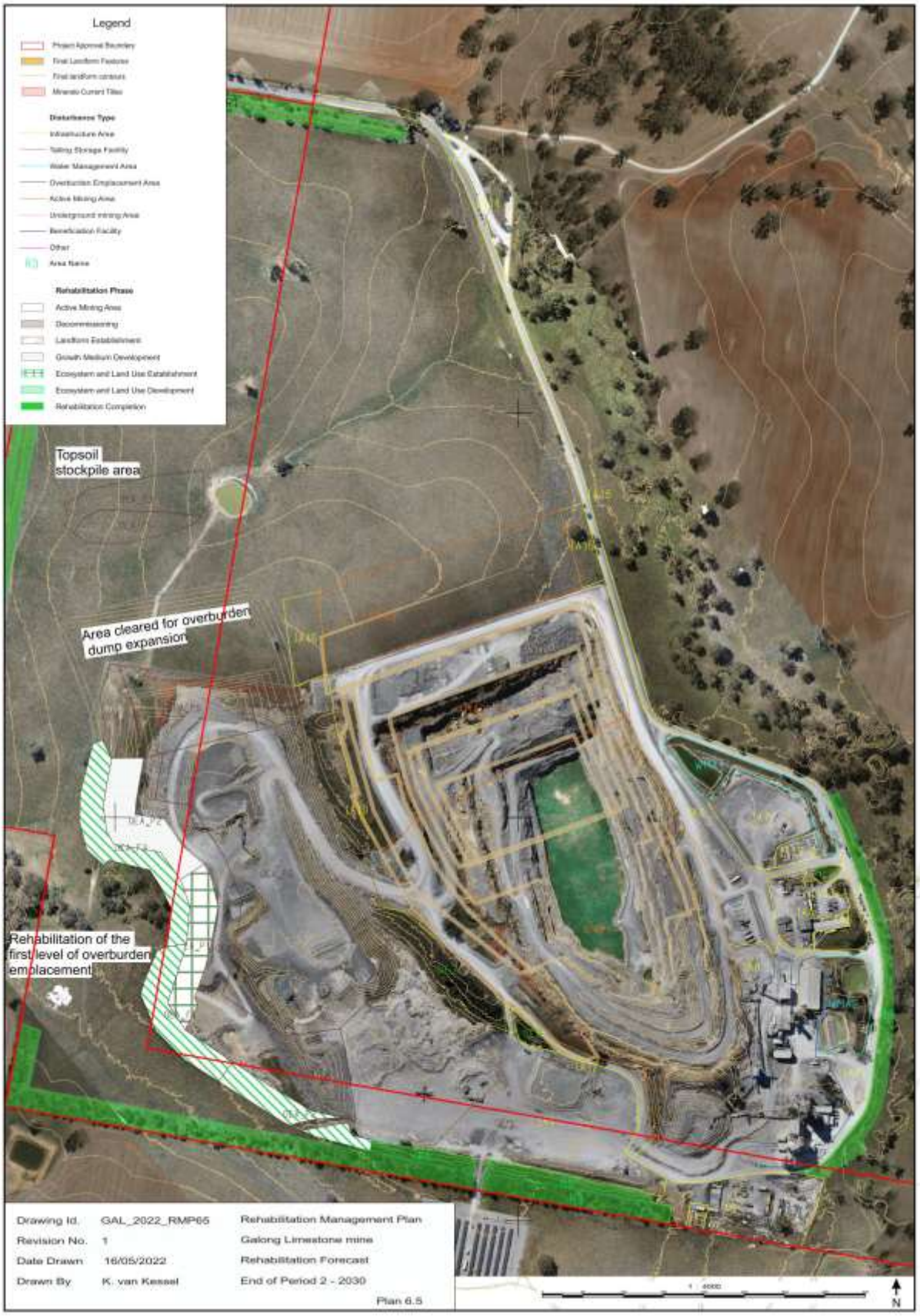

Figure 7: Rehabilitation by the end of 2030

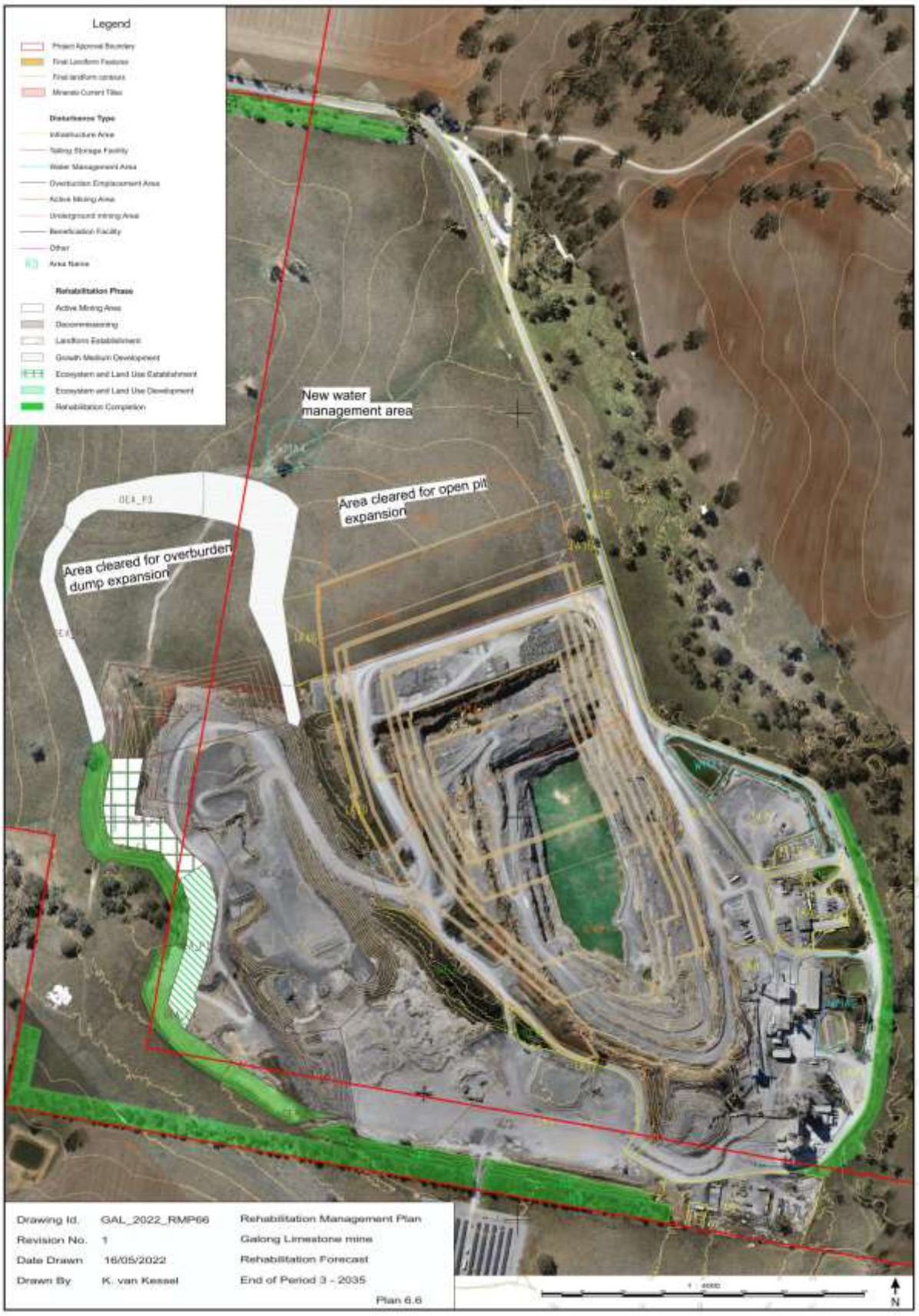

Figure 8: Rehabilitation by the end of 2035

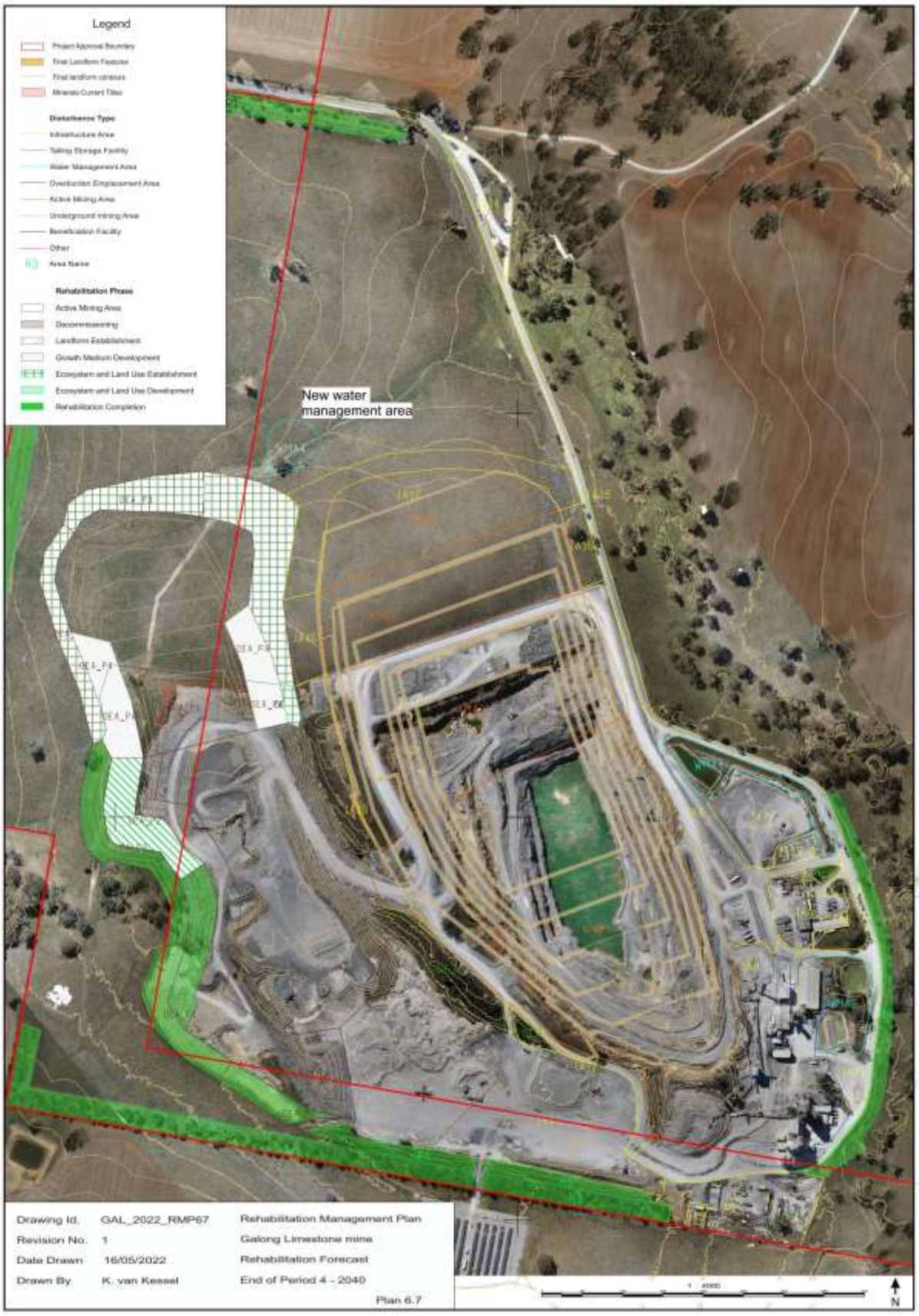

Figure 9: Rehabilitation by the end of 2040

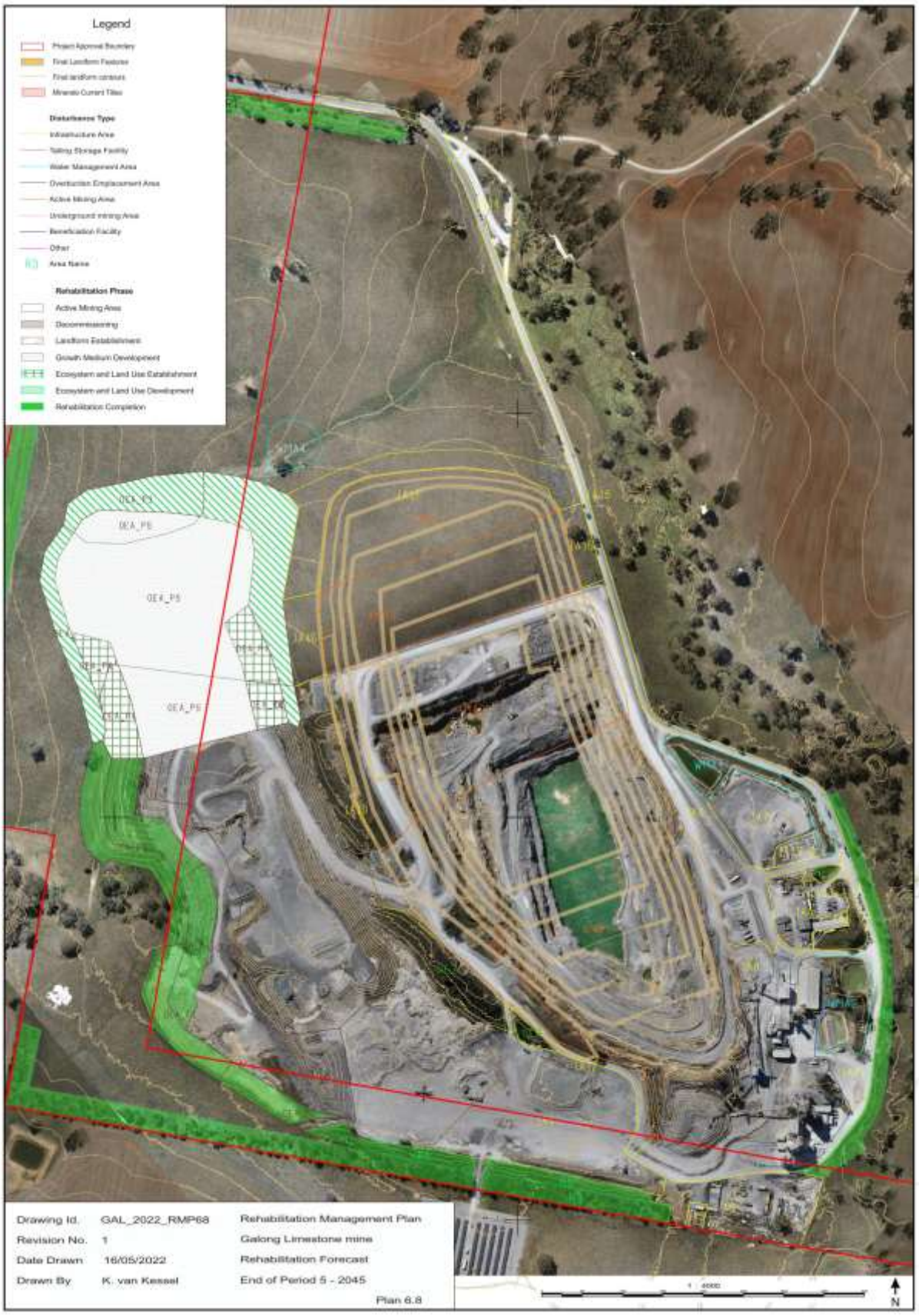

Figure 10: Rehabilitation by the end of 2045

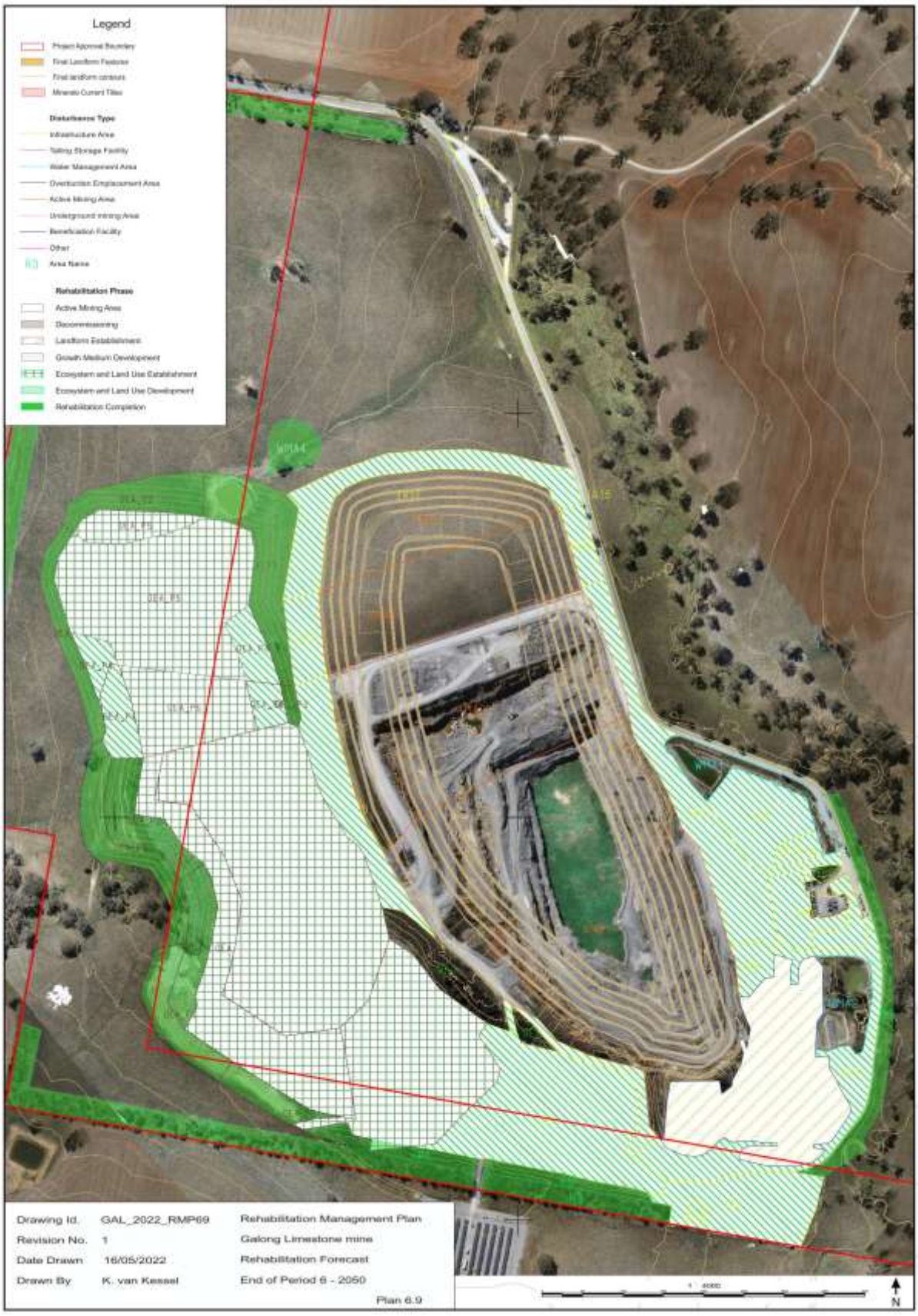

Figure 11: Rehabilitation by the end of 2050

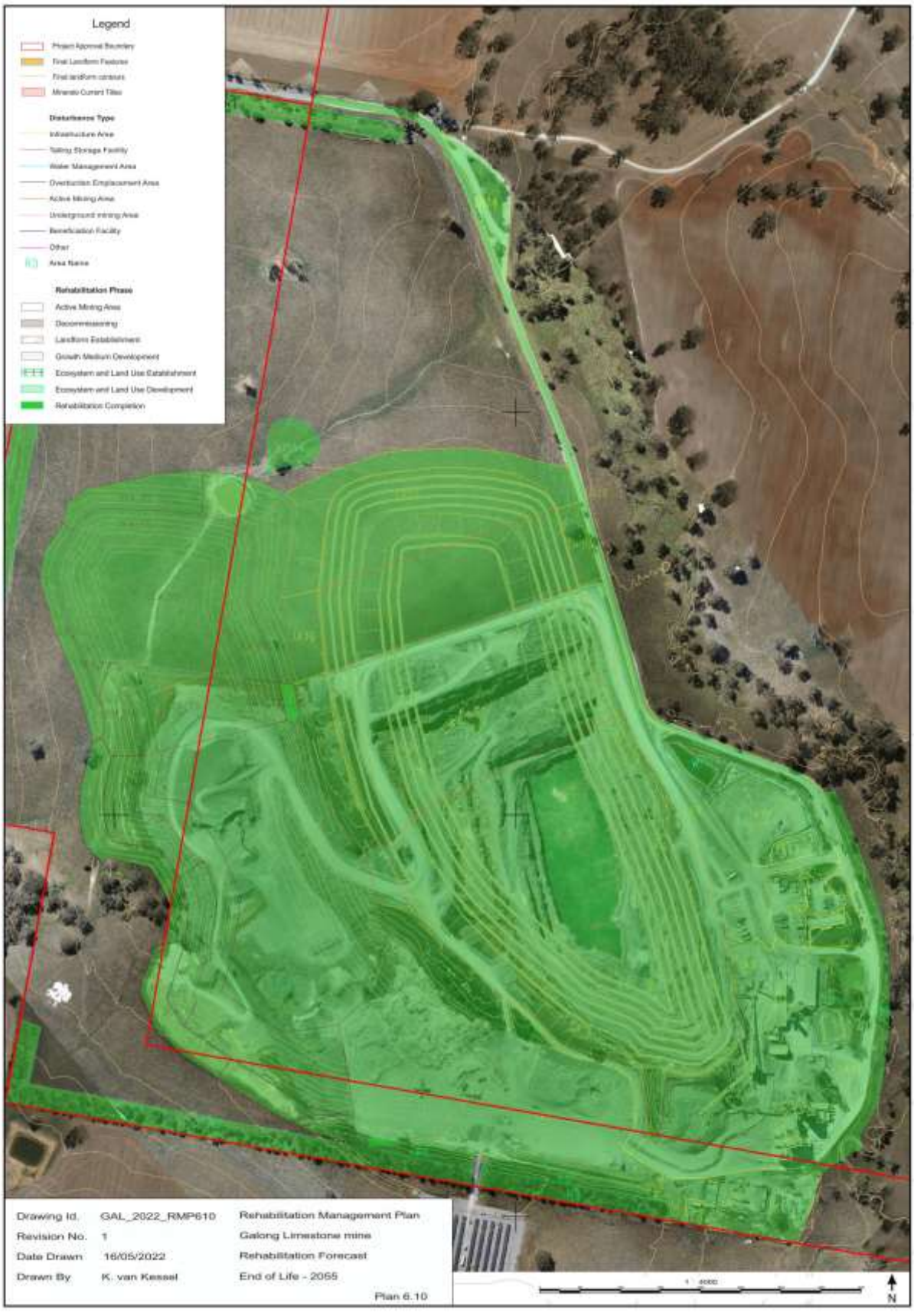

Figure 12: Rehabilitation by the end of 2055

6.2 Phases of rehabilitation and general methodologies

6.2.1 Active mining

The active mining phase for the Galong site 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
- Development of a register of contaminated sites and waste landfill sites areas and where they are located; and
- Development of strategies for disposal or stockpiling of processing waste materials from the hydration and calcination to avoid poor rehabilitation outcomes.

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

A soil study undertaken by Geoff Cunningham Natural Resource Consultants in 2003 confirmed the existence of two characteristic Soil Mapping Units (SMU's) at the Galong site.

Soil Mapping Unit 1 are soils primarily influenced by the underlying limestone and located on the site's slopes and crest. The soils are approximately 250-330 cm deep with a surface loose to firm, sometimes hard setting and the presence of stone is absent. The topsoil texture is characterised as silty clay loam, sandy clay loam, and fine sandy clay loam soil about 11-20cm deep. pH 6.5 to 8.0. roots are common, but stones and gravel are absent. The colour is brown to reddish-brown. The subsoil has three to four layers recorded within the excavations, with light, medium to heavy clay. pH 6.0 to 7.5, sometimes 9.0. The subsoil is well structured with a red/brown colour at the upper horizons and red, yellow, grey and brown mottled colours at the lower horizons.

Soil Mapping Unit 2 soils are not primarily influenced by the underlying limestone and are located at broad drainage depressions. The soils are more than 260 to 350 cm deep as excavated, but bedrock was not encountered in any pit. The surface is loose to hard setting, and stones are absent. The topsoil texture is characterised as sandy to clay loam around 40cm deep, consisting of three layers. pH 5.5 to 7.0. Some surfaces are hydrophobic. Colours can vary from brown, light brown, pinkish grey to yellowish-brown. The subsoil is up to 310cm deep with a number of layers. pH 5.5 to 8.5, sometimes 9.0 and 9.5. Texture can vary from light to medium to heavy clay.

Topsoil and subsoil would be stripped and stockpiled separately in accordance with the stripping suitability recommendations as follows:

- 0-15cm layer: suitable for topsoiling and contains valuable seed and organic matter, nutrient reserves and has other favourable attributes. This allow it to be stripped and stockpiled as topsoil provided suitable stripping and storage methods and employed
- 15-50cm layer: This material is suitable for use as subsoil. This allows it to be stripped and stockpiled as subsoil provided suitable stripping and storage methods are used; and
- >50cm layer: This material could be stripped to 100cm depth and stockpiled if additional subsoil material is required. If additional subsoil material is not required, the soil material below the base of layer 2 should be used to cover emplaced rock and to form a soil base over which Layers 1 and 2 can be spread during the rehabilitation process.

Flora

The native ecology within the mining lease area is heavily disturbed by grazing, cropping and a long history of agricultural land use.

A site survey was undertaken on 14 January 2014 to identify flora species and communities. The existing environment surrounding the disrurbed mine site consists of the following three distinct communities:

- Mine rehabilitation corridor
- White Box Yellow Box Blakely's Red Gum Woodland; and
- Exotic grassland.

The mine rehabilitation corridor community is located along the southern boundary of the mining lease area. The corridor is approximately 20 metres wide and consists of native planted trees (Eucalyptus sp. and Acacia sp.), limited understory and introduced grasses. Individual remnant eucalypt trees are also located within the corridor, as well as a dead stag with several large hollows.

White Box Yellow Box Blakely's Red Gum Woodland (listed endangered ecological community (NSW Threatened Species Conservation Act 1995) and critically endangered ecological community (Commonwealth Environment Protection and Biodiversity Conservation Act 1999)) is located in the south-western corner of the mining lease (Corkery, 2003). The community appears to extend to the west as a stand of remnant trees along the drainage line, and is considered to also consist of White Box Yellow Box Blakely's Red Gum Woodland.

Fauna

The native ecology within the mining lease area has been heavily disturbed due to vegetation clearing and habitat removal. Currently the management of fauna includes the following measures:

- Where practicable, tree removal would be undertaken during late summer or autumn to minimise impacts upon spring-nesting birds and bats
- Where practicable, dam removal to be undertaken during dry periods
- Inspect dam for fauna habitation prior to dewatering; and
- Relocate fauna identified during pre-works inspection.

Rock/overburden emplacement

There are three waste streams on site:

- Waste Rock – Material mined that is not of suitable quality to be processed in the calcination process and is in excess of crushed road base requirements
- Process Waste – Material that is rejected in the calcination or hydration process – basically un-calcined feed material, i.e. limestone; and
- Baghouse Dust – Material that is collected in the dust collector that exhausts the kilns – a combination of limestone and waste component of oil combustion.

Waste Management

Waste disposal and material handling includes the following:

- Waste oils and greases are stored within a designated waste oil containment area whilst awaiting collection for disposal
- In the event of a spill/leak, hydrocarbon spill clean-up stations are located across the site
- Coal feed is stored inside an enclosed building with sealed and bunded floors and waste dust with residual coal ash is stored in a silo, prior to placement in a designated area on the overburden/waste emplacement area
- Quicklime and hydrated lime products are contained in designated silos
- No explosives are stored on-site
- General waste is contained in designated waste bins and regularly removed from site
- Redundant equipment is stored in designated lay down area for subsequent parts removal or dispatch to scrap metal recyclers; and
- Mobile plant and equipment maintained regularly according to service schedule and undertaken in a designated area.

Geology and geochemistry

No issues relating to geology or geochemistry have been identified for the Galong site.

Material prone to spontaneous combustion

Coal is stored and milled on-site to fuel the lime kiln. All coal is stored internally and contained within the process. A nitrogen inerting system is installed to prevent instantaneous combustion of the coal throughout the milling process. Following the cessation of mining, any remaining coal will be removed from site and disposed of at an appropriately licensed premises.

Material prone to generating acid mine drainage

No issues relating to the generation of acid mine drainage have been identified at the Galong site.

Ore beneficiation waste management (reject and tailings disposal)

No tailings or residues are produced at the Galong mine. As a by-product, the kiln produces unburnt limestone (core) and baghouse dust, and the hydration plants produce Nibs. By-products are placed on the waste emplacement. Mineral processing is carried out in three main sections with each section producing a number of final products.

Erosion and sediment control

Final landforms will be contoured to drain into the pit void and will be revegetated to meet rehabilitation objectives outlined in Chapter 4 of this document. The existing three sediment basins will remain in place until objectives have been achieved. Other sediment control measures which may be required during rehabilitation include installation of earthen bund walls and sediment fencing.

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
- 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 for the Galong site.

Management of potential cultural and heritage issues

The proposed management measures to mitigate impacts to Aboriginal or European heritage areas as a result of activities conducted within the mine lease are:

- Heritage items previously identified and classified are fenced off and the site preserved; and
- In the event that any heritage item is encountered during earthworks, works within 50 metres of the find will cease immediately. Further assessment of the site will be undertaken, and heritage stakeholders will be contacted.

Therefore, impacts to heritage areas have been assessed as low risk. Monitoring to be undertaken to determine effectiveness of these measures includes fencing of heritage areas will be visually inspected to ensure they are intact.

Exploration activities

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 the Galong site 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:

- 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 plant, kilns and associated processing plants
- 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

A number of areas of potential hydrocarbon contamination exist within the Beneficiation Facility domain and the Open Pit void domain at the Galong site. These areas are associated with the processing plant, maintenance workshops, and refuelling and include storage of diesel and hydraulic/lubricating oils and waste oils.

Current management practices include bunded storage, regular inspections and spill response procedures, including spill kits available and training on their use. Past inspections have indicated that hydrocarbon contamination is not a significant issue. Ongoing inspections will continue to monitor contamination.

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 on line hazardous substance databases 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 within the Galong mine. There will not be construction of any new water management infrastructure, but maintenance of the existing ones, including:

- Removal of excess sediment from the surface dams for future use by the subsequent land owner
- 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 has been approved to remain as part of the final landform as stated in the EIS prepared for the DA 03-25 Therefore, 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: reject 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 Galong site 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

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
- As each of the benches on the western and southern edge of the mine void is completed, they would be covered with approximately 1m to 2m of clean overburden and planted with endemic species to the area. only those benches on terminal mine faces would be treated in the manner; and
- If the mine closes in 2043 and the dewatering program ceases, the water level in the void would gradually rise to approximately 490m AHD to form a lake.

Construction of creek/river diversion works

The final landform for the Galong site 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.

The estimated topsoil quantity available in stockpiles is 30,000 m3 (as at July 2022).

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 the Galong Mine revegetation rehabilitation activities will be undertaking for the Agricultural – Grazing and Native Vegetation final land use domains. 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 noxious weeds within the Galong site will be controlled in accordance with the requirements of the Biosecurity Act 2015. A Weed Management Plan has been implemented. The continued monitoring of noxious 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 Galong site is not affected by mine subsidence.

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.

The Galong site 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 (tubestock/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 the identified analogue sites for native vegetation and Agricultural – Grazing, refer to section 8.1.1 and 8.1.2. These analogue sites are representative of the local region landform and land uses.

An inspection by an ecologist or agronomist will be undertaken to determine all species including weed species within the analogue sites and information recorded in a future update of this RMP. The analogue sites were selected in previous years.

Figure 13 shows the tow analogue sites.

Figure 13: Analogue sites

8.1.1 Analogue site – native ecosystem

Table 19 provide a description of the analogue sites for native vegetation final land use. This site is in an undisturbed area in the Western side of overburden/waste emplacement area within the mine.

Table 19: Analogue site 1

Site	Analogue site 1 (AS1) 
Coordinates	34°35'19.72"S, 148°35'51.90"E
Ecosystem Type	Disturbed remanent native vegetation - White Box Yellow Box Blakely's Red Gum Woodland
Canopy / Emergent	Exotic grassland
Shrub / Understory Layer	Limited understory
Ground / Herb Layer	Introduced grasses
Landform	Low gradient simple slope
Soil Conditions	A soil survey was no undertaken for this analogue site.

8.1.2 Analogue site – agricultural grazing

Table 20 provides a description of the analogue sites for agricultural – grazing final land use. This site is located at the western side of Limestone creek within the mining site.

Table 20: Analogue site 2

Site	Analogue site 2 (AS2) 
Coordinates	34.352799 S, 148.362832 E
Ecosystem Type	Grazed pasture/Grassland
Canopy / Emergent	Canopy cover is around 10 to 15 %. Tree species to be confirmed by a future survey.
Shrub / Understory Layer	A mixed pasture of native and improved pasture species.
Ground / Herb Layer	100% groundcover dominated by pasture grasses (yet to be identified). Less than 5% surface rock. Floristic details to be provided in a future survey.
Fallen timber (Coarse woody debris)	None visible at the time of inspection.
Landform	Lower slope with a gradient of approximately 5%
Soil Conditions	No visible erosion on site. A soil survey was no undertaken for this analogue site.

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 Graymont Galong 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 undertaken. Rehabilitation monitoring of existing rehabilitation areas will be undertaken in accordance with Chapter 8 .

9.2 Future rehabilitation research, modelling and trials

Very little active rehabilitation of land disturbed by mining has been undertaken in the past at Galong. Consequently, there is limited information available on direct implementation of different rehabilitation techniques and their performance at the site. With significant rehabilitation being scheduled over the next three years there is a good opportunity to trial different techniques, assess performance and use these learnings in planning future rehabilitation.

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 agronomist; 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 tubestock 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).

In the event that rehabilitation failure has occurred, further investigation to establish a cause and appropriate remediation strategy(s) will be undertaken. Amongst the issues to consider include the following:

- Nutrient availability
- pH, salinity and metal toxicity
- Shallow root depth
- Other soil limitations
- Insect attack
- Lack of N-fixing legumes
- Lack of organisms involved in litter breakdown (e.g. fungal fruiting bodies) and nutrient cycling (e.g. puff balls)
- Excessive grazing
- Predation
- Evidence of drought effects or storm damage
- Poor soil preparation; and
- Weed competition.

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 Galong site 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

pitt&sherry

Graymont Galong – 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

pitt&sherry

Trigger Action Response Plan (TARP)

Response to Undesired Changes to Rehabilitation affecting Outcome Criteria, or Operational Activities that may affect Rehabilitation Outcomes

Rehabilitation or Operational Activity	Green	Amber	Red	Recommended monitoring/measuring method
Changes in legislation or approval conditions requiring a review of rehabilitation criteria or change to land use or ecological community.	New legislation or approval conditions implemented, but no impact on current closure land use or criteria.	New legislation or approval conditions implemented that requires changes to land-use or closure criteria e.g. slope gradients or vegetation community. Required changes are such that they can be implemented without requiring major redesign work.	New legislation or approval conditions implemented that requires major changes to land-use or closure criteria, requiring major changes to rehabilitation design or processes, as well as impacting on closure costs.	
	Trigger Action Response to above Triggers			
	No actions required except to continue to review any legislation changes that may affect rehabilitation methodology. If best practice is implemented in rehabilitation works, then the risk of legislation changes impacting on planned or implemented rehabilitation will be reduced.	Mine Closure and Rehabilitation Plan and closure criteria are to be updated in accordance with updated legislation. Impact on closure costing to be determined. Rehabilitation designs are to be updated as required.	Closure criteria and final land use options are to be reviewed and the rehabilitation processes developed to achieve the required changes, specialist advice may be required. Closure costing and rehabilitation plans and manuals are to be updated.	Triggers for legislation changes will include new approval conditions, updates of mining lease conditions, and Rehabilitation Management Plans.
Slope Gradients	Slope gradient ≤ 2% of design gradient	Slope gradient ≤ 4% of design gradient	Slope gradient ≤ 6% of design gradient	Formal survey is undertaken as part of the waste dump inspection process prior to the placement of subsoil and topsoil.
	Trigger Action Response to above Triggers			
	Do nothing, progress rehabilitation works.	Instigate investigation into the cause of the non-conformance—re-grade slopes and survey.	Instigate investigation into cause of the non-conformance. Determine and implement a methodology to return the slope to design gradients.	
Topsoil in rehab domains	Suitable topsoil quality and depth	Insufficient topsoil depth for establishment species	Insufficient suitable growing media	Topsoil testing from stored stockpiles prior to re-spreading.
	Trigger Action Response to above Triggers			
	Proceed with seeding and/or planting	Apply ameliorated subsoil	Test mine spoil for agronomic and erosion parameters. Amend spoil for rehabilitation purposes. Investigate why topsoil and subsoil resources were insufficient.	
Seed Establishment Rate	>75% of seeds germinate	<75% and > 40% of seeds germinate	<40% of seeds germinate	
	Trigger Action Response to above Triggers			
	Check soil moisture and weather forecast & determine if irrigation may be required. Review seed purity and germination certificates.	Visual investigation for potential causes of low establishment rate, including (soil moisture & temperature, ground conditions). Record any findings. Follow up seeding to improve plant densities is to be considered. Undertake spot topsoil and subsoil samples to determine if soil parameters fall within required ranges.	Detailed investigation into cause of poor seed establishment. Investigations may include: Detailed soil sampling program including soil moisture levels, analysis of meteorological conditions, follow seed germination testing with original seed used, germination trials in seed trays using field growth medium. Use an ecology specialist to investigate potential causes.	Measured as number of grass seedlings that have emerged ±2 weeks after expected germination. Establishment rate is determined by counting the number of seedlings in a few (1-3) square meter plots with comparison to sowing density
Germination testing	>80% of seeds germinate	65% - 80%of seeds germinate	<40% of seeds germinate	
	Trigger Action Response to above Triggers			
	No action to be taken and germination rate is to be used to determine seeding rate.	Cause of poor germination rate is to be investigated. The investigation is to include growth vigor, as vigor may also be affected. Actions to improve germination using various seed preparation methodologies may be required and the germination trials redone. Seeding rate in kg/ha is to be adjusted to compensate for poor germination. An alternate option is to include other seed which has a higher germination rate if available.	Investigation of flow germination rate to be undertaken. Actions to improve germination using various seed preparation methodologies may be required and the germination trials Seeding rate in kg/ha is to be adjusted to compensate for poor germination. Other seed may need to be sourced.	
Weeds and invader species across the mining lease or within the seed mix	No identified weeds	Suspect weed and/or invader species identified	Weeds and/or invader species identified in seed mix. Infestation of weeds in concentrated areas of the Mining Lease.	
	Trigger Action Response to above Triggers			
	No action to be taken.	Monitoring to continue, treatment and management to occur as per the weed management plan. Seed mix to be visually screened and additional testing undertaken to confirm if free of weeds.	Seed mix is not to be used on any mine rehabilitation areas. Monitoring frequency to increase, frequency of treatment and management measures to increase beyond the normal requirements of the weed management plan.	Weeds and invader species will be identified during germination trials. Identification can also be done by visual inspection of the seed mix prior to use. History and sourcing of the seeds acts as a prompt to investigate the seed mix.
Waste outside the design criteria (shape, height, and volume)	Waste Dump is in accordance with design criteria.	Waste Dump area has reached the design capacity.	Dumping has extended beyond the design criteria (shape, height, and volume).	
	Trigger Action Response to above Triggers			
	No action to be taken.	Discuss situation with mine planning and put procedures in place to prevent toe of dump extending beyond the design criteria. Design criteria can be reviewed and amended if the dump rehabilitation design is feasible within the	Dumping should be put on hold until the situation has been reviewed and a workable rehabilitation plan implemented for the change in dumping strategy. If no alternative design plan is feasible then all dumping should be halted. An investigation into the cause of the change of the dumping plan is to be investigated	Identification of design exceeds is through: Visual inspection, from mining and survey reports, comparison of aerial photography with surface elevations to original design criteria.
Rehabilitation Monitoring				
Geotechnical instability	No identified signs of instability or mass movement.	Signs of minor settlement (drop in elevation), appearance of hairline ground cracks.	Signs of significant movement: Appearance of enlarged ground cracks (+2mm wide), visible vertical or horizontal movement	
	Trigger Action Response to above Triggers			
	No action to be taken.	Depth and extent of cracking to be recorded and 3 monthly monitoring undertaken. Survey stations for movement may be required. Minor settlement can be infilled with topsoil and reseeded if required.	Geotechnical investigation of the ground movement is to be undertaken together with an assessment of damage to rehabilitation landform or drainage structure.	Ground movement will be identified as part of infield rehabilitation monitoring (ecological or annual walk around, remote sensing initiative to identify erosion would also assist in the identification of ground movement)
Erosion and loss of topsoil/growth medium	No rill erosion evident	Rills and inter rill erosion present	Gullies and tunnels present	
	Trigger Action Response to above Triggers			
	No action is to be taken other than continued monitoring following rainfall.	Erosion to be treated. Surface hydrology reviewed and landform is to be reviewed, in conjunction with surface vegetation and historic weather. Application of organic cover or soil polymer may be considered.	Full investigation is to be undertaken with a review of all design parameters with particularly emphasis on overland from the top of the dump, drainage design and amelioration of dispersive spoil and soils. Expert advice on remediation to be sought.	Visual assessment for rill, inter rill, gully and tunnel erosion inlet and outlet points.
Vegetation Predation	Minimal amount of vegetation predation by browsers and grazers (kangaroos, rabbits, livestock, insects), no effect on plant growth.	Pest animal species presence and density increased in annual monitoring events.	Significant numbers of pest animals causing widespread damage to rehabilitation	
	Trigger Action Response to above Triggers			
	No action to be taken other than continued monitoring.	Consult with LHPA to recommend and implement appropriate pest animal control campaign. Implement controls to prevent access depending on the species eating the vegetation.	Consult with LHPA to recommend and implement appropriate pest animal control campaign. Engage a suitably qualified specialist to prepare a site management plan and implement recommendations such as augmenting pest animal exclusion fencing and re-vegetation.	Identified as part of annual ecological and walk around monitoring.
Monitoring shows Vegetation communities have unsatisfactory progress towards achieving the set closure criteria, or there is degradation in the vegetation community function.	Vegetation community progression still within expected progression.	Vegetation community progression is not in accordance with expected progression.	Vegetation community progression has started to deteriorate.	
	Trigger Action Response to above Triggers			
	No action to be taken other than continued monitoring.	Progression analysis is to be reviewed with meteorological data and compared with analogue sites. Causes of the poor vegetation progression to be determined and remedial action developed.	Specialist advice is to be sought to determine root cause of deterioration and a remedial action plan developed. Learning's from the process are to be fed back into the rehabilitation plan as part of continuous improvement.	Determined by annual rehabilitation monitoring and analysis of monitoring data.
Destructive environmental event (Fire, drought, flood, insect plague)	Minimal effect/damage to vegetation and landform including drainage structures, vegetation able to fully recover without intervention.	Minor damage to ecological plant structures and or landform and stability structures. Minimal remediation required e.g. reseeding or fertilizer application.	Significant damage to ecological plant structures and or landform and stability structures requiring remediation and redesign.	
	Trigger Action Response to above Triggers			
	No action to be taken other than continued monitoring.	Remediation action plan to be implemented by site personnel.	Detailed assessment to be undertaken by rehabilitation specialist and remedial action plan developed. Preventative measure to be investigated and any recommendations are to be implemented and the rehabilitation manual updated as required.	Identified as part of post event inspection and monitoring by rehabilitation specialist as required.
Batters and Benches	Batters and benches show no signs of erosion and vegetation layer is self-sustaining and improving over time.	Batters and benches show signs of sediment filling, minor erosion, stressed vegetation covering or minor water ponding.	Batters and benches are filled with sediment, signs of water overtopping or substantial erosion (undercutting, tunnel erosion, riling along bank), or bare vegetation patches.	
	Trigger Action Response to above Triggers			
	No action to be taken other than continued monitoring.	Monitoring frequency is to be increased, and observations undertaken during rainfall events that cause runoff. Local repair work is to be undertaken as needed. Diversion banks or contour drains to be removed and sheet flow conditions re-established if 70% soil surface (vegetation) cover exists below diversion bank.	Investigation into the cause of the diversion bank failure is to be initiated, and the design parameters reviewed, with learning fed back into the rehabilitation processes. Investigation initiated by erosion specialist if ground movement (slumping, settlement) is suspected. Grade survey of the diversion bank may be required if drainage is an issue. After initial causes have been identified a remediation plan is to be implemented. Diversion banks to be removed and sheet flow conditions re-established if 70% soil surface cover (vegetation) exists below diversion bank.	Monitoring is primarily undertaken during informal and formal rehabilitation inspections (walk around) and monitoring. Site incident reporting and ad-hoc environmental inspections ay also identify issues.
Slope Drains & Drops structures	Slope drains show no signs of erosion and any geofabrics/membranes or rock lining are in place as constructed with no signs of movement. No signs of water overtopping or undercutting of drain structure.	Slope drains starting to show signs of channel bed erosion, minor undercutting of drain inlets, erosion riling of drain sidewalls, drain outlets show signs of erosion. Topsoil/growth medium shows signs of accelerated erosion and degradation of any vegetation covering.	Severe channel erosion, damage to any geofabric linings or stone lining, overtopping of drain sidewalls, loss of topsoil/growth medium, tunnel erosion under or beside the structure.	Monitoring is primarily undertaken during informal and formal rehabilitation inspections (walk around) and monitoring. Site incident reporting and ad-hoc environmental inspections ay also identify issues.
	Trigger Action Response to above Triggers			
	No action to be taken other than continued monitoring.	Monitoring frequency is to be increased, and observations undertaken during rainfall events causing runoff. Local repair work is to be undertaken as needed. Diversion banks and slope drains to be removed and rehabilitation once 70% vegetative soil surface cover has been achieved and sheet flow conditions can be established.	Investigation into the cause of the failure is to be initiated, and the design parameters reviewed, with learning fed back into the rehabilitation design. Erosion specialist investigation initiated if tunnel erosion is suspected. Grade survey of the diversion bank may be required if drainage is an issue. After initial causes have been identified a remediation plan is to be implemented. Diversion banks and slope drains to be removed and rehabilitation once 70% vegetative soil surface cover has been achieved and sheet flow conditions can be established.	
Dams and water retained in final void.	Water quality monitoring shows water meets requirements for final land use.	Water quality monitoring shows water quality parameters are outside the requirements for final land use.	Water quality monitoring shows that water quality parameters are continually significantly outside the requirements for final land use.	Water quality monitoring
	Trigger Action Response to above Triggers			
	No action to be taken other than continued monitoring.	Continue monitoring to determine if increased vegetation establishment achieves improved water quality. Treat the dam water.	Investigate removal of dam or alternate water uses. Investigate removal of dam and landform changes to manage surface water as sheet flow conditions if possible. Develop removal and earthworks plan and undertake works. Alternatively investigate alternate water use and criteria if water quality cannot be maintained.	

pitt&sherry

Rehabilitation Management Plan (RMP) Galong Limestone Mine

Pitt & Sherry (Operations) Pty Ltd
ABN 67 140 184 309

Phone 1300 748 874
info@pittsh.com.au
pittsh.com.au

Located nationally —
Melbourne
Sydney
Brisbane
Hobart
Launceston
Newcastle
Devonport