

PROGRESSIVE REHABILITATION AND CLOSURE PLAN

GURULMUNDI BENTONITE MINE

For Department of Environment and Science
Prepared by Ausrocks Resource Consultants

AUQ00056



MINERALS TECHNOLOGIES INC.

**GURULMUNDI BENTONITE MINE –
PROGRESSIVE REHABILITATION AND
CLOSURE PLAN**

16 MARCH 2026

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MTI GURULMUNDI MINE PRC PLAN COVER PAGE

A Progressive Rehabilitation and Closure Plan (PRC plan) must contain a cover page and include the following information:

Table 1: PRC plan cover page requirements

Required cover page information	Description
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EA Holder Name	Amcol Australia Pty Ltd ¹
EA Holder Contact Details	Minerals Technologies Inc. 94 Balham Road Archerfield QLD 4108 (07) 3277 9563

¹ A wholly owned subsidiary of Minerals Technologies Inc. (MTI)



Document Control

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This document has been reviewed and signed off by the undersigned:

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Appendix 2	Queensland Department of Environment and Science Progressive Rehabilitation and Closure Plan Transition Notice (via email) Ref. EPML00699113 (19 July 2021)
Appendix 3	Horizon Soil Science and Engineering: Report on the Soil Survey of Leases of the Mineral Technologies Bentonite Mine Rev 1.0 (October 2022)



Appendix 4	Ausrocks Resource Consultants: Final Land Use and Rehabilitation Plan Rev 1.4 (February 2026)
Appendix 5	Ausrocks Resource Consultants: Annual Rehabilitation Report 2023 Rev 1.1 (April 2024)
Appendix 6	Ausrocks Resource Consultants: Community Consultation Plan Rev 1.1 (February 2026)
Appendix 7	Landowner Agreements
Appendix 8	Gurulmundi Mine Risk Assessment
Appendix 9	Waste Characterisation Assessment

Terms & Abbreviations

ALC	Agricultural Land Classification
ARC	Ausrocks Resource Consultants (Ausrocks Pty Ltd)
ARR	Annual Rehabilitation Report
ASC	Australian Soil Classification
bcm	Bank cubic meters as material as is lies in its natural bank state
BoM	Bureau of Meteorology
CEC	Catio exchange capacity
EA	Environmental Authority
EAT	Emerson Aggregate Test
EC	Electrical conductivity
ENSO	El Niño Southern Oscillation
ESA	Environmentally Sensitive Area
MTI	Mineral Technologies Incorporated
EP Act	<i>Environmental Protection Act 1994</i>
MERFP Act	<i>Mineral and Energy Resources (Financial Provisioning) Act 2018</i>
PRC plan	Progressive Rehabilitation and Closure Plan in terms of the <i>Environmental Protection Act 1994</i> (Queensland)
PRCP Guideline	Progressive Rehabilitation and Closure Plan Guideline V3.01 September 2024 (DESI, Queensland)
DES	Department of Environment and Science (former department name)
DESI	Department of Environment, Science & Innovation (former department name)
DETSI	Department of the Environment, Tourism, Science & Innovation (current department name)
CCP	Community Consultation Plan
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
ha	Hectares
km	Kilometre
lcm	Loose cubic meters as material which has been excavated in some way and swelled as a result of the space that now exists between its elements
LGA	Local Government Area
LOD	Land outcomes document
ML	Mining Lease
MNES	Matter of National Environmental Significance
MSES	Matter of State Environmental Significance
NC Act	<i>Nature Conservation Act 1992</i> (Queensland)
NUMA	Non-use management area
PMLU	Post-mining land use



RA	Rehabilitation area
RM	Rehabilitation Milestone as defined in the PRCP Guideline: “a rehabilitation milestone, for the rehabilitated land, means each significant event or step necessary to rehabilitate the land to a stable condition” (section 115 of the EP Act)
RE	Regional Ecosystems
ROM	Run-of-mine
SCL	Strategic Cropping Land
Overburden stockpile	Out-of-put landform containing mine waste (also, spoil dump or waste dump)
Qld	Queensland
RRR	Residual risk rating with reference to the risk assessment
SMART	Specific, measurable, achievable, reasonable/relevant, time-specific
WQOs	Water Quality Objectives

INTRODUCTION

Ausrocks Resource Consultants (ARC) has been commissioned by Minerals Technologies Inc. (MTI) to prepare and submit a transitional Progressive Rehabilitation and Closure Plan (PRC plan) in accordance with the amendments promulgated by the *Mineral and Energy Resources (Financial Provisioning) Act 2018* (MERFP Act) to the *Environmental Protection Act 1994* (EP Act). This PRC plan has also been prepared to meet the requirements of the Progressive Rehabilitation and Closure Plan Guideline (PRCP Guideline)¹.

Environmental Authority Holder:	Amcol Australia Pty Ltd
Environmental Authority Number:	EPML00699113 (10 October 2025)
Land description:	ML55007, ML55008, ML55017

Environmentally relevant activities (ERA) at the MTI Gurulmundi Mine are limited to claypit, dimension stone or gemstones mining and are undertaken under the conditions of the site's Environmental Authority (EA) EPML00699113² (**Appendix 1**).

The EA is the land outcome document (LOD) for this transitional PRC plan.

The PRC plan comprises two parts:

- **Part A: Rehabilitation planning part** – provides information about the site, rehabilitation plans, and evidence and justification to support the development of the proposed PRCP schedule; and
- **Part B: PRCP schedule** – includes maps of rehabilitation and closure outcomes for the site and tables of time-based milestones.

Transitional provisions

Part 27, Chapter 13 of the EP Act outlines the transitional provisions following the commencement of the MERFP Act. In particular, MTI is a 'mining EA holder' for the purposes of the transitional provisions on the basis that, on commencement of the MERFP Act, MTI was "the holder of an environmental authority (EPML00699113) for a mining activity relating to a mining lease authorising operations" at Gurulmundi Mine (Section 750, EP Act). Section 6 of the PRCP Guideline makes provisions for "existing EA holders who must transition into the new PRC plan framework"¹. MTI has an approved EA; therefore, the site falls under the ambit of the requirements of a transitional PRC plan.

¹ DESI. (2024). Progressive rehabilitation and closure plans (PRC plans) guideline version 3.01 (ESR/2019/4964). Department of Environment, Science & Innovation, Queensland.

² DETSI. (2025). Environmental Authority EPML00699113 (issued 10 October 2025). Department of the Environment, Tourism, Science and Innovation, Queensland.

Based on the requirements of Section 6 of the PRCP Guideline, the following are applicable to this PRC plan:

- A Transition Notice for the site was issued to MTI by the administering authority, dated 19 July 2021³ (**Appendix 2**). This Transition Notice requires submission of the MTI PRC plan by 27 January 2023.
- In accordance with transitional provisions (Section 750, EP Act), the MTI EA is an approved LOD.
- Prior to the PRC plan submission, one (1) pre-lodgement meeting between the administering authority and MTI was held:
 - Initial meeting held on 15 July 2021 attended by MTI and administering authority personnel. The purpose of this meeting was to discuss requirements of the transitional PRC plan.
- Following the Information Request period from the original submission (27 January 2023), and the Decision Notice period, this document represents the updated, final version of the MTI Gurulmundi Mine transitional PRC plan submitted for approval.

Aligned to the above and the PRCP Guideline⁴ requirements, the following process for transitioning rehabilitation and closure outcomes from the site's EA into its PRCP schedule has been followed:

1. Identifying rehabilitation and closure outcomes in the LOD (EA EPML00699113);
2. Identifying post-mine land uses (PMLUs) (non-use management areas have not been identified for Gurulmundi Mine);
3. Defining rehabilitation areas within the PMLU;
4. Identifying milestones;
5. Identifying milestone criteria; and
6. Identifying when the first milestone must commence and completion dates for the milestones.

PRCP for exploration activities

There is no provision in the EA explicitly allowing or prohibiting exploration activities.

Currently, there are no proposed plans for future mining and/or exploration activities at Gurulmundi Mine outside of the scope described in this document.

³ DES. (2021). Progressive rehabilitation and closure plan transition notice (via email received 19 July 2021). Reference EPML00699113. Department of Environment and Science, Queensland.

⁴ Per Section 6.4 (Transitioning rehabilitation and closure outcomes into the PRCP schedule) of the Progressive Rehabilitation and Closure Plan Guideline

PART A: REHABILITATION PLANNING PART

1 Project planning

Legislative Requirement

In accordance with section 126C(1)(b) and (c)(ii) of the EP Act, the rehabilitation planning part of the PRC plan must include a description of:

- each resource tenure, including the area of each tenure
- the relevant activities to which the application relates
- the likely duration of the relevant activities
- how and where the relevant activities are to be carried out, including maps.

PRCP Guideline

The following spatial information must be submitted as part of the PRC plan:

- the location and maximum extent of disturbance footprint for the mine life
- the PMLUs and NUMAs for the area within the resource tenures
- any sensitive receptors.

In addition to the list above, the PRC plan must include spatial information outlining the rehabilitation and improvement areas that correspond to the proposed PRCP schedule. The spatial information must show the locations of the rehabilitation and improvement areas for a 10-year period (minimum).

All spatial information must be prepared and submitted in accordance with the guideline 'Spatial Information Submission' (ESR/2018/4337).

1.1 Project description

Gurulmundi Mine is located within the south-eastern corner of the Fitzroy basin and approximately 40km north of Miles. The site is accessed via Gurulmundi Road off the Leichardt Highway, a state-controlled road. The site is also located approximately 4.5km northeast of another bentonite mine (owned and operated by Terrequip Environmental Pty Ltd).

The EA holder is Amcol Australia Pty Ltd, which is a wholly owned subsidiary of MTI.

EA EPML00699113 limits activity at Gurulmundi Mine to claypit, dimension stone or gemstone mining. MTI Gurulmundi Mine operates on mining leases approximately 355.59 hectares (ha) and is identified as a sodium bentonite resource. Primary products include foundry, drilling, civil engineering, cat litter, agriculture, and other markets locally and overseas.

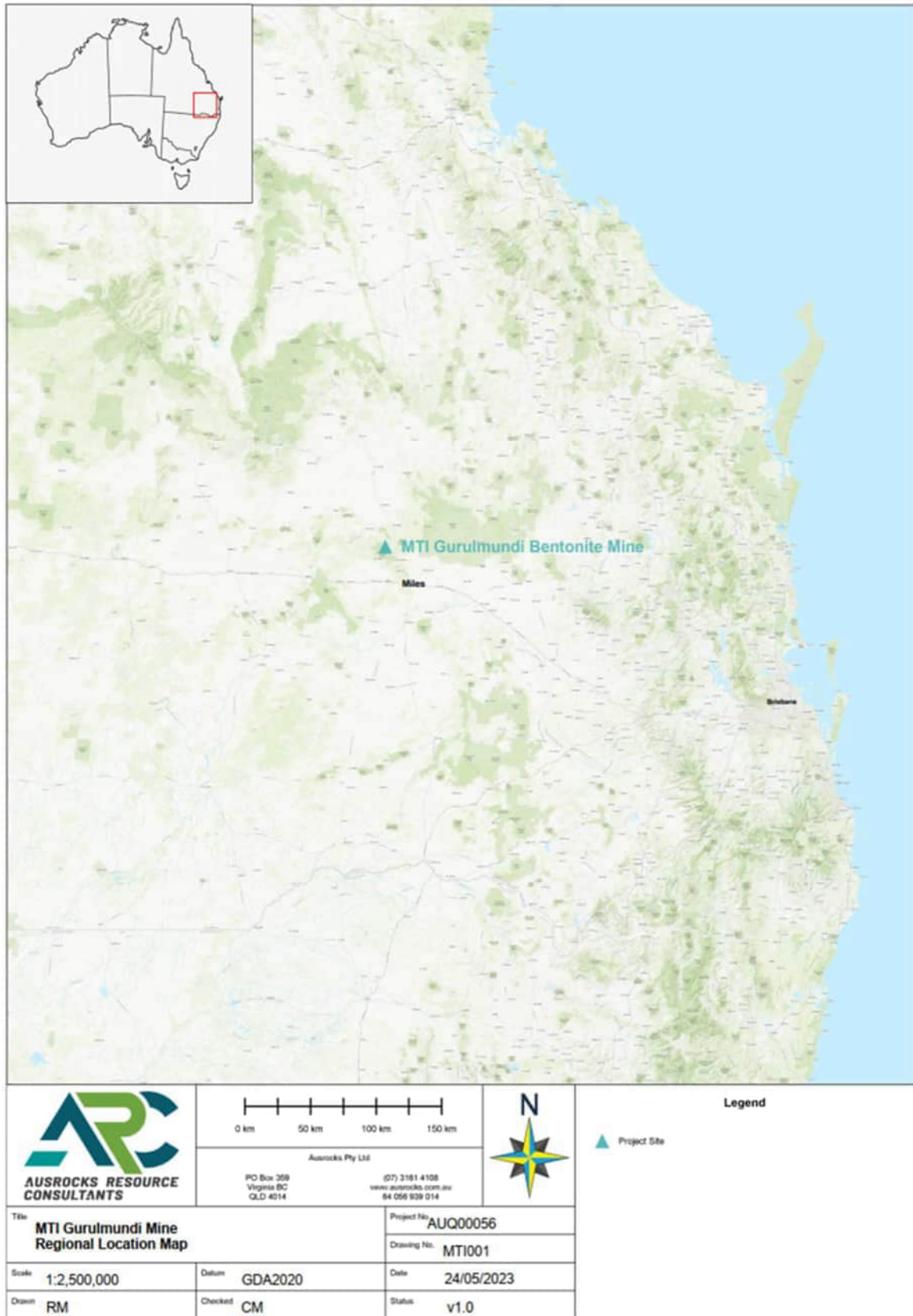


Figure 1: MTI Gurulmundi Mine location map

1.1.1 Mining tenements

MTI operates the mining leases (MLs) provided in **Table 3** and illustrated in **Figure 2**.

Table 2: Gurulmundi Mine mining tenements

Mining lease	Permit name	EA holder	Purpose	Area (ha)
ML55007	IMT0401	Amcol Australia Pty Ltd ¹	Far North pit, North pit, Central pit, West pit, Plant (processing and stockpiling)	318.55
ML55008	BG2012	Amcol Australia Pty Ltd ¹	Undisturbed land	15.37
ML55017	WEST AMCOL	Amcol Australia Pty Ltd ¹	Far West pit	21.67
Total Area (ha)				355.59

¹ A wholly owned subsidiary of Minerals Technologies Inc

1.1.2 Primary mine features and infrastructure

The main features and infrastructure approved within the EA for Gurulmundi Mine are summarised in **Table 3** and illustrated in **Figure 2**.

Table 3: Primary mine features and infrastructure at MTI Gurulmundi, as approved within the EA

Mine domain	Mine feature name
Ancillary Infrastructure	<ul style="list-style-type: none"> mining footprint mine infrastructure access tracks, ancillary roads and haul roads administration, office buildings, carparks and amenities laydown areas (including vehicle manoeuvring) material storage weighbridge geotechnical sample storage and laboratory potable water (bottled)
Dams	<ul style="list-style-type: none"> onsite water storage(s)
Combined Stockpile Areas	<ul style="list-style-type: none"> topsoil stockpiles waste rock dumps and overburden stockpiles storage pads
Non-Mining Areas	<ul style="list-style-type: none"> undisturbed land rehabilitation areas (complete and in progress)
Utilities / Services	<ul style="list-style-type: none"> non-potable water (rainwater tanks) septic sewage power lines communications

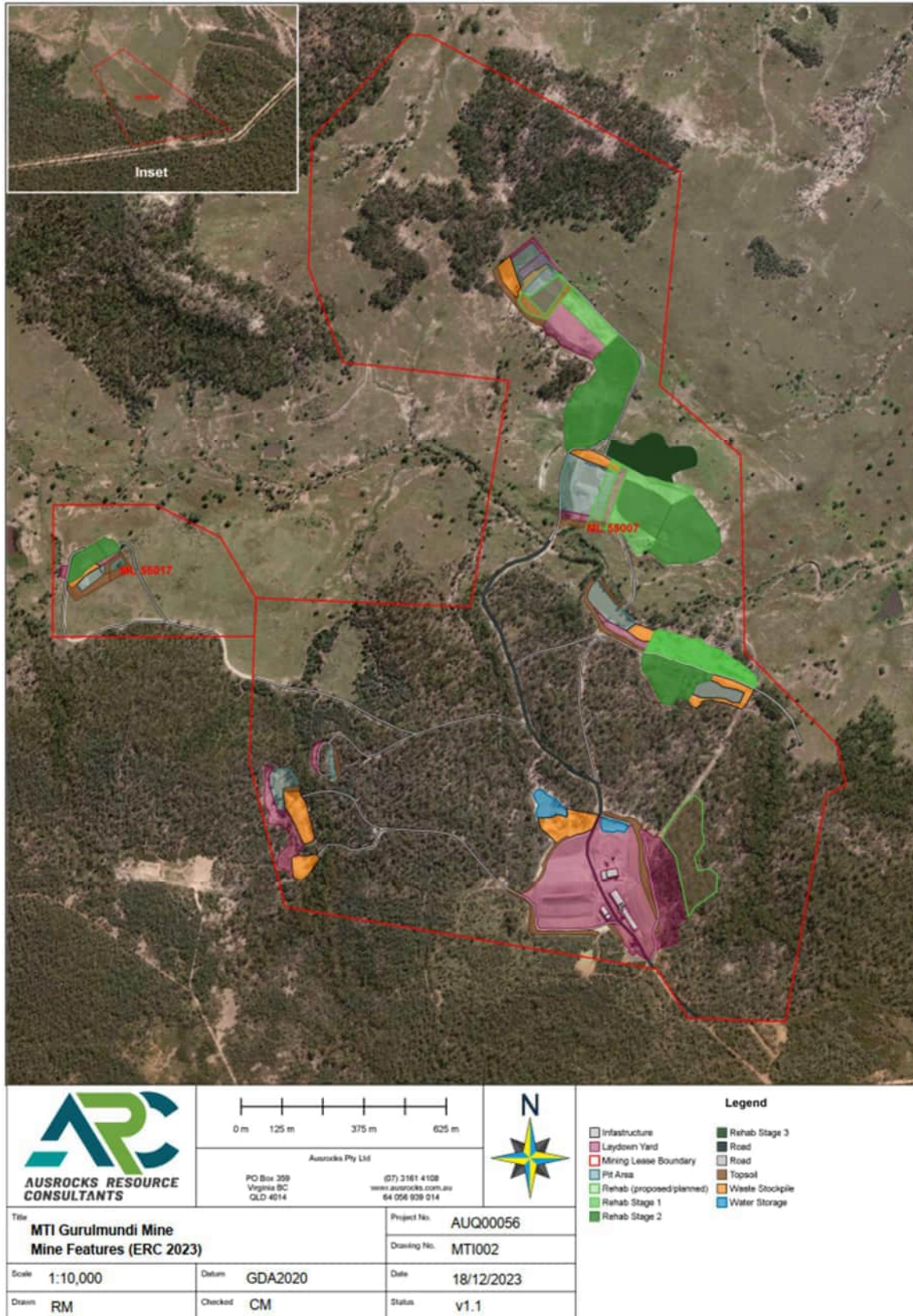


Figure 2: MTI Gurulmundi Mine mining tenements including primary mine features and infrastructure

1.1.3 Type of mining operation

MTI, at the time of preparation of this PRC plan, is an active mining operation. The EA permits activities associated with ERA 'Mining – ML Claypit, dimension stone or gemstones – 20(a)'.

Gurulmundi Mine has been in an operation and production phase since the 1990's, previously operated by Amcol Australia Pty Ltd. The MTI Gurulmundi Mine comprises of open-cast pits mined in a series along strike to continually backfill into previous pit voids. Three (3) satellite pits are currently used for this purpose: North pit (including the Far North pit), Central pit, and Far West pit (**Figure 2**). Most of the mining activity takes place within ML55007 (the largest mining lease) and includes resource processing and stockpiling, and the housing of infrastructure to support the mining operation.

Historical mining methods are assumed to have included, but were not limited to:

- clearing of vegetation including removal and disposal by dozer;
- excavation and temporary stockpile of topsoil by dozer and/or excavator and/or articulated dump truck;
- removal of overburden via rip and push method by dozer;
- overburden re-used in pit backfill to final landform level and/or stockpiled; and
- mining and transport of bentonite resource by excavator to road trucks via haul access road network to designated stockpile and processing areas.

Extraction is not occurring in the West pit. Although previously mined, this area has potential for future mining to extract remaining resources.

Production activities have been undertaken in the Far West pit; the newest operation within the site.

1.1.4 Proposed duration of the operation

Current mining activities at Gurulmundi Mine are proposed to continue up to, and including, the year 2066. Applications to renew and/or extend the expiry dates of each granted mining lease will be required (current expiry year 2032 for ML55017, and year 2034 for ML55007 and ML55008). If additional applications to renew and/or extend the expiry of any ML beyond 2066 is granted during the current proposed duration of operation, the PRC plan and PRCP schedule will be amended accordingly.

1.2 Baseline information

PRCP Guideline (section 3.1)

In addition to the legislative requirements, the following information about the site, where relevant, is considered necessary by the administering authority (as per section 126C(1)(9j) of the EP Act) to decide whether to approve the PRCP schedule:

- site topography (locally and regionally)
- climate (general and specific (rain, evaporation, temperature) including long-term projections
- geological setting
- site hydrology and fluvial networks
- groundwater levels and properties
- soil types, properties and productivity
- land stability (pre-existing land degradation/erosion and pre-disposition to ongoing stability issues)
- vegetation communities and ecological data (including existing regional ecosystem mapping)
- fauna presence and populations
- pre-mining land use
- identification of underlying landholders

Applicability to Transitional PRC plan

Transitional PRC plans must include any baseline information collected as part of an EIS process or original EA application. If this information is unavailable, the reasons should be explained in this section of the rehabilitation planning part. Transitional PRC plans are not required to demonstrate how aspects of the mine site have been designed for closure for existing or approved disturbance. However, any expansion to an existing site must demonstrate how it has been designed for closure. The rehabilitation/improvement planning must include data from when mining first commenced up until planned surrender. The transitional provisions of the EP Act include an exceptional circumstance for when land is available for rehabilitation.

Under section 126C(1)(j) of the EP Act, transitional PRC plans must also include the following details about any existing rehabilitation already completed at the time of submission of the proposed PRC plan:

- a description of the rehabilitation works previously carried out
- when the rehabilitation works commenced and were completed
- whether the rehabilitation has been applied for or approved as progressively certified under the EP Act

Spatial information outlining the location of all existing rehabilitation must also be submitted as part of the proposed PRC plan.

1.2.1 Site topography

The southern portion of the site is positioned on a relatively flat plateau with elevation ranging from 400m to 420m AHD. The regional topography is characterised by undulating hills. Over time the plateau has been incised and slowly eroded water moving in nearby creeks. The remainder of the site is located over undulating lowland areas north of the escarpment with elevation ranging from 360m to 380m AHD.

1.2.2 Climate

MTI Gurulmundi experiences dry humid sub-tropical climate. Monitoring of weather data is not conducted onsite. Data has been collected from the Bureau of Meteorology (BoM) Miles Post Office (Station No. 42023). The weather station is located approximately 30km southeast of the site and where data has been collected since 1885.

1.2.2.1 Temperature

The area experiences mean daily maximum temperatures of 27.9°C and mean daily minimum temperatures of 13.0°C. The highest average temperatures in the warmer months (December to February) reaches 37.1°C.

1.2.2.2 Rainfall

Average annual rainfall during the wet season is approximately 100mm per month and average annual rainfall of 645.7mm. A 1 in 10 year 24-hour rainfall event is predicted at 126mm.

Table 4: Miles monthly average rainfall

Month	Station no. 42023 (mm)
January	94.6
February	75.0
March	61.4
April	35.1
May	38.4
June	38.2
July	36.1
August	28.7
September	31.8
October	54.2
November	64.5
December	89.7
Annual	645.7

1.2.2.3 Evaporation

Average annual evaporation rates are approximately at 2368mm per year. This suggests a strongly negative water balance is present for the site (i.e. annual evaporation is greater than annual rainfall).

1.2.2.4 Wind

MTI Gurulmundi typically experiences north westerly to northly winds changing easterly in late Summer. Maximum wind speeds typically occur during storm events between October to December. During the cooler months, these winds become predominantly easterly and southernly, shifting to the north in the late Winter.

1.2.2.5 Long-term climate projections

An assessment of long-term climate trends is summarised in **Table 5**.

Table 5: Long-term climate projections for MTI Gurulmundi

Climate Feature	Summary of Conditions
Storms	<ul style="list-style-type: none"> There is no defined storm season or period for severe storms. Queensland typically experiences severe storms during warmer months (October to April) and during heatwave events⁵. Severe storms are known to cause significant damage to property and infrastructure due to destructive and powerful wind gusts, flash flooding, lightning strikes, and large hailstones (>4cm diameter)⁵.
Cyclones	<ul style="list-style-type: none"> The area may be indirectly impacted by tropical cyclones passing nearby or crossing the eastern coastline of Australia. Cyclones are more likely to occur between early November to late April⁵. The likelihood of a cyclone traveling inland is influenced by the El Niño Southern Oscillation (ENSO). The area has no history of cyclones or cyclone-related weather events.
Bushfire	<ul style="list-style-type: none"> Bushfires can cause significant harm to people and property. Bushfire prone areas and bushfire intensities are identified based on assessment of contributing factors including wind, rain/drought conditions, fuel source (vegetation)⁵. The area has a medium to high potential bushfire intensity based on SPP IMS modelling. A large bushfire affected land east of the Highway in February 2023, whilst there were no direct impacts to site the event did serve to raise awareness and encouraged local landowners to re-establish firebreaks along property boundaries.
Drought	<ul style="list-style-type: none"> Western Downs Regional Council is not in a drought declared state, as per the most current data available from The Long Paddock (Queensland Drought Situation map as reviewed on 1 November 2023)⁶. The area typically experiences low rainfall during cooler months between April to September (based on data available from the Bureau).
Floods	<ul style="list-style-type: none"> Watercourses within the area feed towards the north to Juandah Creek, within the Fitzroy Basin of the Dawson River sub-basin. The area is located in the uppermost reaches of the Fitzroy Basin of the Dawson River sub-basin, reducing the likelihood of flooding. There is no historical evidence to suggest Juandah Creek has experienced a flooding event, even during high rainfall periods⁷. The area is not at risk of flooding based on data from the Queensland Floodplain Assessment Overlay (Figure 6).
Earthquakes	<ul style="list-style-type: none"> Historical data shows earthquakes are more likely to occur along the coastline of Queensland and near offshore regions. The area has a low-risk potential for earthquakes to occur within or surrounding the area⁷.

⁵ QFES (December 2017) Fire and Emergency Services

⁶ <https://www.longpaddock.qld.gov.au/drought/drought-declarations/> (accessed January 2023)

⁷ Surat Basin Rail. (2009). Surat Basin Rail Project Environmental Impact Statement – Appendix F (Dawson River Flood Events). Revision 2.

1.2.3 Geological setting

The site overlaps the Wandoan and Guluguba geological sheets. Bentonite deposits are hosted by Orallo Formation of the Jurassic/Cretaceous Surat Basin across southeast Queensland and northern New South Wales. Sedimentary infill is believed to originate from the mostly volcanic rocks of the Cretaceous Whitsunday Volcanic Province and Graham Volcanics of the Maryborough Basin to the northeast⁸. The Jurassic Orallo Formation in the upper Surat Basin comprises clayey lithic sandstone, siltstone, and minor mudstone. Bentonite beds are deposited within high-energy fluvial to lacustrine coastal plains and shallow marine environments.

Detailed surface and regional geology is summarised in **Table 6**, **Table 7**, **Figure 3** and **Figure 4**.

Table 6: Detailed surface geology of the MTI Gurulmundi area

Geological Setting	ML Tenement	Lithology Description
Orallo Formation (Kyo(w))	ML55007 ML55008	Sedimentary rock; Deeply weathered sandstone, siltstone, mudstone, conglomerate, coal; Early Cretaceous; Stratified rock unit (including volcanic and metamorphic)
Orallo Formation (Kyo)	ML55007 ML55008	Sedimentary rock; Sandstone, siltstone, mudstone, conglomerate, coal; Early Cretaceous; Stratified unit (including volcanic and metamorphic)
Mooga Sandstone (Kym)	ML55007 ML55017	Arenite rock; Sandstone, siltstone, mudstone; Stratified unit (including volcanic and metamorphic)

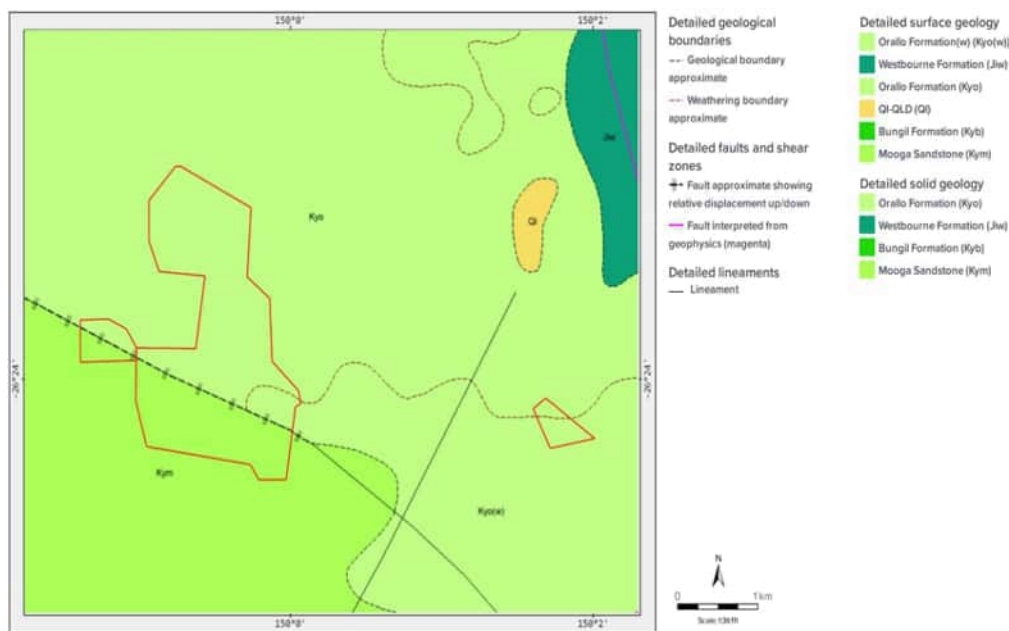


Figure 3: Geology of MTI Gurulmundi site

⁸ Bryan, S.E., Ewart, A., Stephens, C.J., & Parianos, J. (2000). The Whitsunday Volcanic Province, Central Queensland, Australia: Lithological and stratigraphic investigations of a silicic-dominated large igneous province, *Journal of Volcanology and Geothermal Research*, 99(1), 55-78. [https://doi.org/10.1016/S0377-0273\(00\)00157-8](https://doi.org/10.1016/S0377-0273(00)00157-8)

⁹ <https://qldglobe.information.qld.gov.au/> (accessed September 2022)

Table 7: Detailed regional geology of the Gurulmundi area

Geological Setting	ML Tenement	Lithology Description
Orallo Formation (Kyo)	ML55007 ML55008	Sedimentary rock; Sandstone, siltstone, mudstone, conglomerate, coal; Early Cretaceous; Stratified unit (including volcanic and metamorphic)
Mooga Sandstone (Kym)	ML55007 ML55017	Arenite rock; Sandstone, siltstone, mudstone; Stratified unit (including volcanic and metamorphic)

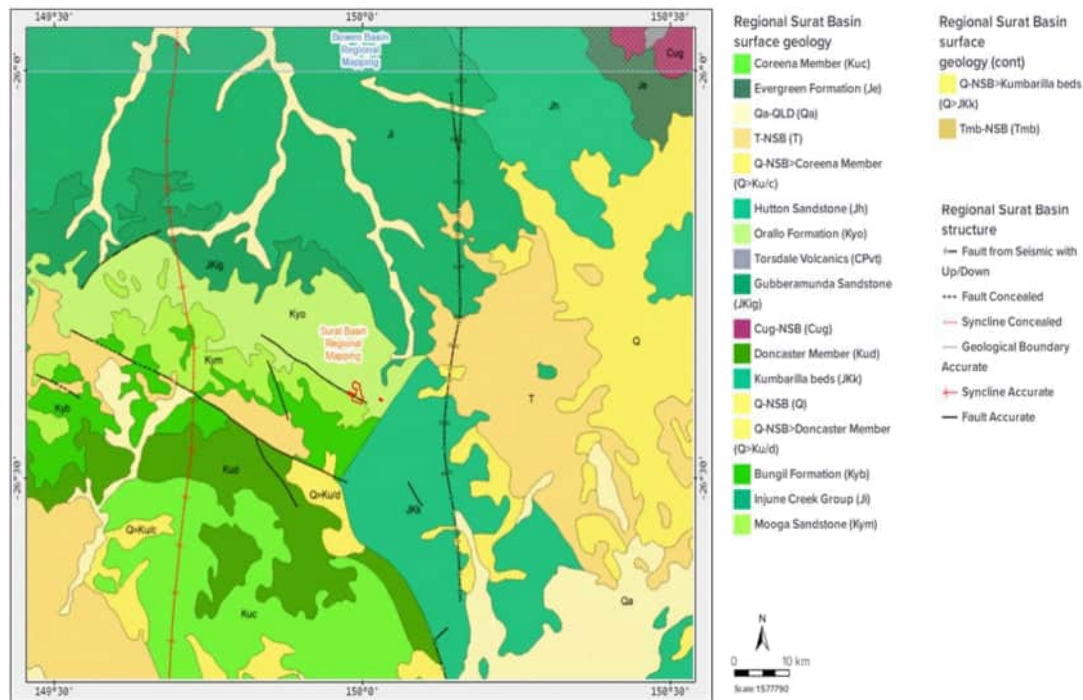


Figure 4: Regional geology of the Gurulmundi area

1.2.4 Site hydrology and fluvial networks

The site is located within the south-eastern corner of the Fitzroy Basin adjacent to the Balonne-Condamine Basin. **Figure 5** illustrates the location of the basins and mining leases.

The entirety of the mining leases ML55007, ML55008 and ML55017 are contained within the Fitzroy Basin, and Dawson River sub-basin. Tributaries intersecting the mining leases drain towards the north into Juandah Creek and into the Dawson River.

The environmental values and water quality objectives established for the Fitzroy Basin under the *Queensland Environment Protection (Water and Wetland Biodiversity) Policy (2019)* are documented below:

- *Water Plan (Fitzroy Basin) 2011 (Qld)*
- Fitzroy Basin Association 2015, Fitzroy Water Quality Improvement Plan 2015;
- Dawson River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (Part).

¹⁰ <https://qldglobe.information.qld.gov.au/> (accessed September 2022)

The environmental values identified for the Upper Dawson River are summarised in **Table 8**.

Table 8: Water environmental values for the MTI Gurulmundi Mine area

Basin	Catchment	Aquatic ecosystems	Irrigation	Farm supply / use	Stock water	Aquaculture	Human consumption	Primary recreation	Secondary recreation	Visual recreation	Raw drinking water	Industrial use	Cultural and spiritual
Fitzroy Basin	Upper Dawson River (WQ1308) – Southern tributaries	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
	Upper Dawson River (WQ1308) – Groundwater	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓

✓ means the EV is selected for protection

A summary of watercourses and dams located within and immediately surrounding the Gurulmundi Mine are summarised in **Table 9**.

No fourth order streams or above, or diversions, are present within the Gurulmundi Mine mining leases.

Table 9: Summary of MTI Gurulmundi Mine watercourses and dams

Watercourse	Perennially	Hierarchy	Stream order	Comment
Fitzroy Basin				
Unnamed	Non-perennial	Minor	1-2-3	Multiple unnamed drainage lines intersecting and draining across all mining tenements.
Juandah Creek	Non-perennial	Minor	3	Located approximately 5km north-east of ML55007.

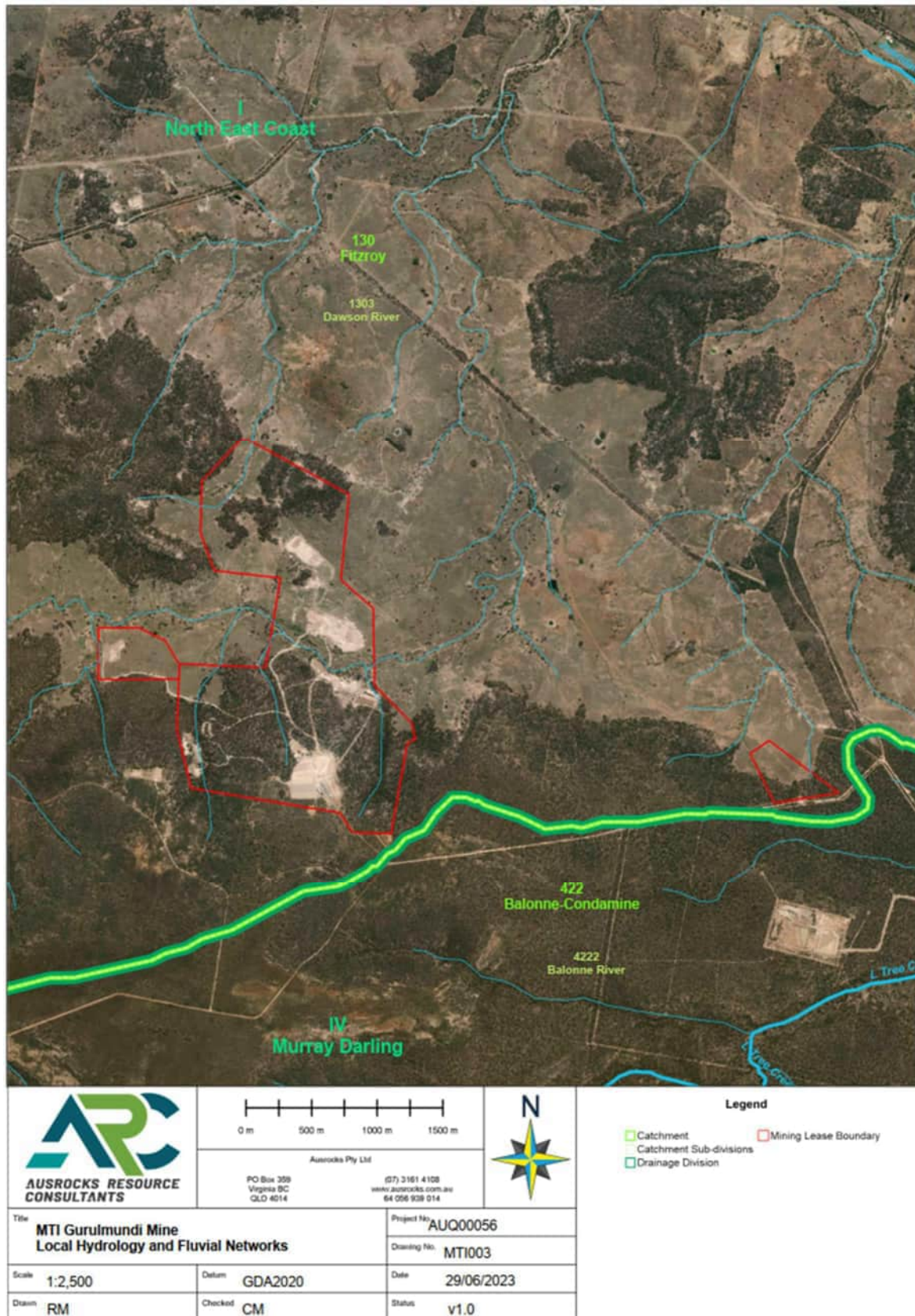


Figure 5: MTI Gurulmundi Mine fluvial networks and basins

1.2.4.1 Floodplain assessment

Major floods occur in the Dawson River at Taroom, on average, every 6 years over the last 120 years of detailed data¹¹. Under the 'Guideline for Voids in Flood Plains'¹², a flood plain model of the Project area is not required as the watercourses on site are not mapped within the Level 1 Queensland Floodplain Assessment Overlay, a buffer to the mapped floodplain of >1000m is maintained for Mining Lease Boundaries and >4.5km for any water storage final landform (**Figure 6**).

Although Juandah Creek and other watercourses on site connect to the upper-most tributaries of the Dawson River, the area has no risk of significant flooding and no history of flooding on site.

The site topography is undulating and a proportion of the site is located on a plateau, with no risk of 'floodplain' development as water moves across site. Due to the relatively small catchments associated with the site, the risk to final landform structures from floodwaters is considered very low. No constructed landforms have been placed in the path of concentrated stormwater runoff; the majority of pits are to be backfilled and recontoured to be free-draining. Appropriately sized erosion and sediment controls have been designed to convey surface water away from the landform in a safe manner. Due to these factors, water movement across site is considered very low risk to the long-term stability of the final landforms designed on site.

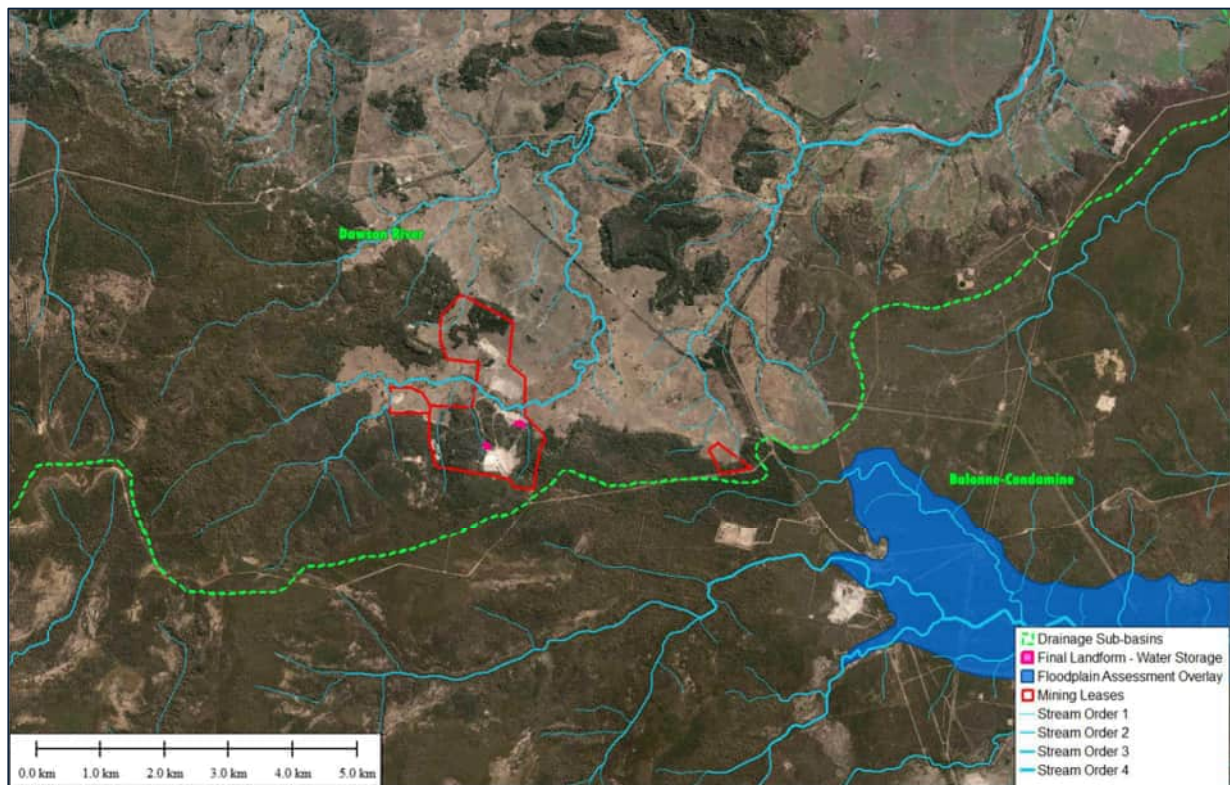


Figure 6: MTI Gurulmundi Mine Floodplain Locations

¹¹ Australian Government. (2011, January). *Flood Summary for the Dawson River at Taroom* Australian Bureau of Meteorology.

¹² Queensland Government. (2020, 11 March). Information Sheet: Voids in flood plains (ESR/2019/4966).

1.2.5 Groundwater levels and properties

There are 20 registered groundwater bores within a 5km radius of the mining leases listed of which 17 are listed as existing¹³ (**Figure 7**). Limited information is available in bore reports; 10 bore reports provide no data on water level.

Water quality pH and electrical conductivity (EC) within these groundwater bores is summarised in **Table 10**.

Table 10: Available water quality data (pH and EC) of groundwater bores within a 5km radius of MTI Gurulmundi Mine

Bore ID	pH	EC (µS/cm)
RN 11491	-	-
RN 123557	-	-
RN 123644	-	-
RN 13218	-	-
RN 13462	-	-
RN 14523	-	-
RN 160694	-	-
RN 160704	-	-
RN 160720	-	-
RN 160908	-	-
RN 18392	-	-
RN 22342	-	-
RN 22343	-	-
RN 22370	7.8	1700
RN 22515	-	-
RN 22549	-	-
RN 23510	-	-
RN 33486	-	-
RN 42220059	8.7	4900
RN 58010	8.4	2083

¹³ <https://qldglobe.information.qld.gov.au/> (accessed August 2022)

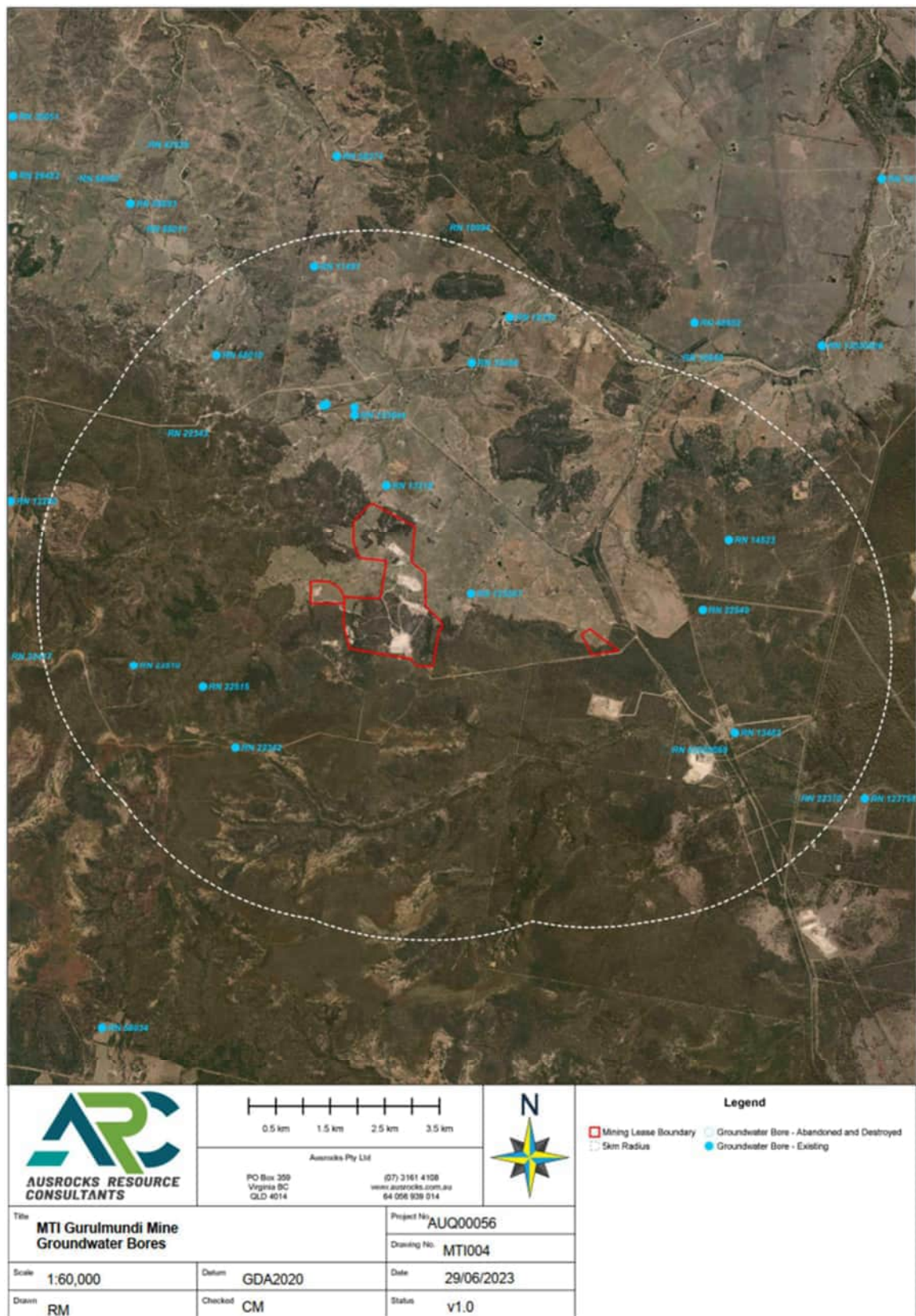


Figure 7: Groundwater bores within a 5km radius of the MTI Gurulmundi Mine leases

1.2.6 Soil types, properties and productivity

A soil resources and assessment of agricultural land suitability was undertaken in 2022 to determine soil type and properties to understand baseline soil characteristics and availability of suitable rehabilitation resources (**Appendix 3**)¹⁴. The scale of survey at Gurulmundi Mine was 1:25,000 giving a range of 15-60 observation site. A total of 42 observation sites (300-1200mm) were sampled as well as an additional 3 surface samples (0-100mm) for chemistry analysis in an area of uncertified rehabilitation. Soil types were identified according to the Australian Soil Classification (ASC).

The survey found Sodosols, Rudosols and Vertosols to be present (**Figure 8**). A summary of physical properties of these soil types is provided in **Table 11** and summary of chemical properties in **Table 12**. All soil types within the Gurulmundi Mine mining leases supported a pre-mining land of marginal grazing.

Table 11: Typical physical characteristics of soil types within MTI Gurulmundi Bentonite Mine

Australian Soil Classification	Physical characteristics
Brown Rudosol	A1 Very dark grey (10YR 3/1) silty clay with weak granular structure, common small to large gravel, to 0.1m, clear change to B2
	B2 Brown (10YR 4/3) clayey coarse sand with weak granular structure, abundant small to large gravel, to 0.4m
Grey Sodosol	A1 Very dark grey (2.5Y 3/1) silty clay loam with weak granular structure to 0.15m, clear change to
	B2 Very dark grey (2.5Y 3/1) heavy clay with weak blocky structure, to 0.6m, clear change to C
	C Dark greyish brown (10YR 4/2) fine sandy medium clay with weak blocky structure, a few small gravel, with common dark/yellow mottles, a few carbonates to 1m
Black Vertosol	A1 Black (10YR 2/1) heavy clay with strong blocky structure, a very few carbonates, to 0.1m, gradual change to B21
	B21 Black (10YR 2/1) heavy clay with strong blocky structure, with a very few red mottles, a few carbonates, to 0.5m, diffuse change to B22
	B22 Very dark grey (10YR 3/1) heavy clay with strong blocky structure, common carbonates, to 1.0m

¹⁴ Horizon Soil Science and Engineering. (2022). Report on the Soil Survey of Leases of the Mineral Technologies Bentonite Mine. Revision 1.0 (Final).



Table 12: Chemical properties of soil types within MTI Gurulmundi Bentonite Mine

Australian Soil Classification	Chemical properties	Area (ha)
Grey and Red Sodosol	<ul style="list-style-type: none"> pH profiles neutral at the surface to very strongly alkaline at depth Non-saline at surface to slightly saline at depth moderate organic carbon in the surface declining to low at depth Low to moderate CEC, sodic at surface increasing to strongly sodic at depth with low Ca:Mg ratio; EAT scores suggest dispersive topsoils and subsoils 	60
Black and Grey Sodosol with Brown Rudosol	<ul style="list-style-type: none"> pH profiles moderately acid at surface increasing to slightly acid to depth Non-saline throughout Moderate organic carbon in the surface declining to low at depth Very low CEC, non-sodic at surface to marginally sodic to depth with low Ca:Mg ratio EAT scores suggest dispersive topsoils with dispersive subsoils 	246
Black Vertosol	<ul style="list-style-type: none"> pH profiles strongly to very strongly alkaline Non-saline at surface to highly saline at depth Moderate organic carbon in the surface declining to low at depth Moderate CEC at surface increasing to high at depth, sodic at surface increasing strongly sodic at depth with balanced to low Ca:Mg ratio EAT scores suggest slaking topsoils with dispersive subsoils 	93
Total Area (ha)		399

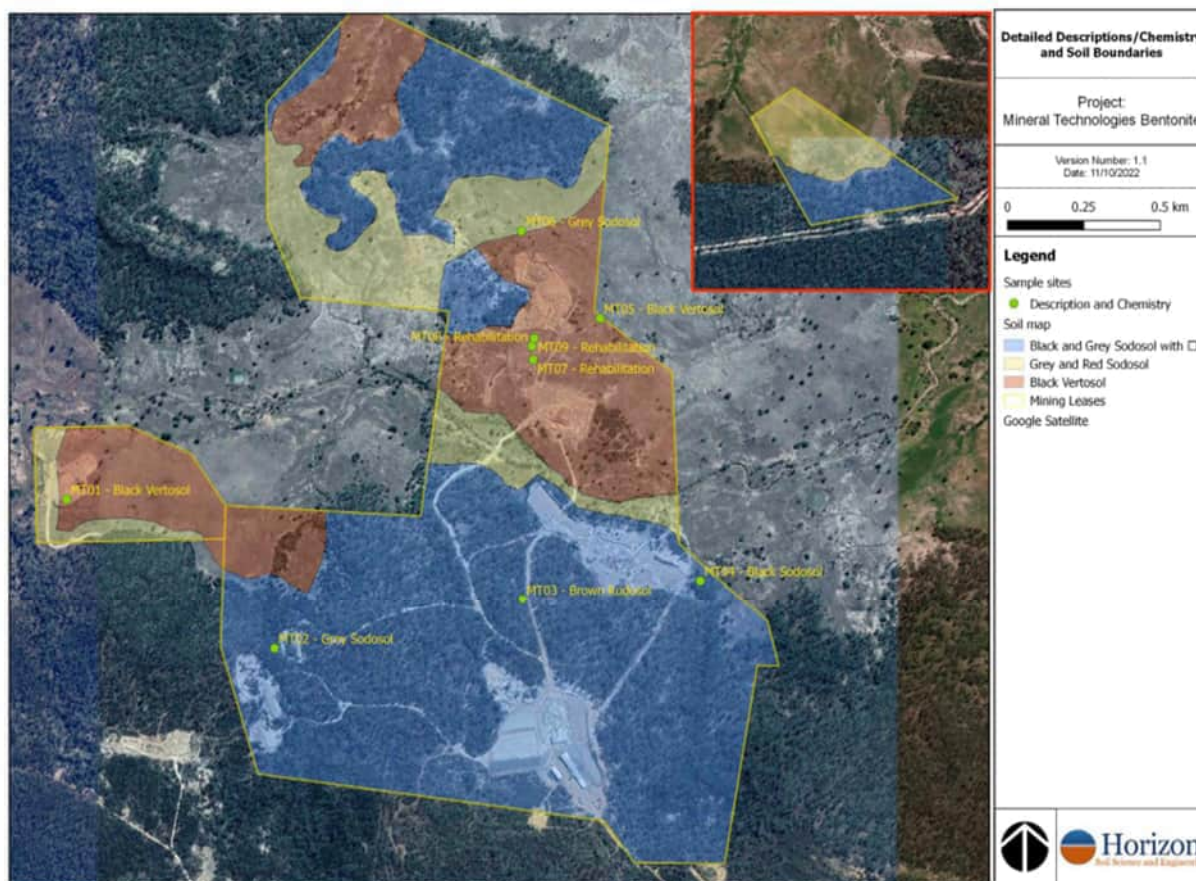


Figure 8: Soil map of MTI Gurulmundi Bentonite Mine

1.2.7 Land stability

The regional topography is characterised by lowland undulating hills. Although positioned on a plateau, the topography of Gurulmundi Mine is similar to the surrounding landscape. Agricultural Land Classification (ALC) categorises the area as C2 class; considered typically suitable for livestock fattening with low stocking rates^{14,15}. Gurulmundi Mine is considered suitable for livestock fattening where stock can be removed as required to maintain vegetative cover, protecting soils from erosion risk. The ALC classification is consistent with pre-mining land use and the post-mining land capability classification VII¹⁶ described in the site EA ('Table F1 – Final Land Use and Rehabilitation Approval Schedule').

Gurulmundi Mine is located within the Western Downs sub-zone Strategic Cropping Area (SCA) defined under the *Regional Planning Interests Act 2011*. The site is not within the boundaries of SCL trigger areas, and no further assessment is required under this framework.

¹⁵DSITI & DNRM. (2015). Guidelines for Agricultural Land Evaluation in Queensland, second edition. The State of Queensland (prepared by Department of Science, Information Technology and Innovation and Department of Natural Resources and Mines), Brisbane.

¹⁶ "land that is not suitable for cultivation but on which pastoral use is possible only with careful management"

1.2.8 Vegetation communities and ecological data

The vegetation communities at Gurulmundi Mine comprises a mix of non-remnant pasture and remnant vegetation.

Due to the age of the site, historical records of ecological flora surveys and/or assessments are not available.

A desktop study was conducted to identify the presence and mapped distribution of vegetation communities at Gurulmundi Mine. The results of the study are provided in the following sections.

The results of the desktop study are limited by the following:

- proximity to nearby State Forests and National Parks (Gurulmundi State Forest, Cherwondah State Forest, Binkey State Forest 1 and Binkey State Forest 2);
- no record of field based ecological surveys and/or assessments to confirm accuracy of data; and
- data available online is based on reported sightings over a large span of time, therefore reporting is inconsistent.

1.2.8.1 Vegetation communities

Vegetation communities at MTI Gurulmundi consist of both remnant and non-remnant growth. These are summarised in **Table 13**.

Table 13: Vegetation communities within the MTI Gurulmundi area

Regional Ecosystem	Short description	Biodiversity status ¹	Condition
11.7.2	Acacia spp. Woodland on Cainozoic lateritic duricrust. Scarp retreat zone	Least concern	Remnant
11.10.1	<i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks	Least concern	Remnant
11.7.6	<i>Corymbia citriodora</i> or <i>Eucalyptus crebra</i> woodland on Cainozoic lateritic duricrust	Least concern	Remnant
11.5.21	<i>Corymbia bloxsomei</i> +/- <i>Callitris glaucophylla</i> +/- <i>Eucalyptus crebra</i> +/- <i>Angophora leiocarpa</i> woodland on Cainozoic sand plains and/or remnant surfaces	Least concern	Remnant
11.7.5	Shrubland on natural scalds on deeply weathered coarse-grained sedimentary rocks	Least concern	Remnant
Non-remnant	None	None	Non-remnant

¹ Vegetation Management Act 1999

1.2.8.2 Environmentally sensitive areas

Category A and Category B environmentally sensitive areas (ESAs) are defined under Schedule 19 of the *Environmental Protection Regulation 2008* (EP Regulation). **Figure 9** indicates estimate mapping of ESAs at Gurulmundi Mine (based on desktop study¹⁷). This information is not supported by ground-truthing surveys.

There are no specific requirements in the site EA for the inclusion of ESAs in the rehabilitation planning.

¹⁷ <https://qldglobe.information.qld.gov.au/> (accessed June 2023)

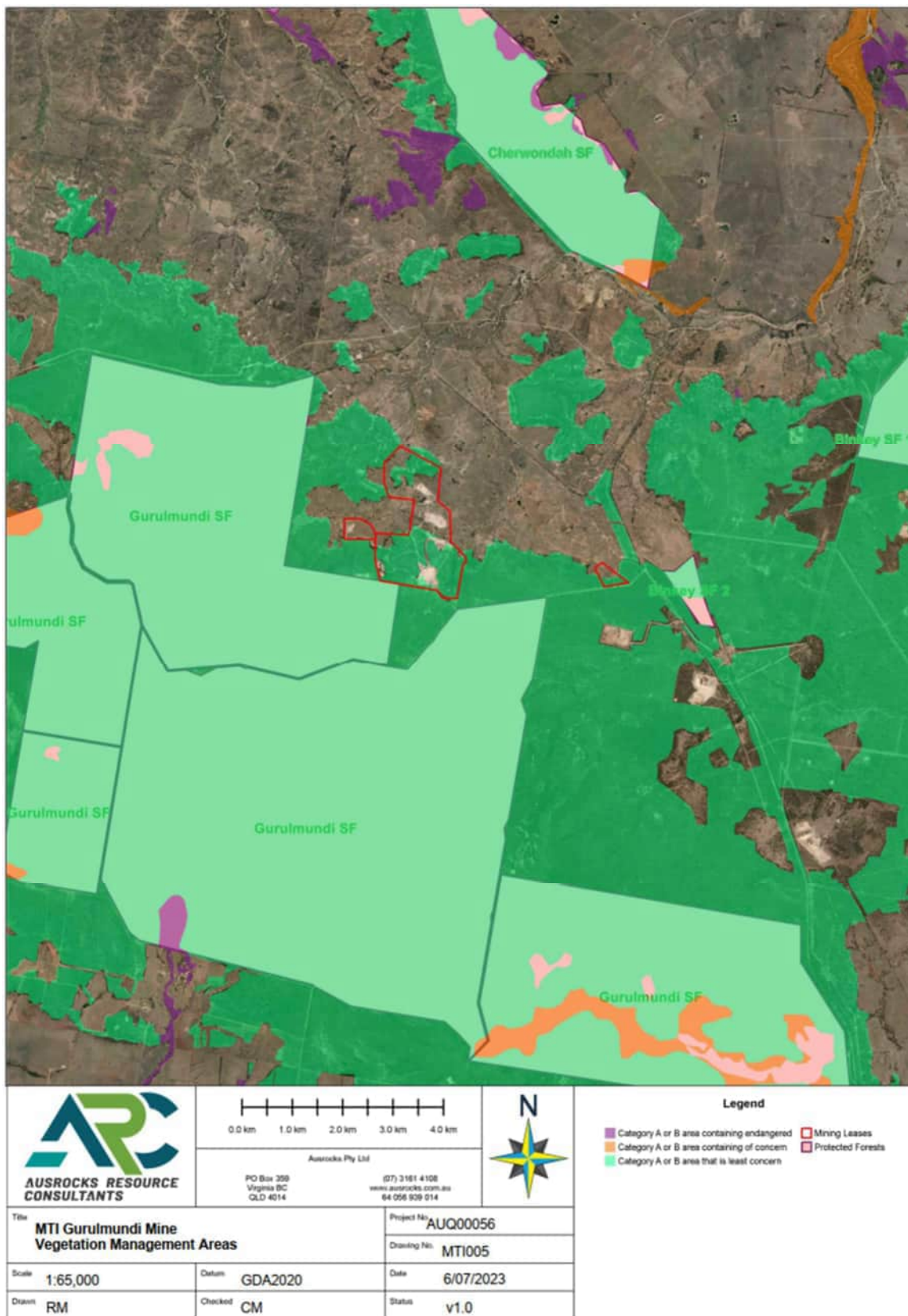


Figure 9: Gurulmundi Mine vegetation management areas

1.2.8.3 Threatened ecological communities

Three (3) threatened ecological communities (TECs) listed as Matters of National Significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were identified from the desktop study¹⁸:

- Coolibah – Black Box Woodlands of the Darling Riverine plains and the Brigalow Belt South Bioregions (Coolibah and Brigalow TEC);
- Poplar Box Grassy Woodland on Alluvial Plains (Poplar Box TEC); and
- Weeping Myall Woodlands (Weeping Myall TEC).

The TECs are all described as ‘endangered’. On-the-ground surveys have not been completed to determine the extent and distribution of these communities. There are no specific requirements in the Gurulmundi Mine EA for inclusion of TECs in the rehabilitation planning.

1.2.8.4 Threatened flora

A desktop study of the mining leases (with 1km buffer) returned 10 threatened flora species listed under the EPBC Act and/or the *Nature Conservation Act 1992* (NC Act). These are summarised in **Table 14**. There are no specific requirements in the Gurulmundi Mine EA for inclusion of threatened flora species in the rehabilitation planning.

Table 14: Threatened flora populations within the Gurulmundi Mine area (up to 1km buffer)

Class	Species name	Common name	Status ¹	Likelihood of occurrence ²
Threatened species				
Plant	<i>Acacia curranii</i>	Curly-bark Wattle	V	K
	<i>Arthraxon hispidus</i>	Hairy-joint Grass	V	M
	<i>Cadellia pentastylis</i>	Ooline	V	L
	<i>Calytrix gurulmundensis</i>	-	V	L
	<i>Dichanthium setosum</i>	Bluegrass	V	L
	<i>Homoranthus decumbens</i>	A shrub	E	M
	<i>Lepidium monoplacoides</i>	Winged Pepper-cress	E	M
	<i>Thesium australe</i>	Austral Toadflax, Toadflax	V	M
	<i>Vincetoxicum forsteri</i> listed as <i>Tylophora linearis</i>	-	E	M
	<i>Xerothamnella herbacea</i>	-	E	M

¹ Threatened category: Vulnerable (V); Critically Endangered (CE); Endangered (E), Special Least Concern (SL).

² Likelihood of occurrence: Species or species habitat likely to occur within area (L); Species or species habitat may occur within area (M); Species or species habitat known to occur within area (K); Pest species has potential to occur within area (P).

1.2.9 Fauna presence and populations

A desktop study returned 26 threatened fauna species and 11 migratory species listed under the EPBC Act and/or the NC Act that may occur within the MTI Gurulmundi area, based on the desktop search. One (1) pest species was also identified. The likelihood and occurrence of each species is based on reported sightings and mapped habitats. This is summarised in **Table 15**. There are no specific requirements in the MTI Gurulmundi EA for inclusion of fauna habitat planning in the rehabilitation planning.

¹⁸ <https://pmst.awe.gov.au/> (accessed July 2023)

Table 15: Fauna populations within the MTI Gurulmundi area

Class	Scientific name	Common name	Status ^{1, 2}	Likelihood of occurrence ³
Threatened species				
Bird	<i>Aphelocephala leucopsis</i>	Southern Whiteface	V	M
	<i>Calidris ferruginea</i>	Curlew Sandpiper	CE	M
	<i>Calyptorhynchus lathamii lathamii</i>	South-eastern Glossy Black-Cockatoo	V	L
	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (south-eastern)	V	M
	<i>Erythrorhynchus radiatus</i>	Red Goshawk	E	M
	<i>Falco hypoleucos</i>	Grey Falcon	V	L
	<i>Geophaps scripta scripta</i>	Squatter Pigeon (southern)	V	L
	<i>Hirundapus caudacutus</i>	White-throated Needletail	V	M
	<i>Rostratula australis</i>	Australian Painted Snipe	E	L
	<i>Stagonopleura guttata</i>	Diamond Firetail	V	K
Mammal	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat, Large Pied Bat	V	M
	<i>Dasyurus hallucatus</i>	Northern Quoll	E	M
	<i>Macroderma gigas</i>	Ghost bat	V	M
	<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat, South-eastern Long-eared Bat	V	L
	<i>Petauroides Volans</i>	Greater Glider (southern and central)	E	L
	<i>Petaurus australis australis</i>	Yellow-bellied Glider (south-eastern)	V	K
	<i>Phascolarctos cinereus</i>	Koala	E	L
Reptile	<i>Anomalopus mackayi</i>	Five-clawed Worm-skink, Long-legged Worm-skink	V	M
	<i>Delma torquate</i>	Adorned Delma, Collared Delma	V	M
	<i>Egernia rugosa</i>	Yakka Skink	V	M
	<i>Eseya albagula</i>	Southern Snapping Turtle, White-throated Snapping Turtle	CE	M
	<i>Furina dunmali</i>	Dunmall's Snake	V	M
	<i>Hemiaspis damelii</i>	Grey Snake	E	L
	<i>Rheodytes leukops</i>	Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver	V	M
Gastropod	<i>Adclarkia cameroni</i>	Brigalow Woodland Snail	E	M
	<i>Adclarkia dulacca</i>	Dulacca Woodland Snail	E	M
Migratory species (birds)				
Marine species	<i>Apus pacificus</i>	Fork-tailed Swift	-	L
Terrestrial species	<i>Cuculus optatus</i>	Oriental Cuckoo, Horsfield's Cuckoo	-	M
	<i>Hirundapus caudacutus</i>	White-throated Needletail	V	M
	<i>Motacilla flava</i>	Yellow Wagtail	-	M
	<i>Myiagra cyanoleuca</i>	Satin Flycatcher	-	M
	<i>Rhipidura rufifrons</i>	Rufous Fantail	-	M
Wetland species	<i>Actitis hypoleucos</i>	Common Sandpiper	-	M
	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	-	M
	<i>Calidris ferruginea</i>	Curlew Sandpiper	CE	M
	<i>Calidris melanotos</i>	Pectoral Sandpiper	-	M
	<i>Gallinago Hardwickii</i>	Latham's Snipe, Japanese Snipe	-	M
Introduced species				
Amphibian	<i>Bufo marinus</i>	Cane toad	OI	P

¹ Threatened category: Vulnerable (V); Critically Endangered (CE); Endangered (E), Special Least Concern (SL)

² Invasive category: Restricted invasive (RI); Other Invasive (OI)

³ Likelihood of occurrence: Species or species habitat known to occur within area (K); Species or species habitat likely to occur within area (L); Species or species habitat may occur within area (M); Species or species habitat known to occur within area; Foraging, feeding or related behaviour likely to occur within area (K); Pest species has potential to occur within area (P)

1.2.10 Pre-mining land use

The pre-mining land use of the area is cattle grazing with surrounding nature conservation areas (protected State Forests). It is likely some parts of the mining area were cleared for grazing purposes. It is also likely that existing soil erosion would have been present across the site pre-mining disturbance, such as along watercourses.

1.2.11 Underlying landholders

The underlying landowners for the MTI Gurulmundi leases are shown in **Table 16**.

Table 16: Underlying landholders for the Gurulmundi Mine project area

Mining lease	Lot Plan	Landowner
ML55007	34/FT167 11/FT142	
ML55008	10/FT142	
ML55017	34/FT167	

1.3 Design for closure

This PRC plan has been developed to proactively manage progressive rehabilitation of the Gurulmundi Mine to a stable PMLU, aiming to minimise long-term management requirements as well as associated closure costs. Importantly, a focussed design for closure underpins all sections of this plan from:

- existing operations methods to development of the rehabilitation knowledge base (baseline information);
- engagement with relevant stakeholders to define suitable PMLUs and in accordance with the LOD;
- defining and implementing rehabilitation practices to identify risks that could influence achievement of milestone criteria; and
- demonstrating successful rehabilitation through defined site monitoring to develop a feasible PRCP schedule.

1.4 Spatial information

The following spatial information are submitted to support the development of this PRC plan¹:

- location and maximum extent of disturbance footprint for the mine life
- the PMLUs and NUMAs for the area within the resource tenures (there are no NUMAs proposed for the Gurulmundi Mine)
- any sensitive receptors

Spatial information is provided to the administering authority via email to spatialsubmit@des.qld.gov.au¹⁹.

¹⁹ DES. (2022). Spatial information submission guideline version 5 (ESR/2018/4337). Department of Environment and Science, Queensland.

1.5 Rehabilitation and improvement planning

Legislative Requirement

In accordance with section 126C(1)(b) and (c)(ii) of the EP Act, the rehabilitation planning part of the PRC plan must include:

- identification of all relevant activities on the mine site
- the predicted duration of each of the relevant activities proposed for the mine site
- the size/extent of the relevant activities; and
- whether the different relevant activities can be progressively rehabilitated.

PRCP Guideline (section 3.5)

Under section 126C(1)(j) of the EP Act, transitional PRC plans must also include the following details of any existing rehabilitation already completed at the time of submission of the proposed PRC plan:

- a description of the rehabilitation works previously carried out
- when the rehabilitation works commenced and were completed; and
- whether the rehabilitation has been applied for or approved as progressively certified under the EP Act.

1.5.1 Relevant activities

Relevant activities at Gurulmundi Mine that will require rehabilitation are provided in **Table 17** – note, total size (ha) provided reflects the maximum extent of disturbance over the life of mine, not EA authorised disturbance or current disturbance. During the development of the PRC Plan, it was determined that the authorised disturbance did not match the life of mine planned disturbance. At this stage the PRC Plan covers the whole life of mine disturbance footprint and a future EA Amendment will address any discrepancies. **Table 17** summarises the relevant activities including estimate duration, size, rehabilitation commenced and/or completed, and availability for progressive rehabilitation.

Table 17: Relevant activities requiring rehabilitation at Gurulmundi Mine

Relevant activity	Estimate availability	Size (ha)	Availability for progressive rehabilitation (including historical works)
Pit Areas (RA1 & RA2)			
Central Pit	2025 – 2034	9.0	Available for rehabilitation once all pit mining activities are complete. Rehabilitation will commence as soon as practicable.
North Pit	2025 – 2029	3.8	
Far North Pit	2025 – 2046	22.0	
West Pit	2025 – 2046	10.4	Sections of pit areas will become available at different times throughout the life of mine (e.g. one portion of the ML55008 Pit rehabilitation availability is estimated in 2039 and the remaining portion in 2046).
ML55017 Pit (Far West Pit)	2025 – 2034	3.9	
ML55008 Pit	2039 – 2046	8.7	
Topsoil Stockpiles (RA3 & RA4)			
Topsoil stockpiles	2025 - 2048	16.3	Available once areas within the mine are ready for rehabilitation and topsoil spreading. Areas will become available for rehabilitation at different stages throughout the life of mine.
Overburden and Laydown Areas (RA5 & RA6)			



Relevant activity	Estimate availability	Size (ha)	Availability for progressive rehabilitation (including historical works)
Overburden and Laydown Area – western side of main road in the Processing and Infrastructure Area	2048	9.8	Available once all mining activities are complete and all stockpiled material is removed off-site.
Overburden and Laydown Area – eastern side of main road in the Processing and Infrastructure area	2048	6.7	Available once all mining activities are complete and all stockpiled material is removed off-site. Processing plant equipment positioned atop concrete footings are located within this stockpile yard. Concrete footings will be broken up and removed off-site to an appropriate and licenced waste facility. Areas will become available for rehabilitation at different stages throughout the life of mine.
Overburden and Laydown Area – in the Far West pit of ML55017, and in the Central pit of ML55007	2034	0.8	Available once all mining activities are complete and all stockpiled material is removed off-site. Excess stockpile material will be used as backfill material (if determined suitable) to assist in landform development to achieve a smooth and free-draining landform. Areas will become available for rehabilitation at different stages throughout the life of mine.
Infrastructure (RA7)			
Infrastructure – office, laboratory, weighbridge and storage buildings/sheds	2052	0.5	Available once all mine operations have ceased. All fixed buildings including Office Shed, Toilet, Weighbridge, Dispatch Office, Site Office, Laboratory, Lunchroom, USA Clay/Coal Shed, Cat Litter Storage Shed, Mill Feed Shed, Mill Shed, Mill Warehouse and Silos will be surrendered to the landowner (subject to the removal of all bentonite processing plant including conveyors, screens, etc., and any other mobile equipment of plant. Power connection including lights and power supply points may remain within buildings.
Roads & Tracks (RA8 & RA9)			
Roads – ancillary	2029 - 2048	4.2	Available once all active mine operations have ceased. Sections of road will become available for rehabilitation at different stages throughout the life of mine.
Main Road (RA10)			
Roads – main access road to remain	2052	1.8	Available once all active mine operations have ceased. The main access road from the front gate to Juandah Creek will be surrendered to the landowner in its current state as an unsealed dirt road.
Sediment Basins & Water Storages (RA11 & RA12)			
Sediment Basins & Mine Water Storages	2048	1.2	Available for rehabilitation once all active mine operations have ceased.
Water Storages (RA13)			
Mine Water Storage – Lower Sediment Basin & Central Pit Extraction Dam 1 to remain	2052	1.2	The 'CP_Dam1' (0.61ha) will be available once all active mine operations have ceased. 'CP_Dam1' and the 'Lower Basin' (0.54ha) will be surrendered to the landowner following clean out of sediment and conversion to a clean water storage area. 'Lower Basin' is considered suitable for direct access & livestock use, however 'CP_Dam 1' will be fenced to prevent livestock access and water will be siphoned to nearby stock dams for livestock access.



Relevant activity	Estimate availability	Size (ha)	Availability for progressive rehabilitation (including historical works)
Existing Rehabilitation Areas (RA14, RA15, RA16, RA17 & RA18)			
Existing Rehabilitation	Already commenced	26.0	Progressive rehabilitation has already commenced. These areas are in various stages of rehabilitation (Stage 1, Stage 2 & Stage 3) requiring additional activities to improve condition to meet PMLU. Additional activities including sub-soil ripping, application of amelioration, topsoil spreading, seeding and maintenance.

1.5.2 Rehabilitation areas and milestones

The activities in **Table 17** are grouped by rehabilitation area (RA). The PRCP Guideline defines a rehabilitation area as ‘An area of land in the post-mine land use to which a rehabilitation milestone for the post-mining use relates. A rehabilitation milestone (RM) for the rehabilitated land, means each significant event or step necessary to rehabilitate the land to a stable condition (section 115 of the EP Act)¹.’

Rehabilitation milestones are legally enforceable commitments once the PRCP schedule is approved. Therefore, it is essential that milestones are written in a manner that delivers on SMART principles:

- **Specific** – It is clear what must be done;
- **Measurable** – It must be possible to know when it has been achieved;
- **Achievable** – It is capable of being achieved;
- **Reasonable / Relevant** – There is a clear connection between the milestone and desired outcomes (the requirement is reasonable); and
- **Time Specific** – It is clear when the milestone will be completed.

The RAs and RMs for Gurulmundi Mine are summarised in **Table 18**.



Table 18: Rehabilitation areas (RAs) and rehabilitation milestones (RMs) for Gurulmundi Mine

Rehabilitation Areas (RA)		Rehabilitation Milestones (RM)	
RA1	Pits - Grazing	RM1	Infrastructure decommissioning and removal
RA2	Pits – Hybrid Ecosystem	RM2	Water storage preparation
RA3	Topsoil Stockpiles - Grazing	RM3	Landform development and reshaping
RA4	Topsoil Stockpiles – Hybrid Ecosystem	RM4	Establishment of geotechnically stable surface conditions
RA5	Overburden & Laydown Areas - Grazing	RM5	Surface preparation
RA6	Overburden & Laydown Areas – Hybrid Ecosystem	RM6	Seeding / Revegetation
RA7	Infrastructure	RM7	Establishment of PMLU surface conditions
RA8	Roads & Tracks - Grazing	RM8	Achievement of PMLU to a stable condition – Without water quality
RA9	Roads & Tracks – Hybrid Ecosystem	RM9	Achievement of water quality – Water quality only
RA10	Main Road (to remain)	RM10	Permanent infrastructure remaining post-mining is in a safe and stable condition
RA11	Sediment Basins & Water Storages – Grazing		
RA12	Sediment Basins & Water Storages – Hybrid Ecosystem		
RA13	Water Storages (to remain)		
RA14	Existing Rehabilitation – Grazing Stage 1		
RA15	Existing Rehabilitation – Grazing Stage 2		
RA16	Existing Rehabilitation – Grazing Stage 3		
RA17	Existing Rehabilitation – Hybrid Ecosystem Stage 1		
RA18	Existing Rehabilitation – Hybrid Ecosystem Stage 2		



1.5.3 Existing rehabilitation

Per Schedule F of the site's EA the site employs a Final Land Use and Rehabilitation Plan (FLURP) (**Appendix 4**). The purpose of the FLURP is to ensure all areas disturbed by mining activities are appropriately rehabilitated to final land uses described in 'Table F1 - Final Land Use and Rehabilitation Approval Schedule ('Table F1')' in the EA. Approximately 26.0 ha of mining disturbed land has commenced rehabilitation at Gurulmundi Mine (in line with annual return submitted 31 March 2024).

Figure 10 illustrates the location of existing (and planned) rehabilitation areas:

- **'Rehabilitation Stage 1'** – Rehabilitation has commenced with some backfilling and/or recontouring undertaken.
- **'Rehabilitation Stage 2'** – Rehabilitation has commenced (topsoil & seeding) but does not meet acceptance criteria; and
- **'Rehabilitation Stage 3'** – Rehabilitation essentially complete but minor repair required to fully satisfy acceptance criteria.

A summary of existing rehabilitation activities and the condition of existing rehabilitation areas is provided in the site Annual Rehabilitation Report 2023 (**Appendix 5**).

1.5.3.1 Existing rehabilitation

Rehabilitation activities undertaken in existing rehabilitation areas are likely to consist of, but not limited to:

- backfill of pits with overburden via dozer push;
- covering and levelling to allow for settlement, and covering with topsoil (where required);
- removal of equipment, machinery and all waste/rubbish;
- ripping to promote regrowth;
- re-spreading topsoil (previously removed from the site) over the area;
- contour ripping immediately after topsoil placement for erosion control; and
- seeding and/or tube stock planting.

An area mapped as "Rehab Stage 3" commenced rehabilitation around 2014-15, and areas mapped as "Rehab Stage 2" in the Far North and Central pits commenced rehabilitation around 2015-2016 (based on historical aerial imagery).

1.5.3.2 Progressive certification

At the time of preparing this PRC plan, no rehabilitation areas have a progressive certification application under the EP Act.

The condition of the rehabilitation area of 2.3ha in the North pit (Rehab Stage 3) is complete however has since experienced degradation due to poor weather conditions. Minor repair works have been completed and will be applied to return the area to a safe and stable condition prior to applying for progressive certification.



2 Post-mining land uses

Legislative Requirement

In accordance with section 126C(1)(d) of the EP Act, the rehabilitation planning part of the PRC plan must state the extent to which each post-mining land use or land identified in the PRCP schedule for the plan is consistent with:

- the outcome of consultation with the community in developing the plan; and
- any strategies or plans for the land of a local government, the State or the Commonwealth

PRCP Guideline (section 3.5)

A PMLU is defined under section 112 of the EP Act as the purpose for which the land will be used after all relevant activities for the PRC plan carried out on the land have ended. Relevant activity for a PRC plan is defined in the EP Act as the relevant activities to be carried out on land the subject of the plan. It is not the intention of this definition to include third-party activities or assets that continue to exist once mining activities have ceased, such as third-party pipeline easements, power easements or overlapping tenures for other EAs.

The rehabilitation planning part of the PRC plan must include a detailed description of the nominated PMLU(s) for the site. The description must include (where relevant), but is not limited to:

- a description of the use of the land
- if applicable, the specific vegetation types (e.g. RE 13.2.9) or land suitability classification (e.g. Class 4)
- identification of any permanent or essential management infrastructure to be included as part of the PMLU
- completion criteria for measuring whether the PMLU has been successfully achieved

Applicability to Transitional PRC plans

Where a PMLU has been previously addressed in a land outcome document and is able to be transitioned into the PRCP schedule, the holder is not required to complete the information requirements under section 126C(1)(j) of the EP Act in this section for those PMLUs.

However, the legislative requirements under section 126C(1)(d) of the EP Act still apply. All PMLUs transitioned into the PRCP schedule must still meet the requirements of a PMLU explained in this section, particularly that the PMLU can be rehabilitated to a stable condition.

2.1 Land outcome documents

In accordance with transitional provisions (section 750, EP Act), the site EA is an approved land outcome document².

2.2 Nominated PMLUs

The Gurulmundi Mine EA permits PMLUs of marginal grazing and water storage due to the pre-mining land use of the site and the surrounding existing land uses. Through consultation with the department, it is proposed that a portion of the land is rehabilitated to suit a hybrid ecosystem PMLU instead of marginal grazing. This is supported because a hybrid ecosystem PMLU will allow rehabilitation in specific areas to be more consistent with the surrounding landforms including areas characterised by steep slopes and Remnant Vegetation (RE11.10.1/11.7.2). Portions of the site intended to be rehabilitated to the hybrid ecosystem PMLU include;

- The southern portion of the Central Pit
- The northern portions of the Northern Pit
- The Western Pit
- The Infrastructure Area.

It is proposed that marginal grazing is the designated PMLU for mine disturbance on the lower slopes:

- Far West Pit
- The northern portion of the Central Pit



- The southern portions of the Northern Pit
- Baileys Gate Pit

The Water Storage PMLU is designated for areas of pit disturbance and existing sediment basins (where agreed in writing; **Appendix 7**).

Rehabilitation acceptance criteria have been transitioned to support the milestone criteria in the PRCP schedule with the final milestone of achieving a stable and safe post-mining land use condition. These are summarised in the following tables.

2.2.1 Marginal grazing PMLU

2.2.1.1 Marginal grazing on improved pasture grasses

The PMLU of marginal grazing on improved pasture grasses are designated for areas that have been disturbed by mining activities. Rehabilitation objectives, indicators, and acceptance criteria are summarised in **Table 19**.

Table 19: MTI Gurulmundi objectives, indicators and acceptance criteria for marginal grazing (improved pasture grasses) PMLU

Rehabilitation goal	Objective	Indicator	Acceptance criteria
Safe to humans and wildlife	Safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use	Hazard assessment	No significant difference
Non-polluting	Rainfall runoff from rehabilitation achieves relevant water quality objectives for receiving waters	ANZECC 95% aquatic ecosystem threshold	No significant difference
	Deep drainage from rehabilitation achieves relevant water quality objectives for groundwater	ANZECC 95% aquatic ecosystem threshold	Not significantly different to local water quality objectives in accordance with the Queensland Water Quality Guidelines ¹
Stable	Rehabilitation is geotechnically stable	Factor of Safety (FoS)	FoS $\geq 1.5^2$
	Rehabilitation is erosionally stable	Extent, slope gradient and groundcover	Groundcover $\geq 70\%$ 95% slopes $\leq 15\%$ gradient
Able to sustain an agreed post-mining land use	Rehabilitation is suitable for sustainable grazing pasture	Land suitability assessment for grazing pasture	Land suitability ≥ 3 or not different from pre-mining class if ≥ 4
		Native plant richness	≥ 4 ground cover species per ha

¹ DEHP, Queensland Water Quality Guidelines 2009 (re-published July 2013)

² ANCOLD, Factor of Safety? – Do we use it correctly?

2.2.1.2 Hybrid Ecosystems

The PMLU of hybrid ecosystems are designated for areas within the mining lease boundary that are disturbed, with rehabilitated slopes that are likely to exceed grazing (>15%) standards. These zones are commonly on elevated portions of the site adjacent to existing Regional Ecosystems. The slope issue is predominantly due to the pre-existing slopes of the areas mined, which varies across the site with maximums of >60% as topography ramps up to the upper plateau. The hybrid ecosystems will be rehabilitated using a similar groundcover species mix as the grazing PMLU, but will also include a portion of shrub species that are commonly found in the surrounding RE. This is intended to provide additional slope stabilisation for erosion control, suitable wildlife habitat connectivity between the RE and the PMLU but also maintain use as low intensity grazing for the landowner. In time these areas may naturally recruit tree species from the surrounding RE, but due to the overall land use preference for grazing, tree species are not considered mandatory for the hybrid ecosystem to function as a connectivity area. Revegetation species have been referenced from a varied of sources including BioCondition Benchmarks and the RE descriptions database however planting densities are not considered appropriate as they would likely undermine the grazing use of the land.

These areas will also contain marginally different monitoring and rehabilitation milestones to reflect the increased slope characteristics. The justification for modifying these areas is that whilst grazing has been formally accepted as the post mining land use under the EA, the rehabilitated slope characteristics are unable to comply with grazing guideline documents and the proposed hybrid ecosystem allows appropriate risk management of erosion on slopes whilst maintaining the overall intent of the PMLU for low intensity grazing. Rehabilitation objectives, indicators, and acceptance criteria are summarised in **Table 20**.

Table 20: MTI Gurulmundi objectives, indicators and acceptance criteria for hybrid ecosystem PMLU

Rehabilitation goal	Objective	Indicator	Acceptance criteria
Safe to humans and wildlife	Safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use	Hazard assessment	No significant difference
Non-polluting	Rainfall runoff from rehabilitation achieves relevant water quality objectives for receiving waters	ANZECC 95% aquatic ecosystem threshold	No significant difference
	Deep drainage from rehabilitation achieves relevant water quality objectives for groundwater	ANZECC 95% aquatic ecosystem threshold	Not significantly different to local water quality objectives in accordance with the Queensland Water Quality Guidelines ¹
Stable	Rehabilitation is geotechnically stable	Factor of Safety (FoS)	FoS $\geq 1.5^2$
	Rehabilitation is erosionally stable	Extent, slope gradient and groundcover	Groundcover $\geq 70\%$ slopes with comparable gradient to surrounding undisturbed slopes
Able to sustain an agreed post-mining land use	Rehabilitation is suitable for hybrid ecosystems	Native plant richness	≥ 3 ground cover species per ha ≥ 2 shrub species per hectare

¹ DEHP, Queensland Water Quality Guidelines 2009 (re-published July 2013)

² ANCOLD, Factor of Safety? – Do we use it correctly?



2.2.2 Water storage PMLU

The post-mine land use of water storage is designated for pit areas. This includes a portion of the Central Pit extraction area (labelled “CP Dam 1” and/or “CPD1”) and the Lower Sediment Basin (labelled LSBR) which are planned to be retained by the landowner with the water to be used for stock watering. For the lower sediment basin, the water storage will have battered slopes to 1V:3H, along with an access ramp at 1V:7H. All battered slopes that exceed 15% will require fencing to restrict livestock from accessing the water storage. Similarly, for CP Dam 1, the area is generally unsuitable for cattle access due to its 1V:2H slopes, instead it will be fenced off and water will be siphoned via pipe to nearby stock watering dams as required by the landowner following rehabilitation. CP Dam 1 will still include a 1V:7H ramp for machinery access, cleanout and relocating water management infrastructure.

Rehabilitation objectives, indicators, and acceptance criteria are summarised in **Table 21**.

Table 21: MTI Gurulmundi objectives, indicators and acceptance criteria for water storage PMLU

Rehabilitation goal	Objective	Indicator	Acceptance criteria
Safe to humans and wildlife	Safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use	Hazard assessment	No significant difference
			Steep slopes adequately fenced
Non-polluting	Rainfall runoff from rehabilitation achieves relevant water quality objectives for receiving waters	ANZECC 95% aquatic ecosystem threshold	No significant difference
	Deep drainage from rehabilitation achieves relevant water quality objectives for groundwater	ANZECC 95% aquatic ecosystem threshold	Not significantly different to local water quality objectives in accordance with the Queensland Water Quality Guidelines ¹
Stable	Rehabilitation is geotechnically stable	Factor of Safety (FoS)	FoS $\geq 1.5^2$
	Rehabilitation is erosionally stable	Extent, slope gradient and groundcover	Groundcover $\geq 70\%$ slopes $\leq 33\%$ gradient (1V:3H)
Able to sustain an agreed post-mining land use	Rehabilitation is suitable for sustainable grazing pasture	ANZECC 90% stock drinking water threshold	Water quality modelling shows water column is not predicted to dry out or overflow
		Water balance	Residual voids are not predicted to dry out or overflow
		Floodplain modelling	Residual voids are not in a floodplain zone 1% AEP modelling

¹ DEHP, Queensland Water Quality Guidelines 2009 (re-published July 2013)

² ANCOLD, Factor of Safety? – Do we use it correctly?

2.2.2.1 Water storage outcome

The site EA describes an approved final land use of marginal grazing and water storages for pit disturbance. Presently no pits are designated a PMLU of water storage except a portion of the Central Pit extraction area (labelled “CP Dam 1” and/or “CPD1”) designated for the use of stock drinking water, per the landowner agreement (**Appendix 7**). An existing sediment basin (labelled ‘Lower Basin’) located within the Processing and Infrastructure area will also remain post-mine as a water storage to support post-mining grazing land use.

To ensure a suitable rehabilitation outcome is achieved post-mining (i.e. water storage PMLU), the rehabilitation of existing water storages (CP Dam 1 and Lower Basin), will be assessed against defined acceptance criteria (**Table 21**) as well as a separate satisfaction/suitability assessment by the landowner, prior to relinquishment.

2.2.3 Marginal grazing land suitability

2.2.3.1 Pre-mining land suitability

The Guideline for Agricultural Land Evaluation in Queensland (herein referred to as ‘Queensland Land Evaluation Guidelines’)¹⁵ defines land capability and land use suitability in Queensland as follows:

- **Land capability classification** in Queensland is the evaluation of land attributes for arable, pastoral and other agricultural land uses involving current technology and agronomic management practices; and
- **Land suitability classification** in Queensland is the evaluation of soil and land attributes based on the requirements of a specified land use using current technology and management.

Five (5) land suitability classes are defined for use in Queensland, with land suitability decreasing progressively from class 1 to class 5, with classes 1 to 3 considered suitable for PMLU of marginal grazing (**Table 22**). Class 3 land suitability may be as productive as land classified as class 1 or 2 when supported by increased inputs such as fertiliser, land preparation and maintenance operations²⁸. Class 4 and class 5 are considered unsustainable for marginal grazing due to one or a number of severe limitations whereby the inputs required to initiate and maintain sustainable long-term production outweigh the potential benefits.

Table 22: Land suitability classes in Queensland

Class	Suitability	Limitations	Description
1	Suitable	Negligible	Highly productive land requiring only simple management practices to maintain economic production.
2	Suitable	Minor	Land with limitations that either constrain production, or require more than the simple management practices of class 1 land to maintain economic production
3	Suitable	Moderate	Land with limitations that either further constrain production or require more than those management practices of class 2 land to maintain economic production.
4	Unsuitable	Severe	Currently unsuitable land. The limitations are so severe that the sustainable use of the land in the proposed manner is precluded. In some circumstances, the limitations may be surmountable with changes to knowledge, economics or technology.
5	Unsuitable	Extreme	Land with extreme limitations that preclude any possibility of successful sustained use of the land in the proposed manner.

2.2.3.2 Rehabilitated land suitability

The Queensland land suitability classes (**Table 22**) are useful for determining pre-mining land use suitability; however, do not provide specific criteria for assessing land suitability classes for grazing land use on rehabilitated lands. The assessment of land suitability for marginal grazing on rehabilitated lands within the mining leases of Gurulmundi Mine, is instead based on the achievement of the post-mine land description and post-mine land capability classification specified in the EA (i.e. land capability class VII)²⁰. Land capability classification evaluates the potential of land for broadly defined land uses and is generally only used for broad scale assessment of land in Queensland. The system uses eight (8) classes, with limitations and hazards to agricultural and pastoral use becoming progressively greater from class I to class VIII with decreasing adaptability and choice of use (**Table 23**). Class I to class III are suited to more intense land uses while higher-numbered classes are suited to only low-intensity agriculture use or conservation.

The Queensland Land Evaluation Guidelines provides a comprehensive list of limitations, land use requirements and diagnostic attributes for agricultural land uses in Queensland. However, as class VII is unsuitable for agricultural use, these limitations are not incorporated in the assessment of rehabilitated land suitability for a marginal grazing PMLU.

Table 23: Land capability classes in Queensland

Class	Description
I	Land suitable for all agricultural and pastoral uses.
II	Land suitable for all agricultural uses but with slight restrictions for cultivation.
III	Land suitable for all agricultural uses but with moderate restrictions for cultivation.
IV	Land primarily suited to pastoral use, but which may be safely used for occasional cultivation with careful management.
V	Land that in all other characteristics would be arable but has limitations that make cultivation impractical and/or uneconomic.
VI	Land that is not suitable for cultivation but is well suited to pastoral use.
VII	Land that is not suitable for cultivation but on which pastoral use is possible only with careful management.
VIII	Land that has such severe limitations that is unsuited for either cultivation or grazing.

²⁰ DME. (1995). Technical Guidelines for Environmental Management of Exploration and Mining in Queensland. Department of Minerals and Energy, Queensland.



2.3 Community considerations

Achievement of the PMLU of marginal grazing is aligned with consultation completed to date and fulfills desired post-mine outcomes of the EA and landowner.

2.4 Regional planning integration

The marginal grazing PMLU at Gurulmundi Mine considers the pre-mining land use, surrounding land use and EA conditions. Existing land use in the area is primarily for grazing of beef cattle.

Under the Western Downs Regional Council Planning Scheme (April 2019). Gurulmundi Mine is located in a 'rural zone', which includes uses such as grazing, farming, forestry, tourism and extractive industries.

Land use performance outcomes for this rural zone include ensuring²¹:

- (1) *The zone primarily accommodates cropping or animal husbandry and ancillary detached dwellings;*
- (2) *All rural land is protected from alienation and fragmentation. A lack of viability for existing farming operations and small holdings does not provide suitable and sufficient planning justification for further subdivision or uses for non-rural purposes;*
- (3) *Residential development within the rural zone only occurs to the extent that it supports and is ancillary to the productive use of the land. Urban and residential development is contained within designated zonings for such uses and will not be permitted to expand into rural areas;*
- (4) *New enterprises, such as rural service industries and tourism activities, are accommodated;*
- (5) *Extractive resources and existing extractive operations on rural land are protected from encroachment from incompatible land uses:*
- (6) *They are directly associated with rural production, a natural resource or the natural environment or need to be removed from urban uses as a result of their impacts;*
- (7) *The productive capacity of the land is not diminished and conflicts with existing and intended activities in the surrounding area are avoided;*
- (8) *The existing landscape and natural resource values of the land are maintained; and*
- (9) *The proposed use could not be more appropriately located in another zone;*
- (10) *The environmental, character and landscape values of all rural land are protected from encroachment from incompatible land uses;*
- (11) *Adequate separation and buffering is provided by new development in nearby or adjoining urban or rural residential zone land to ensure that encroachment, fragmentation or alienation of rural land by these uses is avoided;*
- (12) *Special industry uses that require separation distances from sensitive land uses are supported and encouraged to locate in areas identified as Special Industrial Areas;*
- (13) *Any proposed reconfiguring of lots must facilitate allotments to ensure that battle-axe allotments are not created and that the location of any proposed future dwelling will allow for the front entrance of buildings to address the street;*

²¹ Western Downs Regional Council. (2019). Western Downs Planning Scheme – Amendment 1. Part 6.2.10 – Rural Zone Code



- (14) *Development is connected to urban infrastructure networks or is provided with suitable onsite potable water supply and a sustainable waste water disposal system to ensure the protection and maintenance of environmental health and human wellbeing and safety;*
- (15) *Ecologically significant features including waterways, wetlands and significant vegetation are retained and buffered from the impacts of development or where appropriate, vegetation is integrated within the development to ensure the long term protection of these features;*
- (16) *Development is located and designed to achieve ecological sustainability by ensuring that the proposed development incorporates the objectives and principles of energy efficiency, water conservation, water quality management and the principles Crime Prevention through Environment Design (CPTED);*
- (17) *Places, buildings or items of heritage character or heritage significance are protected and enhanced by development to preserve the historic character, amenity and identity of the locality;*
- (18) *Development responds to land constraints such as topography, bushfire and does not impact on the flood capacity or impede the flood conveyance function of land;*
- (19) *Where development is not consistent with the purpose and intent of the Rural zone, overriding community need will need to be demonstrated as well as valid planning justification provided as to why the proposed use cannot be reasonably established in a more appropriate zone.*

3 Non-use management areas

Legislative Requirement

In accordance with section 126C(1)(d), (g) and (h) of the EP Act, for each proposed non-use management area, the rehabilitation planning part of the PRC plan must:

- state the reasons the applicant considers the area cannot be rehabilitated to a stable condition
- include copies of reports or other relevant evidence relied on by the applicant for each proposed non-use management area
- state the extent to which the proposed non-use management area is consistent with the outcome of consultation with the community in developing the plan; and
- state the extent to which the non-use management area is consistent with any strategies or plans for the land of a local government, the State or the Commonwealth.

PRCP Guideline (section 3.3)

A NUMA is defined in the EP Act as an area of land the subject of a PRC plan that cannot be rehabilitated to a stable condition after all relevant activities for the PRC plan carried out on the land have ended. Proposed NUMAs must be justified under the criteria set out in section 126D(2) of the EP Act.

The rehabilitation planning part of the PRC plan must also include:

- a) information demonstrating that the proposed footprint of each NUMA is as small as practicable
- b) an assessment of the NUMA location options, having regard to the constraint of the resource location, with an analysis of the potential environmental harm and sensitivity of the surrounding environment of each option
- c) a description of the proposed location of each NUMA and the environmental values of the surrounding environment
- d) evidence showing how the proposed location will prevent or minimise environmental harm

In accordance with section 126D(1)(c) of the EP Act, the applicant must develop and implement management milestones within the PRCP schedule which achieve best practice management and minimise environmental harm for any NUMAs contained in the proposed PRC plan. As part of the development of management milestones, the applicant must conduct a NUMA specific risk assessment to identify and quantify risks and associated controls. The risk assessment should have an overarching goal of identifying and controlling any significant risks to the community and the environment.

The proposed PRC plan must include a detailed description of the nominated NUMA(s) for the site. The description must include, but is not limited to:

- description of the land at surrender
- any relevant safety features
- completion criteria for measuring whether the NUMA has achieved sufficient improvement

Applicability to Transitional PRC plans

Where a NUMA has already been identified in a land outcome document and is able to be transitioned into a PRCP schedule, the applicant is not required to comply with sections 126C(1)(g) or (h) or 126D(2) or (3) of the EP Act. NUMAs transitioned into the PRCP schedule are not required to complete the information requirements under section 126C(1)(j) of the EP Act in this section for those NUMAs. However, the legislative requirements under section 126C(1)(d) of the EP Act still apply.

Where a NUMA has not been pre-approved and is proposed as part of the transition into the PRC plan, the applicant must include all of the requirements identified in this section.

3.1 Land outcome documents

There are no NUMAs planned for MTI Gurulmundi.



3.2 Nominated NUMAs

Not applicable. There are no NUMAs nominated or planned for MTI Gurulmundi.

3.3 Community considerations

There are no NUMAs planned for MTI Gurulmundi.

3.4 Regional planning integration

There are no NUMAs planned for MTI Gurulmundi.

4 Voids in floodplains

Legislative Requirement

In accordance with sections 126D(3) of the EP Act, if land the subject of the proposed PRCP schedule will contain a void situated wholly or partly in a flood plain, the schedule must provide for the rehabilitation of the land to a stable condition.

PRCP Guideline (section 3.4)

Section 41C of the EP Regulation states the decision considerations for a void situated wholly or partly in a flood plain. A void is considered to be located in a flood plain if the flood plain modelling shows that, when all relevant activities carried out on the land have ended, the land is the same height as, or lower than, the level modelled as the peak water level 0.1% AEP for a relevant watercourse under the guideline Australian Rainfall and Runoff (2019)(ARR).

Applicability to Transitional PRC plans

Where a land outcome document has been pre-approved for a void with a location specified, flood plain modelling is not required. If a void has been identified as a NUMA in a land outcome document but the location is not identified, the applicant is required to carry out flood plain modelling in accordance with this section of the guideline. While the provision in the EP Act relating to voids located within a floodplain having to rehabilitate to a stable condition does not apply, the PRC plan must include how the proposed location of the void minimises risks to the environment. Therefore, the flood plain modelling is required to support the assessment of the proposed location of the void.

If there are no land outcomes identified in a land outcome document, the applicant is required to carry out flood plain modelling in accordance with this section of the guideline.

The EP Act defines the West, Far West, Central, North and Far North pits as voids (*“an area of land to be excavated in the carrying out of mining activity”*). All voids will be backfilled in accordance with EA conditions to achieve a stable condition with PMLU of marginal grazing and post-mine land capability class VII. Therefore, no voids will not be left on-site as a NUMA and flood modelling for the purpose of a void within a floodplain are not required.

As per **Section Floodplain assessment1.2.4.1** and **Figure 6** the remaining water storage structure locations do not overlap with the Floodplain Assessment Overlay and the water storages are associated with small catchments.

5 Community consultation

Legislative Requirement

In accordance with section 126C(1)(c)(iii) and (iv) of the EP Act, the rehabilitation planning part of the PRC plan must include:

- details of the consultation undertaken by the applicant in developing the proposed PRC plan; and
- details of how the applicant will undertake ongoing consultation in relation to the rehabilitation to be carried out under the plan.

PRCP Guideline (section 3.5)

In developing the proposed PRC plan, the community should at least be engaged on the plan for the mine, PMLUs and/or NUMAs, areas of disturbance, rehabilitation and management methods, progressive rehabilitation, and closure timeframes. Ongoing community consultation should continue throughout the stages of the mine life so that progressive rehabilitation and the socio-economic and environmental impacts related to mine closure can be discussed with the community.

Community consultation carried out through different processes, such as an EIS, may be used to address the requirements in section 126C(1)(c) of the EP Act. The details of this consultation must be provided in the rehabilitation planning part of the proposed PRC plan.

Applicability to Transitional PRC plans

Transitional PRC plans are still required to meet the legislative requirements in section 126C(1)(c) of the EP Act. All proposed PRC plans must contain a community consultation plan regardless of whether the site has an existing EA.

5.1 Consultation to date

Access to historical records of community consultation and stakeholder engagement is not available due to the age of the mine. It is assumed that methods of consultation included, but were not limited to:

- local governments to source land use approvals required by planning instruments relevant at the time;
- DES (formerly Department of Environment and Heritage Protection / Environmental Protection Agency) to secure environmental authority approval for the mine activity;
- DOR (formerly Department of Natural Resources, Mines and Energy) to secure mining tenure approval for the mine activity;
- local governments and landowners to secure compensation agreements; and
- state governments to secure royalties for the extraction of mineral resources.

It is also assumed historical consultation was undertaken via telephone calls, in person meetings and/or via written correspondence, on an as-required basis.

5.2 Community consultation register

A community consultation register has been provided as part of the PRC plan in compliance with section 126C(1)(c)(iii) of the EP Act and includes:

- identification of each community member/stakeholder;
- all recorded previous engagements with the community;
- consultation date(s);
- description of consultation type (e.g. letters, meetings and communication strategies);
- information provided to the community;
- issues raised/discussed;
- how issues raised and the outcomes of engagement have been considered in decision-making; and
- commitments made by the applicant.



The community consultation register (**Appendix 6**) will be a live instrument for recording future consultation on the Gurulmundi Mine PRC plan.

Relevant stakeholders identified for MTI Gurulmundi PRC planning and are detailed in **Table 24**.

Table 24: Stakeholders register for MTI Gurulmundi

Stakeholder(s)	Details	Related issues
Affected stakeholders		
Traditional owners – Iman People	The Iman People hold an active claim with the NNTT (National Native Title Tribunal) over a large area of land (approximately 10,603.1km ²) of which the Gurulmundi Mine is located within. Tribunal No. QC2017/008 Federal Court No. QUD413/2017	<ul style="list-style-type: none"> • Cultural heritage impacts • Impacts on Native Title • Potential for impacts on the cultural landscape and/or connections to Country • Post-mining land use and landform/ landscape • Environmental management/ stewardship • Employment and business opportunities in exploration, environmental management and monitoring, and rehabilitation
Affected landowners and lessees	MTI has agreements with the two landowners within the Gurulmundi Mine MLs. Land on which the MLs are located is used for grazing. There are no properties in place within the MLs therefore there are current no Compensation Agreements in place.	<ul style="list-style-type: none"> • Future access to and ownership of lands • Compensation impacts on land use • Water access – water allocations, water pipelines • Environmental management/ stewardship • PMLU and landform/landscape • Rehabilitation
Utility owners	Implementation of the PRC plan will trigger requirements to update agreements with utility owners who have assets within the Gurulmundi Mine MLs.	<ul style="list-style-type: none"> • Impact on asset/asset value • Remediation of impacts on assets • Service disruptions and mitigations • Crossing/interface agreements
Owners of overlapping tenures	There are no overlapping tenures with the Gurulmundi Mine MLs	<ul style="list-style-type: none"> • Not applicable
Adjacent private landowners	A land parcel (lot plan 164FTY1242) to the south of Gurulmundi Mine MLs is State owned forest. No other land parcels directly abut against mining leases.	<ul style="list-style-type: none"> • Environmental management/ stewardship • PMLU and landform/landscape • Rehabilitation schedule • Future access to and ownership of lands
Local government Western Downs Regional Council	Western Downs Regional Council is the local government and planning authority for the Woleebee and Gurulmundi LGA.	<ul style="list-style-type: none"> • Local job opportunities • Economic and community sustainability and transformation (towards post-mining) • Environmental management/ stewardship • Effects on Council services and infrastructure (e.g. road maintenance, water supply) • Mine rehabilitation progress • Management of closure impacts on employment and businesses • Accordance of MTI rehabilitation plans with local and regional planning goals
Interested stakeholders		
Other nearby landowners	Several surrounding private freehold and State-owned land around Gurulmundi Mine	<ul style="list-style-type: none"> • Post-mining land use and landform/ landscape • Access to land • Rehabilitation schedule • Future access to and ownership of lands
MTI employees and contractors	Interest in closure planning if they believe it will affect employment security	<ul style="list-style-type: none"> • Job opportunities • Loss of jobs relating to closure • Closure planning • Worker conditions • Sustainability of communities dependent on mining



Stakeholder(s)	Details	Related issues
Interested stakeholders		
Businesses	Local business	<ul style="list-style-type: none"> Economic transformation (post-mining) Economic and community sustainability
Community members and groups	Woleebee and Gurulmundi communities	<ul style="list-style-type: none"> Community and regional sustainability Environmental management Supply of mobile plant & equipment for bushfire management Future use of mined land Rehabilitation schedules
Queensland Government	State government representatives and agencies with an interest in PRC planning include: <ul style="list-style-type: none"> Office of the Minister for Resources Office for the Minister of Environment, Great Barrier Reef, Science and Youth Affairs Shadow Minister for Natural Resources, Mine and Energy Member for Woleebee and Gurulmundi Department of Natural Resources, Mining and Energy (DNRM) Department of Environment and Science (PRCP Team and Sunshine Coast Business Centre) 	<ul style="list-style-type: none"> Legislative compliance Public interest Environmental management Financial assurance Environmental risk identification and management Future use and landform Company response to stakeholder views
Federal Government	The Department of Agriculture Water and Environment (DAWE) is the lead agency for environmental protection at the Commonwealth level.	

5.3 Ongoing consultation

A dedicated Community Consultation Plan (CCP) has been developed for Gurulmundi Mine PRC planning²² (**Appendix 6**). The purpose of this plan is to document iterative consultation processes to be followed to facilitate ongoing engagement with relevant community members and stakeholders (**Table 25**).

²² Ausrocks Resource Consultants. (2026). Gurulmundi Bentonite Mine Community Consultation Plan. Version 1.1.

Table 25: Process for ongoing stakeholder consultation

Engagement objectives	<ul style="list-style-type: none"> • Develop strong and cooperative stakeholder relationships (affected stakeholders) • Demonstrate transparency regarding PRCP intentions and timeframes (local communities) • Incorporate community objectives 	
Stakeholders	Consultation method	Frequency
<ul style="list-style-type: none"> • Landowners and lessees within the MLs • Adjacent private landowners • Western Downs Regional Council • Utility owners • Traditional Owners – Iman People 	Notify affected stakeholders in writing when the PRC plan is approved and provide a copy of the PRC plan for their information.	One-off
	Meet directly with affected stakeholders to communicate progress on rehabilitation against the PRC plan and PRCP schedule and discuss any other items of interest pertaining to disturbed areas for example. Meetings may be face-to-face or virtual.	Ongoing, as required
	Notify affected stakeholders in writing of any amendments to the site EA and/or to the PRC plan and PRCP schedule, and the approval of any amendments.	One-off
<ul style="list-style-type: none"> • Gurulmundi and Woleebee community members/groups • Landowners and lessees within the MLs • Adjacent private landowners • Local businesses 	Provide community updates on PRC planning and advise of the progress on rehabilitation.	Ongoing, as required
	Respond in writing and/or via face-to-face or virtual meetings to address any complaints received.	Ongoing, as required
<ul style="list-style-type: none"> • Government agencies and/or elected representatives 	Provide updates via letter and/or meeting on PRC plan and PRCP schedule to: <ul style="list-style-type: none"> • Office of the Minister for Resources and Critical Minerals (Queensland) • Shadow Minister for Resources • Office of the Minister for Energy and Clean Economy Jobs • Office of the Minister for Regional Development and Manufacturing and Minister for Water • Member for Callide (Queensland Parliament) • Department of Environment and Science PRCP Team and Cairns Minerals Business Centre • Deputy Director-General, Georesources, Department of Resources • Assistant secretary assessments and Governance Branch, Department of Agriculture, Water and the Environment 	As required and/or as agreed with individual representatives/agencies
<ul style="list-style-type: none"> • MTI employees, contractors and unions 	Provide regular updates on PRC planning and updates on rehabilitation process. Delivered in writing and/or via meetings.	Ongoing, as required
<ul style="list-style-type: none"> • Western Downs Regional Council 	Meet with council representatives to understand Council's strategic analysis and planning for the Western Downs Regional LGA and the MTI Gurulmundi area to ensure PMLUs are aligned to council zoning and planning objectives.	Annually and/or as agreed with council

6 Rehabilitation and management methodology

Legislative Requirement

In accordance with sections 126C(1)(e) and (i) of the EP Act, the rehabilitation planning part of the PRC plan must:

- for each proposed post-mining land use for land, state the proposed methods or techniques for rehabilitating the land to a stable condition in a way that supports the rehabilitation milestones under the proposed PRCP schedule; and
- for each proposed non-use management area, state the proposed methodology for achieving best practice management of the area to support the management milestones under the proposed PRCP schedule for the area.

PRCP Guideline (section 3.6)

The proposed rehabilitation or management methodologies will underpin the development of the milestone criteria and support how the proposed PMLU will be achieved or the NUMA will be managed. As per Section 126C(1)(j) of the EP Act, the administering authority requires information describing how the proposed rehabilitation or management methodologies have been developed and will be implemented.

This section identifies a number of studies that must be provided in the proposed PRC plan. If any of the required information outlined below is not relevant to the specific operation, the applicant must provide justification in the PRC plan outlining why the information is not required.

6.1 General rehabilitation practices

PRCP Guideline (section 3.6.1)

This section outlines the range of information that the administering authority considers is necessary to underpin the development of the rehabilitation or management methodologies applicable to new and existing mines for most domains. The applicant must include the information as appendices to the rehabilitation planning part.

6.1.1 Hydrogeology

PRCP Guideline (section 3.6.1)

Assess the hydrogeology of the site and all connected strata and develop a conceptual model of the mine site's groundwater systems. This information must be integrated into the design of rehabilitation strategies and choice of PMLU or NUMA.

A desktop study found that whilst there is no site specific hydrogeology reports for the Gurulmundi Mining Leases, there is a report completed for the Secure Landfill located on Lot 67 AU67 directly South of ML55008. The report titled '*Secure Landfill Gurulmundi - Draft Impact Assessment Study Report*', 1991, AGC Woodward-Clyde concluded that the local area, including the geology under the Gurulmundi Mine was ideal for contaminated land storage because of the geological sequence severely limiting the movement of groundwater.

As part of the landfill investigation, 20 boreholes were drilled over lot 67 (adjacent lot to the South of ML55008) with a further 4 on lot 72 with the purpose of undertaking geotechnical testwork on the shallow stratigraphy & to investigate hydrogeological aspects such as groundwater intersection. Only one deep bore (GDB1) intersected groundwater to enable long term groundwater monitoring. Of the 24 shallow holes drilled (average 30m depth, significantly deeper than bentonite extraction) none intersected groundwater. GDB1 intersected steady groundwater at 66m and was terminated at 84m. In addition the Water Resources Commission drilled a bore to 296m for the purpose of stratigraphic interpretation. In the first portion of the hole to 162m, the only water of significance was noted at 116m depth supplying less than 0.1L/s. Significant shale layers occur at the site which impede vertical movement, and sandstone layers are poor aquifers. Horizontal movement is anticipated to be less than 1-5m per year and even less through the sandstone. The area was interpreted to be near the edge of the Great Artesian Basin, and it was considered extremely unlikely that any main aquifers could

be contaminated from the area due to the nature of the geological sequence. In summary the area cannot be a major intake area of the Great Artesian Basin when major aquifers do not outcrop there.

Figure 11 details the existing borehole locations in the proximity to the Gurulmundi Mining leases, along with a typical cross section showing the distance between the pit depths and a projected groundwater depth. The indicative groundwater level was mapped using known groundwater intercepts in surrounding boreholes, with a regional averaging effect to smooth the surface. As can be seen in the figure, there is a significant gap between the mine final landform and the projected groundwater table.

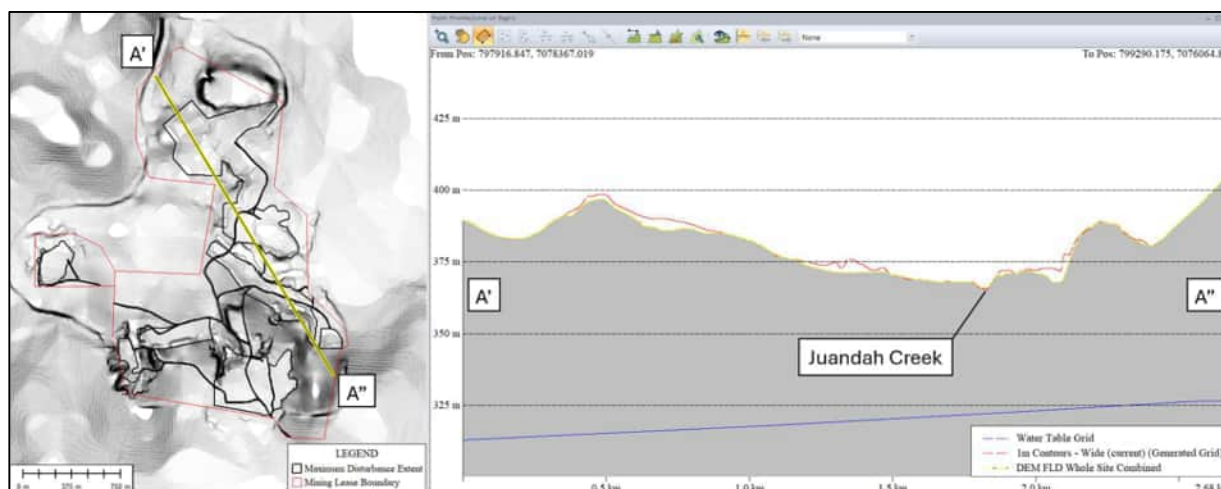


Figure 11: Groundwater mapping in relation to Gurulmundi Mine Final Landform

The EA does not require a hydrological assessment for Gurulmundi Mine; and it is determined the mining activities do not have an impact to groundwater. This is based on no incident of groundwater interaction throughout the history of exploration drilling or mine operations. EA conditions C10 to C11 outline protection measures must be undertaken to prevent groundwater contamination and that draw down is not to impact other users of the groundwater. Should an assessment be required in future, the following steps will be taken as part of the assessment:

- determine the groundwater occurrence including the existence of, and depth to, aquifers and aquitards;
- locate groundwater recharge and discharge locations locally and regionally;
- determine groundwater quality within each of the aquifers and from surface expressions (i.e. seeps and springs);
- determine current and potential future uses of groundwater including existing groundwater extraction bores;
- determine flow direction and velocity, including field tests to determine hydraulic conductivity;
- develop potentiometric mapping and hydro-stratigraphy cross sections; and
- conduct groundwater modelling to determine contaminant transport and potential changes to groundwater level from dewatering or waste storage.

Groundwater infiltration into all pits is negligible due to the geological strata and dewatering from working pits generally is only necessary after a heavy and prolonged rainfall event. There are no groundwater bores within the Gurulmundi Mine mining lease boundaries. Potential sources of groundwater contamination at Gurulmundi Mine is confined to infrastructure and processing areas, and any areas where fuel and chemicals, and/or septic tanks are stored. Contamination to groundwater from these sources, however, is low.



6.1.2 Flooding

PRCP Guideline (section 3.6.1)

Section 3.4 of this guideline requires flood plain modelling for the purpose of voids located within a flood plain being rehabilitated to a stable condition. In addition to this, the applicant must also assess the flooding susceptibility and influence across the site. If flooding is a consideration, develop a hydrologic model of the catchment and a hydraulic model of the proposed mining area. Knowledge of flooding is integral to the rehabilitation planning process, including the placement and design of mine domains.

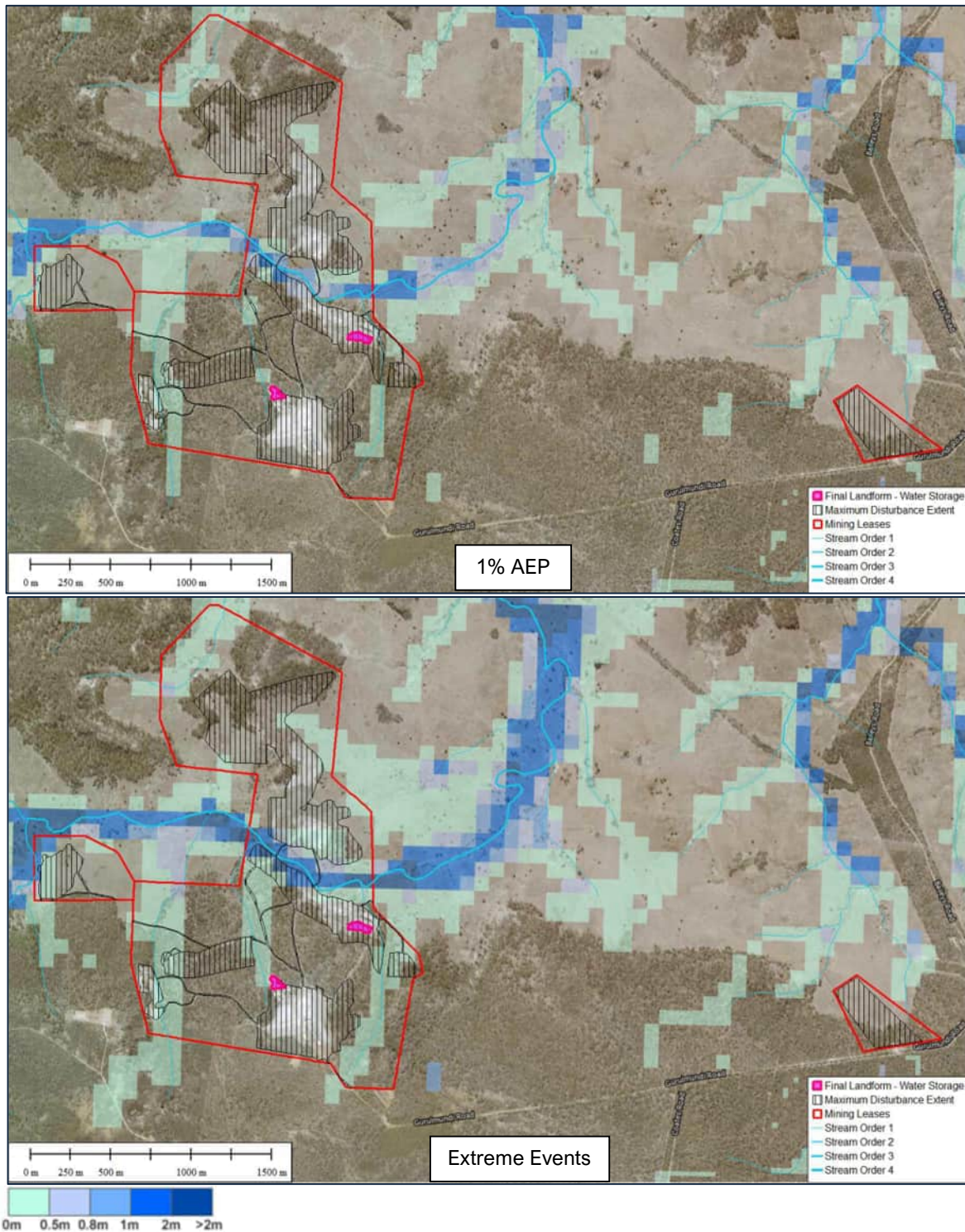
The approved activities will result in a final landform that is similar to the original and surrounding topography. The backfilling of pits will be undertaken to achieve a stable landform that does not present long-term erosion or weathering risks, greater than rates that are naturally occurring in the area (compared to the analogue sites).

An assessment of flood susceptibility has been used to inform a risk-based approach to determine the basis for this flood assessment.

In addition to the backfilling of the majority of pits and the final landform outcome, the assessment of flood susceptibility identified the following:

- DOR FloodCheck mapping (**Figure 12**) indicates only a limited overlap to areas within the disturbance footprint from a 1% AEP flood event, with only the central pit area of Gurulmundi Mine exposed to potential flood impacts of >1m;
- The Extreme Event mapping indicates that additional disturbance areas overlap, but no final landform water storages are impacted by >0.5m or high risk areas. Based on the relatively low level resolution of the Basin Level Flood Modelling and on-site topographic considerations, it is considered unlikely any impacts to water storage will occur during these events.
- the approved activities do not require diversion or interruption of creeks and/or streams (Juandah Creek is frequently observed not flowing); and
- there are no fourth order or higher streams present on the Gurulmundi Mine mining area.

Based on the above findings, the final landform will not adversely affect pre-mining flows and the identified risk associated with flooding is deemed low. No further flood modelling is required.



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Figure 12: Department of Resources 1% AEP flood depths (top) and extreme event flood depths (bottom)

²³ <https://floodcheck.information.qld.gov.au/> (accessed July 2023)



6.1.3 Waste characterisation

PRCP Guideline (section 3.6.1)

Characterise mine wastes in a report that describes the likely physical behaviour and chemical reactivity of the waste materials under the conditions in which they would be stored. The report must address the constituent elements present, and their relevant likely future speciation and mobility.

All mined material should be classified on its propensity to be potentially acid or non-acid forming, to generate neutral metalliferous or saline drainage, and its susceptibility to weather.

Due to the type of mining operations, all bentonite material mined from the Gurulmundi Mine is sold at various grade levels. Small quantities of overburden material that is generated from stripping activities are not processed during mining operations and are placed adjacent to stripping areas. These materials are then backfilled to the pit as part of the rehabilitation process. Overburden materials are therefore determined benign unaltered sedimentary rock consisting of sandstone, shale, siltstone and mudstone.

Whilst limited site specific material testing has been completed on waste, a waste characterisation summary has been prepared in **Appendix 9** which collates available information including data collected during the site's resource assessment and the neighbouring site's landfill proposal.

6.1.4 Soil and capping material

PRCP Guideline (section 3.6.1)

The rehabilitation and management methodology should include that soil assessment activities are supplemented by additional surveys conducted at appropriate intervals to assess soil resources in planned disturbance areas. In addition to the assessment of soils, the proposed rehabilitation methodologies in the rehabilitation planning part must also address topsoil management. Topsoil management must ensure sufficient topsoil quantity and quality is available in those instances that waste rock or tailings cannot support the proposed PMLU. Integrated soil and waste rock characterisation and mapping should form the foundation of the rehabilitation strategies. The available soil resources and capping material should be assessed prior to the commencement of operations.

6.1.4.1 Topsoil stripping

Approved disturbance areas that will require topsoil stripping for re-use in rehabilitation include the North Pit, West Pit, Central Pit, Far West Pit (ML550017 Pit), ML55008 Pit and Infrastructure areas.

Topsoil stripping is recommended at a depth no greater than 200mm for the Sodosol/Rudosol unit (i.e. spotted gum/ironbark country) and the Vertosol and cleared Sodosol unit (i.e. Brigalow land type)¹⁴. Topsoil volume is calculated based on the disturbance footprint of primary mine site features and infrastructure illustrated in **Figure 2**. Topsoil disturbance will be minimised wherever possible to protect soil integrity. **Table 26** summarises topsoil volumes

Table 26: Topsoil volume estimates

	Topsoil depth (mm)	Area to strip (ha)	Topsoil volume (bcm)	Topsoil volume (lcm) ¹
Pit areas				
Black Vertosols	200	1.97	3,933.60	4,523.64
Grey and Red Sodosols	200	2.77	5,530.00	6,359.50
Black and Grey Sodosols with Brown Rudosols	200	10.30	20,608.20	23,699.43
Total		15.04	30,071.80	34,582.57
Processing & stockpiling area				

Black and Grey Sodosols with Brown Rudosols	200	1.51	3,079.4	3,541.31
Total		1.54	3,079.4	3,541.31

¹ swell of 15% assumed

6.1.4.2 Topsoil management

Topsoil stockpiles are and will be established adjacent to pit areas to limit handling and transport of the material. Topsoil stockpiles are recommended at a maximum height of 2m to minimise degradation of topsoil material, maintain biological capital and maintain soil fertility.

The use of machinery on stockpiles will be minimised wherever possible to prevent occurrence of topsoil compaction. Coarse stockpile surface textures are preferred to promote infiltration and aeration, and to minimise erosion until suitable cover vegetation is established. Topsoil stockpiles will be positioned in free-draining areas to prevent occurrence of long-term soil saturation. Temporary silt fences and/or cleared vegetation will be positioned around topsoil stockpiles as a means of sediment control and erosion protection.

6.1.4.3 Topsoil application

Topsoil will be spread wherever required to achieve a safe and stable PMLU of marginal grazing. All stockpiled topsoil will be used for the rehabilitation of disturbed areas in Gurulmundi Mine. The following will be considered during topsoil resspreading:

- topsoil (all soil units) spread at an average thickness of 150mm;
- sodosol/Rudosol units (spotted gum/ironbark country) is susceptible to erosion and concentrated runoff due to sodic subsoil materials. Resspreading on the contour will aid runoff control and increase soil moisture retention for subsequent plant growth;
- levelling to an even surface avoiding a compacted and/or smooth surface;
- rip across the contour prior to seeding to promote relationship between topsoil and underlying materials; and
- minimise vehicle traffic accessing rehabilitation areas after topsoil is spread.

6.1.4.4 Amelioration requirements

Soil amelioration will vary for different soils depending on soil chemistry. The following amelioration recommendations are provided for the soils within Gurulmundi Mine¹⁴:

For the Sodosol/Rudosol unit (spotted gum/ironbark country):

- the surface 200mm of material is suitable for use in rehabilitation without amendment (soil has no pH, salinity or sodicity limitations);
- topsoil material will be subject to erosion due to concentrated runoff and needs to be spread such that any runoff flows are not concentrated; and
- a broad-based fertiliser should be applied with suitable rates (40-50kg/ha N, 20-30kg/ha P, 20-30kg/ha K) to assist vegetation growth.

For the Vertosol and cleared Sodosol unit (Brigalow land type):

- the stripped material should be treated with gypsum at a rate not less than 15t/ha (sufficient to treat 150mm across 1ha to achieve ESP <6%);
- these soils do not have salinity limitation however their high pH may limit nutrient availability to vegetation lowering both the sodicity of the material and with nutrient availability; and



- a broad-based fertiliser should be applied with suitable rates (40-50kg/ha N, 20-30kg/ha P, 20-30kg/ha K) to assist vegetation growth.

The parameters provided in **Table 27** will be used to assess the suitability of topsoil material for rehabilitation.

Table 27: Topsoil surface requirements for rehabilitation at Gurulmundi Mine

Parameter	Unit	Acceptable range/limit
pH	n/a	5.0 – 8.4
ESP	%	<6 (or within 10% of analogue site)
EC _{se}	dS/cm	<5.5
TOC	%	>1

6.1.5 Landform design

PRCP Guideline (section 3.6.1)

The final landform design must be based on the proposed PMLUs and NUMAs and demonstrate that the land will be safe and structurally stable.

Landform design incorporates landform structures, landform development and the reshaping of all relevant activity areas after the removal of infrastructure (where relevant) and wastes, prior to the placement of topsoil.

The following approved activities at Gurulmundi Mine are likely to have had no impact to the pre-mining landform:

- exploration drilling;
- topsoil stockpiles;
- industrial and workshop areas;
- administration areas; and
- roads and tracks.

Activities that will result in changes to the pre-mining landform include:

- backfilled pits;
- overburden stockpiles;
- stockpile and laydown yards; and
- mine water storage and sediment basins.

6.1.5.1 3D design

Activities on-site will result in a final landform that is, on average within pit areas, 1.5m below the surrounding natural topography. Approximate final landforms with contours and maximum pit extent outlines are illustrated in the following figures.

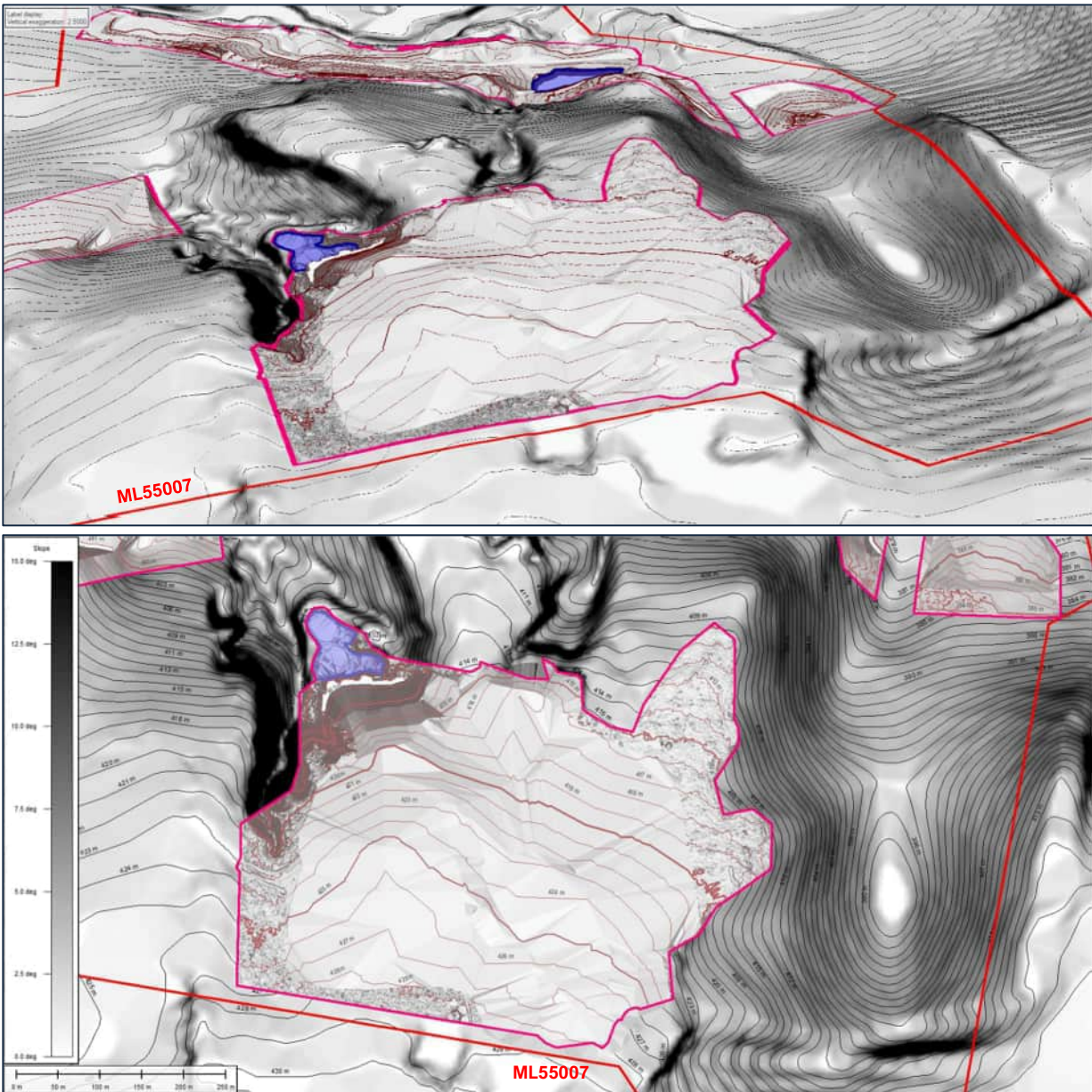


Figure 13: Processing and infrastructure area 3D post-mining landform design

1m contours, mining lease boundary (red), final landform boundary (pink), crest & toe design (blue) and remaining water storage area (blue shaded) – 3D image (top) and plan view (bottom)

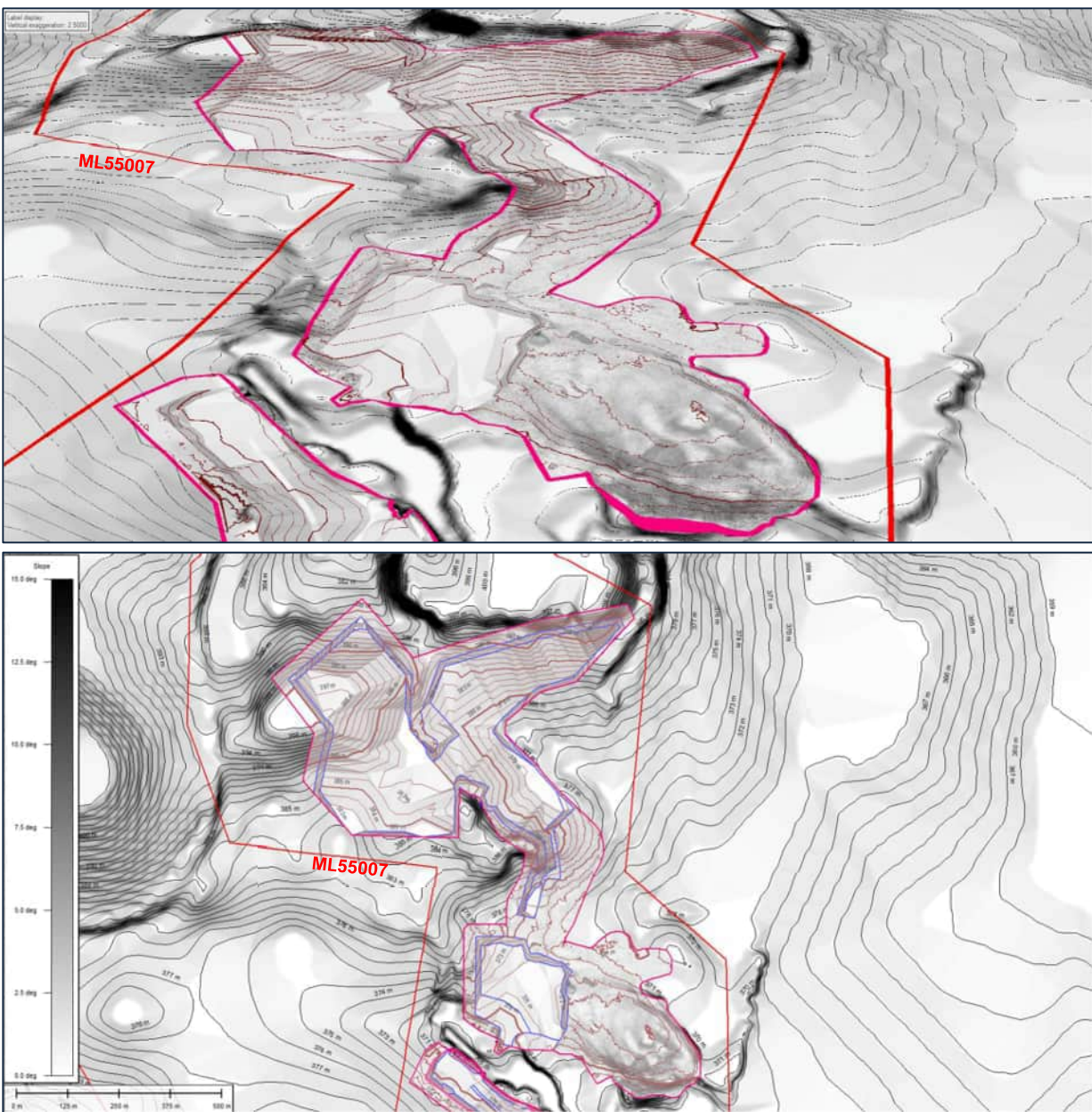


Figure 14: Far North and North pit 3D post-mining landform design

1m contours, mining lease boundary (red), final landform boundary (pink), crest & toe design (blue) and remaining water storage area (blue shaded) – 3D image (top) and plan view (bottom)

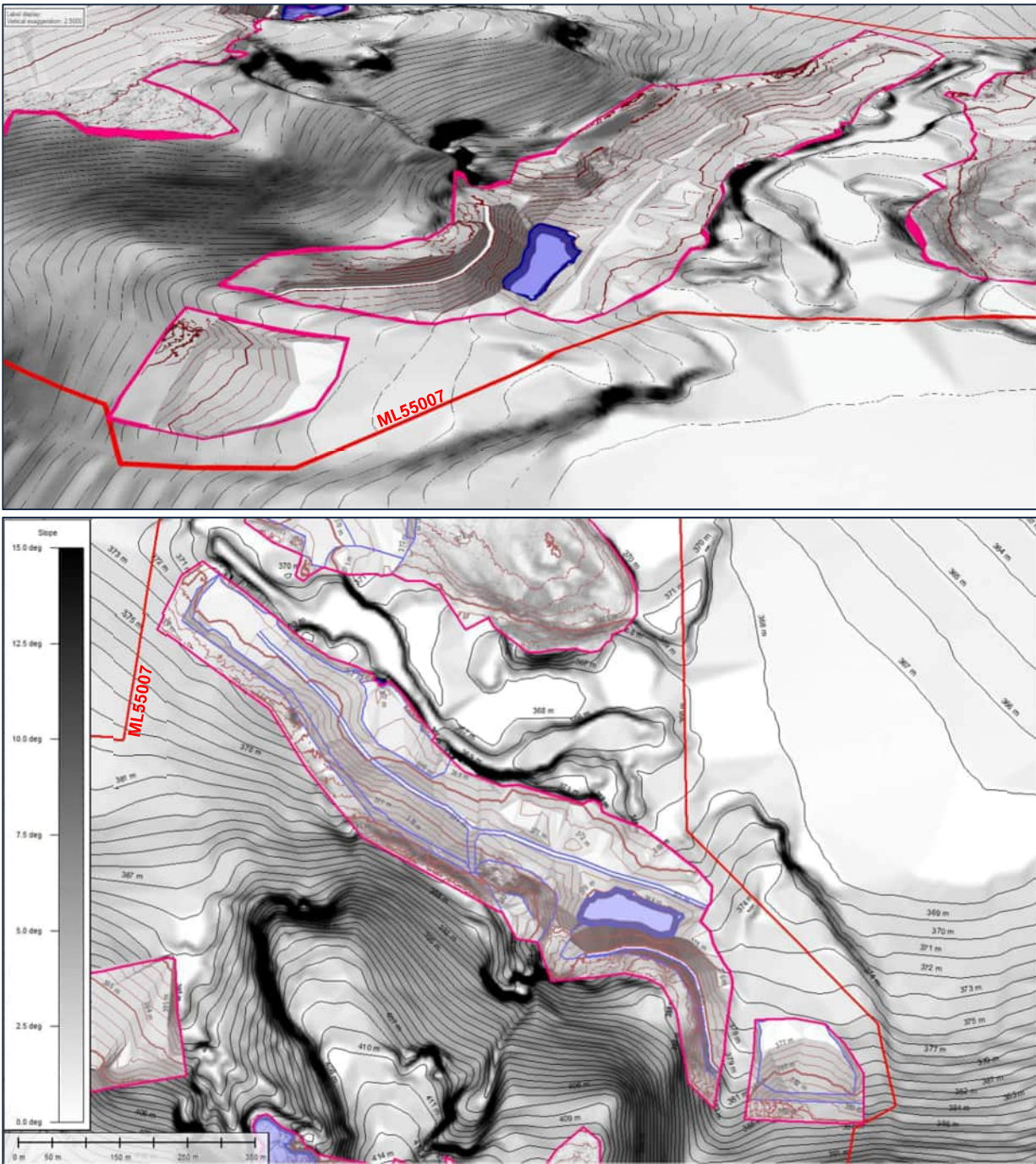


Figure 15: Central pit 3D post-mining landform design

1m contours, mining lease boundary (red), final landform boundary (pink), crest & toe design (blue) and remaining water storage area (blue shaded) – 3D image (top) and plan view (bottom)

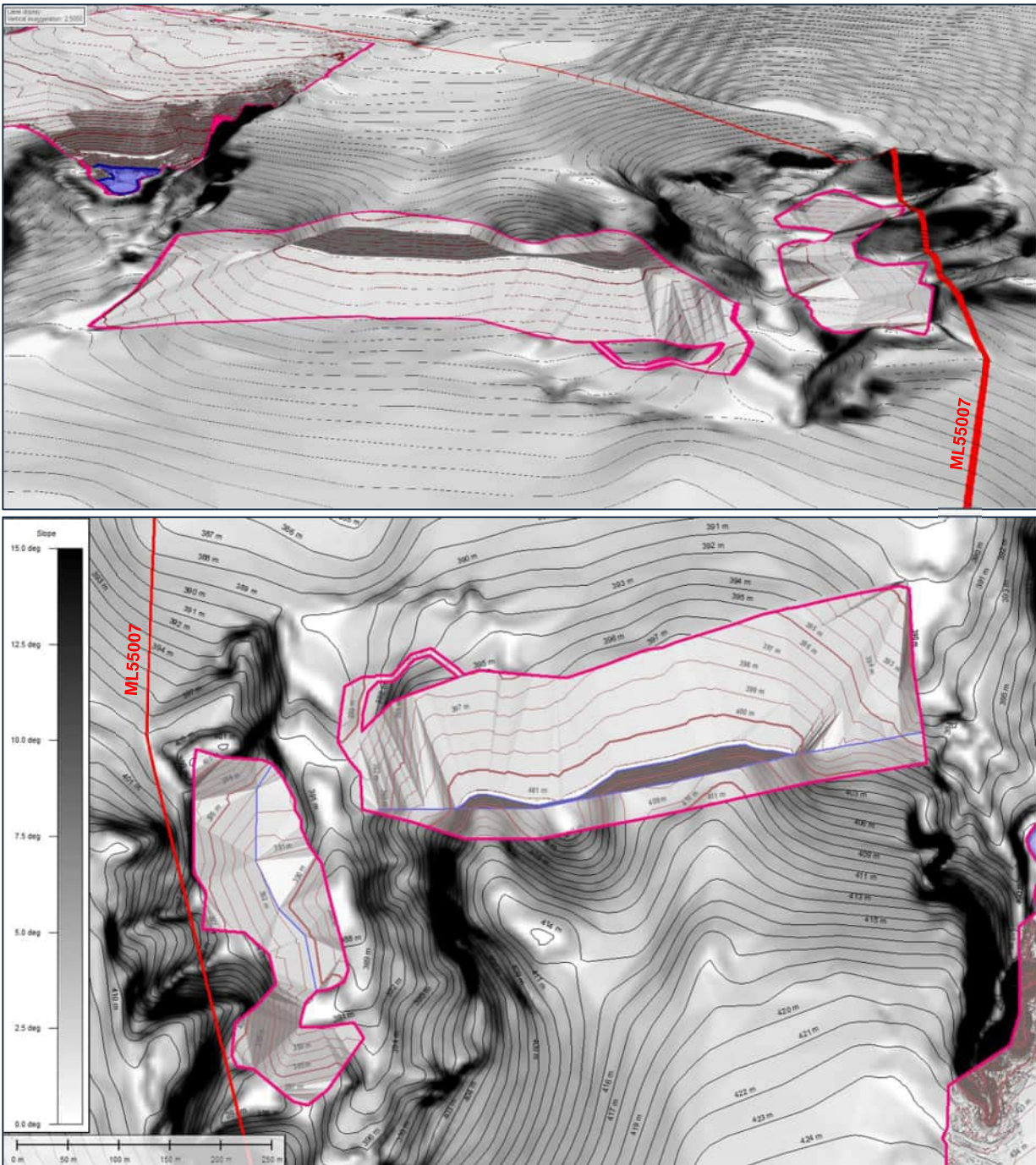


Figure 16: West pits 3D post-mining landform design

1m contours, mining lease boundary (red), final landform boundary (pink), crest & toe design (blue) – 3D image (top) and plan view (bottom)

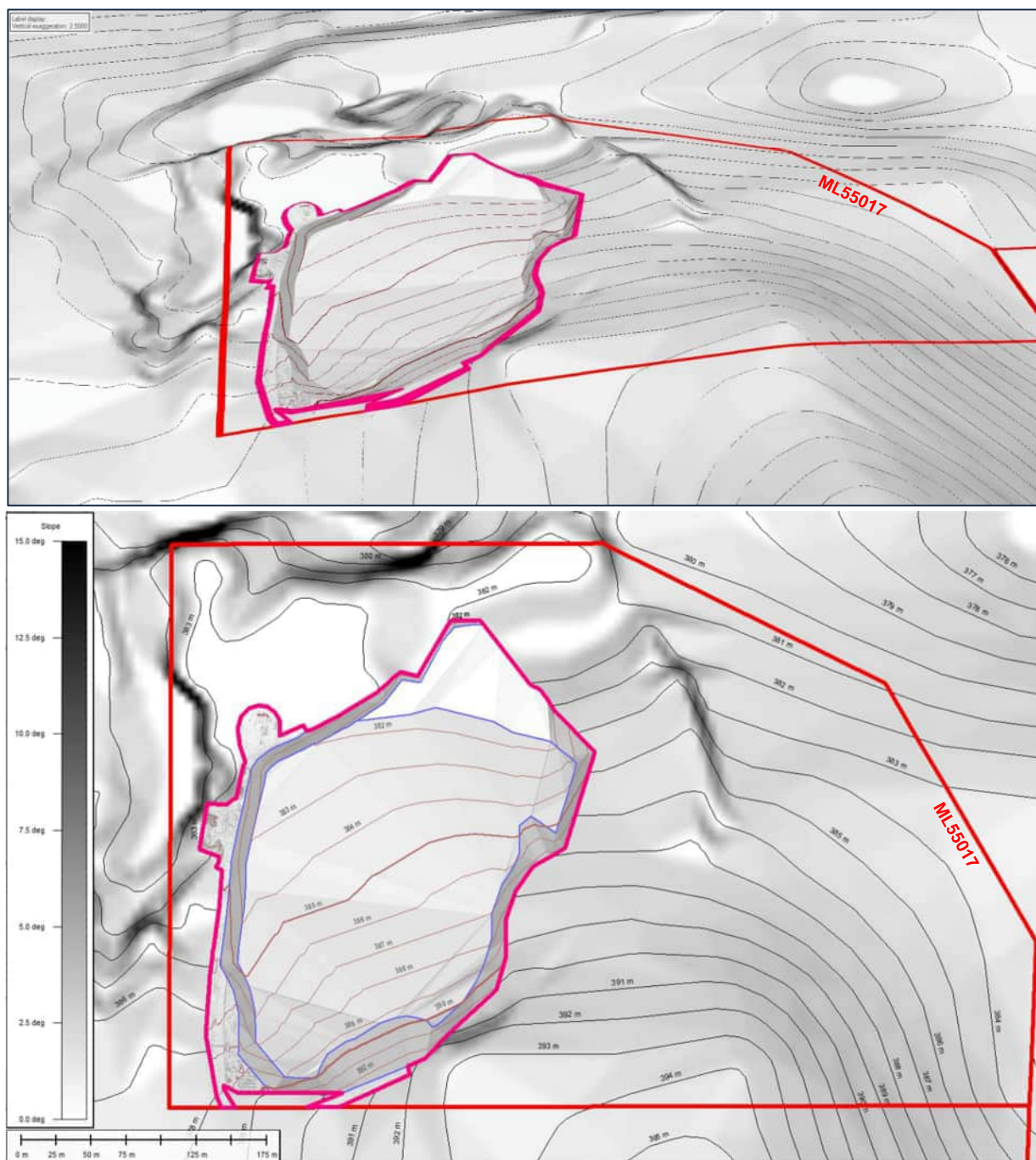


Figure 17: ML55017 (Far West) pit 3D post-mining landform design

1m contours, mining lease boundary (red), final landform boundary (pink), crest & toe design (blue) – 3D image (top) and plan view (bottom)

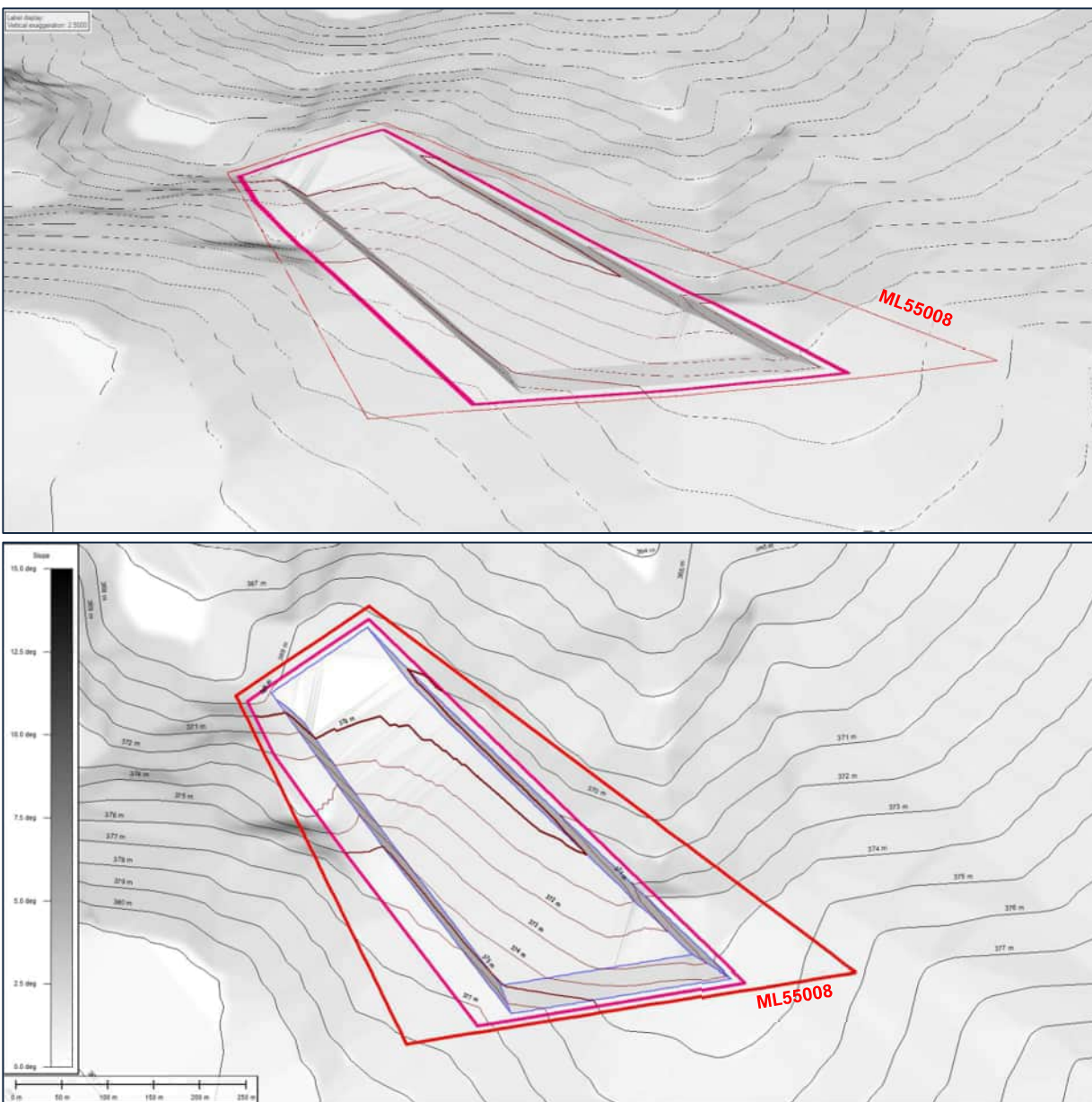


Figure 18: ML55008 pit 3D post-mining landform design

1m contours, mining lease boundary, and outline of final landform crest & toe design (blue line) – 3D image (above) and plan view (below)



6.1.5.2 Landform structure location

Activities within Gurulmundi Mine are designed for closure by locating pits, associated activities and infrastructure areas outside areas of endangered or of concern vegetation management areas (**Figure 9**).

The post-mining landform design is planned to result in minimal variation to the pre-mining to reduce impact or risk to the following:

- surrounding land uses (grazing);
- sensitive receptors (neighbouring properties, nearby State Forest);
- local and regional topography;
- visual amenity; and
- flooding.

6.1.5.3 Landform structures

Relevant activities within Gurulmundi Mine summarised in **Section 1.5.1** are considered landform structure for the purposes of determining the landform design (**Table 28**). Note, total size (ha) provided reflects the maximum extent of disturbance over the life of mine.

Table 28: Landform structures for Gurulmundi Mine

Landform structure	Area (ha)	Landform design and rehabilitation
Pits (Central, North, Far North, West, Far West)	57.8	<ul style="list-style-type: none"> • Pits will be backfilled with overburden from the overburden stockpile to pre-mining levels; • Remaining overburden will be spread over the box-cut and overburden stockpile area, shaped to be free-draining and blended in with the surrounding topography; and • The final surface level after settling will be similar to the original topography. Pits will be backfilled to (on average) 1.5m below surrounding topography.
Topsoil	16.3	<ul style="list-style-type: none"> • Stockpiled topsoil will be re-spread on disturbed areas (where required) and to the required thickness (150mm minimum).
Overburden and laydown yards	17.3	<ul style="list-style-type: none"> • Area reshaped to be free-draining and blended in with surrounding topography (if required). • Overburden will be used to backfill pits; • Mobile equipment and/or machinery, and all waste and rubbish will be removed; and • The remaining footprint area will be reshaped to be free-draining and blended in with surrounding topography (if required).
Infrastructure	0.5	<ul style="list-style-type: none"> • Following the disconnection and removal (where required) of services, all fixed buildings will be retained by the landowner (subject to the removal of all bentonite processing plant)¹.
Roads and tracks	4.2	<ul style="list-style-type: none"> • Area will be reshaped to be free-draining and blended in with surrounding topography; and • The main access road will be surrendered in its current condition as an unsealed dirt road to the landowner¹.
Main road (to remain)	1.8	



Landform structure	Area (ha)	Landform design and rehabilitation
Sediment basins and water storages	1.2	<ul style="list-style-type: none"> After water is removed from the storage or basin area, walls will be dozed back over the water storage footprint; Footprint area will be reshaped to make stable, free-draining, and blended in with surrounding topography (target maximum of 1V:3H slope); and Following clean out water storage labelled 'CP Dam 1' and sediment basin 'Lower Basin' will be converted to clean water storage areas suitable for livestock use¹.
Water storages (to remain)	1.2	
Existing rehabilitation areas	26.0	<ul style="list-style-type: none"> Areas have completed or are undergoing backfill, reshaping to be free-draining and blended in with surrounding topography, topsoil spreading, and seeding (where required).

¹ Refer to the landowner agreement (Appendix 7)

Removal of bentonite processing plant and mobile equipment and machinery will be completed where required and prior to reshaping the final landform. All fixed infrastructure as expressed in writing will be retained by the landowner (**Appendix 7**). After reshaping of the final landform, topsoil will be spread over disturbed areas where required (**Section 6.1.4.3**) and seeded or revegetated with tube stock (**Section 6.4**).

6.1.5.4 Landform runoff

The surface water flow of pit areas is shown in **Figure 19** to **Figure 24**. The figures illustrate the extent of pit disturbance areas (pink outline) the final landform is proposed to be consistently blended into the surrounding topography. Fixed infrastructure and two water storages located in the Central pit and the Processing and Stockpiling area will remain post-mining. The final landform will be free-draining and water-shedding resulting in no wholesale changes or diversions to pre-mining water flows which generally directs water towards the north to Juandah Creek. The following figures illustrate indicative surface water flow direction of all disturbed areas following completion of rehabilitation.

The proposed water monitoring points are shown in **Figure 25** (Plan 056_PREMP_02). Some of these points are additional to the current EA requirements to ensure that appropriate monitoring of environmental conditions can be maintained as new areas are mined either upstream or downstream of existing operations. All locations are accessible within the current landholder's property via vehicle or foot traverse. These locations are considered representative and allow appropriate comparison of upstream and downstream receiving environment waters to be sampled for comparison.

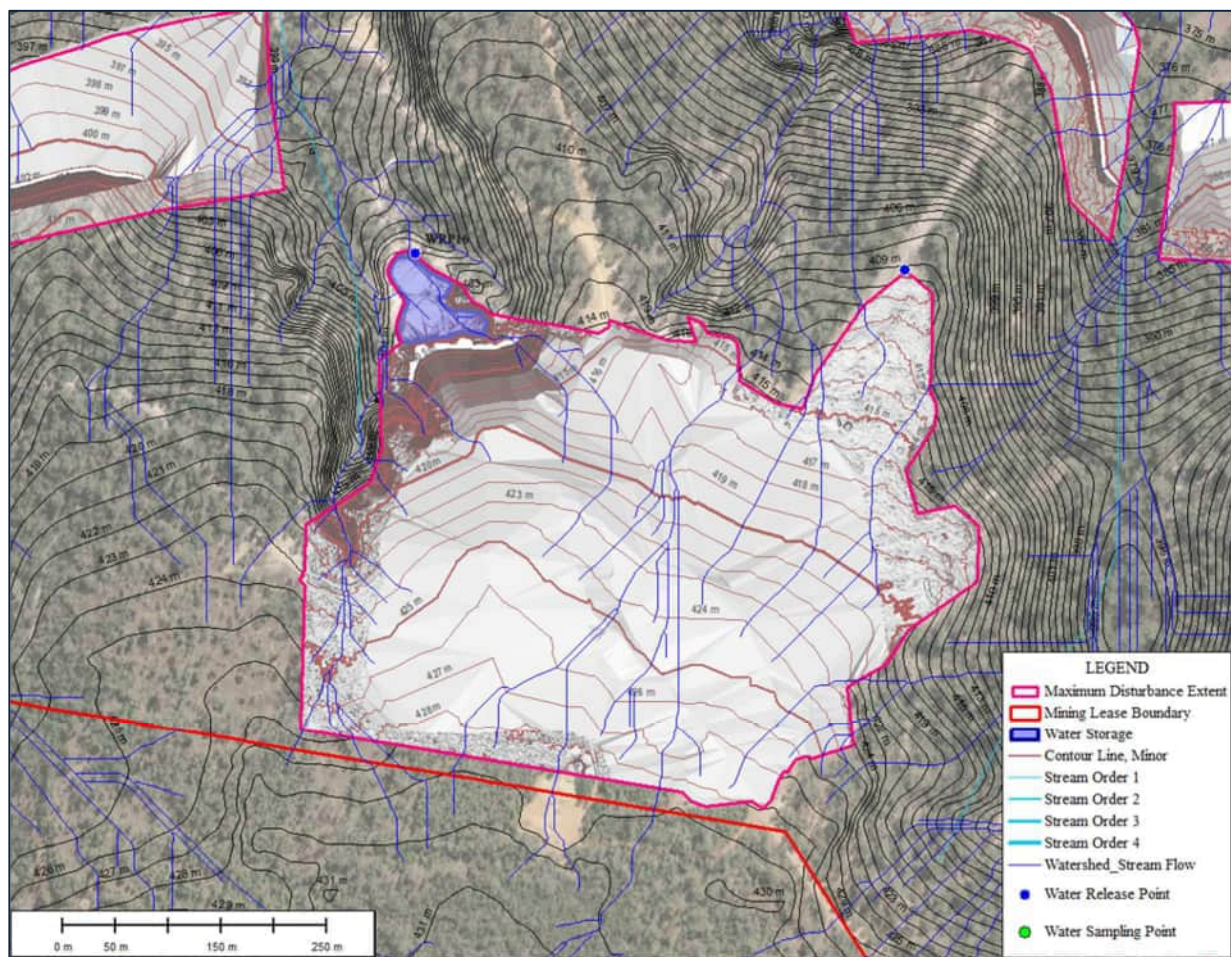


Figure 19: Indicative surface water flow direction of Processing and infrastructure area

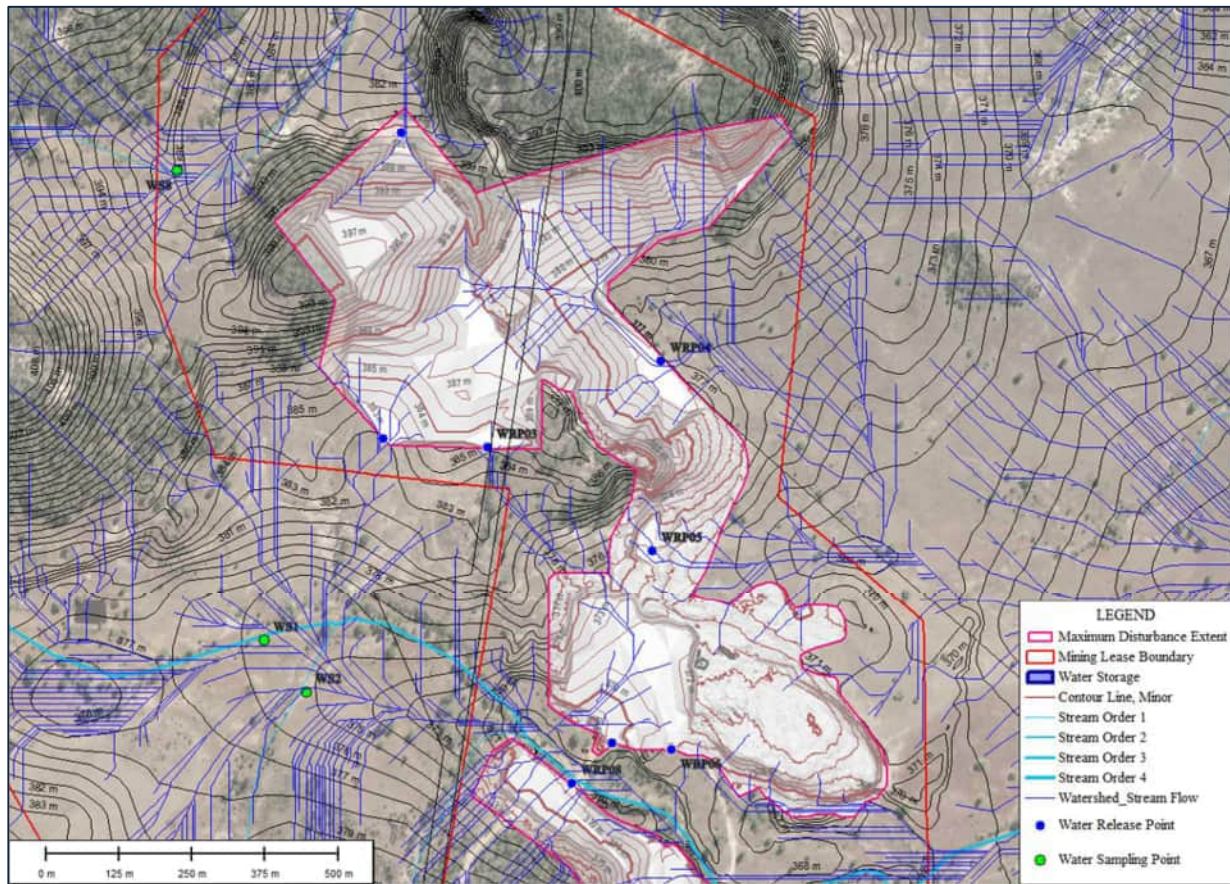


Figure 20: Indicative surface water flow direction of Far North and North pits

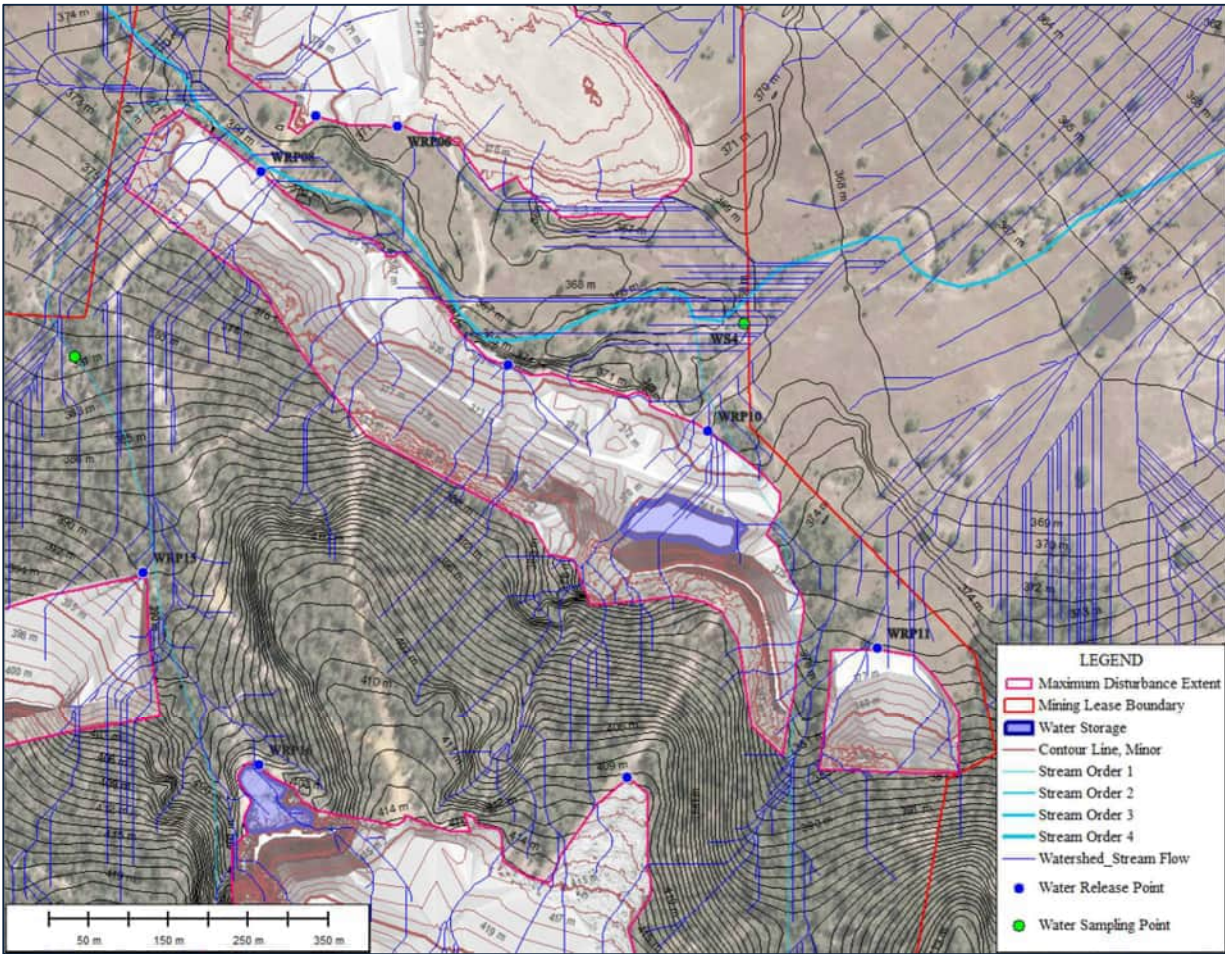


Figure 21: Indicative surface water flow direction of Central pit

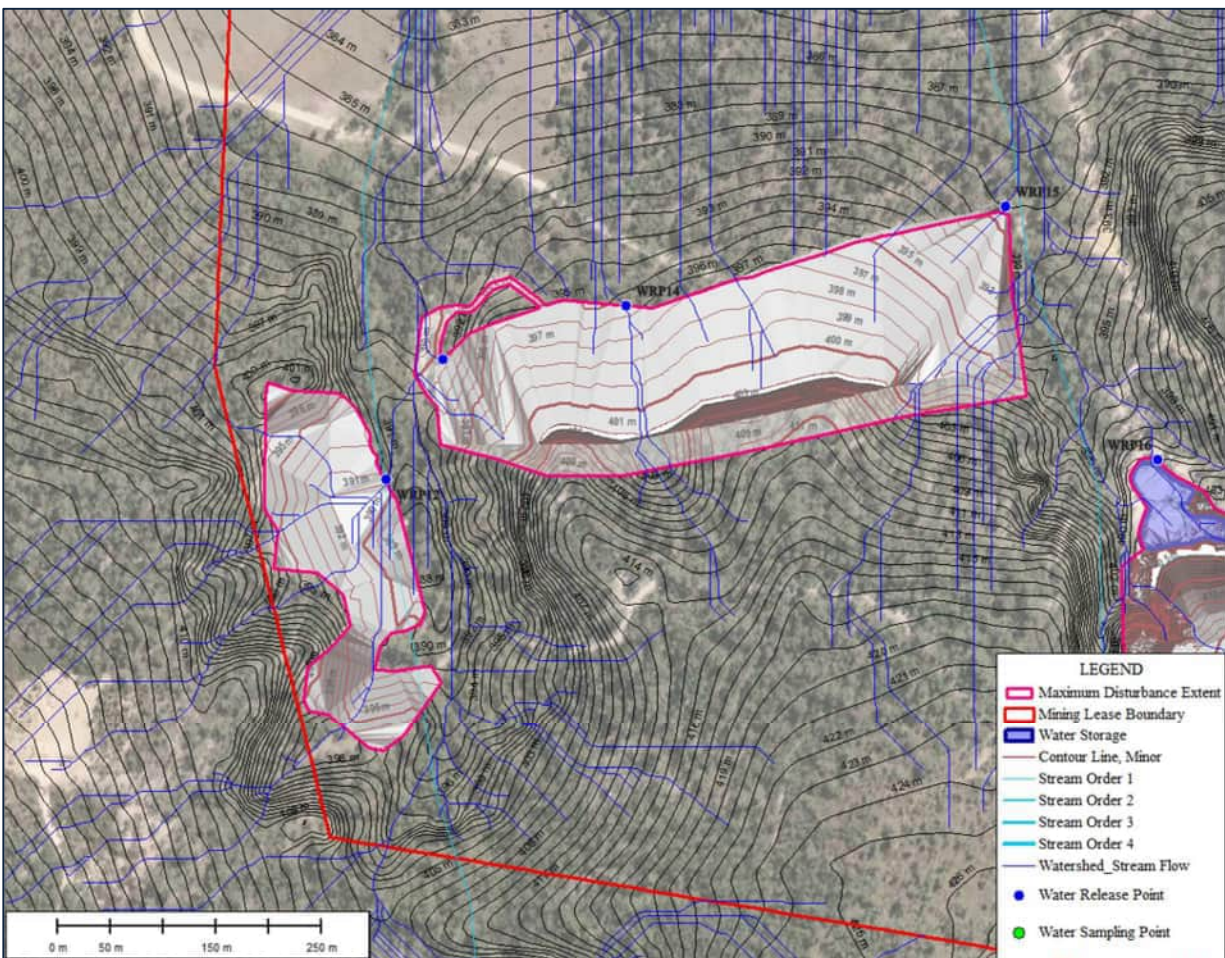


Figure 22: Indicative surface water flow direction of West pits

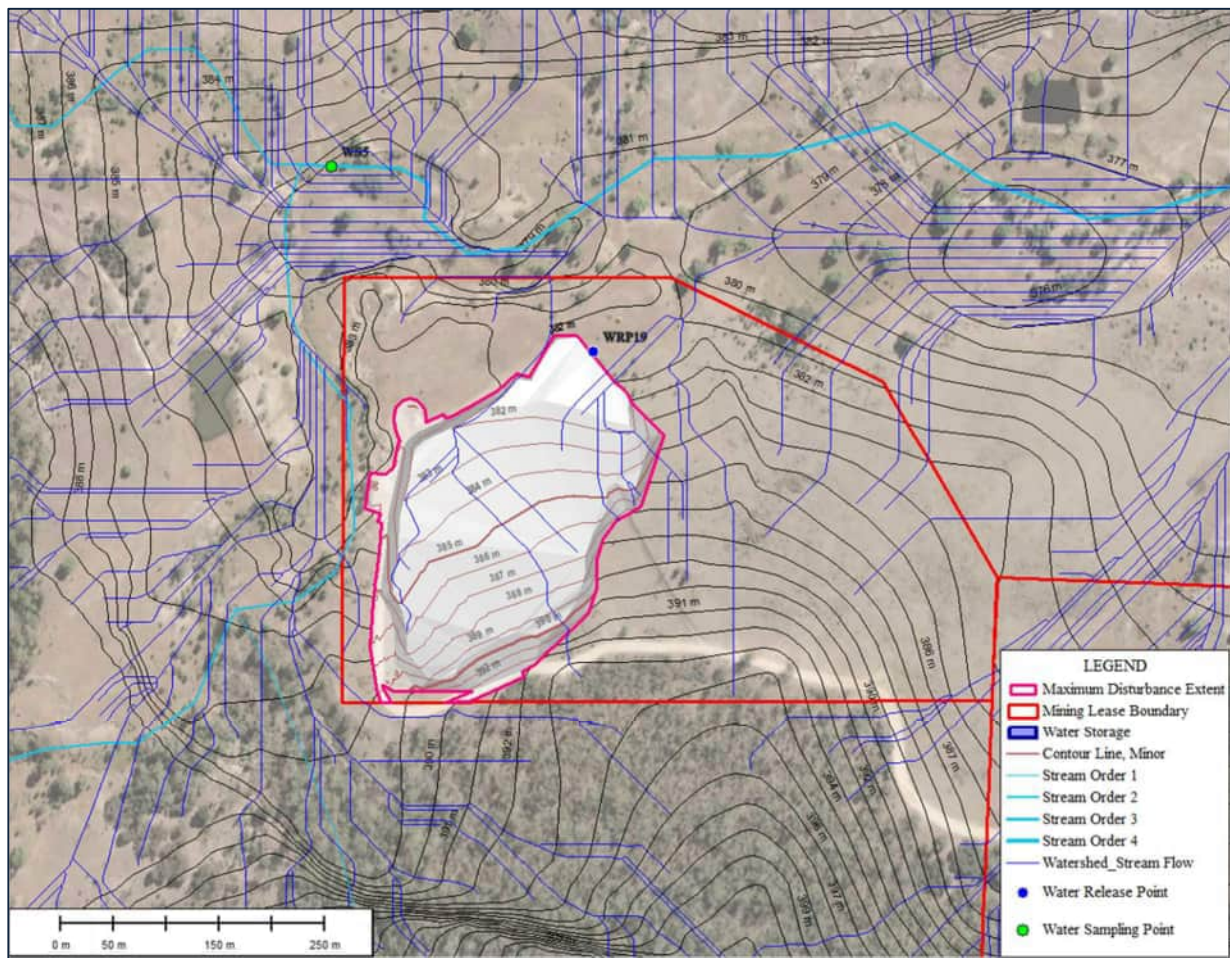


Figure 23: Indicative surface water flow direction of ML55017 (Far West) pit

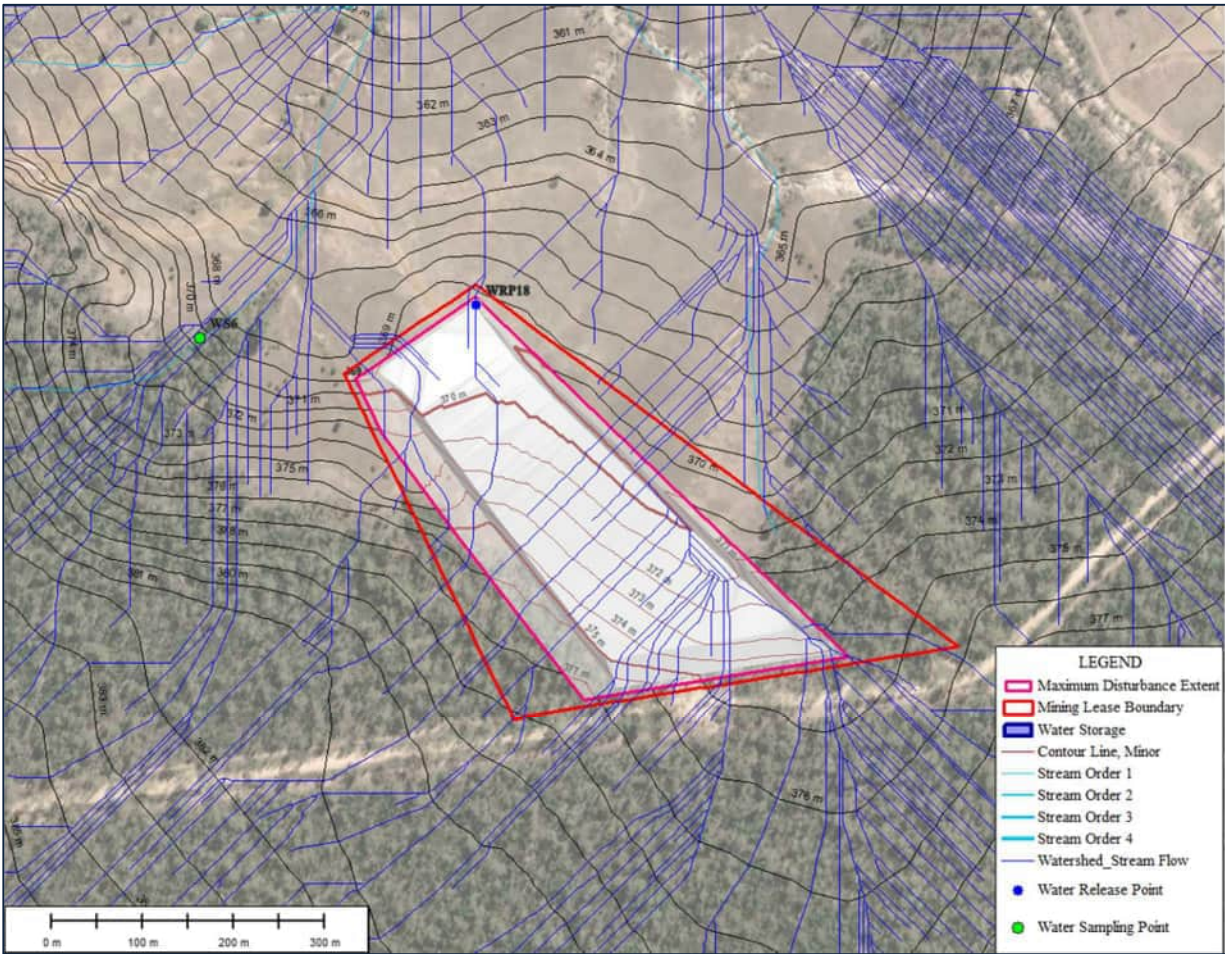


Figure 24: Indicative surface water flow direction of ML55008 pit

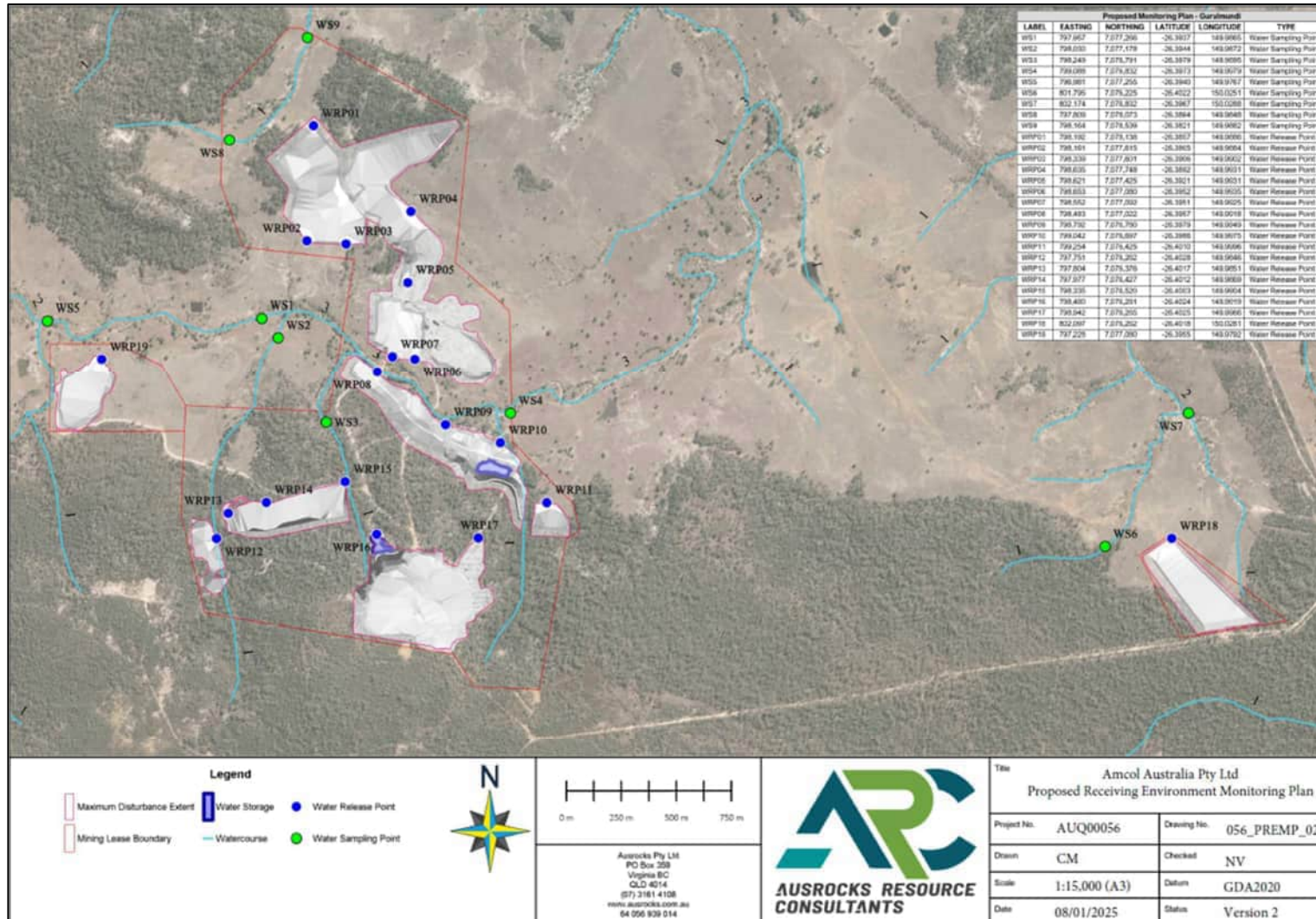


Figure 25: Proposed Water Monitoring Plan



6.1.5.5 Materials

The materials available for rehabilitation are shown in **Table 30** (values are rounded to the nearest whole number).

Table 29: Materials available for rehabilitation at Gurulmundi Mine

Material	Mined volume (bcm)	Mined volume (lcm) ¹	Void backfill (lcm) ²
Topsoil (pit areas)	30,071	34,582	-
Topsoil (infrastructure areas)	3,079	3,541	-
Overburden stockpiles	100,960	116,104	110,299

¹ Swell of 15% assumed

² Settling of 5% assumed

A marginal grazing PMLU can be achieved with materials available on-site for rehabilitation. Sufficient material is available to backfill pits and all stockpiled topsoil will be re-spread across disturbed areas (where required). The void backfill quantity is based on current inventory, the mining method employed at the site utilises roughly a 1:1 ratio when establishing a new pit. Therefore, as the pits advance, it is assumed that the volume of overburden available remains the same.

A swell factor of 15%²⁴ is assumed; this is considered a standard factor for truck-and-shovel movement of materials within Gurulmundi Mine.

6.1.5.6 Erosion assessment

Proposed maximum disturbance extent make up approximately 35% (approximately 125ha) of the total landform area within the Gurulmundi Mine leases (**Table 2**). The final landform design will be reshaped to be free-draining and blended in with surrounding topography, topsoiled (where required) and seeded to achieve the designated PMLU's. Soil will be assessed and amended where appropriate to promote establishment of pasture and native species and limit dispersion potential (**Section 6.1.4.4**). An erosional assessment has been completed for the site and has been included in **Appendix 2** of the FLURP (also attached as **Appendix 4** of this PRC Plan).

The erosional assessment utilised a combination of Global Mapper software and the Revised Universal Soil Loss Equation (RUSLE) calculations to determine erosion rates for a number of catchment areas associated with the disturbance areas across the Mine leases. Three different scenarios were run to determine the effect of groundcover over the catchment areas. An acceptable rate of erosion for the site has been adopted as 5 tonnes per hectare per year (t/ha/yr), which is a widely acceptable rate in mine site rehabilitation as it is indicative of significantly reducing rill/gully formations across the landform. The natural topography of the surrounding environment has naturally occurring soil loss areas >5t/ha/yr. The results indicate that if 70% groundcover is achieved for each PMLU erosion is kept minimal ranging from 0.1 – 5.7t/ha/yr. The areas that exceeded the acceptable erosion rate generally had steep slopes over short lengths, limiting the ability for concentrated flows. With the majority of erosion rates below the acceptable rate the overall erosion risk of the disturbed areas is minimal.

6.1.5.7 Slope profile design

Landform structures are designed to be blended with surrounding topography and not be significantly different or above the pre-mining landform. The final landform will have maximum slopes of <5%, similar to the

²⁴ Caterpillar (2023) Swell & Void Percentage, Load Factors, https://www.cat.com/en_US/articles/ci-articles/swell-and-void-percentage-load-factors.html



surrounding natural topography – final landform design of pits have 1:3 faces and 1:10 ramps to facilitate human and livestock access.

The proportion of pits which has 1:3 faces is minimal; generally <5% of the surface area. The remaining portion of the pits will provide ample opportunity for grazing where several zones of the floor daylight to the natural surface directly. This layout and land structure mimics the natural landscape where there are steeper banks throughout the topography, for example, such as high banks of creeks and rocky outcrops. Appropriate mitigation measures have been allowed for to prevent erosion on these faces including, but not limited to:

- contouring to prevent stormwater concentration;
- contour ripping;
- mulching; and
- planting densities.

All slopes that exceed >15% (i.e. water storage pit faces) require a detailed final landform design for the area must be prepared and an erosion assessment of the landform to ensure it will meet the rehabilitation milestone criteria must be conducted.

6.1.5.8 Settling and subsidence

Minor settling of pit backfill is expected. Assuming a likely 5% compaction factor for overburden material, a total volume of 110,299m³ is required to fully backfill all pits within Gurulmundi Mine.

Majority of settlement is expected to occur during placement of overburden material into pit disturbance areas. Backfilled areas are therefore expected to be available for rehabilitation within 12 - 24 months of the completion of backfill activities.

6.1.5.9 Hydrological and hydrogeological assessments

Most of the site will remain undisturbed (approximately 230ha undisturbed). The final landform of disturbed areas will be free-draining and vary from the pre-mining and/or surrounding topography by (on average) 1.5m. DOR-predicted extreme event flood depths estimate flood depths ≤0.5m may reach the West pit and estimate flood depths ≤2m across the Central and North pits via unnamed watercourses that flow towards Juandah Creek in the north. The area of Juandah Creek closest to Gurulmundi Mine has frequently been observed dry and the extent of flooding is determined to be low. The potential benefit of additional protection has been assessed and is determined to not be required.

Hydrological and hydrogeological risks associated with the approved activities on site are therefore evaluated as low and unlikely to impact on the final landform.

6.1.5.10 Waste placement strategy

Overburden materials will be prioritised in backfill material to manage any associated risks. There is no expected risk of acid mine drainage on-site.

6.1.5.11 Specific landform requirements

There are no specific landform requirements.

6.1.5.12 Monitoring of control measures

No control measures will be used on-site (e.g. liners or seepage collection systems).

6.1.5.13 Long-term landform stability



Major disturbance to the site is limited to shallow excavation pits (up to 12m deep). These pits will be backfilled during rehabilitation to be free-draining and blended with the surrounding topography. Slopes will be shaped to ensure consistency with the pre-mining landform to facilitate safe access by livestock. Topsoil will be spread across disturbed areas (where required) and revegetated with suitable pasture seed mix to support a marginal grazing PMLU. Based on these outcomes, landform erosion risk is determined to be low risk and modelling of long-term stability is not required.

6.1.5.14 Quality assurance / quality control

The proposed actions referenced in **Table 33** are the key controls that will be implemented to manage landform risks associated with achieving the PMLUs of marginal grazing and, where relevant, water storage. Quality assurance and quality control (QA/QC) activities are incorporated into all the necessary execution and verification activities of these controls. Monitoring and reporting processes to verify and ensure effective execution of these controls are described in **Section 8**.

6.1.5.15 Trial methodology

The landform design is determined low risk therefore no trial methodology is proposed.

6.2 Cover design

PRCP Guideline (section 3.6.1)

A cover design is required for the surface treatment of a mine landform or other waste material. Hence, the cover system design must be appropriate for the type(s) of waste the project will generate and reflect a risk-based approach where waste has the potential for AMD, neutral mine drainage or saline mine drainage, an appropriate cover system must be designed.

The cover design should include:

- identification and specification of the objectives of the cover system
- a detailed description of the design including the thickness of each layer
- a detailed description of construction methodology including any proposed staging of the cover system
- a quantitative assessment that identifies the location and quantity of proposed capping material available on site; and
- proposed QA/QC for the construction of the cover system including the timely implementation of corrective actions where deviations from the design are identified.

The waste characterisation (**Section 6.1.3**) showed there is no environmental risk associated with any material remaining on-site, therefore no cover designs are required.

6.3 Water management

PRCP Guideline (section 3.6.1)

The rehabilitation planning part must include a description of the following:

- a description of the contaminants that pose a risk to environmental values of the receiving environment
- source, pathway and fate of contaminants that have the potential to impact environmental values
- infiltration and seepage intervention and collection controls
- surface water diversions and long-term management requirements
- dewatering requirements
- on-going water management and reduction requirements (i.e. treatment).

Water management is aimed at minimising the potential for release of contaminants to the surrounding environment. Clean and mine-affected waters are stored separately during active mine operations in stormwater and mine water storage dams and sediment basins in accordance with conditions of the site EA. No ongoing water management requirements are proposed following the establishment of final landforms and the removal of all infrastructure (except where otherwise agreed in writing).



6.3.1 Potential contaminants

Due to the age of the mine, there is no access to or available record of preliminary site investigations. Pre-mining land uses of the Gurulmundi Mine mining leases are identified to have predominantly been cattle grazing. Activities associated with cattle grazing that have the potential for contamination such as cattle dips, workshop areas, homesteads or waste disposal areas were not found to be present based on available historical aerial imagery²⁵.

Activities related to approved activities that have the potential to generate contaminants, if inappropriately managed, could pose a risk to the environmental values of the receiving environment. These include:

- mine affected or storm waters stored within water storages or sediment basins; and
- sewage wastes.

The above potential sources of contamination are determined to have a low risk level (**Appendix 8**).

Pits within Gurulmundi Mine will be backfilled and mobile infrastructure and plant equipment will be removed, including water storage and sediment basins. This excludes infrastructure and selected water storage to remain upon closure (**Appendix 7**). Remaining infrastructure is not considered a source of potential contamination. Remaining water storages will be cleaned and converted into clean water storage suitable for livestock use and therefore, are also not considered a source of potential contamination.

6.3.2 Sources

Approved relevant activities have the potential to create the following sources of contaminants that could pose a risk to the environmental values of the receiving environment:

- backfilling of pits;
- removal of all infrastructure including water storage structures (except where otherwise agreed in writing);
- removal of all ROM and/or product from the site;
- revegetation of backfilled areas and/or revegetation of residual overburden stockpiles;
- leaks/spills/discharges from water storage structures used to manage water from disturbance areas; and
- untreated sewage leaks/spills/discharges.

6.3.3 Potential water receptors

The dominant proposed PMLU is marginal grazing. Post-mining potential receptors have been identified to include:

- land managers and/or employees;
- cattle;
- residents within nearby properties surrounding the Gurulmundi Mine;
- public users of Gurulmundi Road and other publicly accessible locations;
- terrestrial ecosystems including rehabilitation areas; and
- groundwater dependent ecosystems (GDEs) (where relevant).

6.3.4 Potential water exposure routes

Potential pathways for contaminant migration between identified sources and receptors with the ability to impact water management upon closure include:

- surface water flows during rainfall events in contact with contaminated material; and

²⁵ <https://qldglobe.information.qld.gov.au/> (accessed July 2023)



- uptake of groundwater by GDEs (where relevant).

6.3.5 Potentially complete pathways

The ongoing management of water resources upon surrender is considered not required based on:

- backfilling of pit voids;
- EA limited maximum disturbance areas; and
- removal of all infrastructure (unless where otherwise agreed in writing).

No infiltration, seepage and/or collection controls, surface water diversions or other long-term water management is deemed suitable or required upon surrender.

In accordance with the landowner agreement, any water remaining in CP Dam 1 and the Lower Basin must be suitable for livestock use after conversion to clean water storage structures.

6.3.6 Water storages to remain for livestock use

Per the landowner agreement (**Appendix 7**), the Lower Sediment Basin and Central Pit Dam 1 are to be converted into a clean water storage for livestock use. The rehabilitation process for these water storage dams will entail:

- dewatering;
- removal of any embankments impeding natural runoff pathways of clean water into the storage dam;
- revegetation of areas outside the water storage to support soil stability and adjacent grazing PMLU areas; and
- rehabilitation monitoring to ensure any clean water contained in the storage dam is suitable for livestock use based on relevant water quality guidelines.

The conversion of mine water storages to grazing use requires a number of prerequisites to meet the post-mining land use objectives. During the operational phase, water storages on site act as sediment dams to help contain stormwater runoff from disturbed areas. This results in a high sediment load in the water due to the exposed nature of the catchment. Therefore current water samples recorded at the site are not representative of the conditions expected post-mining. Once the site is rehabilitated and catchment areas are returned to either PMLU Grazing or PMLU Hybrid Ecosystem, the level of sediment reporting to the water storages will be significantly reduced. It is anticipated that if the catchment areas contain a similar vegetation cover to the pre-mining landscape, the water quality within the water storages will be similar to existing farm dams.

A review of aerial photography from site reveals that there are at least 10 stock dams located within the cadastral parcels of the project. Although no water testing has been undertaken within the farm dams, the clarity and colour of water within these dams appears to vary significantly with a wide range of factors influencing the quality. It can be reasonably assumed that if water quality of these dams is sufficient for existing stock watering, rehabilitated land which is consistent with the pre-mining catchment areas will result in similar water quality characteristics. It is recommended that water quality testing is conducted across a range of existing farm dams, and the water quality objectives for the post-mine land use water storages are <110% of the worst-case grazing water quality parameters. No significant environmental impact is anticipated for water storages that are similar to existing farm storages on the property.

In terms of potential overflow post-mining, each water storage will be facilitated with a 1:50 year ARI spillway capable of conveying overflows in the direction of the nearest watercourse. This restores the natural stormwater flows during extreme events and reduces risk of water storage damage.

The use of water from the storages for livestock use will be the responsibility of the landholder. The Lower Sediment Basin is provisioned for direct stock access and requires minimal ongoing management of water. The



Central Pit Dam 1 however is not suitable for direct livestock access due to its steep sides. Provisions have been allowed for a ramp for personnel to access the water, and for the installation of a siphon pipe to convey water from this storage to the downstream existing farm dam (approx. 450m to the NE). This siphoning process will be wholly managed by the landowner as required and is considered reasonable due to the proximity to the landholder's house for ease of access. To ensure Central Pit Dam 1 is not accessed by livestock it will be fenced off with access installed at the ramp for personnel use.

Water storages not intended to remain for livestock use will be returned to grazing land.

6.4 Revegetation

PRCP Guideline (section 3.6.1)

The revegetation plan must propose activities that will establish self-sustaining vegetation communities that are appropriate for the intended PMLU (e.g. natural ecosystems, grazing, forestry and some agricultural and other land uses). Revegetation should, therefore, not only establish a ground cover, but also, in some domains, establish associated fauna habitat and other ecological services.

6.4.1 Revegetation objectives

EA Condition F1 requires rehabilitation of all areas significantly disturbed by mining activities in a manner that ensures rehabilitated areas achieve the following rehabilitation objectives:

- safe for humans and wildlife;
- non-polluting;
- stable;
- able to sustain an agreed post mining land use in accordance with the 'final land use and rehabilitation plan';
- revegetated with species endemic appropriate to achieve the agreed post mining land use and free of declared pest species;
- compliant with the 'Final Land Use and Rehabilitation plan' required by EA Condition F4; and
- compliant with all conditions of the environmental authority (EPML00699113).

Acceptance criteria to achieve a safe, stable and non-polluting PMLU of marginal grazing are listed in **Table 19**.

The final landform is designed to be free-draining and blend in with surrounding topography and pre-mining topography. Marginal grazing PMLU can be achieved with materials available on-site for rehabilitation. Types of topsoils existing within the Gurulmundi Mine mining leases are described in **Section 1.2.6**. Land suitability requirements for marginal grazing PMLU are described in **Section 2.2.3**.

Based on the final landform, the topsoil materials available for rehabilitation and the pre-mining land use suitability assessment of a marginal grazing PMLU is achievable through revegetation activities associated with pasture seeding and additional soil amelioration (where required).

6.4.2 Revegetation pasture species and seed mixes for marginal grazing PMLU

There are no requirements listed in the EA for the inclusion of any species of conservation significance or fauna habitat and/or analogue sites for the purpose of a PMLU of marginal grazing (improved pasture grasses). The species mix selected for revegetation has been developed based on selecting a combination of both native (& endemic appropriate) pasture grasses listed as perennial, productive and palatable (3P); suited to the topsoils present within Gurulmundi Mine (**Section 1.2.6**) and are known to exist within the Western Downs local

government area²⁶ and/or are based on landowner preference. The selection will satisfy EA conditions and landowner outcome expectations.

Table 30 summarises the revegetation pasture species and recommended sowing rates for a PMLU of marginal grazing at Gurulmundi Mine. Species availability is prone to annual fluctuation and in the event of unavailability, species will be substituted with other species listed in this table.

Table 30: Recommended species and sowing rates for Grazing PMLU

Common name	Scientific name	Sowing rate (kg/ha)
Black Speargrass	<i>Heteropogon contortus</i> (3P)	<1kg to 5kg/ha
Cotton Panic	<i>Digitaria brownii</i>	
Mitchell grass	<i>Astrebla</i> (3P)	
Native Millet	<i>Panicum decompositum</i> (3P)	
Brigalow grass	<i>Paspalidium species</i> (3P)	
Curly bluegrass	<i>Dichanthium fecundum</i> (3P)	
Giant speargrass	<i>Heteropogon tiliaceus</i> (3P)	
King bluegrass	<i>Dichanthium queenslandicum</i> (3P)	
Desert Bluegrass	<i>Bothriochloa ewartiana</i> (3P)	
Bull Mitchell grass	<i>Astrebla squarrosa</i> (3P)	
Kangaroo Grass	<i>Themeda australis</i>	
Golden Beard Grass	<i>Chrysopogon fallax</i> (3P)	
Queensland blue grass	<i>Dichanthium sericeum</i> (3P)	
Narrow-leaved ironbark	<i>Eucalyptus crebra</i>	
Windmill grass/es	<i>Enteropogon species</i> (3P)	
Tall cup grass	<i>Eriochloa crebra</i> (3P)	
Lemon Sented	<i>Corymbia citriodora</i>	
Red Ash	<i>Alphitonia excelsa</i>	
Grass tree	<i>Xantheria johnstonii</i>	
Total		<15kg/ha

6.4.3 Revegetation species for hybrid ecosystems PMLU

There are no specific EA conditions which describe the rehabilitation of areas to suit a PMLU of hybrid ecosystem. The reasoning behind these areas being specified as hybrid ecosystem rather than grazing is due to the slope characteristics in a portion of these areas, and the suitability of the grazing rehabilitation when the surrounding area is predominantly Regional Ecosystem. Therefore to maintain the intent of the EA conditions, the hybrid ecosystem areas will be rehabilitated using a similar groundcover species mix as the grazing, but also include a portion of shrub species that are commonly found in the surrounding RE. This is intended to provide suitable connectivity between the areas for wildlife habitat but also provide some value as low intensity grazing for the landowner. In time these rehabilitation areas may naturally recruit tree species from the surrounding RE, but due to the overall land use preference for grazing tree species are not considered mandatory for the hybrid ecosystem to function as a connectivity area. Revegetation species have been referenced from a varied of sources including:

- BioCondition Benchmarks for Regional Ecosystems 11.10.1 and 11.7.2 with a preference for 11.10.1 as it dominates the landscape 90%.
- Regional Ecosystem Descriptions Database

²⁶ DES. (2013). WetlandInfo – Native plants of Western Downs local government area. Department of Environment and Science, Queensland. <https://wetlandinfo.des.qld.gov.au/wetlands/facts-maps/wildlife/?AreaID=lga-western-downs&Kingdom=plants&SpeciesFilter=Native>



The species mix selected for revegetation, refer **Table 31**, has been developed based on selecting a range of native (& endemic appropriate) species suited to the topsoils present within the site.

Table 31: Recommended species and sowing rates for Hybrid Ecosystem PMLU

Common name	Scientific name	Sowing rate (kg/ha)
Black Speargrass	<i>Heteropogon contortus</i>	<1kg to 5kg/ha
Cotton Panic	<i>Digitaria brownii</i>	
Desert Bluegrass	<i>Bothriochloa ewartiana</i>	
Kangaroo Grass	<i>Themeda australis</i>	
Golden Beard Grass	<i>Chrysopogon fallax</i>	
Soap Tree / Red Ash	<i>Alphitonia excelsa</i>	
Hickory Wattle	<i>Acacia glaucocarpa</i>	
Henderson's bloodwood	<i>Corymbia hendersonii</i>	
Clarkson's bloodwood	<i>Corymbia clarksoniana</i>	
Moreton Bay ash	<i>Corymbia tessellaris</i>	
Brown bloodwood	<i>Corymbia trachyphloia</i>	
Gympie messmate	<i>Eucalyptus cloeziana</i>	
Wild pear	<i>Persoonia falcata</i>	
Rare Panic	<i>Paspalidium rarum</i>	
Burrow's wattle	<i>Acacia burrowii</i>	
Queensland peppermint	<i>Eucalyptus exserta</i>	
Gum-top ironbark	<i>Eucalyptus decorticans</i>	
Blake's wattle	<i>Acacia blakei</i>	
Currawong tree	<i>Acacia sparsiflora</i>	
Quinine bush	<i>Petalostigma pubescens</i>	
Lancewood	<i>Acacia shirleyi</i>	
Bendee	<i>Acacia catenulata</i>	
Turkey bush	<i>Acalypha eremorum</i>	
Mountain yapunyah	<i>Eucalyptus thozetiana</i>	
Steel Geass	<i>Xanthorrhoea johnsonii</i>	
White croton	<i>Croton phebaloides</i>	
Conkerberry	<i>Carissa ovata</i>	
Leafy panic	<i>Urochloa foliosa</i>	
Many-headed Wiregrass	<i>Aristida caput-medusae</i>	
Narrow-leaved ironbark	<i>Eucalyptus crebra</i>	
Lemon-scented gum	<i>Corymbia citriodora</i>	
Red Ash	<i>Alphitonia excelsa</i>	
Grass tree	<i>Xantheria johnstonii</i>	
Black Wattle	<i>Acacia leiocalyx</i>	
Native Blackthorn	<i>Bursaria spinosa</i>	
Total		<20kg/ha

6.4.4 Establishing and managing revegetation

Selected seed mixes consists of native (& endemic appropriate) that are cognisant of grazing best management practices. A pasture of good condition typically has a high percentage of 3P grasses and a high frequency of legumes with low number of weeds.

Sowing campaigns will be planned around the wetter months (October to March). Seed quality will be assessed prior to planting to ensure the greatest potential for vegetation establishment. The seed bed will be ripped on the contour to create a friable base on which seed mix will be directly planted using agricultural equipment.



Note, surface ripping may not be required in all disturbance areas. Amelioration and application rates will be determined prior to rehabilitation surface preparation commencing (**Section 6.1.4.4**).

Rehabilitation planning and revegetation for grazing PMLU is based on sowing 3P pasture species and species suitable for sustainable cattle grazing, that are aligned to the associated rehabilitation soils and landform topography.

The hybrid ecosystem PMLU areas are anticipated to contain a higher proportion of organic litter cover due to the presence of the surrounding RE. The rehabilitation objectives reflect these factors. Recruitment of native tree species is considered likely, from the topsoil seed bank and via natural seed distribution from wildlife & weather effects. Whilst this is encouraged, it is not considered a mandatory requirement of the area achieving self-sustaining status.

6.4.5 Topsoil

Sufficient topsoil is available on-site to respread over disturbance areas. Topsoil ameliorations and depth for rehabilitation are described in **Section 6.1.4.3** and **6.1.4.4**.

6.5 Tailings storage facility

PRCP Guideline (section 3.6.2)

The tailings require characterisation to determine the geochemistry, rheology and geotechnical parameters that influence the rehabilitation or management strategies and the capacity of the site to support revegetation.

The design for a TSF must include relevant elements:

- a) lining of TSF (i.e. embankments and base of structure)
- b) leak detection systems
- c) cellular design of TSF
- d) seepage collection systems
- e) design storage allowance
- f) spillway location
- g) designing TSF for progressive rehabilitation

No tailings storage facility exists within the MTI Gurulmundi Mine.



6.6 Voids

PRCP Guideline (section 3.6.2)

The information requirements of this domain are dependent on the nature of the proposed PMLU or NUMA for the void. For mine sites with voids, the rehabilitation planning part must include a void closure plan, which includes options for minimising final void area and volume; final void dimension; pit wall geotechnical and geochemical stability, final slope angles, void hydrology, groundwater modelling, water balance and predicted long-term water quality.

A geotechnical report should focus on how the void will achieve post-closure slopes that will exhibit stability characteristics consistent with the planning and design of the post-closure mine void.

If floodwaters are likely to move over backfilled material, an assessment of the hydraulic properties must be conducted to assess whether instability may occur.

The rehabilitation and management strategies in the plan must include the supervision, verification and auditing of engineering works carried out to achieve the post-closure void landform, to ensure construction is consistent with the geotechnical design.

The rehabilitation and management strategy must also include confirmation that the post-closure landform demonstrates the level of stability as specified by the design.

6.6.1 Minimising final void

An area within the Central Pit labelled 'CP Dam 1' (referred as the 'void') is planned to remain post-mining with a PMLU of water storage. This water storage will be retained by the landowner upon surrender following sediment clean out and conversion to a clean water storage suitable for livestock use (**Appendix 7**).

No other void is proposed to remain post-mining. All other pit disturbance areas will be backfilled to be free-draining and blended in with surrounding topography.

6.6.2 Final void geometry (dimensions, wall stability, wall angles)

The final void contains a southern wall that is up to 5m high inclusive of the maximum 3m void depth and an additional 2m that extends beyond the maximum water storage level.

Final void wall angles are planned to have a maximum 1V:2H design. The upper portion of the southern wall will be battered back during future extraction phases. Internal void walls will remain at a maximum 1V:2H design. The main access ramp is planned to have a gradient maximum of 1V:7H.

Majority of the final void wall height (3m) will be below ground level and is therefore considered low risk and a safe and stable water storage landform.

6.6.3 Void hydrology

Potential hydrological risks, associated with approved voids (pits) – including those pertaining to flooding are considered low risk due to:

- voids will be backfilled to, on average, 1.5m below the pre-mining level with a free-draining final landform design;
- 1%AEP and extreme flood heights does not impact pit disturbance areas; and
- approved activities do not require diversion and/or interruption of any creeks or streams.

The EA does not require a hydrological assessment for Gurulmundi Mine; and it is determined the mining activities do not have an impact to groundwater. Current mining activities do not interact with groundwater, and there are no groundwater bores within the mining lease boundaries of Gurulmundi Mine. Void hydrological modelling is therefore not required due to the low hydrological risks presented by current activities and lack of interaction with groundwater.

6.6.3.1 Final void water balance

Figure 26 illustrates a conceptual water balance model for void catchments. The model describes a simple water balance assessment considering the inflows of daily rainfall, catchment runoff, groundwater recharge and outflows of potential evapotranspiration and infiltration. Direct in-pit water monitoring for these parameters is not available at Gurulmundi Mine.

A water balance assessment was undertaken using data found from a desktop search of grid point data for a specified location (latitude -26.40 and longitude 150.00). The assessment does not include streamflow inputs as there is no direct relationship between the final void and Juandah creek (located north of the mine) – the portion of Juandah creek near the mine is observed dry for most of the year. The assessment also does not include groundwater interactions. Mining and resource drilling activities have not intercepted groundwater at the mine – groundwater bores in the region suggest the groundwater table lies a significant distance below the base of the final void. Infiltration outputs are not monitored nor have been tested at Gurulmundi Mine. An estimate basic infiltration rate for clay soils of 2.5mm/day has been used²⁷.

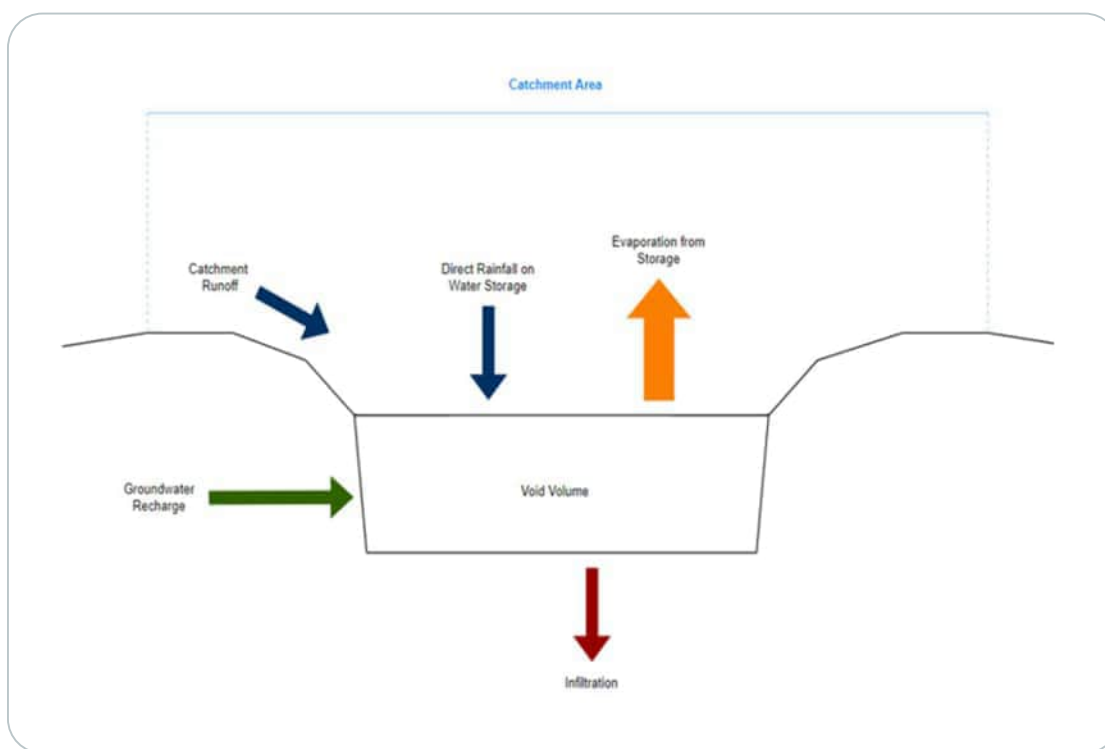


Figure 26: Conceptual water balance model for a void catchment

The water balance assessment considered 2 scenarios – a final void at full capacity (18.44ML) and an empty final void. The assessment was run for a 50-year period (**Figure 27**).

²⁷ FAO. (1985). Irrigation Water Management – Irrigation Methods. Training Manual 5 (Provisional Edition). Food and Agriculture Organization.

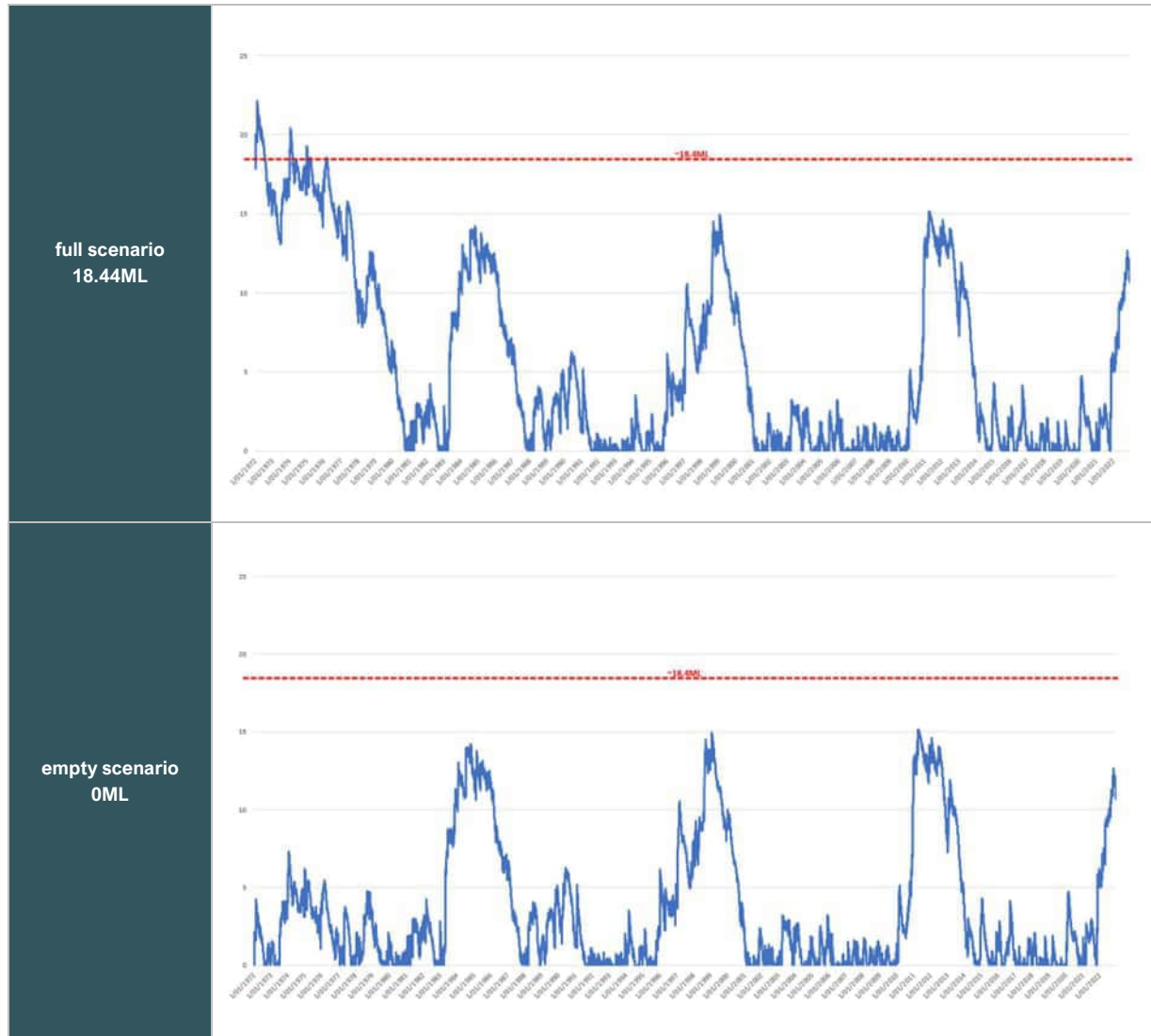


Figure 27: Final void water balance assessment full capacity scenario (top) and empty scenario (bottom)

Based on the 'full scenario; assessment the final void is considered at risk of overflow during prolonged wet periods with a cyclical frequency of approximately 1:15 years. As the final void will be used as a water storage to service livestock use, the risk of overflow post-mining is minimised therefore the infrequent risk of an overflow event from occurring is reduced and is unlikely to impact the end land use.

6.6.3.2 Final void water quality

Water within the final void has been monitored for the last 12-months, and infrequently since 2017. The water quality generally achieves quality limits described in the EA Condition C6 for pH (6.5 – 8.5 acceptable range) and EC ($\leq 370 \mu\text{S/cm}$). Due to bentonite materials in the environment the water quality has high levels of suspended solids, above EA condition limits ($>30 \text{mg/L}$) and is currently unsuitable for use as stock drinking water. As part of the rehabilitation plan, this area will have sediment removed from the basin and water quality treatment to reduce the suspended solids. In addition, it is expected planned rehabilitation in surrounding disturbance areas will improve catchment runoff and quality of water stored in the final void.



No modelling was undertaken on the time required to achieve relevant water quality objectives however, additional manual treatment options are available (at a greater cost) to guarantee the outcome if required.

6.6.4 Design plan

As mining pits will be backfilled, there is no final void and no requirement for a 3D design plan. Water storages that will remain are existing mine water storages.

6.6.5 Rehabilitation and management strategies

The rehabilitation strategy for voids remaining as water storage is to ensure water quality suitable for livestock watering and safe stock access. Additionally steep slopes (>15%) around voids will require further management to ensure all acceptance criteria can be met. This includes fencing to ensure livestock cannot interact with the slope and an assessment to ensure the slope remains geotechnically stable. Final landform stability will be confirmed via rehabilitation monitoring.

6.7 Underground mining

PRCP Guideline (section 3.6.4)

For underground mining operations, the rehabilitation planning part must include:

- a geotechnical study
- an assessment of groundwater interactions and potential lower of groundwater levels
- the development of a hydrogeological conceptual model
- subsidence analysis and modelling and a subsidence vegetation/habitat impact assessment
- consideration of how potential entries to underground workings will be sealed (i.e. through some form of capping or back filling)
- how surface ponding and cracking will be mitigated
- identification of post-closure stabilisation of underground workings in order to manage the potential for unplanned surface subsidence and

Underground mining is not applicable.

6.8 Built infrastructure

PRCP Guideline (section 3.6.5)

The administering authority's expectation of rehabilitation relating to built infrastructure is that it will be decommissioned, demolished, salvaged and/or disposed of unless it is being formally retained by the landholder to achieve an appropriate PMLU.

The rehabilitation planning part must include:

- identification of infrastructure that will be decommissioned and the methods for decommissioning
- a description of infrastructure that will remain post rehabilitation and the identification of ongoing maintenance requirements
- evidence of agreement for any infrastructure that will have ownership transferred.

6.8.1 Decommissioning, demolition and removal

In accordance with the site FLURP, all infrastructure constructed by, or for use by the EA holder during the approved activities, must be removed from the site prior to surrender, unless otherwise agreed upon in writing by the post-mining landowner. Currently, there is a signed landowner agreement in place for [REDACTED] (freehold landowner under the EA) (**Appendix 7**). Infrastructure that will remain on site, as agreed upon by the landowner and documented in the landowner agreement, are listed in **Table 32**.

The site is accessible off Gurulmundi Road, a Council controlled road. The responsibility of any required rehabilitation activities to this road does not fall under the responsibility of MTI.

Table 32: Infrastructure associated with approved activities at MTI Gurulmundi

Infrastructure	Description
Built infrastructure	<ul style="list-style-type: none"> Office buildings – office shed, dispatch office, site office, laboratory, toilet block, break room Storage sheds – USA clay/coal shed, cat litter storage shed, mill feed shed, mill shed, mill warehouse, silos Associated infrastructure – power, water, communication services Weighbridge
Water storage	<ul style="list-style-type: none"> Central extraction area Lower basin
Roads and tracks	<ul style="list-style-type: none"> Main access road (front gate to Juandah Creek) as an unsealed dirt road

6.8.1.1 Landholder agreement conditions

Per the landowner agreement, the following conditions must be met for listed infrastructure to be accepted upon surrender:

- Acceptance of silos post-mining is subject to the removal of all bentonite processing plant equipment (conveyors, screens, etc.) and other mobile plant and/or mobile equipment;
- Clean out of the sediment dam and conversion to a clean water storage in the Central extraction pit area;
- Payment of all current and outstanding invoices for energy consumption during mining operations; and
- Utility connections to buildings may remain post-mining.

6.8.1.2 Built infrastructure

Except where agreed in writing in the landowner agreement, decommissioning of built infrastructure will include:

- Disconnecting all services;
- Demolition and removal of all built and service infrastructure including buildings, pipes, pumps, power lines, etc;
- Removal of all concrete, bitumen and aggregate from buildings, roads, carparks, laydown areas, footpaths, etc.; and
- Removal of all waste products and rubbish.

6.8.1.3 Water storage

There are no conditions in the EA pertaining to the decommissioning of water storages.

Per the landowner agreement, the transition of water storages (labelled 'CP Dam 1' and 'Lower Basin') to an acceptable condition will include:

- Clean out of sediment dam;
- Conversion to clean water storage; and
- Water left in storage areas must be suitable for livestock use.

6.8.1.4 Roads and tracks

In accordance with EA Condition F2 'Table F1' haul roads have a designated post-mine land description of marginal grazing.



Decommissioning of roads and tracks will include:

- Deep ripping, shaping and grading to suit surrounding landforms; and
- Topsoil and seed with suitable grazing species.

6.8.2 Contaminated land assessment

In accordance with EA Condition E1, all waste generated as part of the mining activities must be lawfully reused, recycled, or removed to a facility that can lawfully accept the waste. Contamination at the Gurulmundi Mine is highly unlikely, however, in the event a contamination is suspected, a contaminated land assessment will be completed on all suspected areas listed in **Table 32**, as well as adjacent operational areas, where required. The purpose of such an assessment will be to confirm that no contamination unsuitable for the post-mining land use is occurring.

6.9 Summary of key rehabilitation and management practices

Key rehabilitation activities for each relevant activity at Gurulmundi Mine are summarised in **Table 33**. The rehabilitation activities are aimed to drive achievement of the Gurulmundi Mine rehabilitation milestones and inform the associated PRCP schedule.

Table 33: Key rehabilitation activities identified to drive achievement of Rehabilitation Milestones, per relevant activity

Rehabilitation area	Relevant activities	Area (ha)	Rehabilitation activities (to drive achievement of rehabilitation milestones)	Rehabilitation timing	Rehabilitation milestones
RA1	Pits (Grazing)	31.7	<ul style="list-style-type: none"> Backfill with overburden from overburden stockpiles; Backfill to on average 1.5m below pre-mining levels / surrounding topography; Spread remaining overburden across backfilled pit voids and overburden stockpile area (where required); Reshape the landform to be free-draining and blended with surrounding topography; Install erosion and sediment controls (where required); Monitor backfilled material for settlement and repair if low dips arise that will impact achievement of a stable condition; Spread topsoil an average thickness of 150mm; Assess soil characteristics to determine ameliorant and fertiliser requirements; Apply ameliorants and fertilisers (where required); Rip across contour; Seed; and Undertake monitoring and maintenance to demonstrate achievement of marginal grazing PMLU 	<ul style="list-style-type: none"> Some pit areas are available to commence rehabilitation as early as 2025, with future pits progressively rehabilitated as they become available; Seeding should be completed by 2049. 	RM1 RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA2	Pits (Hybrid Ecosystem)	25.8	<ul style="list-style-type: none"> Backfill with overburden from overburden stockpiles; Backfill to on average 1.5m below pre-mining levels / surrounding topography; Spread remaining overburden across backfilled pit voids and overburden stockpile area (where required); Reshape the landform to be free-draining and blended with surrounding topography; Install erosion and sediment controls (where required); Monitor backfilled material for settlement and repair if low dips arise that will impact achievement of a stable condition; Spread topsoil an average thickness of 150mm; Assess soil characteristics to determine ameliorant and fertiliser requirements; Apply ameliorants and fertilisers (where required); Rip across contour; Seed; and Undertake monitoring and maintenance to demonstrate achievement of hybrid ecosystem PMLU. 	<ul style="list-style-type: none"> Some pit areas are available to commence rehabilitation as early as 2025, with future pits progressively rehabilitated as they become available; Seeding should be completed by 2050. 	RM1 RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA3	Topsoil Stockpiles (Grazing)	4.1	<ul style="list-style-type: none"> Load and transport topsoil where required; Leave remaining volume for topsoil stockpile areas; Reshape the landform to be free-draining and blended with surrounding topography; Spread topsoil an average thickness of 150mm; 	<ul style="list-style-type: none"> Areas available for rehabilitation progressively as topsoil is used on other disturbance areas; Majority of topsoil should be loaded, transported and spread by 2049; and 	RM3 RM5 RM6 RM7 RM8 RM9



Rehabilitation area	Relevant activities	Area (ha)	Rehabilitation activities (to drive achievement of rehabilitation milestones)	Rehabilitation timing	Rehabilitation milestones
			<ul style="list-style-type: none"> Assess soil characteristics to determine ameliorant and fertiliser requirements; Apply ameliorants and fertilisers (where required); Rip across contour; Seed; and Undertake monitoring and maintenance to demonstrate achievement of marginal grazing PMLU. 	<ul style="list-style-type: none"> Seeding should be completed by 2040. 	
RA4	Topsoil Stockpiles (Hybrid Ecosystem)	12.3	<ul style="list-style-type: none"> Load and transport topsoil where required; Leave remaining volume for topsoil stockpile areas; Reshape the landform to be free-draining and blended with surrounding topography; Spread topsoil an average thickness of 150mm; Assess soil characteristics to determine ameliorant and fertiliser requirements; Apply ameliorants and fertilisers (where required); Rip across contour; Seed; and Undertake monitoring and maintenance to demonstrate achievement of hybrid ecosystem PMLU. 	<ul style="list-style-type: none"> Areas available for rehabilitation progressively as topsoil is used on other disturbance areas; Majority of topsoil should be loaded, transported and spread by 2049; and Seeding should be completed by 2051. 	RM3 RM5 RM6 RM7 RM8 RM9
RA5	Overburden & Laydown Areas (Grazing)	0.8	<p>Overburden areas:</p> <ul style="list-style-type: none"> Undertake assessment for contaminated land and remediate (if required / suspected); Spread remaining overburden over the overburden stockpile (overburden remaining after backfill in pits); Reshape the landform to be free-draining and blended with surrounding topography; Install erosion and sediment controls (where required); Spread topsoil an average thickness of 150mm; Assess soil characteristics to determine ameliorant and fertiliser requirements; Apply ameliorants and fertilisers (where required); Rip across contour; Seed; and Undertake monitoring and maintenance to demonstrate achievement of marginal grazing PMLU. <p>Laydown areas:</p> <ul style="list-style-type: none"> Reshape the landform to be free-draining and blended with surrounding topography; Install erosion and sediment controls (where required); Monitor backfill material for settlement and repair if low dips arise that will impact achievement of a stable condition; Spread topsoil an average thickness of 150mm; Assess soil characteristics to determine ameliorant and fertiliser requirements; 	<ul style="list-style-type: none"> Some areas are available for rehabilitation as the mine is progressively developed; Most laydown yards are required for the duration of active mining operations; and Seeding should be completed by 2037. 	RM1 RM3 RM4 RM5 RM6 RM7 RM8 RM9



Rehabilitation area	Relevant activities	Area (ha)	Rehabilitation activities (to drive achievement of rehabilitation milestones)	Rehabilitation timing	Rehabilitation milestones
			<ul style="list-style-type: none"> • Apply ameliorants and fertilisers (where required); • Rip across contour; • Seed; and • Undertake monitoring and maintenance to demonstrate achievement of marginal grazing PMLU. 		
RA6	Overburden & Laydown Areas (Hybrid Ecosystem)	16.6	<p>Overburden areas:</p> <ul style="list-style-type: none"> • Undertake assessment for contaminated land and remediate (if required / suspected); • Spread remaining overburden over the overburden stockpile (overburden remaining after backfill in pits); • Reshape the landform to be free-draining and blended with surrounding topography; • Install erosion and sediment controls (where required); • Spread topsoil an average thickness of 150mm; • Assess soil characteristics to determine ameliorant and fertiliser requirements; • Apply ameliorants and fertilisers (where required); • Rip across contour; • Seed; and • Undertake monitoring and maintenance to demonstrate achievement of hybrid ecosystem PMLU. <p>Laydown areas:</p> <ul style="list-style-type: none"> • Reshape the landform to be free-draining and blended with surrounding topography; • Install erosion and sediment controls (where required); • Monitor backfill material for settlement and repair if low dips arise that will impact achievement of a stable condition; • Spread topsoil an average thickness of 150mm; • Assess soil characteristics to determine ameliorant and fertiliser requirements; • Apply ameliorants and fertilisers (where required); • Rip across contour; • Seed; and • Undertake monitoring and maintenance to demonstrate achievement of hybrid ecosystem PMLU. 	<ul style="list-style-type: none"> • Some areas are available for rehabilitation as the mine is progressively developed; • Most laydown yards are required for the duration of active mining operations; and • Seeding should be completed by 2052. 	RM1 RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA7	Infrastructure	0.5	<ul style="list-style-type: none"> • Decommissioning of relevant items; • Removal of excess bentonite and/or foreign materials from processing and stockpiling areas; • Where required and/or suspected, conduct contaminated land assessment; • Removal of rubbish and unnecessary mobile equipment or machinery; and • Assessment of remaining infrastructure to be in safe and stable condition. 	<ul style="list-style-type: none"> • Required to remain post-mining per landholder agreement; and • Available for relinquishment by 2055. 	RM1 RM10



Rehabilitation area	Relevant activities	Area (ha)	Rehabilitation activities (to drive achievement of rehabilitation milestones)	Rehabilitation timing	Rehabilitation milestones
RA8	Roads & Tracks (Grazing)	2.0	<ul style="list-style-type: none"> Reshape the landform to be free-draining and blended with surrounding topography; Spread topsoil an average thickness of 150mm; Assess soil characteristics to determine ameliorant and fertiliser requirements; Apply ameliorants and fertilisers (where required); Rip across contour; Seed; and Undertake monitoring and maintenance to demonstrate achievement of marginal grazing PMLU. 	<ul style="list-style-type: none"> Infrastructure areas required until majority of rehabilitation is complete; Some roads/tracks available for rehabilitation by 2029 at the earliest; and Seeding to be completed by 2046. 	RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA9	Roads & Tracks (Hybrid Ecosystem)	2.3	<ul style="list-style-type: none"> Reshape the landform to be free-draining and blended with surrounding topography; Spread topsoil an average thickness of 150mm; Assess soil characteristics to determine ameliorant and fertiliser requirements; Apply ameliorants and fertilisers (where required); Rip across contour; Seed; and Undertake monitoring and maintenance to demonstrate achievement of hybrid ecosystem PMLU. 	<ul style="list-style-type: none"> Infrastructure areas required until majority of rehabilitation is complete; Some roads/tracks available for rehabilitation by 2039 at the earliest; and Seeding to be completed by 2055. 	RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA10	Main Road (to remain)	1.8	<ul style="list-style-type: none"> Where required, reshape and/or regrade sections of the main road; and Monitor and assess geotechnical stability for continued use post-mining. 	<ul style="list-style-type: none"> Required to remain post-mining per landholder agreement; Available for relinquishment by 2052. 	RM10
RA11	Sediment Basins and Water Management (Grazing)	1.0	<ul style="list-style-type: none"> Pipe, truck or transfer any remaining water for stock watering, and/or irrigation purposes; Undertake contaminated land assessment of mine water dam area and remediate, if required and if contamination is suspected; Dam walls dozed into the dam and spread over remaining sediment; Spread topsoil to an average thickness of 150mm (where required); Apply ameliorants and fertilisers; Rip across contour; Seed; and Undertake monitoring and maintenance to demonstrate achievement of marginal grazing PMLU. 	<ul style="list-style-type: none"> Required for water management until rehabilitation of pits is close to achieving surface requirements rehabilitation milestone (RM7); Areas available for rehabilitation by 2025; Seeding to be completed by 2030. 	RM2 RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA12	Sediment Basins and Water Management (Hybrid Ecosystem)	0.3	<ul style="list-style-type: none"> Pipe, truck or transfer any remaining water for stock watering, and/or irrigation purposes; Undertake contaminated land assessment of mine water dam area and remediate, if required and if contamination is suspected; Dam walls dozed into the dam and spread over remaining sediment; 	<ul style="list-style-type: none"> Required for water management until rehabilitation of pits is close to achieving surface requirements rehabilitation milestone (RM7); Areas available for rehabilitation by 2048; Seeding to be completed by 2053. 	RM2 RM3 RM4 RM5 RM6 RM7 RM8



Rehabilitation area	Relevant activities	Area (ha)	Rehabilitation activities (to drive achievement of rehabilitation milestones)	Rehabilitation timing	Rehabilitation milestones
			<ul style="list-style-type: none"> Spread topsoil to an average thickness of 150mm (where required); Apply ameliorants and fertilisers; Rip across contour; Seed; and Undertake monitoring and maintenance to demonstrate achievement of hybrid ecosystems PMLU. 		RM9
RA13	Water Storages (to remain)	1.2	<ul style="list-style-type: none"> Removal of any embankments impeding natural clean water runoff into the sediment dams; Reshape water storage where required to support a geotechnically stable structure; and Undertake monitoring and maintenance to demonstrate achievement of water storage PMLU. 	<ul style="list-style-type: none"> CPD1 in the Central extraction area will remain post-mining and be converted to clean water storage for the purpose (RM2); The Lower Sediment basin in the Processing and Infrastructure area will remain post-mining; Water storage preparation and clean water conversion will commence by 2052; and Suitable for surrender to the landowner by 2066. 	RM2 RM3 RM6 RM7 RM8 RM9 RM10
RA14	Existing Rehabilitation (Grazing Stage 1)	6.9	<ul style="list-style-type: none"> Reshape the landform to be free-draining and blended with surrounding topography; Spread topsoil an average thickness of 150mm; Assess soil characteristics to determine ameliorant and fertiliser requirements; Apply ameliorants (where required) Rip across contour; Seed; and Undertake monitoring and maintenance to demonstrate achievement of marginal grazing PMLU 	<ul style="list-style-type: none"> Some areas already available for rehabilitation commenced; Other rehabilitation areas available to commence in 2025; Seeding to be completed by 2028. 	RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA15	Existing Rehabilitation (Grazing Stage 2)	9.9	<ul style="list-style-type: none"> Reshape the landform to be free-draining and blended with surrounding topography; Spread topsoil an average thickness of 150mm; Assess soil characteristics to determine ameliorant and fertiliser requirements; Apply ameliorants (where required) Rip across contour; Seed; and Undertake monitoring and maintenance to demonstrate achievement of marginal grazing PMLU 	<ul style="list-style-type: none"> Some areas available for rehabilitation have already commenced; Seeding to be completed by 2028. 	RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA16	Existing Rehabilitation (Grazing Stage 3)	1.5	<ul style="list-style-type: none"> Undertake monitoring and maintenance to demonstrate achievement of marginal grazing PMLU 	<ul style="list-style-type: none"> Rehabilitation completed; Awaiting certification. 	RM3 RM4 RM5 RM6 RM7 RM8



Rehabilitation area	Relevant activities	Area (ha)	Rehabilitation activities (to drive achievement of rehabilitation milestones)	Rehabilitation timing	Rehabilitation milestones
					RM9
RA17	Existing Rehabilitation (Hybrid Ecosystem Stage 1)	1.4	<ul style="list-style-type: none"> Reshape the landform to be free-draining and blended with surrounding topography; Spread topsoil an average thickness of 150mm; Assess soil characteristics to determine ameliorant and fertiliser requirements; Apply ameliorants (where required) Rip across contour; Seed; and Undertake monitoring and maintenance to demonstrate achievement of hybrid ecosystem PMLU 	<ul style="list-style-type: none"> Some areas available for rehabilitation have already commenced; Other rehabilitation areas available to commence in 2025; Seeding to be completed by 2028. 	RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA18	Existing Rehabilitation (Hybrid Ecosystem Stage 2)	6.4	<ul style="list-style-type: none"> Reshape the landform to be free-draining and blended with surrounding topography; Spread topsoil an average thickness of 150mm; Assess soil characteristics to determine ameliorant and fertiliser requirements; Apply ameliorants (where required) Rip across contour; Seed; and Undertake monitoring and maintenance to demonstrate achievement of hybrid ecosystem PMLU 	<ul style="list-style-type: none"> Some areas available for rehabilitation have already commenced; Other rehabilitation areas available to commence in 2025; Seeding to be completed by 2028. 	RM3 RM4 RM5 RM6 RM7 RM8 RM9

7 Risk assessment

Legislative Requirement

In accordance with sections 126C(1)(f) of the EP Act, the rehabilitation planning part of the PRC plan must identify the risks of a stable condition for land described as a post-mining land use not being achieved, and how the applicant intends to manage or minimise the risks.

PRCP Guideline (section 3.7)

As per section 126C(1)(j) of the EP Act, the administering authority considers it necessary for the proposed PRC plan to contain a risk assessment of all proposed NUMAs. The risk assessment must be carried out to identify the risks of the NUMA causing environmental harm and not being safe and structurally stable and detail how the applicant intends to manage and minimise the identified risks.

The AS ISO 31000:2018 Risk Management – Guidelines (Standards Australia, 2018) describes risk assessment as the overall process of risk identification, risk analysis, risk evaluation and risk treatment. Each of these aspects must be included in the risk assessment in the rehabilitation planning part.

Applicability to Transitional PRC plans

Information requirements in this section apply to all applicants whether or not they are an existing EA holder. Existing holders may have the required information available from previously submitted plans/reports/applications that, if still valid, can be used in the PRC plan.

7.1 Identifying, assessing and treating risks

7.1.1 Risk assessment methodology

A risk-based approach (**Figure 28**) to the Gurulmundi Mine PRC planning part was conducted per ISO 3100:2018 Risk Management Guidelines.

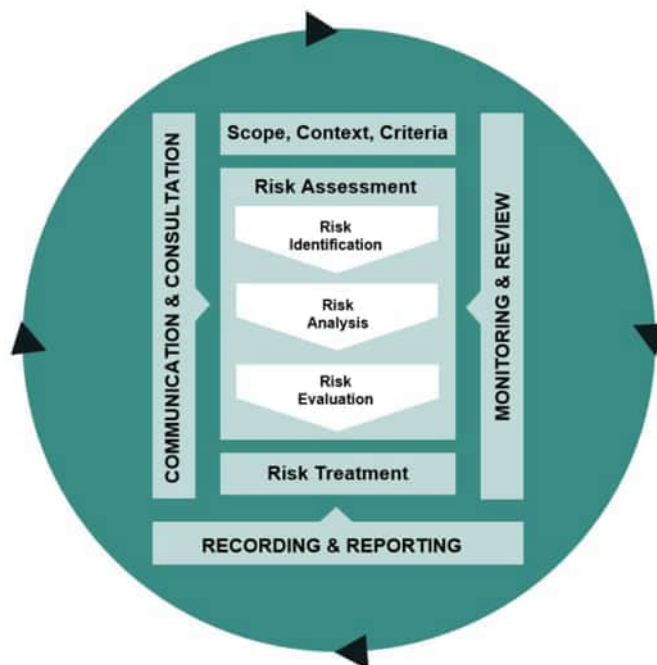


Figure 28: ISO 3100-compliant risk-based approach for the D'Aguilar Mining Project PRC plan

7.1.2 Risk identification

The risk event of a stable condition for land described as a post-mining land use not being achieved, was assessed per ISO 31000 methodology described in **Figure 28** above, where a stable condition is defined per Section 111A of the EP Act:

- the land is safe and structurally stable;
- there is no environmental harm being caused by anything on or in the land; and
- the land can sustain a PMLU.

The EA approves marginal grazing and water storage (pits only) PMLUs for Gurulmundi Mine (**Section 2**). Areas adjacent to marginal grazing PMLUs that remain undisturbed from mining activities will have a marginal grazing on/near natural ecosystem PMLU.

Scenarios identified in the risk identification process related to a stable condition for the land described as the PMLUs not being achieved include:

- alteration of hydrogeological conditions;
- alteration of surface water systems;
- alteration of flood hydrology;
- landform failure;
- water storage failure;
- revegetation failure;
- insufficient, inadequate or inappropriate soil and capping material required for rehabilitation activities;
- insufficient identification and management of waste characterisation;
- inadequate and/or inappropriate cover design;
- stability failure of rehabilitated void(s); and
- deterioration of built infrastructure conditions.

A full risk assessment of PMLUs is provided in **Appendix 8**.

7.1.3 Risk analysis, evaluation and relevant treatments

The risk assessment table included in **Appendix 8** provides full details of the risk analysis, risk evaluation and risk treatment for the scenarios listed above. Worst case outcomes were assessed per scenario, and preventative and mitigation measures were identified to allow a residual risk rating to be calculated. Likelihood and consequence scales and residual risk rating (RRR) matrix are provided in **Figure 29**.

Uncertainty	Frequency	Likelihood factor	Guidance
Highly likely	Likely to occur within a 1 year period	3	Event is expected to occur > 80% of the time during a 5 year planning cycle
Likely	Likely to occur within a 1 to 5 year period	1	Event is expected to occur 60% to 80% of the time during a 5 year planning cycle
Probable	Likely to occur within a 5 to 20 year period	0.3	Event is expected to occur 60% of the time during a 5 year planning cycle
Unlikely	Likely to occur within a 20 to 50 year period	0.1	Event is expected to occur 30% of the time during a 5 year planning cycle
Highly unlikely	Not likely to occur within a 5 year period	0.03	Event is expected to occur < 10% of the time during a 5 year planning cycle

Severity level	Description	Severity factor
5	Severe impact to the environment where recovery of ecosystem function takes 10 years or more	1000
4	Serious impact to the environment where recovery of ecosystem function takes between 3 to 10 years	300
3	Substantial impact to the environment, where recovery of ecosystem function takes between 1 and up to 3 years	100
2	Measurable but limited impact to the environment where recovery of ecosystem function takes less than 1 year	30
1	Minor and/or temporary impact to the environment where the ecosystem recovers with little to no intervention	10

Severity								
			Severity level	1	2	3	4	5
			Severity factor	10	30	100	300	1000
Likelihood	Likelihood	Likelihood factor	Timeframe	Residual Risk Rating (with controls in place and effective)				
	Highly likely	3	Within 1 year	30	90	300	900	3000
	Likely	1	Within 1-5 years	10	30	100	300	1000
	Probable	0.3	Within 5-20 years	3	9	30	90	300
	Unlikely	0.1	Within 20-50 years	1	3	10	30	100
	Highly unlikely	0.03	Within 50 years	0.3	0.9	3	9	30

Figure 29: Likelihood and severity tables with residual risk rating (RRR) matrix

7.2 Rehabilitation trials

PRCP Guideline (section 3.7.1)

In accordance with section 126C(1)(j) of the EP Act, if rehabilitation trials are planned, the rehabilitation planning part must state:

- the objective of the trial(s)
- the trial design including, but not limited to, the location, underlying land characteristics and potential issues
- the details of how the trials(s) will be carried out
- when trials(s) will commence
- the duration of the trial(s)
- how the trial(s) will be assessed for success
- how the results of the trial(s) will be incorporated into rehabilitation strategies and the development of milestones; and
- where the trials have previously been carried out by the applicant.

Applicability to Transitional PRC plan

The information requirements in this section will apply to all applicants, whether or not they are an existing EA holder, who have planned or commenced rehabilitation trials. Existing EA holders can provide details of any rehabilitation trials that have occurred prior to the submission of the proposed PRC plan.

No rehabilitation trials will be conducted due to the EA limited maximum disturbance areas and minimal change to the topography of the land. There is insufficient data available from existing rehabilitation to accurately predict the timeframe requirements for revegetation outcomes. The proposed revegetation timeframes include up to 5 years to go from establishment of PMLU surface conditions - RM7 to achievement of PMLU to a stable condition - RM8. If future research (i.e. existing or future rehabilitation areas) indicates this is insufficient, an amendment will need to be made to the PRCP to reflect the additional timeframes. Rehabilitation outcomes are considered low risk and extension of timeframes for rehabilitation is unlikely to significantly impact the post-mining land use being grazing. This is due to the rehabilitation areas being a significantly smaller footprint than the existing grazing land available within the land boundary. Additionally, due to the long life of the site (deadline for rehabilitation to be complete) and the nature of progressive rehabilitation there would be sufficient time to ensure that all RMs are met.

8 Monitoring and maintenance

PRCP Guideline (section 3.8)

In accordance with section 126C(1)(j) of the EP Act, the administering authority considers monitoring and maintenance necessary to decide if the PRC plan is consistent with the requirements of the legislation. The rehabilitation planning part must contain a monitoring and maintenance program that identifies and describes the monitoring systems that will be carried out in order to demonstrate a milestone and milestone criteria have been achieved. the program must include, where relevant to the milestone and milestone criteria (but is not limited to):

- schedule of monitoring, reporting and review for each milestone
- description of methodologies and standards, which could include field-based assessments and the application of new remote sensing, GIS and other relevant emerging technologies
- monitoring that enables the repeatable collection of relevant statistically valid data
- monitoring using appropriate assurance and data management processes and systems
- regular analysis of site data including multi-year comparison trends and bench-marking against analogue/reference sites
- contingency strategies if monitoring data indicates milestone criteria are not being met
- post-closure monitoring to ensure milestone criteria has been demonstrated
- intent of monitoring reports, such as provision of results and key findings

Applicability to Transitional PRC plan

The information requirements in this section will apply to all applicants whether or not they are an existing EA holder. However, existing holders may already have the required information available from previously submitted plans/reports/applications that, if still valid, could be used in the PRC plan. If there has/is any monitoring or maintenance of areas already rehabilitated, details must be included in the PRC plan.

8.1 Milestone monitoring

To demonstrate achievement of rehabilitation milestones as they relate to achieving a PMLU of marginal grazing, hybrid ecosystem and/or water storage (pits), a combination of the following approaches will be implemented:

- Rehabilitation reporting requirements; and
- Ongoing rehabilitation monitoring, including desktop and field-based assessment with associated reporting requirements.

Table 34: Rehabilitation milestones and relevant reporting requirements

Milestone reference	Rehabilitation milestone	Reporting requirements
RM1	Infrastructure decommissioning and removal	<ul style="list-style-type: none"> • Visual inspections • Document inspections
RM2	Water storage preparation (clean water conversion)	<ul style="list-style-type: none"> • Visual inspections • Document inspections
RM3	Landform development and reshaping	<ul style="list-style-type: none"> • Survey landform • Analyse final landform against design
RM4	Establishment of geotechnically stable surface conditions	<ul style="list-style-type: none"> • Document acceptance criteria achieved
RM5	Surface preparation	<ul style="list-style-type: none"> • Survey landform and extent after topsoil is placed • Document topsoil depth • Document soil assessment • Document soil ameliorants and/or physical treatments applied

Milestone reference	Rehabilitation milestone	Reporting requirements
RM6	Seeding / Revegetation	<ul style="list-style-type: none"> Document seed mix, planting rates and areas
RM7	Establishment of PMLU surface conditions	<ul style="list-style-type: none"> Undertake rehabilitation monitoring & document acceptance criteria achieved
RM8	Achievement of PMLU to a stable condition – without water quality	<ul style="list-style-type: none"> Undertake rehabilitation monitoring & document acceptance criteria achieved
RM9	Achievement of water quality – water quality only	<ul style="list-style-type: none"> Undertake rehabilitation monitoring & document acceptance criteria achieved
RM10	Permanent infrastructure remaining post-mining is in a safe and stable condition	<ul style="list-style-type: none"> Document acceptance criteria achieved

8.1.1 Selection of analogue sites

Monitoring of analogue or reference sites is not a requirement of the site EA, however, a total of four analogue sites have been selected, with two analogue sites representing each of the PMLU's (marginal grazing and hybrid ecosystem). Sites A1 & A2 have been selected, with A1 north of ML55017 and A2 in the northeast of ML55007 selected as representative examples of marginal grazing PMLU on lands undisturbed by mining activities.

The analogue sites are positioned within areas currently used for grazing by the landowner. The sites also represent the typical landscape immediately surrounding Juandah Creek. The analogue sites exhibit natural rates of erosion in areas adjacent to Juandah Creek; where observed rates of erosion seem typical of sodic soils found in the region.

Sites A3 & A4 have been selected within ML55007, with A3 west of the infrastructure and processing area and A4 south of the Central Pit. Both are representative examples of the surrounding Regional Ecosystem (RE11.10.1/11.7.2) and represents PMLU hybrid ecosystem undisturbed by mining activities.

A3 is positioned on the plateau with relatively slope angles between 0 and 15% which is representative of the infrastructure and processing area and low angle slopes of hybrid ecosystem rehabilitation area. A4 is located on the slope between the plateau and the lower plains, with slope between 15% and 60% which is representative of a variety of rehabilitation areas including portions the West, North and Central pits. The analogue sites exhibit varied vegetation and erosion rates which is representative of the broader landscape in the region. **Figure 30** details the location of the four analogue sites including the GPS co-ordinates in UTM and decimal degrees.

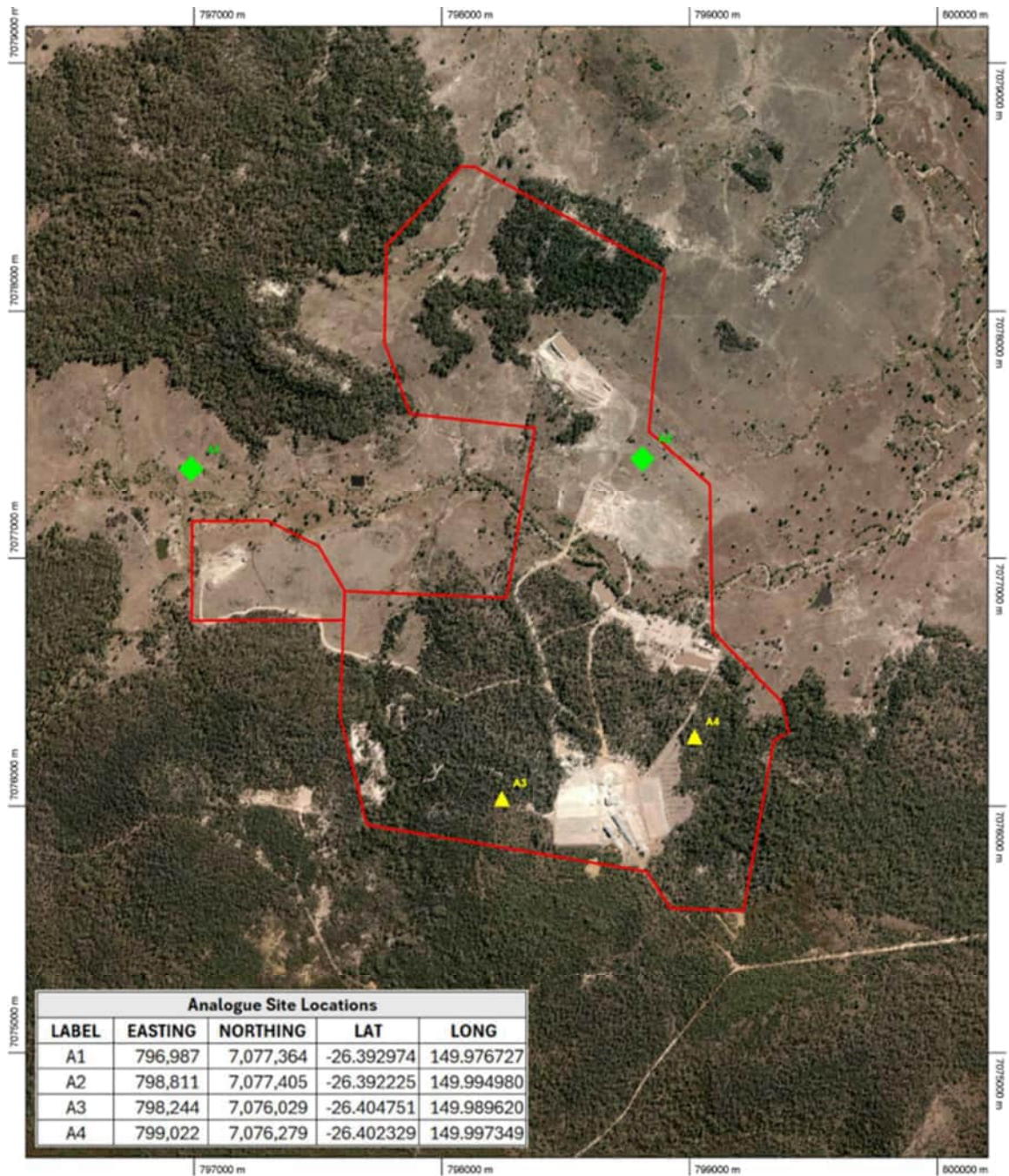
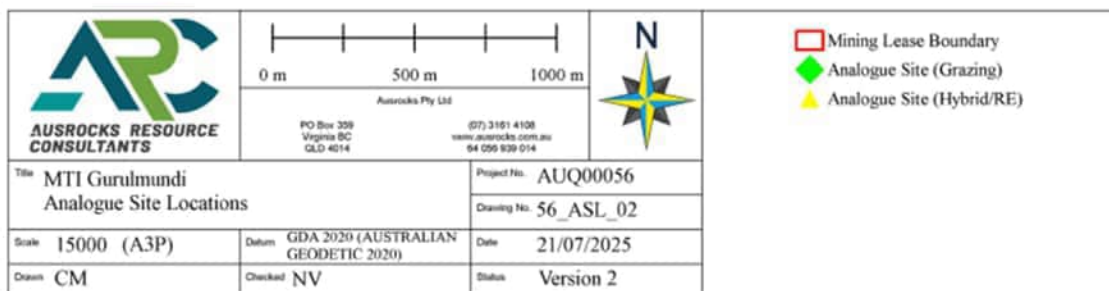


Figure 30: Marginal grazing and hybrid ecosystem analogue sites

In addition to qualitative assessment of achievement of acceptance criteria, the analogue sites will also be used in BioCondition Assessments (**Section 8.4.3**) of rehabilitation areas using appropriate attributes (e.g. for grasslands)²⁸. Assessable attributes may include, but are not limited to:

- non-native plant cover;
- native perennial grass cover (%);
- litter cover;
- size of patch;
- context; and
- connectivity or distance to artificial water.

8.1.2 Grazing PMLU monitoring

Monitoring of grazing PMLUs is proposed to be undertaken by site personnel at regular intervals (minimum 6-month periods) until specific milestone criteria are met and a stable and safe condition is achieved.

The following information will be collected as part of the monitoring program:

- photo images of existing and new rehabilitation areas (RAs) for comparison with surrounding areas of similar land use;
- records of treatments used for each new RA including seeding rate, soil treatment, and topsoil source;
- summary of plant species within RAs including cover percentage and species diversity;
- presence and abundance of weed species;
- soil testing program for each uniform RA (testing >1 sample locations per 6ha, and >3 sample locations per RA) – samples taken at a maximum of 100mm increments and at depth no less than topsoil capping depth;
- soil testing conducted by NATA accredited laboratory for pH, ESP, ECse and OC;
- summary of any fauna re-settling in rehabilitated areas;
- landform monitoring (slope angle, contour bank spacing, waterways, presence/absence of severe rill or gully erosion); and
- summary of poor rehabilitation activities, maintenance applied and/or proposed for each affected RA.

Rehabilitation monitoring will also be conducted by an appropriately qualified and experienced person(s) at regular intervals, depending on the RA and its progress in relation to the PRCP schedule. It is anticipated yearly monitoring will be required in initial stages of rehabilitation. New RAs will be added as soon as they become available and is dependent on establishment success. This form of AQP monitoring will continue until all rehabilitation activities meet relevant acceptance completion criteria achieving a safe and stable condition, and until the surrender of the Gurulmundi Mine leases.

The rehabilitation performance of RAs with a designated marginal grazing PMLU will be assessed against the analogue site and the acceptance criteria outlined in **Table 19**.

²⁸ Treeless or non-woody dominant ecosystems (e.g. grasslands) cannot suitably be assessed against woody-type BioCondition attributes. Woody-type attributes should therefore be discounted from final assessment scores where these attributes are naturally absent. Queensland Herbarium BioCondition Assessment Manual.

8.1.3 Hybrid Ecosystem PMLU monitoring

Monitoring of the Hybrid Ecosystem PMLU is proposed to be undertaken by site personnel at regular intervals (minimum 6-month periods) until specific milestone criteria are met and a stable and safe condition is achieved. Note, where BioCondition assessments are required, these will be undertaken by suitably qualified persons (RM7 and RM8).

The following information will be collected as part of the monitoring program:

- photo images of existing and new rehabilitation areas (RAs) for comparison with surrounding areas of similar land uses and/or composition;
- records of treatments used for each new RA including seeding rate, soil treatment, and topsoil source;
- summary of plant species within RAs including cover percentages and species diversity;
- presence and abundance of weed species;
- soil testing program for each uniform RA (testing >1 sample locations per 6ha, and >3 sample locations per RA) – samples taken at a maximum of 100mm increments and at depth no less than topsoil capping depth;
- soil testing conducted by NATA accredited laboratory for pH, ESP, ECse and OC;
- summary of any fauna re-settling in rehabilitated areas;
- landform monitoring (slope angle, contour bank spacing, waterways, presence/absence of severe rill or gully erosion); and
- summary of poor rehabilitation activities and maintenance applied and/or proposed for each affected area RA.

Rehabilitation monitoring will also be conducted by an appropriately qualified and experienced person(s) at regular intervals, depending on the RA and its progress in relation to the PRCP schedule. It is anticipated yearly monitoring will be required in initial stages of rehabilitation. New RAs will be added as soon as they become available and is dependent on establishment success. This form of AQP monitoring will continue until all rehabilitation activities meet relevant acceptance completion criteria achieving a safe and stable condition, and until the surrender of the Gurulmundi Mine leases.

The rehabilitation performance of RAs with a designated hybrid ecosystem PMLU will be assessed against the analogue site and the acceptance criteria outlined in **Table 20**.

8.1.4 Water storage PMLU monitoring

Monitoring of water storage PMLU is proposed to be undertaken by site personnel at regular intervals (minimum 6-month periods) until specific milestone criteria are met and a safe and stable condition is achieved.

The following information will be collected as part of the monitoring program:

- photo images of existing and new rehabilitation areas (RAs) for comparison with surrounding areas of similar land use;
- records of treatments and/or works applied for each new RA including, but not limited to backfilling, re-profiling, geotechnical and/or safety inspections;
- all requirements approved and prescribed in the Site Water Management Plan;
- landform monitoring (slope angle, contour banks spacing, waterways, presence/absence of severe rill or gully erosion); and
- summary of poor rehabilitation activities, maintenance applied and/or proposed for each affected RA.

Rehabilitation monitoring will also be conducted by an appropriately qualified and experienced person(s) at regular intervals depending on the RA and its progress in relation to the PRCP schedule. It is anticipated yearly monitoring will be required in initial stages of rehabilitation. New RAs will be added as they become available and is dependent on establishment success. This form of AQP monitoring will continue until all rehabilitation

activities achieve relevant completion criteria and reach a safe and stable condition, and until the surrender of the Gurulmundi Mine leases.

The rehabilitation performance of RAs with a designated water storage PMLU will be assessed against the analogue site and the acceptance criteria outlined in **Table 21**.

8.1.5 Rehabilitation monitoring phase

Permanent monitoring points will be established at the start of the rehabilitation monitoring program. These points will be used as markers for assessing rehabilitation progress and performance against the analogue site.

8.2 Monitoring program

8.2.1 Grazing and Hybrid ecosystem PMLU monitoring program

Proposed rehabilitation monitoring will be conducted in 6-month intervals (minimum) and assessed by an appropriately qualified person (AQP) until acceptance criteria are met and a safe and stable landform is achieved. Informal assessment of rehabilitation will be conducted by site personnel to minimise, wherever possible, requirements for additional and/or urgent repair (e.g. weed infestation).

To be able to adequately compare the rehabilitation against the analogue sites, the analogue sites should be included in the Grazing and Hybrid ecosystem PMLU monitoring program. This will ensure that the rehabilitation is being compared against the proper analogue criteria, as seasonal fluctuations will impact both the rehabilitation areas and the analogue sites.

8.2.2 Water storage PMLU monitoring program

In addition to the above water storage PMLU monitoring (**Section 8.1.4**) water quality monitoring is required to ensure water storage and receiving environments are not contaminated. Water storage quality should be monitored quarterly (3-month intervals) to ensure water quality does not exceed the limits in **Table 40**. Additional water quality monitoring will be required if there is flow from any watercourse downstream of the water storages. Downstream locations in **Table 42** (also **Figure 25**) indicate where samples should be taken if flow occurs (monthly only). If any downstream sample exceeds the limits in **Table 40** the applicable upstream location/s must be collected and compared to the downstream result.

8.3 Maintenance

Maintenance initiatives will be implemented when issues are identified through rehabilitation monitoring, or if milestone criteria are not being met. The likely cause of the issue will need to be determined prior to selecting the most appropriate remedial action(s).

Rehabilitation issues could potentially result due to the following (but are not limited to):

- climate (e.g. droughts, floods);
- poor drainage;
- insufficient vegetation cover;
- presence of weeds;
- soil type; and
- influence from adjacent land use.

8.4 Data analysis and reporting

Rehabilitation monitoring data will be collected and analysed by a suitably qualified and experienced person (SQEP), or appropriately qualified person (AQP), and assessed against relevant milestone criteria. Data will be analysed to identify any changes in trends and impacts to the site's ability to achieve milestones and maintain

the PRCP schedule. Rehabilitation monitoring allows for suitable remediation to be applied quickly and efficiently.

Rehabilitation monitoring data will be collected and managed by MTI and/or their nominated environmental managers.

8.4.1 Annual returns and annual rehabilitation reports

An Annual Rehabilitation Report (ARR) will be provided to the administering authority with the submission of each annual return. These reports will include qualitative data comprising photographic records of previous and current rehabilitation works in planned rehabilitation areas per EA Condition F4(d).

The ARR will include, but won't be limited to the following:

- summary of visual monitoring for severe rill, sheet and/or gully erosion (particularly within the first 12-months following seeding or after heavy rainfall events);
- photographic record of work carried out to establish new rehabilitation areas;
- photographic record of permanent monitoring reference points in new rehabilitation areas;
- summary of degraded and/or failed rehabilitation (if any);
- summary of maintenance works to repair degraded and/or failed rehabilitation (where required); and
- assessment of existing rehabilitation areas against acceptance criteria and milestone achievement to ascertain suitability for progressive certification.

A copy of the most recent ARR is provided in **Appendix 5**.

8.4.2 BioCondition Assessment Method

Gurulmundi Mine will implement an annual rehabilitation inspection to evaluate the success and progress of rehabilitation works in accordance with the submission of annual rehabilitation reports with each annual return. The scope of inspection includes all existing and recently completed rehabilitation across the site.

The BioCondition Assessment Framework will be used to assess ecosystem condition in addition to assessing rehabilitation against completion criteria. A BioCondition Assessment is a site-based and quantitative assessment that can be used in any vegetation state and is therefore repeatable. Annual inspections will allow for easy and comparable assessment to be made between inspection years, allowing rehabilitation to be monitored and adapted where required.

The BioCondition Assessment Framework aims to provide simple, robust and easy to follow monitoring program for rehabilitation to marginal grazing land. Using the BioCondition Assessment in rehabilitation monitoring rehabilitation is useful for tracking progress, mitigate issues and allowing adaptation of rehabilitation methods to reduce and/or prevent risk of failure. The primary goal of rehabilitation is to create an environment that is safe, stable, and able to sustain an ecosystem condition that is similar to that existing pre-mining.

8.4.3 BioCondition Assessment for Rehabilitated Areas

The BioCondition Assessment Method will be used to evaluate rehabilitated areas. The assessment unit will consist of a 50m x 5m plot along which established photo monitoring points will be used to track the progress of rehabilitation at a designated point along the transect. Along a 50m transect the relevant indicators will be recorded per the BioCondition Assessment Manual²⁹ (the manual) and each attribute will be scored according to manual descriptions with corresponding weightings (assigned as a percentage). Field assessment techniques are further outlined in the manual.

²⁹ Eyre, T. J., Kelly, A. L., Neldner, V. J., Wilson, B. A., Ferguson, D. J., Laidlaw, M. J. & Franks, A. J. (2015). BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual. Version 2.2. Queensland Herbarium, Department of Science, Information Technology, Innovation and Arts, Brisbane.

8.4.4 Field Sheets

Completed field sheets and photographs (taken at established photo monitoring points) will be filed for each BioCondition Assessment. Record keeping this information will be useful for informing future reports that must be prepared in order to surrender the EA and reclaim financial assurance. Information gathered from previous BioCondition Assessments will form useful lessons learned and can be used to inform future rehabilitation efforts.

In the event any issues are identified during or following a BioCondition assessment, Gurulmundi Mine will engage a suitably qualified and experienced person to assist in rectifying and managing the rehabilitation issue. The engagement of a suitably qualified and experienced person will be dependent on the type of expertise required to mitigate the rehabilitation issue.

8.5 Quality assurance and quality control

Figure 31 illustrates the quality assurance and quality control (QA/QC) process to be followed as part of ongoing rehabilitation monitoring at Gurulmundi Mine.

The process allows for:

- Initial execution of rehabilitation in accordance with rehabilitation measures;
- Verification of how the execution was conducted in accordance with rehabilitation measures;
- If required, the implementation of corrective action/maintenance in rehabilitation areas; and
- Further rehabilitation monitoring of rehabilitation and corrected/maintained areas.

The QA/QC process allows for repetition for an execution/verification/monitoring approach to ensure rehabilitation areas continue to progress towards achieving rehabilitation milestones and future certification.

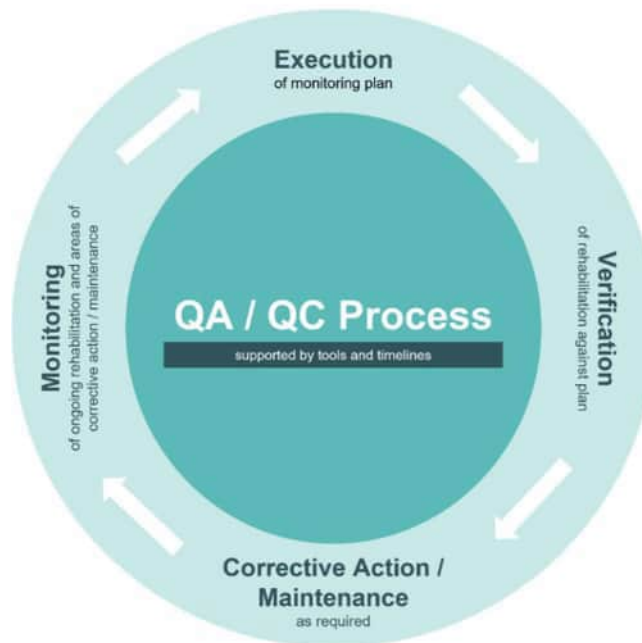


Figure 31: QA/QC process to be followed to support ongoing rehabilitation monitoring at Gurulmundi Mine

REFERENCES

- ABARES. (2016). The Australian Land Use and Management Classification. Version 8. Australian Bureau of Agricultural and Resource Economics and Sciences.
- Ausrocks Resource Consultants. (2026). Final Land Use and Rehabilitation Plan MTI Gurulmundi. Version 1.4.
- Ausrocks Resource Consultants. (2024). Gurulmundi Bentonite Mine 2023 Annual Rehabilitation Report. Version 1.1.
- Ausrocks Resource Consultants. (2026). Gurulmundi Bentonite Mine Community Consultation Plan. Version 1.1.
- BOM. (2023). Australian Bureau of Meteorology. <http://www.bom.gov.au/>
- Bryan, S.E., Ewart, A., Stephens, C.J., & Parianos, J. (2000). The Whitsunday Volcanic Province, Central Queensland, Australia: Lithological and stratigraphic investigations of a silicic-dominated large igneous province, *Journal of Volcanology and Geothermal Research*, 99(1), 55-78.
[https://doi.org/10.1016/S0377-0273\(00\)00157-8](https://doi.org/10.1016/S0377-0273(00)00157-8)
- Caterpillar. (2023). Swell & Void Percentage, Load Factors. https://www.cat.com/en_US/articles/ci-articles/swell-and-void-percentage-load-factors.html
- DCCEEW. (2023). Protected Matters Search Tool. Department of Climate Change, Energy, the Environment and Water, Australian Government. <https://pmst.awe.gov.au/>
- DEHP. (2013). Queensland Water Quality Guidelines 2009 (re-published July 2013). Environmental policy and Planning, Department of Environment and Heritage Protection, Queensland.
- DES. (2013). WetlandInfo – Native plants of Western Downs local government area. Department of Environment and Science, Queensland. <https://wetlandinfo.des.qld.gov.au/wetlands/facts-maps/wildlife/?ArealD=lga-western-downs&Kingdom=plants&SpeciesFilter=Native>
- DES. (2013). WetlandInfo “Native plants of Western Downs local government area”, Queensland Government. <https://wetlandinfo.des.qld.gov.au/wetlands/facts-maps/wildlife/?ArealD=lga-western-downs&Kingdom=plants&SpeciesFilter=Native>
- DES. (2023). Environmental Authority EPML00699113 (issued 24 October 2023). Department of Environment and Science, Queensland.
- DES. (2022). Spatial information submission guideline. Version 5. ESR/2018/4337. Department of Environment and Science, Queensland.
- DES. (2023). Progressive rehabilitation and closure plans (PRC plans) guideline. Version 3. ESR/2019/4964. Department of Environment and Science, Queensland.
- DES. (2021). Progressive rehabilitation and closure plan transition notice (via email received 19 July 2021). Reference EPML00699113. Department of Environment and Science, Queensland.
- DME. (1995). Technical Guidelines for Environmental Management of Exploration and Mining in Queensland. Department of Minerals and Energy, Queensland.
- DOR. (2023). FloodCheck Queensland. Department of Resources. <https://floodcheck.information.qld.gov.au/>

- DSITI & DNRM. (2015). Guidelines for Agricultural Land Evaluation in Queensland, second edition. The State of Queensland (prepared by Department of Science, Information Technology and Innovation and Department of Natural Resources and Mines), Brisbane.
- Eyre, T. J., Kelly, A. L., Neldner, V. J., Wilson, B. A., Ferguson, D. J., Laidlaw, M. J. & Franks, A. J. (2015). BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual. Version 2.2. Queensland Herbarium, Department of Science, Information Technology, Innovation and Arts, Brisbane.
- FAO. (1985). Irrigation Water Management – Irrigation Methods. Training Manual 5 (Provisional Edition). Food and Agriculture Organization.
- Herza, J., Ashley, M. & Thorp, J. (2017). Factor of Safety? – Do we use it correctly? Australian National Committee on Large Dams Incorporated.
- Horizon Soil Science and Engineering. (2022). Report on the Soil Survey of Leases of the Mineral Technologies Bentonite Mine. Revision 1.0 (Final).
- QFES. (2017). 2017–2018 Annual Report. Queensland Fire and Emergency Services Queensland.
- Queensland Government. (2023). Queensland Globe. <https://qldglobe.information.qld.gov.au/>
- Queensland Government. (2023). SILO – Australian climate data from 1889 to yesterday. <https://www.longpaddock.qld.gov.au/silo/>
- Surat Basin Rail. (2009). Surat Basin Rail Project Environmental Impact Statement – Appendix F (Dawson River Flood Events). Revision 2.
- Western Downs Regional Council. (2019). Western Downs Planning Scheme – Amendment 1.

PART B: PRCP SCHEDULE

9 PRCP Schedule

Legislative Requirement

In accordance with sections 126D(1) of the EP Act, the PRCP schedule in the PRC plan must:

- a) describe the area of each resource tenure either a post-mining land use or non-use management area, and
- b) for each post-mining land use state:
 - i. each rehabilitation milestone required to achieve a stable condition, and
 - ii. when each rehabilitation milestone is to be achieved, and
- c) for each non-use management area state:
 - i. each management milestone required to achieve a stable condition, and
 - ii. when each management milestone is to be achieved, and
- d) include maps showing the land mentioned in (a), (b) and (c).

9.1 Final site design

The final site design for Gurulmundi Mine, including maximum disturbance extent, tenure boundaries and PMLUs is illustrated in **Figure 32**.

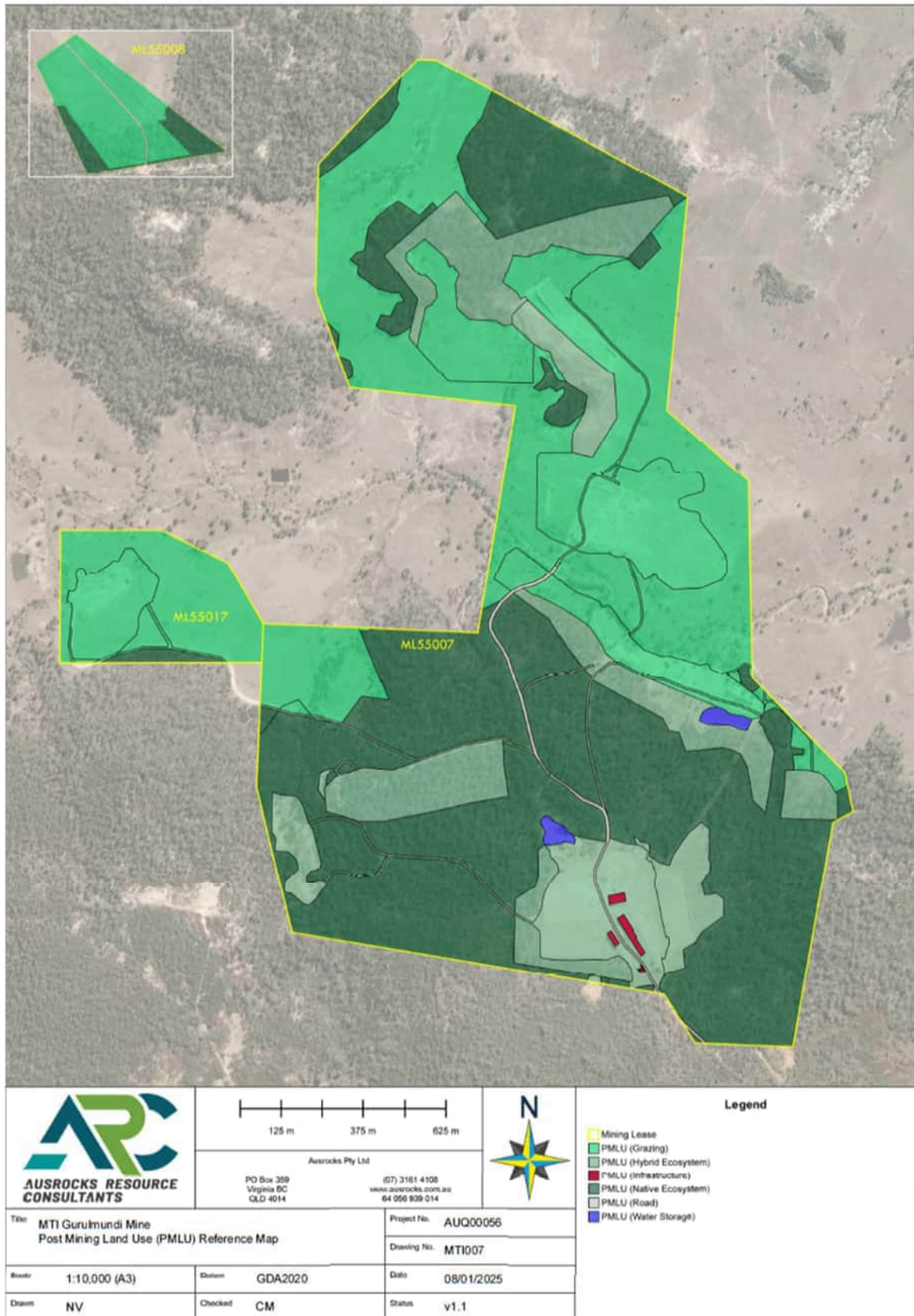


Figure 32: Gurulmundi Mine final site design

9.2 Post-mining land use milestones

The Gurulmundi Mine rehabilitation areas and relevant rehabilitation milestones are listed in **Table 35**. Reference maps provided in **Section 9.4** illustrate these.

Table 35: Gurulmundi Mine rehabilitation areas and relevant rehabilitation milestones

Rehabilitation area	Relevant activities	PMLU	Relevant rehabilitation milestones
RA1	Pits	• Grazing	RM1 RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA2	Pits	• Hybrid Ecosystem	RM3 RM5 RM6 RM7 RM8 RM9
RA3	Topsoil stockpiles	• Grazing	RM1 RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA4	Topsoil stockpiles	• Hybrid Ecosystem	RM1 RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA5	Overburden and laydown areas	• Grazing	RM1 RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA6	Overburden and laydown areas	• Hybrid Ecosystem	RM1 RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA7	Infrastructure	• Permanent Infrastructure	RM1 RM10
RA8	Roads and tracks	• Grazing	RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA9	Roads and tracks	• Hybrid Ecosystem	RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA10	Main Road (to remain)	• Road	RM10
RA11	Sediment basins and water storages	• Grazing	RM2 RM3 RM4 RM5 RM6 RM7 RM8 RM9
RA12	Sediment basins and water storages	• Hybrid Ecosystem	RM2 RM3 RM6 RM7 RM8 RM9 RM10
RA13	Water storages (to remain)	• Water Storage	RM2 RM3 RM6 RM7 RM8 RM9 RM10
RA14	Existing Rehabilitation (Grazing Stage 1)	• Grazing	RM3 RM4 RM5 RM6 RM7
RA15	Existing Rehabilitation (Grazing Stage 2)	• Grazing	RM3 RM4 RM5 RM6 RM7

Rehabilitation area	Relevant activities	PMLU	Relevant rehabilitation milestones
RA16	Existing Rehabilitation (Grazing Stage 3)	<ul style="list-style-type: none"> Grazing 	RM8 RM9
RA17	Existing Rehabilitation (Hybrid Ecosystem Stage 1)	<ul style="list-style-type: none"> Hybrid Ecosystem 	RM3 RM4 RM5 RM6
RA18	Existing Rehabilitation (Hybrid Ecosystem Stage 2)	<ul style="list-style-type: none"> Hybrid Ecosystem 	RM7 RM8 RM9

Rehabilitation milestones and milestone criteria are provided in **Table 36**.

Table 36: Gurulmundi mine rehabilitation milestones and milestone criteria

Milestone reference	Rehabilitation milestone	Milestone criteria
RM1	Infrastructure decommissioning and removal	<ul style="list-style-type: none"> a) With the exception of any infrastructure to remain as part of the post-mining land use (PMLU) or where infrastructure is agreed to be retained by the landowner as evidence by a signed landowner agreement, the following are complete: <ul style="list-style-type: none"> i) All services disconnected, terminated and removed. ii) All built and service infrastructure demolished and removed (including bentonite processing plant and any other mobile equipment or plant). iii) All waste not permitted for on-site disposal under Environmental Authority EPML00699113 identified, removed, and disposed of at a licensed waste facility that is authorised to receive such waste. iv) All fencing and associated foundations removed. v) All hardstand, concrete areas and roads (bitumen, blue metal, aggregate etc.) removed. vi) Watercourse crossings and culverts removed. vii) All surface water drainage infrastructure that is not compatible with the sustainment of the PMLU removed. b) Removal of excess bentonite and/or foreign materials from processing and stockpiling area(s). c) Machinery/equipment that is not required for rehabilitation removed from site. d) Contaminated land investigations, (investigation, remediation and validation) in accordance with the EP Act, including a site investigation report, and where required, a validation report and/or a draft Site Management Plan. e) Contaminated water and sediment removed from dams. f) Contaminate land managed consistent with SQP advice. g) Contaminated Land Auditor certifies that no contamination unsuitable for the PMLU remains or is occurring. h) An independent AQP has certified the achievement of RM1a) - RM1g).
RM2	Water storage preparation	<ul style="list-style-type: none"> a) All dams have been desilted. <p><u>Grazing PMLU (RA11) & Hybrid Ecosystem PMLU (RA12)</u></p> <ul style="list-style-type: none"> b) All water remaining in mine water storages and sediment basins lawfully removed through; <ul style="list-style-type: none"> i) Evaporation; ii) Onsite re-use; or iii) treatment and discharge, in accordance with water quality criteria consistent with downstream receiving environment conditions and in Appendix 5. c) Removal of all embankments or structures impeding the flow of clean surface water, allowing reinstatement of the natural clean water runoff. d) Landforms recontoured and stabilised to meet geotechnical stability standards. e) All water storage structures are safe, stable and non-polluting and suitable for the achievement of the selected PMLU. f) An independent AQP has certified the achievement of RM2a) - RM2e).



Milestone reference	Rehabilitation milestone	Milestone criteria
RM3	Landform development and reshaping	<p><u>Grazing (RA1, RA3, RA5, RA8, RA9, RA11, RA14, RA15, RA16) and Hybrid (RA2, RA4, RA6, RA12, RA17, RA18) PMLU's except Retained infrastructure (Water Storage) (RA13)</u></p> <ul style="list-style-type: none"> a) All major earthworks (including reshaping, pushing/trimming) are completed in accordance with the design specification provided by an AQP. b) An "As-Constructed Report" prepared which details and justifies all variation to the design, including a certification from an AQP that such variations will not affect the design performance. c) Any slope >15% adheres to the final landform design as per general condition PRCP13 (from PRCP schedule (P-PRCP-100882576)). d) Constructed landform achieves geotechnical stability with a factor of safety (FoS) >1.5. e) Erosion and sediment control installed to AQP design specifications. f) All landforms are free-draining and water shedding, with surface contours blended into surrounding undisturbed terrain to avoid ponding and minimise erosion risk. <p><u>Grazing PMLU (RA1) and Hybrid PMLU (RA2)</u></p> <ul style="list-style-type: none"> g) Material used in backfilling is geochemically suitable for achieving safe, stable, non-polluting landform. h) Backfilling is completed to final landform designs using fully co-mingled and mixed material (ore, waste rock, overburden) sourced from existing stockpiles: <ul style="list-style-type: none"> i) Pit voids backfilled to an average of 1.5m below pre-mining land surface. ii) Grazing PMLU batters ≤15%. iii) Hybrid Ecosystem PMLU batters shaped to blend with the natural topography. <p><u>Grazing PMLU (RA11) and Hybrid PMLU (RA12)</u></p> <ul style="list-style-type: none"> i) Sediment basins backfilled or recontoured using material from the associated dam walls. <p><u>Retained Infrastructure (Water Storage) (RA13)</u></p> <ul style="list-style-type: none"> j) Pit voids intended as water storage reshaped to final landform designs. <ul style="list-style-type: none"> i. Dam wall batter slopes are not steeper than 1 vertical: 3 horizontal (1V:3H); ii. Final slope geometry including excavated void walls (e.g. water storage basins) shaped to a maximum slope of 1V:2H, and final access ramps graded to a maximum of 1V:7H; k) Dam wall batter slopes are required to have access restriction fencing for stock accessing water storages (RA13) in areas with a slope greater than 15%. l) An independent AQP has certified the achievement of RM3a) - RM3k).
RM4	Establishment of geotechnically stable surface conditions	<p><u>Grazing PMLU (RA1, RA11) and Hybrid PMLU (RA2, RA12)</u></p> <ul style="list-style-type: none"> a) An AQP has assessed backfilled areas, confirming that backfilled areas are geotechnically stable, this assessment confirms the following: <ul style="list-style-type: none"> i) No evidence of instability (e.g. slumping, settlement, or shearing) is present across backfilled areas;

Milestone reference	Rehabilitation milestone	Milestone criteria
		<ul style="list-style-type: none"> ii) Backfill material exhibits suitable compaction, density, and engineering properties to ensure long-term slope stability and support the PMLU as per the final landform design; and iii) Potential failure mechanisms (e.g. sliding, piping, rotational failures) have been assessed and found to have no risk under expected site conditions. <p>b) An AQP assessment of backfilled areas and reshaped water storages confirms these areas have achieved geotechnically stable surface conditions in accordance with the AQP final landform designs.</p> <p><u>Grazing, Hybrid (all RAs) PMLU's and Retained Infrastructure (RA13)</u></p> <ul style="list-style-type: none"> c) An AQP assessment determines reshaped areas are safe and erosionally stable. d) An independent AQP has certified the achievement of RM4a) - RM4c).
RM5	Surface preparation	<ul style="list-style-type: none"> a) Assessment of suitability of growth media/topsoil, and development of an amelioration and physical treatment plan completed by an AQP. b) Ameliorant and physical treatments are applied in accordance with the plan in RM5a). c) Growth media health and suitability is assessed and documented by an AQP as suitable for the PMLU and target vegetation establishment. d) Growth media placed to a minimum depth of 150mm or as otherwise specified within the final landform design report and profile ripped along the contour to no more than 300mm. e) The surface water monitoring is underway (one year of sampling undertaken). f) Land preparation has achieved a surface that is commensurate with the identified completion RE11.10.1 and RE11.7.2 for RA2, RA4, RA6, RA9, RA12, RA17 & RA18. g) An independent AQP has certified the plan in RM5a) and the achievement of RM5b) - RM5f).
RM6	Seeding / revegetation	<ul style="list-style-type: none"> a) Non-native seed has not been used for revegetation (except when sterile cover crops are used). b) Stock exclusion fencing has been established to prevent stock from grazing newly seeded areas. c) Replanting of vegetation has occurred following a strike rate below 60%. <p><u>Grazing PMLU (RA1, RA3, RA5, RA8, RA11, RA14, RA15 and RA16)</u></p> <ul style="list-style-type: none"> d) Completed seeding with a selection of species and seeding rates listed in Table 37. e) At least 4 four species of 3P native pasture species and two native legumes applied per hectare, as well as one native shade tree species applied every 2 hectares, species selected from Table 37. f) Minimum total seeding rate of 15kg/ha. <p><u>Hybrid Ecosystem PMLU (RA2, RA4, RA6, RA9, RA12, RA17 & RA18)</u></p> <ul style="list-style-type: none"> g) Completed seeding with a selection of native vegetation species and seeding rates in Table 38 h) Minimum total seeding rate of ≤ 20kg/ha. <p><u>Retained Infrastructure (Water Storage) (RA13)</u></p> <ul style="list-style-type: none"> i) Banks re-vegetated with at least 1 species listed in Table 37.



Milestone reference	Rehabilitation milestone	Milestone criteria
		j) An independent AQP has certified the achievement of RM6a) - RM6i).
RM7	Establishment of PMLU surface conditions	<p><u>Grazing, Hybrid and Retained Infrastructure PMLU's (all RAs) except Retained Infrastructure (Water Storage) (RA13)</u></p> <ul style="list-style-type: none"> a) Vegetation groundcover achieves a minimum of $\geq 50\%$. b) Evidence of seed set, germination and emergence of grass species. c) Evidence of flowering, seed setting, germination and emergence of shrub species. d) Areas where seeding results in $< 60\%$ strike rate are identified and reseeded. e) Weed presence is less than 5% of total vegetative cover. f) Absence of ecosystem altering weeds. g) All native species used in revegetation show evidence of natural recruitment. h) No evidence of erosion classified as 'moderate' or 'severe' as defined in Table 39. i) Any erosion present will not compromise the achievement of a PMLU to a stable condition. j) Erosion requiring intervention has been remediated and does not impact achievement of PMLU. k) No evidence of scouring, instability or excessive sedimentation in or associated with engineered drainage structures. <p>Surface water runoff complies with Source: NCST (2024) <i>Australian Soil and Land Survey Field Handbook, 4th edition</i>. The National Committee on Soil and Terrain. CSIRO Publishing, Collingwood, Australia.</p> <p>¹Transect 100m across the contour (Source: Tongway, D. J. and Hindley, N.L. 2005. <i>Landscape Function Analysis: Procedures for Monitoring and Assessing Landscapes</i>. CSIRO Publishing, Canberra, Australia.</p> <ul style="list-style-type: none"> l) Table 40. m) The growth media (topsoil and subsoil) physical, chemical and biological properties do not limit vegetation cover performance or restrict the potential effective depth of rooting. n) Overland flows and surface runoff drain freely. o) All temporary ESC structures have been removed. <p><u>Grazing PMLU (RA1, RA3, RA5, RA8, RA11, RA14, RA15 and RA16)</u></p> <ul style="list-style-type: none"> p) At least 50% of established vegetative groundcover are species listed in Table 37. q) Minimum vegetation composition (per hectare (averaged)) of: <ul style="list-style-type: none"> i. Four species of 3P native pasture species; ii. Two native legumes; and iii. One native shade tree species, present every 2 hectares. <p><u>Hybrid Ecosystem PMLU (RA2, RA4, RA6, RA9, RA12, RA17 and RA18)</u></p> <ul style="list-style-type: none"> r) At least 50% of total vegetative groundcover species present are species characteristic of RE11.10.1 and/or RE11.7.2, as per Table 38. <p>A BioCondition assessment completed in accordance with latest version of Queensland Herbarium's "BioCondition Assessment Manual" determines that the PMLU has exceeds the minimum total BioCondition score of greater than 20 at RM7 as per Notes:</p> <ul style="list-style-type: none"> • All metals and metalloids must be measured as 'dissolved' (from analysis of a field filtered sample) and total (unfiltered). • Limits for metals and metalloids apply to dissolved results. • ANZG (2018) Aquatic ecosystem protection for moderately disturbed system (95% protection).



Milestone reference	Rehabilitation milestone	Milestone criteria
		<ul style="list-style-type: none"> Local water guideline values for protection of aquatic ecosystems as per <i>Environmental Protection (Water) Policy 2009 Dawson River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part)</i>, including all waters of the Cawson River Sub-basin except the Callide Creek Catchment, published in September 2011. <p>s) Table 41.</p> <p>t) Groundcover (native perennial grass + organic litter cover) $\geq 60\%$.</p> <p><u>Retained infrastructure (Water Storage) (RA13)</u></p> <p>u) Retained water storages are safe for native animals and stock access, stable and have vegetated banks.</p> <p>v) An independent AQP has certified the achievement of RM7a) - RM7u).</p>
RM8	Achievement of PMLU to a stable condition – without water quality	<p>a) AQP assessment confirms safety hazards in rehabilitation areas are not significantly different to surrounding unmined landscapes subject to the same land use;</p> <p>b) The land is structurally and erosionally stable.</p> <p>c) The final landform is geotechnically stable and achieves a FoS ≥ 1.5.</p> <p>d) No evidence of erosion classified as 'moderate' or 'severe' as defined by Table 39.</p> <p>e) Any erosion present will not compromise the achievement of a PMLU to a stable condition.</p> <p>f) No evidence of scouring, instability or excessive sedimentation in or associated with engineered drainage structures.</p> <p>g) Weed presence is a maximum of 5% of the total vegetative cover.</p> <p>h) Restricted invasive plants (as defined in the <i>Biosecurity Act 2014</i>) comprise $\leq 5\%$ of vegetation groundcover.</p> <p>i) Absence of ecosystem altering weeds.</p> <p>j) The growth media (topsoil and subsoil) physical, chemical and biological properties do not limit vegetation cover performance or restrict the potential effective depth of rooting.</p> <p>k) Final landform survey confirms no built structures remain, other than those agreed to in the landowner agreement document.</p> <p><u>Grazing PMLU (RA1, RA3, RA5, RA8, RA11, RA14, RA15 and RA16)</u></p> <p>l) Land suitability class is 3.</p> <p>m) Native plant richness ≥ 4 groundcover species per hectare, as measured by floristic plots or transects.</p> <p>n) Minimum vegetation composition (per hectare (averaged)) of:</p> <ol style="list-style-type: none"> Four species of 3P native pasture species; Two native legumes; and One native shade tree species, present every 2 hectares. <p>o) Assessment of land condition and carrying capacity demonstrates a sustainable grazing outcome has been achieved.</p> <p>p) Vegetative groundcover (vegetative and litter) $\geq 80\%$</p> <p>q) AQP assessment confirms rehabilitated land is erosionally stable with $\geq 95\%$ of the surface area containing slopes $< 15\%$.</p> <p><u>Hybrid Ecosystem PMLU (RA2, RA4, RA6, RA9, RA12, RA17 and RA18)</u></p>

Milestone reference	Rehabilitation milestone	Milestone criteria
		<p>A BioCondition assessment completed in accordance with latest version of Queensland Herbarium's "BioCondition Assessment manual" determines that the PMLU has exceeds the minimum total BioCondition score of greater than 35 at RM8 as per Notes:</p> <ul style="list-style-type: none"> • All metals and metalloids must be measured as 'dissolved' (from analysis of a field filtered sample) and total (unfiltered). • Limits for metals and metalloids apply to dissolved results. • ANZG (2018) Aquatic ecosystem protection for moderately disturbed system (95% protection). • Local water guideline values for protection of aquatic ecosystems as per <i>Environmental Protection (Water) Policy 2009 Dawson River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Cawson River Sub-basin except the Callide Creek Catchment</i>, published in September 2011. <p>r) Table 41.</p> <p>s) Vegetative groundcover (native perennial grass + organic litter cover) $\geq 70\%$</p> <p><u>Retained infrastructure (Water Storage) (RA13)</u></p> <p>t) Water storage area has safe access for humans and/or livestock, and any required safety demarcation or fencing has been installed.</p> <p>u) Water storages have vegetated banks.</p> <p>v) Vegetation groundcover $\geq 50\%$ in catchment areas surrounding water storage.</p> <p>w) An independent AQP has certified the achievement of RM8a) - RM8s).</p>
RM9	Achievement of water quality – water quality only	<p>Surface water quality results monitored monthly during flow at, but not limited to, downstream locations specified in ¹A site's total BioCondition score can be comprised of different attribute scores but must meet or exceed the minimum (modified) BioCondition score for the relevant milestone.</p> <p>Table 42, must not exceed the limits in Source: NCST (2024) <i>Australian Soil and Land Survey Field Handbook, 4th edition</i>. The National Committee on Soil and Terrain. CSIRO Publishing, Collingwood, Australia.</p> <p>¹Transect 100m across the contour (Source: Tongway, D. J. and Hindley, N.L. 2005. <i>Landscape Function Analysis: Procedures for Monitoring and Assessing Landscapes</i>. CSIRO Publishing, Canberra, Australia.</p> <p>a) Table 40, for a maximum of 5 consecutive years.</p> <p>b) If the surface water quality exceeds criteria RM9b, the applicable upstream site must be compared to the downstream site result; and quality result measured at a downstream site must be equal to or less than the quality result measured at the applicable upstream site.</p> <p>Water storages monitored quarterly must not exceed the limits in Source: NCST (2024) <i>Australian Soil and Land Survey Field Handbook, 4th edition</i>. The National Committee on Soil and Terrain. CSIRO Publishing, Collingwood, Australia.</p> <p>¹Transect 100m across the contour (Source: Tongway, D. J. and Hindley, N.L. 2005. <i>Landscape Function Analysis: Procedures for Monitoring and Assessing Landscapes</i>. CSIRO Publishing, Canberra, Australia.</p> <p>c) Table 40 for a minimum of 5 consecutive years.</p> <p>d) An independent AQP has certified the achievement of RM9a) – RM9c)</p>



Milestone reference	Rehabilitation milestone	Milestone criteria
RM10	Permanent infrastructure remaining post-mining is in a safe and stable condition	<ul style="list-style-type: none"> a) All permanent and/or portable infrastructure, buildings, equipment, and access tracks/roads proposed to remain onsite are formally acknowledged and accepted (including understanding the long-term and ongoing management requirements) by the post-mining landholder, evidenced by a signed agreement stating that assets are fit for purpose and aligned with post-mining land use; b) AQP assessment confirms infrastructure to be retained onsite is structurally safe, stable and will not cause environmental harm; c) An independent AQP has certified the achievement of RM10a) – RM10b).

Table 37: Species list and seeding rates for grazing PMLU

Common name	Scientific name	Sowing rate (kg/ha)
Black Speargrass	<i>Heteropogon contortus</i> (3P)	<1kg to 5kg/ha
Cotton Panic	<i>Digitaria brownii</i>	
Michell Grass	<i>Astrebila</i> (3P)	
Native Millet	<i>Panicum decompositum</i> (3P)	
Brigalow grass	<i>Paspalidium species</i> (3P)	
Curly bluegrass	<i>Dichanthium fecundum</i> (3P)	
Giant speargrass	<i>Heteropogon tiliaceus</i> (3P)	
King bluegrass	<i>Dichanthium queenslandicum</i> (3P)	
Desert bluegrass	<i>Bothriochloa ewartiana</i> (3P)	
Bull Mitchell grass	<i>Astrebila squarrosa</i> (3P)	
Kangaroo grass	<i>Themeda australis</i>	
Golden Beard Grass	<i>Chrysopogon fallax</i> (3P)	
Queensland bluegrass	<i>Dichanthium sericeum</i> (3P)	
Narrow-leaved ironbark	<i>Eucalyptus crebra</i>	
Windmill grass/es	<i>Enteropogon species</i> (3P)	
Tall cup grass	<i>Eriochloa crebra</i> (3P)	
Lemon Sented	<i>Corymbia citriodora</i>	
Red Ash	<i>Alphitonia excelsa</i>	
Grass tree	<i>Xantheria johnstonii</i>	
Total		<15kg/ha

Table 38: Species list and seeding rates for Hybrid ecosystem PMLU

Common name	Scientific name	Sowing rate (kg/ha)
Black Speargrass	<i>Heteropogon contortus</i>	<1kg to 5kg/ha
Cotton Panic	<i>Digitaria brownii</i>	
Desert Bluegrass	<i>Bothriochloa ewartiana</i>	
Kangaroo Grass	<i>Themeda australis</i>	
Golden Beard Grass	<i>Chrysopogon fallax</i>	
Soap Tree / Red Ash	<i>Alphitonia excelsa</i>	
Hickory Wattle	<i>Acacia glaucocarpa</i>	
Henderson's bloodwood	<i>Corymbia hendersonii</i>	
Clarkson's bloodwood	<i>Corymbia clarksoniana</i>	
Moreton Bay ash	<i>Corymbia tessellaris</i>	
Brown bloodwood	<i>Corymbia trachyphloia</i>	
Gympie messmate	<i>Eucalyptus cloeziana</i>	
Wild pear	<i>Persoonia falcata</i>	
Rare Panic	<i>Paspalidium rarum</i>	
Burrow's wattle	<i>Acacia burrowii</i>	
Queensland peppermint	<i>Eucalyptus exserta</i>	
Gum-top ironbark	<i>Eucalyptus decorticans</i>	
Blake's wattle	<i>Acacia blakei</i>	
Currawong tree	<i>Acacia sparsiflora</i>	
Quinine bush	<i>Petalostigma pubescens</i>	
Lancewood	<i>Acacia shirleyi</i>	
Bendee	<i>Acacia catenulata</i>	
Turkey bush	<i>Acalypha eremorum</i>	
Mountain yapunyah	<i>Eucalyptus thozetiana</i>	
Steel Geass	<i>Xanthorrhoea johnsonii</i>	

Common name	Scientific name	Sowing rate (kg/ha)
White croton	<i>Croton phebalioides</i>	
Conkerberry	<i>Carissa ovata</i>	
Leafy panic	<i>Urochloa foliosa</i>	
Many-headed Wiregrass	<i>Aristida caput-medusae</i>	
Narrow-leaved ironbark	<i>Eucalyptus crebra</i>	
Lemon-scented gum	<i>Corymbia citriodora</i>	
Red Ash	<i>Alphitonia excelsa</i>	
Grass tree	<i>Xantheria johnstonii</i>	
Black Wattle	<i>Acacia leiocalyx</i>	
Native Blackthorn	<i>Bursaria spinosa</i>	
Total		<20kg/ha

Table 39: Erosion classification framework

Erosion classification	Minor	Moderate	Severe
Sheet erosion	Shallow soil deposits down slope	Partial exposure of roots; moderate soil deposits downslope	Loss of surface horizon; subsoil exposure; root exposure; substantial soil deposits downslope
Rill erosion	<15 rills per transect ¹	15-30 rills per transect ¹	>30 rills per transect ¹
Gully erosion	Absent	Absent	Present
Tunnel erosion	Absent	Absent	Present
Mass movement	Absent	Absent	Present

Source: NCST (2024) *Australian Soil and Land Survey Field Handbook, 4th edition*. The National Committee on Soil and Terrain. CSIRO Publishing, Collingwood, Australia.

¹Transect 100m across the contour (Source: Tongway, D. J. and Hindley, N.L. 2005. *Landscape Function Analysis: Procedures for Monitoring and Assessing Landscapes*. CSIRO Publishing, Canberra, Australia.

Table 40: Surface water quality limits

Quality characteristic (units)	Limit	Comment on Limit
pH	6.5-8.5	WQO
Electrical conductivity (EC) (µS/cm)	370	WQO
Turbidity (NTU)	50	WQO
Sulphate (mg/L)	5	WQO
Arsenic – dissolved (µg/L)	13	ANZG 2018
Nitrate (µg/L)	1100	
Total recoverable hydrocarbons (C6-C9) (µg/L)	20	
Total recoverable hydrocarbons (C10-C36) (µg/L)	100	
Major ions (calcium, chloride, potassium, magnesium, sodium, bicarbonate, carbonate) (mg/L)	Interpretation purposes	
Hardness (mg/L)	Interpretation purposes	

Notes:

- All metals and metalloids must be measured as 'dissolved' (from analysis of a field filtered sample) and total (unfiltered).
- Limits for metals and metalloids apply to dissolved results.
- ANZG (2018) Aquatic ecosystem protection for moderately disturbed system (95% protection).
- Local water guideline values for protection of aquatic ecosystems as per *Environmental Protection (Water) Policy 2009 Dawson River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part)*, including all waters of the Cawson River Sub-basin except the Callide Creek Catchment, published in September 2011.

Table 41: BioCondition Benchmarks RE11.10.1/11.7.2 (as 90%/10%) - Rehabilitated *Corymbia citriodora* / *Acacia* spp. woodland

BioCondition Assessable Attributes	Assessable Attribute Weighting	Benchmark	Indicative measure at RM7 ¹	Score	Indicative measure at RM8 ¹	Score
Recruitment	5	100%	0	0	20%	
Non-native plant cover (%)	10	0%	<25%		<25%	5
Tree species richness	5	4	≥1	2.5	≥4	5
Native shrub species richness	5	4	≥1	2.5	≥2	2.5
Native grass species richness	5	8	≥2	2.5	≥4	2.5
Native forb other species richness	5	15	≥3	2.5	≥5	2.5
Tree canopy height (m)	5	22m	0	0	≥4.75m	3
Tree canopy cover (%)	5	27%	≥4%	2	≥10%	5
Shrub canopy cover (%)	5	12%	≥1.3%	3	≥5%	3
Native perennial grass cover (%)	5	14%	≥12%	3	≥12%	3
Organic litter groundcover (%)	5	45%	0	0	≥4.5%	3
Total BioCondition Assessable Score	60			>20		>35

¹A site's total BioCondition score can be comprised of different attribute scores but must meet or exceed the minimum (modified) BioCondition score for the relevant milestone.

Table 42: Surface water monitoring locations

Monitoring locations	Receiving waters location description	Latitude (decimal degree, GDA2020)	Longitude (decimal degree, GDA2020)
<i>Upstream monitoring locations</i>			
WS5	Juandah Creek upstream of ML55017	-26.3940	149.9767
WS6		-26.4022	150.0251
WS8		-26.3864	149.9848
<i>Downstream monitoring locations</i>			
WS1		-26.3937	149.9865
WS2	Tributary of Juandah Creek downslope from Dam 2	-26.3944	149.9872
WS3	Tributary of Juandah Creek downslope from Dam 2	-26.3979	149.9895
WS4	Juandah Creek downstream of operations	-26.3973	149.9979
WS7		-26.3967	150.0288
WS9		-26.3821	149.9882

9.3 Non-use management area milestones

No NUMAs are identified for Gurulmundi Mine.



9.4 Reference maps

Gurulmundi Mine reference maps showing rehabilitation areas are provided in **Figure 33**.

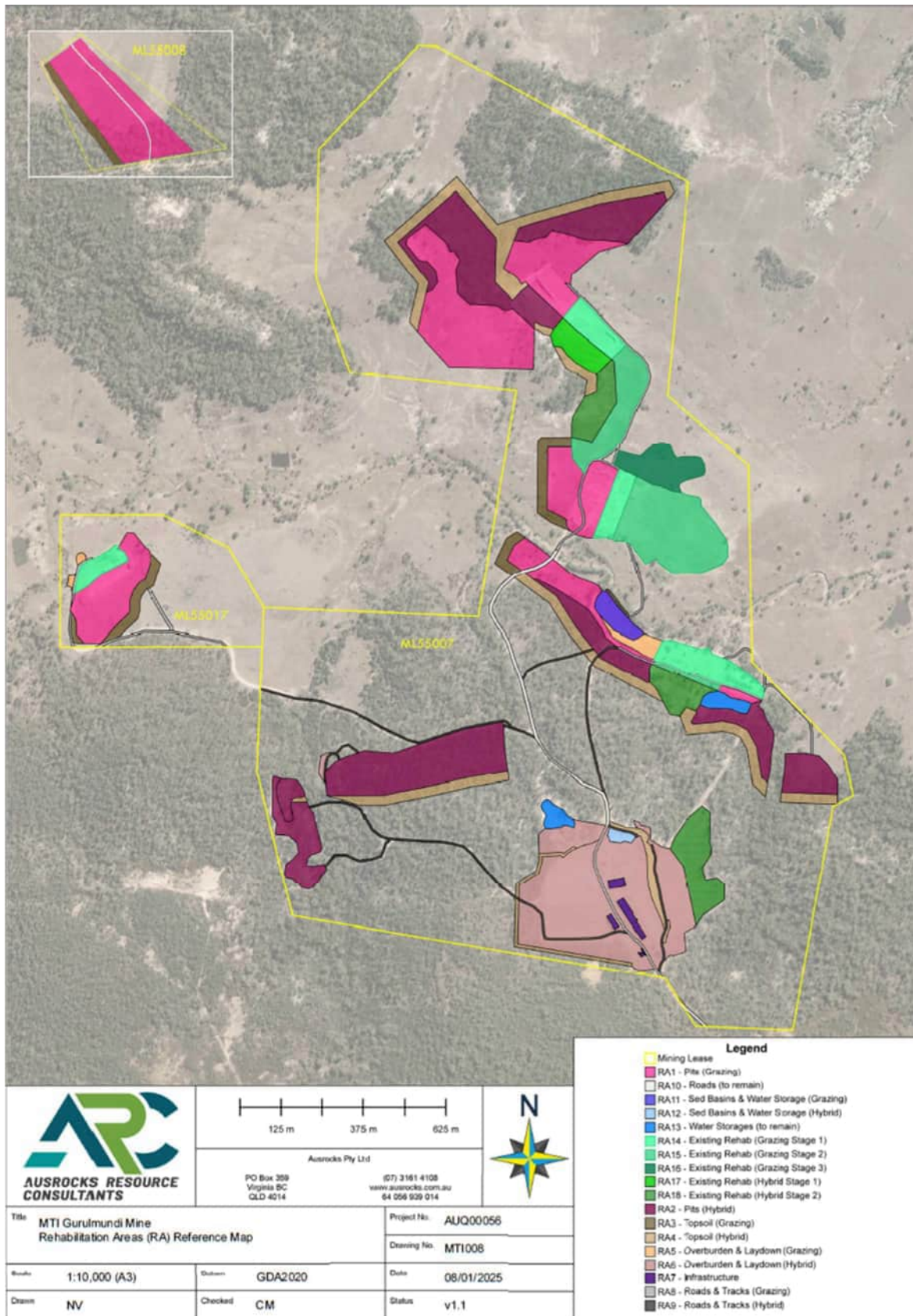


Figure 33: Gurulmundi Mine rehabilitation areas reference map

9.5 Schedule

The PRCP schedule is based on the land being rehabilitated as soon as practicable after the land becomes available, as required under section 126D(4) of the EP Act.

Rehabilitation milestones RM1 to RM6 can generally be grouped into the same completion time period of 2-4 years for each RA, as they become available. This is based on the nominal timeframes allowed to complete earthworks, working in and around availability of machinery, topsoil amelioration, seed species and favourable weather for seeding. However, the completion of RM7 and RM8 are more dependent on varying weather seasonality and undesirable weather periods, and as such have been generally allocated a completion time period of 5 years each. RM9 (water quality) will rely on the completion of RM8 as water quality monitoring before the rehabilitation areas are considered stable will result in ineffective results that don't reflect the final landform. RM10 relates specifically to the infrastructure that will be left behind and will be completed once all other activities have been completed.

The proposed PRCP schedule is provided on the following pages.



9.5.1 Rehabilitation area 1 (RA1)

Post-mining land uses (PMLU)									
Rehabilitation area				RA1					
Relevant activities				Pits (Grazing)					
Total rehabilitation area size (ha)				31.7					
Commencement of first milestone: RM1				10/12/2029					
PMLU				Marginal Grazing					
Date area is available	10/12/2029	10/12/2032	10/12/2034	10/12/2037	10/12/2042	10/12/2046	10/12/2049	10/12/2054	10/12/2059
Cumulative area available (ha)	4.1	4.1	15	15	15	31.7	31.7	31.7	31.7
Milestone completed by	10/12/2032	10/12/2037	10/12/2037	10/12/2042	10/12/2047	10/12/2049	10/12/2054	10/12/2059	10/12/2066
Milestone Reference	Cumulative area achieved (ha)								
RM1	4.1		15			31.7			
RM3	4.1		15			31.7			
RM4	4.1		15			31.7			
RM5	4.1		15			31.7			
RM6	4.1		15			31.7			
RM7		4.1		15			31.7		
RM8				4.1	15			31.7	
RM9									31.7



9.5.2 Rehabilitation area 2 (RA2)

Post-mining land uses (PMLU)													
Rehabilitation area				RA2									
Relevant activities				Pits (Hybrid Ecosystem)									
Total rehabilitation area size (ha)				25.8									
Commencement of first milestone: RM1				10/12/2025									
PMLU				Hybrid Ecosystem									
Date area is available	10/12/2025	10/12/2029	10/12/2029	10/12/2031	10/12/2034	10/12/2034	10/12/2036	10/12/2038	10/12/2043	10/12/2046	10/12/2050	10/12/2055	10/12/2060
Cumulative area available (ha)	3.2	6.8	3.2	6.8	12.4	3.2	6.8	12.4	12.4	25.8	25.8	25.8	25.8
Milestone completed by	10/12/2029	10/12/2031	10/12/2034	10/12/2036	10/12/2038	10/12/2039	10/12/2041	10/12/2043	10/12/2048	10/12/2050	10/12/2055	10/12/2060	10/12/2066
Milestone Reference	Cumulative area achieved (ha)												
RM1	3.2	6.8			12.4					25.8			
RM3	3.2	6.8			12.4					25.8			
RM4	3.2	6.8			12.4					25.8			
RM5	3.2	6.8			12.4					25.8			
RM6	3.2	6.8			12.4					25.8			
RM7			3.2	6.8				12.4			25.8		
RM8						3.2	6.8		12.4			25.8	
RM9													25.8



9.5.3 Rehabilitation area 3 (RA3)

Post-mining land uses (PMLU)												
Rehabilitation area			RA3									
Relevant activities			Topsoil Stockpiles (Grazing)									
Total rehabilitation area size (ha)			4.1									
Commencement of first milestone: RM3			10/12/2025									
PMLU			Marginal Grazing									
Date area is available	10/12/2025	10/12/2029	10/12/2027	10/12/2031	10/12/2033	10/12/2032	10/12/2036	10/12/2035	10/12/2038	10/12/2040	10/12/2045	10/12/2050
Cumulative area available (ha)	0.1	1.3	0.1	1.3	2.8	0.1	1.3	2.8	4.1	4.1	4.1	4.1
Milestone completed by	10/12/2027	10/12/2031	10/12/2032	10/12/2036	10/12/2035	10/12/2037	10/12/2041	10/12/2040	10/12/2040	10/12/2045	10/12/2050	10/12/2066
Milestone Reference	Cumulative area achieved (ha)											
RM3	0.1	1.3			2.8				4.1			
RM5	0.1	1.3			2.8				4.1			
RM6	0.1	1.3			2.8				4.1			
RM7			0.1	1.3				2.8		4.1		
RM8						0.1	1.3			2.8	4.1	
RM9												4.1



9.5.4 Rehabilitation area 4 (RA4)

Post-mining land uses (PMLU)														
Rehabilitation area		RA4												
Relevant activities		Topsoil Stockpiles (Hybrid Ecosystem)												
Total rehabilitation area size (ha)		12.3												
Commencement of first milestone: RM3		10/12/2025												
PMLU		Hybrid Ecosystem												
Date area is available	10/12/2025	10/12/2029	10/12/2027	10/12/2033	10/12/2031	10/12/2038	10/12/2036	10/12/2037	10/12/2041	10/12/2048	10/12/2046	10/12/2051	10/12/2056	10/12/2061
Cumulative area available (ha)	0.1	2.6	0.1	4.3	2.6	10.8	4.3	2.6	10.8	12.3	10.8	12.3	12.3	12.3
Milestone completed by	10/12/2027	10/12/2031	10/12/2031	10/12/2036	10/12/2037	10/12/2041	10/12/2041	10/12/2042	10/12/2046	10/12/2051	10/12/2051	10/12/2056	10/12/2061	10/12/2066
Milestone Reference	Cumulative area achieved (ha)													
RM3	0.1	2.6		4.3		10.8				12.3				
RM5	0.1	2.6		4.3		10.8				12.3				
RM6	0.1	2.6		4.3		10.8				12.3				
RM7			0.1		2.6		4.3		10.8			12.3		
RM8					0.1			2.6	4.3		10.8		12.3	
RM9														12.3



9.5.5 Rehabilitation area 5 (RA5)

Post-mining land uses (PMLU)				
Rehabilitation area			RA5	
Relevant activities			Overburden & Laydown Areas (Grazing)	
Total rehabilitation area size (ha)			0.8	
Commencement of first milestone: RM1			10/12/2034	
PMLU			Marginal Grazing	
Date area is available	10/12/2034	10/12/2037	10/12/2042	10/12/2047
Cumulative area available (ha)	0.8	0.8	0.8	0.8
Milestone completed by	10/12/2037	10/12/2042	10/12/2047	10/12/2066
Milestone Reference	Cumulative area achieved (ha)			
RM1	0.8			
RM3	0.8			
RM4	0.8			
RM5	0.8			
RM6	0.8			
RM7		0.8		
RM8			0.8	
RM9				0.8



9.5.6 Rehabilitation area 6 (RA6)

Post-mining land uses (PMLU)						
Rehabilitation area				RA6		
Relevant activities				Overburden & Laydown Areas (Hybrid Ecosystem)		
Total rehabilitation area size (ha)				16.6		
Commencement of first milestone: RM1				10/12/2039		
PMLU				Hybrid Ecosystem		
Date area is available	10/12/2039	10/12/2042	10/12/2047	10/12/2052	10/12/2056	10/12/2061
Cumulative area available (ha)	0.2	0.2	16.6	16.6	16.6	16.6
Milestone completed by	10/12/2042	10/12/2047	10/12/2052	10/12/2056	10/12/2061	10/12/2066
Milestone Reference	Cumulative area achieved (ha)					
RM1	0.2		16.6			
RM3	0.2		16.6			
RM4	0.2		16.6			
RM5	0.2		16.6			
RM6	0.2		16.6			
RM7		0.2		16.6		
RM8			0.2		16.6	
RM9						16.6



9.5.7 Rehabilitation area 7 (RA7)

Post-mining land uses (PMLU)		
Rehabilitation area		RA7
Relevant activities		Infrastructure
Total rehabilitation area size (ha)		0.5
Commencement of first milestone: RM1		10/12/2052
PMLU		Retained Infrastructure (infrastructure)
Date area is available	10/12/2052	10/12/2055
Cumulative area available (ha)	0.5	0.5
Milestone completed by	10/12/2055	10/12/2066
Milestone Reference	Cumulative area achieved (ha)	
RM1	0.5	
RM10		0.5



9.5.8 Rehabilitation area 8 (RA8)

Post-mining land uses (PMLU)									
Rehabilitation area				RA8					
Relevant activities				Roads & Tracks (Grazing)					
Total rehabilitation area size (ha)				2.0					
Commencement of first milestone: RM3				10/12/2029					
PMLU				Marginal Grazing					
Date area is available	10/12/2029	10/12/2031	10/12/2036	10/12/2039	10/12/2041	10/12/2044	10/12/2046	10/12/2051	10/12/2056
Cumulative area available (ha)	0.2	0.2	0.2	1.4	1.4	2.0	2.0	2.0	2.0
Milestone completed by	10/12/2031	10/12/2036	10/12/2041	10/12/2041	10/12/2046	10/12/2046	10/12/2051	10/12/2056	10/12/2066
Milestone Reference	Cumulative area achieved (ha)								
RM3	0.2			1.4		2.0			
RM4	0.2			1.4		2.0			
RM5	0.2			1.4		2.0			
RM6	0.2			1.4		2.0			
RM7		0.2			1.4		2.0		
RM8			0.2				1.4	2.0	
RM9									2.0



9.5.9 Rehabilitation area 9 (RA9)

Post-mining land uses (PMLU)							
Rehabilitation area				RA9			
Relevant activities				Roads & Tracks (Hybrid Ecosystem)			
Total rehabilitation area size (ha)				2.3			
Commencement of first milestone: RM3				10/12/2039			
PMLU				Hybrid Ecosystem			
Date area is available	10/12/2039	10/12/2042	10/12/2047	10/12/2052	10/12/2055	10/12/2060	10/12/2065
Cumulative area available (ha)	0.3	0.3	0.3	2.3	2.3	2.3	2.3
Milestone completed by	10/12/2042	10/12/2047	10/12/2052	10/12/2055	10/12/2060	10/12/2065	10/12/2066
Milestone Reference	Cumulative area achieved (ha)						
RM3	0.3			2.3			
RM4	0.3			2.3			
RM5	0.3			2.3			
RM6	0.3			2.3			
RM7		0.3			2.3		
RM8			0.3			2.3	
RM9							2.3



9.5.10 Rehabilitation area 10 (RA10)

Post-mining land uses (PMLU)	
Rehabilitation area	RA10
Relevant activities	Main Road
Total rehabilitation area size (ha)	1.8
Commencement of first milestone: RM3	10/12/2052
PMLU	Retained infrastructure (Roads)
Date area is available	10/12/2052
Cumulative area available (ha)	1.8
Milestone completed by	10/12/2066
Milestone Reference	Cumulative area achieved (ha)
RM10	1.80



9.5.11 Rehabilitation area 11 (RA11)

Post-mining land uses (PMLU)				
Rehabilitation area		RA11		
Relevant activities		Sediment Basins & Water Storages (Grazing)		
Total rehabilitation area size (ha)		1.0		
Commencement of first milestone: RM2		10/12/2025		
PMLU		Marginal Grazing		
Date area is available	10/12/2025	10/12/2030	10/12/2035	10/12/2040
Cumulative area available (ha)	1.0	1.0	1.0	1.0
Milestone completed by	10/12/2030	10/12/2035	10/12/2040	10/12/2066
Milestone Reference	Cumulative area achieved (ha)			
RM2	1.0			
RM3	1.0			
RM4	1.0			
RM5	1.0			
RM6	1.0			
RM7		1.0		
RM8			1.0	
RM9				1.0



9.5.12 Rehabilitation area 12 (RA12)

Post-mining land uses (PMLU)				
Rehabilitation area	RA12			
Relevant activities	Sediment Basins & Water Storages (Hybrid Ecosystem)			
Total rehabilitation area size (ha)	0.3			
Commencement of first milestone: RM2	10/12/2048			
PMLU	Hybrid Ecosystem			
Date area is available	10/12/2048	10/12/2053	10/12/2058	10/12/2063
Cumulative area available (ha)	0.3	0.3	0.3	0.3
Milestone completed by	10/12/2053	10/12/2058	0/12/2063	10/12/2066
Milestone Reference	Cumulative area achieved (ha)			
RM2	0.3			
RM3	0.3			
RM4	0.3			
RM5	0.3			
RM6	0.3			
RM7		0.3		
RM8			0.3	
RM9				0.3



9.5.13 Rehabilitation area 13 (RA13)

Post-mining land uses (PMLU)				
Rehabilitation area	RA13			
Relevant activities	Water Storages (to remain)			
Total rehabilitation area size (ha)	1.2			
Commencement of first milestone: RM1	10/12/2052			
PMLU	Retained infrastrucutre (Water Storage)			
Date area is available	10/12/2052	10/12/2055	10/12/2060	10/12/2065
Cumulative area available (ha)	1.2	1.2	1.2	1.2
Milestone completed by	10/12/2055	10/12/2060	10/12/2065	10/12/2066
Milestone Reference	Cumulative area achieved (ha)			
RM1	1.2			
RM2	1.2			
RM3	1.2			
RM6	1.2			
RM7		1.2		
RM8			1.2	
RM9				1.2
RM10				1.2



9.5.14 Rehabilitation area 14 (RA14)

Post-mining land uses (PMLU)				
Rehabilitation area	RA14			
Relevant activities	Existing Rehabilitation (Grazing Stage 1)			
Total rehabilitation area size (ha)	6.9			
Commencement of first milestone: RM3	10/12/2025			
PMLU	Marginal Grazing			
Date area is available	10/12/2025	10/12/2028	10/12/2033	10/12/2038
Cumulative area available (ha)	6.9	6.9	6.9	6.9
Milestone completed by	10/12/2028	10/12/2033	10/12/2038	10/12/2066
Milestone Reference	Cumulative area achieved (ha)			
RM3	6.9			
RM4	6.9			
RM5	6.9			
RM6	6.9			
RM7		6.9		
RM8			6.9	
RM9				6.9



9.5.15 Rehabilitation area 15 (RA15)

Post-mining land uses (PMLU)				
Rehabilitation area	RA15			
Relevant activities	Existing Rehabilitation (Grazing Stage 2)			
Total rehabilitation area size (ha)	9.9			
Commencement of first milestone: RM3	10/12/2025			
PMLU	Marginal Grazing			
Date area is available	10/12/2025	10/12/2028	10/12/2033	10/12/2038
Cumulative area available (ha)	9.9	9.9	9.9	9.9
Milestone completed by	10/12/2028	10/12/2033	10/12/2038	10/12/2066
Milestone Reference	Cumulative area achieved (ha)			
RM3	9.9			
RM4	9.9			
RM5	9.9			
RM6	9.9			
RM7		9.9		
RM8			9.9	
RM9				9.9



9.5.16 Rehabilitation area 16 (RA16)

Post-mining land uses (PMLU)				
Rehabilitation area	RA16			
Relevant activities	Existing Rehabilitation (Grazing Stage 3)			
Total rehabilitation area size (ha)	1.5			
Commencement of first milestone: RM7	10/12/2025			
PMLU	Marginal Grazing			
Date area is available	10/12/2025	10/12/2028	10/12/2033	10/12/2038
Cumulative area available (ha)	1.5	1.5	1.5	1.5
Milestone completed by	10/12/2028	10/12/2033	10/12/2038	10/12/2066
Milestone Reference	Cumulative area achieved (ha)			
RM3	1.5			
RM4	1.5			
RM5	1.5			
RM6	1.5			
RM7		1.5		
RM8			1.5	
RM9				1.5



9.5.17 Rehabilitation area 17 (RA17)

Post-mining land uses (PMLU)				
Rehabilitation area		RA17		
Relevant activities		Existing Rehabilitation (Hybrid Ecosystem Stage 1)		
Total rehabilitation area size (ha)		1.4		
Commencement of first milestone: RM3		10/12/2025		
PMLU		Hybrid Ecosystem		
Date area is available	10/12/2025	10/12/2028	10/12/2033	10/12/2038
Cumulative area available (ha)	1.4	1.4	1.4	1.4
Milestone completed by	10/12/2028	10/12/2033	10/12/2038	10/12/2066
Milestone Reference	Cumulative area achieved (ha)			
RM3	1.4			
RM4	1.4			
RM5	1.4			
RM6	1.4			
RM7		1.4		
RM8		1.4	1.4	
RM9				1.4



9.5.18 Rehabilitation area 18 (RA18)

Post-mining land uses (PMLU)				
Rehabilitation area	RA18			
Relevant activities	Existing Rehabilitation (Hybrid Ecosystem Stage 2)			
Total rehabilitation area size (ha)	6.4			
Commencement of first milestone: RM3	10/12/2025			
PMLU	Hybrid Ecosystem			
Date area is available	10/12/2025	10/12/2028	10/12/2033	10/12/2038
Cumulative area available (ha)	6.4	6.4	6.4	6.4
Milestone completed by	10/12/2028	10/12/2033	10/12/2038	10/12/2066
Milestone Reference	Cumulative area achieved (ha)			
RM3	6.4			
RM4	6.4			
RM5	6.4			
RM6	6.4			
RM7		6.4		
RM8			6.4	
RM9				6.4

APPENDICES

- Appendix 1** Environmental Authority EPML00699113 (24 October 2023)
- Appendix 2** Queensland Department of Environment and Science Progressive Rehabilitation and Closure Plan Transition Notice (via email) Ref. EPML0069913 (19 July 2021)
- Appendix 3** Horizon Soil Science and Engineering: Report on the Soil Survey of Leases of the Mineral Technologies Bentonite Mine Rev 1.0 (October 2022)
- Appendix 4** Ausrocks Resource Consultants: Final Land Use and Rehabilitation Plan Rev 1.4 (February 2026)
- Appendix 5** Ausrocks Resource Consultants: Annual Rehabilitation Report 2023 Rev 1.1 (April 2024)
- Appendix 6** Ausrocks Resource Consultants: Community Consultation Plan Rev 1.1 (February 2026)
- Appendix 7** Landowner Agreements
- Appendix 8** Gurulmundi Mine Risk Assessment
- Appendix 9** Waste Characterisation Assessment



Appendix 1

Environmental Authority EPML00699113 (24 October 2023)

Permit

Environmental Protection Act 1994

Environmental authority EPML00699113

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Environmental authority number: EPML00699113

Environmental authority takes effect on 24 October 2023

Environmental authority holder(s)

Name(s)	Registered address
Amcol Australia Pty. Ltd.	94 Balham Rd ARCHERFIELD QLD 4108

Environmentally relevant activity and location details

Environmentally relevant activity/activities	Location(s)
Schedule 3 20(a) - Clay pit mining, dimension stone mining or mining gemstones (including the material from which gemstones are extracted) - at least 5,000t but not more than 100,000t in a year	ML55007 ML55008 ML55017

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority (EA) is issued is a restatement of the ERA as defined by legislation at the time the EA is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an EA as to the scale, intensity or manner of carrying out an ERA, the conditions prevail to the extent of the inconsistency.

An EA authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the EA specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

Contaminated land

It is a requirement of the EP Act that an owner or occupier of contaminated land give written notice to the administering authority if they become aware of the following:

- the happening of an event involving a hazardous contaminant on the contaminated land (notice must be given within 24 hours); or
- a change in the condition of the contaminated land (notice must be given within 24 hours); or
- a notifiable activity (as defined in Schedule 3) having been carried out, or is being carried out, on the contaminated land (notice must be given within 20 business days);

that is causing, or is reasonably likely to cause, serious or material environmental harm.

For further information, including the form for giving written notice, refer to the Queensland Government website www.qld.gov.au, using the search term 'duty to notify'.

Take effect

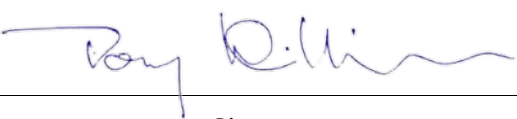
Please note that, in accordance with section 200 of the EP Act, an EA has effect:

- a) if the authority is for a prescribed ERA and it states that it takes effect on the day nominated by the holder of the authority in a written notice given to the administering authority-on the nominated day; or
- b) if the authority states a day or an event for it to take effect-on the stated day or when the stated event happens; or
- c) otherwise-on the day the authority is issued.

However, if the EA is authorising an activity that requires an additional authorisation (a relevant tenure for a resource activity, a development permit under the *Sustainable Planning Act 2009* or an SDA Approval under the *State Development and Public Works Organisation Act 1971*), this EA will not take effect until the additional authorisation has taken effect.

If this EA takes effect when the additional authorisation takes effect, you must provide the administering authority written notice within 5 business days of receiving notification of the related additional authorisation taking effect.

If you have incorrectly claimed that an additional authorisation is not required, carrying out the ERA without the additional authorisation is not legal and could result in your prosecution for providing false or misleading information or operating without a valid environmental authority.



Signature

24 October 2023

Date

Tony Williams
Department of Environment and Science
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:
Minerals Business Centre
Department of Environment and Science
Phone: 07 4222 5352
Email: ESCairns@des.qld.gov.au

Privacy statement

Pursuant to section 540 of the EP Act, the Department is required to maintain a register of certain documents and information authorised under the EP Act. A copy of this document will be kept on the public register. The register is available for inspection by members of the public who are able to take extracts, or copies of the documents from the register. Documents that are required to be kept on the register are published in their entirety unless alteration is required by the EP Act. There is no general discretion allowing the Department to withhold documents or information required to be kept on the public register.

For more information on the Department's public register, search 'public register' at www.qld.gov.au. For queries about privacy matters please email privacy@des.qld.gov.au or telephone 13 74 68.

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Conditions of environmental authority

The environmentally relevant activity conducted at the location as described above must be conducted in accordance with the following site specific conditions of approval.

This environmental authority consists of the following schedules of conditions:

- Schedule A - General
- Schedule B - Air
- Schedule C - Water
- Schedule D - Noise
- Schedule E – Waste
- Schedule F – Land
- Schedule G - Definitions
- Schedule H - Maps and Plans

Schedule A – General

Activity

- A1 This environmental authority authorises environmental harm referred to in the conditions. Where there is no condition or this environmental authority is silent on a matter, the lack of a condition or silence does not authorise environmental harm.
- A2 Contaminants with the potential to cause environmental harm must not be released directly or indirectly to the receiving environment, except as permitted under the conditions of this environmental authority.
- A3 In carrying out the mining activity authorised by this environmental authority, the holder of this environmental authority must comply with the authorised disturbance areas listed in Table A1 – Authorised disturbance and as depicted in Figure H1 - Project Infrastructure Layout.

Table A1 - Authorised Disturbance ('Table A1')

Mine Feature Name	Location (GDA94)		Maximum Disturbance Area (ha)	Description / Purpose
	Northing	Easting		
North Pit	7077522.03	798684.28	25.50	Extraction area, topsoil and overburden stockpiles
West Pit	7076239.38	797714.85	3.54	Extraction area, topsoil and overburden stockpiles
Central Pit	7076694.56	798808.97	7.55	Extraction area, topsoil and overburden stockpiles
ML55008 Pit	7076050.70	802138.53	2.00	Extraction area, topsoil and overburden stockpiles
ML55017 Pit	7076962.99	797267.42	3.07	Extraction area, topsoil and overburden stockpiles
Processing and Infrastructure Area	7075952.77	798719.44	18.29	Infrastructure areas for ancillary mine activities
Haul Roads	-	-	5.91	Access on site (haul roads and access tracks)
Total			65.86	

Maintenance of Measures, Plant and Equipment

- A5 The holder must:
- Install all measures, plant and equipment necessary to ensure compliance with the conditions of the environmental authority;
 - Maintain such measures, plant and equipment in a proper and efficient condition;
 - Operate such measures, plant and equipment in a proper and efficient manner; and
 - Ensure all instruments and devices used for the measurement or monitoring of any parameter under any condition of this environmental authority are properly calibrated.

Monitoring

- A6** Except where specified in another condition of this environmental authority, all monitoring data, records and reports required by this environmental authority or related to environmental management of the activities must be:
- a) Carried out by an appropriately qualified person;
 - b) Kept for a period of not less than five years;
 - c) Provided to the administering authority in the specified format within ten (10) business days of a request; and
 - d) Undertaken in accordance with the most recent version of any applicable standard or guideline for the activity.
- A7** The following information must be recorded in relation to all monitoring required under a condition of this environmental authority:
- a) The date and time when the sample was taken;
 - b) The location where the sample was taken; and
 - c) Any other pertinent details of relevance to interpreting the sampling results (*i.e.* stream flow, wind conditions, atmospheric conditions, any unusual observations such as odour or colouration).

Storage and Handling of Flammable, Corrosive and Combustible Liquids

- A8** All flammable, corrosive and combustible liquids, including petroleum products, must be stored and handled in accordance with:
- a) The latest edition of *AS1940—The storage and handling of flammable and combustible liquids* where applicable;
 - b) The current Australian Standard where applicable; or
 - c) Where no relevant Australian Standard exists, store such materials within an on-site containment system sufficient to prevent release to the receiving environment.

Complaints

- A9** The holder of this environmental authority must record all environmental complaints received about the mining activities including:
- a) Name, address and contact number for complainant (if available);
 - b) Time and date of complaint;
 - c) Reasons for the complaint;
 - d) Investigations undertaken;
 - e) Conclusions formed;
 - f) Actions taken to resolve complaint;
 - g) Any abatement measures implemented; and
 - h) Person responsible for resolving the complaint.
- A10** The holder of this environmental authority must, when requested by the administering authority, undertake relevant specified monitoring within a reasonable timeframe nominated or agreed to by the administering authority to investigate any complaint of actual or potential environmental harm. The results of the investigation (including analysis and interpretation of monitoring results) and abatement measures, where implemented, must be provided to the administering authority within ten (10) business days after the end of the timeframe nominated by the administering authority to undertake the investigation.

Risk management

- A11** The holder of this environmental authority must develop and implement a risk management system for mining activities which mirrors the content requirement of the *Standard for Risk Management (ISO31000:2009)*, or the latest edition of an Australian standard for risk management, to the extent relevant to environmental management, by 16 September 2017.

Notification of emergencies, incidents and exceptions

- A12** The holder of this environmental authority must notify the administering authority within 24 hours of becoming aware of any emergency, incident or event which does or may contravene a condition of this environmental authority.
- A13** Within ten (10) business days following the initial notification of an emergency or incident, or receipt of monitoring results, whichever is the latter, further written advice must be provided to the administering authority, including the following:
- a) Results and interpretation of any samples taken and analysed;
 - b) Outcomes of actions taken at the time to prevent or minimise unlawful environmental harm;
 - c) Proposed actions to prevent a recurrence of the emergency or incident.

Third-party reporting

- A14** The holder of this environmental authority must:
- a) Within one year of the commencement of this environmental authority, obtain from an appropriately qualified person a report on compliance with the conditions of this environmental authority;
 - b) Obtain further such reports at regular intervals, not exceeding three-yearly intervals, from the completion of the report referred to above;
 - c) Provide each report to the administering authority within ninety (90) days of its completion.

Standards, policies and guidelines

- A15** Where a condition of this environmental authority requires compliance with a standard, policy or guideline published externally to this environmental authority and the standard is amended or changed subsequent to the issue of this environmental authority, the holder of this environmental authority must:
- a) Comply with the amended or changed standard, policy or guideline within two years of the amendment or change being made, unless a different period is specified in the amended standard or relevant legislation;
 - b) Until compliance with the amended or changed standard, policy or guideline is achieved, continue to remain in compliance with the corresponding provision that was current immediately prior to the relevant amendment or change.

END OF CONDITIONS FOR SCHEDULE A

Schedule B – Air

- B1** The release of noxious or offensive odour(s), dust, particulate matter or any other airborne contaminant(s) resulting from the mining activity or mineral processing, must not cause environmental harm, at any sensitive or commercial place.
- B2** The holder of this environmental authority must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that the dust and particulate matter emissions generated by the mining activities do not cause exceedances of the following levels when measured at any sensitive or commercial place:
- a) Dust deposition of 120 milligrams per square meter per day, averaged over one month, when monitored in accordance with *AS 3580.10.1 Methods for sampling and analysis of ambient air – Determination of particulate matter – Deposited matter – Gravimetric method*; and
 - b) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometre (µm) (PM10) suspended in the atmosphere of 50 micrograms per cubic metre over a 24 hour averaging time, for no more than five exceedances recorded each year, when monitored in accordance with the most recent version of either:
 - i. Australian Standard AS 3580.9.6 Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – PM10 high volume sampler with size-selective inlet – Gravimetric method of 2003; or
 - ii. Australian Standard AS3580.9.9 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—PM10 low volume sampler—Gravimetric method.

The release of Contaminants to the Atmosphere

- B3** Discharges of contaminants to air from the activity, other than dust and particulate matter addressed by **condition B2**, must be in accordance with **Table B1 – Air emissions release points and contaminant limits** and must be directly vertically upwards without any impedance or hindrance.
- B4** If a complaint is made regarding air quality, the environmental authority holder must conduct a monitoring program for all release points listed in **Table B1 – Air emissions release points and contaminant limits** which complies with the most recent edition of *Australian Standard AS4323.1 Stationary source emissions method 1: Selection of sampling positions*, and the most recent edition of the administering authority's *air quality sampling manual*.

Table B1 – Air emissions release point and contaminant limits

Release Point	Location (GDA94)		Minimum release height (m)	Minimum velocity (m/sec)	Concentration of total suspended particulates (g/Nm ³)
	Easting	Northing			
Raymond Mill Bag House	798679.09	7076027.27	6	8	0.25

END OF CONDITIONS FOR SCHEDULE B

Schedule C – Water

Release to waters

- C1** Contaminated water may only be released from a location specified in **Table C1 - Authorised contaminant release points** and must not cause an exceedance of any receiving waters contaminant limit specified in **Table C3 - Receiving waters contaminant limits** when measured at the compliance monitoring point specified in **Table C2 - Receiving waters reference and compliance monitoring sites**.
- C2** Contaminated water may only be released during periods of natural flow of receiving waters.
- C3** Contaminated water released from a release point specified in **Table C1 - Authorised contaminant release points** must be monitored at the release point and frequency specified in **Table C1 - Authorised contaminant release points** and depicted in **Figure H3 - Release points and surface water monitoring locations**, for all contaminants specified in **Table C3 - Receiving waters contaminant limits**.

Table C1 – Authorised contaminant release points ('Table C1')

Release point	Location (GDA94-Zone 55)		Release source	Monitoring frequency
	Easting	Northing		
WD 1	798461	7076250	Infrastructure Area	One sample within first 12 hours of a release commencing. When a release event has duration of greater than 24 hours, samples must be collected daily for one week and then weekly thereafter until the release ceases.
WD 2	799073	7076672	Central Pit	
WD 3	798742	7076848	Central Pit	
WD 4	798633	7077147	North Pit	
WD 5	798550	7077385	North Pit	
WD 6	797794	7076410	West Pit	
WD 7	797701	7076341	West Pit	
WD 8	797186	7077085	ML 55017 Pit	
TBA ^[1]	TBA ^[1]	TBA ^[1]	ML55008 Pit	

Notes:

[1] TBA means to be advised to the administering authority at least 2 months prior to disturbance on ML55008 commencing.

Notification of release event

- C4** The environmental authority holder must notify the administering authority within twenty four (24) hours of any contaminated water release commencing.

Receiving waters

- C5** The quality of receiving waters must be monitored at the locations and frequency specified in **Table C2 - Receiving waters reference and compliance monitoring sites** and depicted in **Figure H3 - Release points and surface water monitoring locations** for each quality characteristic stated in **Table C3 - Receiving waters contaminant limits**.

- C6** The contaminant concentrations measured at a compliance site in **Table C2 - Receiving waters reference and compliance monitoring sites** must not exceed any contaminant limit specified in **Table C3 - Receiving waters contaminant limits**.

Table C2 - Receiving waters reference and compliance monitoring sites ('Table C2')

Monitoring Point	Location description and purpose	Location (GDA94-Zone 55)		Monitoring frequency
		Easting	Northing	
Reference sites (RS) ^[1]				
WS1 ^[2]	Juandah Creek upstream of operations (RS for WS4)	797957	7077266	One sample within first 12 hours of a release commencing. When a release event has duration of greater than 24 hours, samples must be collected daily for one week and then weekly thereafter until the release ceases.
WS5 ^[3]	Juandah Creek upstream of ML55017 pit (RS for WS4)	796981	7077255	
TBA ^[4]	Upstream of ML55008 Pit (RS for TBA ^[2])	TBA ^[4]	TBA ^[4]	
Compliance sites				
WS4	Juandah Creek – downstream of operations	799088	77076832	One sample within first 12 hours of a release commencing. When a release event has duration of greater than 24 hours, samples must be collected daily for one week and then weekly thereafter until the release ceases.
TBA ^[4]	Tributary of Juandah Creek – downstream of ML55008 Pit	TBA ^[4]	TBA ^[4]	
Receiving water sites ^[5]				
WS2	Tributary of Juandah Creek downslope from Dam 2	798030	7077178	One sample within first 12 hours of a release commencing. When a release event has duration of greater than 24 hours, samples must be collected daily for one week and then weekly thereafter until the release ceases.
WS3	Tributary of Juandah Creek downslope from Dam 2	798249	7076791	

Notes:

- [1] Reference sites must be in accordance with the definition *Queensland Water Quality Guidelines 2009*.
 [2] Reference site for WS4 until disturbance of ML55017 has commenced.
 [3] Reference site for WS4 after disturbance on ML55017 has commenced.
 [4] TBA means to be advised to the administering authority at least 2 months prior to disturbance on ML55008 commencing.
 [5] Monitoring is for information purposes.

Table C3 – Receiving waters contaminant limits ('Table C3')

Contaminant	Contaminant Limit
pH (pH units)	6.5 ^[1] (minimum)
	8.5 ^[1] (maximum)
Electrical conductivity (µS/cm)	370 ^[1] or 95 th percentile ^[2] of the reference site ^[3] , whichever is higher ^[4]
Turbidity (NTU)	50 ^[1] or 95 th percentile ^[2] of the reference site ^[3] , whichever is higher ^[4]
Suspended solids (mg/L)	30 ^[1] or 95 th percentile ^[2] of the reference site ^[3] , whichever is higher ^[4]
Sulfate (SO ₄ ²⁻) (mg/L)	5 ^[1] or 95 th percentile ^[2] of the reference site ^[3] , whichever is higher ^[4]

Notes:

- [1] Local water guideline values for protection of aquatic ecosystems as per *Environmental Protection (Water) Policy 2009 Dawson River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part)*, including all waters of the Dawson River Sub-basin except the Callide Creek Catchment, published in September 2011.
- [2] 95th percentile of reference site contaminant concentration applied as trigger levels/water quality objectives must be calculated in accordance with QWQG (2009) and ANZECC (2000) methodology. The environmental authority holder must maintain a database documenting all relevant water quality monitoring data and calculation of percentiles adopted as trigger levels/water quality objectives.
- [3] The relevant reference site is specified in Table E4.
- [4] If the contaminant concentration measured at the compliance site is equal to or less than the contaminant concentration measured at the applicable reference site, no further action is required.

C7 If quality characteristics of the receiving water at the receiving water compliance monitoring locations exceed any of the contaminant limits specified in **Table C3 – Receiving waters contaminant limits** during a release event, the Authority holder must compare the results of the receiving water compliance monitoring site to the receiving waters reference site monitoring data and:

- a) If the level of contaminants at the receiving water compliance monitoring site does not exceed the receiving waters reference site monitoring data, then no action is to be taken; or,
- b) If the level of contaminants at the receiving water compliance monitoring site is greater than the receiving water reference site monitoring data, complete an investigation in accordance with the ANZECC (2000) guidelines methodology, into the potential for environmental harm and provide a written report to the administering authority within three (3) months, outlining:
 - i. Details of the investigations carried out; and,
 - ii. Actions taken to prevent environmental harm.

Note: Where an exceedance of a contaminant limit has occurred and is being investigated, in accordance with requirement (b) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic within the three month investigation period.

Site Water Management

- C8** A *Water Management Plan* must be developed by an appropriately qualified person, documented and implemented for all stages of the mining activity.

Stormwater and sediment controls

- C9** An *Erosion and Sediment Control Plan* must be developed by an appropriately qualified person, documented and implemented for all stages of the mining activities to prevent erosion and the release of sediment to receiving waters and contamination of stormwater.

Groundwater

- C10** The environmental authority holder must not release contaminants to groundwater.
- C11** Any drawdown of groundwater must not impact on the users of groundwater.

Regulated structures

- C12** Regulated structures may not be operated or constructed as part of the mining activity.

END OF CONDITIONS FOR SCHEDULE C

Schedule D – Noise

- D1** The holder of this environmental authority must ensure that noise generated by the mining activities does not cause the criteria in **Table D1 – Noise limits** to be exceeded at any sensitive or commercial place.
- D2** Noise monitoring and recording must include the following descriptor characteristics and matters:
- LAN,T (where N equals the statistical levels of 1, 10 and 90 and T = 15 mins);
 - Background noise LA90;
 - The level and frequency of occurrence of impulsive or tonal noise and any adjustment and penalties to statistical levels;
 - Atmospheric conditions including temperature, relative humidity and wind speed and directions;
 - Effects due to any extraneous factors such as traffic noise;
 - Location, date and time of monitoring;
 - If the complaint concerns low frequency noise, Max LpLIN,T and one third octave band measurements in dB(LIN) for centre frequencies in the 10 – 200 Hz range.

Table D1 - Noise Limits ('Table D1')

Noise level dB(A) measured as	Noise measured at a 'noise sensitive place'					
	Average hourly A-weighted sound pressure levels L _A 1 hour					
	Monday to Saturday			Sundays and Public Holidays		
	7am – 6pm	6pm – 10pm	10pm – 7am	9am – 6pm	6pm – 10pm	10pm – 9am
L _{Aeq} , adj, 15 mins	CV = 50 AV = 5	CV = 45 AV = 5	CV = 40 AV = 0	CV = 45 AV = 5	CV = 40 AV = 5	CV = 35 AV = 0
L _{A1} , adj, 15 mins	CV = 55 AV = 10	CV = 50 AV = 10	CV = 45 AV = 5	CV = 50 AV = 10	CV = 45 AV = 10	CV = 35 AV = 0

Notes:

- CV = Critical Value
- AV = Adjustment Value
- To calculate noise limits in Table D1:
If $bg \leq (CV - AV)$:
Noise limit = $bg + AV$
If $(CV \text{ limit} = bbg \leq CV)$:
Noise limit = CV
If $bg > CV$:
Noise limit = $bg + 0$
- In the event that measured bg (LA90, adj, 15 mins) is less than 30 dB(A), then 30 dB(A) can be substituted for the measured background level
- bg = background noise level (LA90, adj, 15 mins) measured over 3-5 days at the nearest sensitive receptor
- If the project is unable to meet the noise limits as calculated above alternative limits may be calculated using the processes outlined in the "Planning for Noise Control" guideline.

END OF CONDITIONS FOR SCHEDULE D

Schedule E – Waste

- E1** All waste generated as part of the mining activities must be lawfully reused, recycled, or removed to a facility that can lawfully accept the waste.

END OF CONDITIONS FOR SCHEDULE E

Schedule F – Land

- F1** The environmental authority holder must progressively rehabilitate all significantly disturbed land caused by the mining activities in a manner that ensures rehabilitated areas achieve the following rehabilitation objectives:
- a) Safe for humans and wildlife;
 - b) Non-polluting;
 - c) Stable;
 - d) Able to sustain an agreed post-mining land-use in accordance with the *Final Land Use and Rehabilitation Plan*;
 - e) Revegetated with species endemic appropriate to achieve the agreed post mining land use and free of declared pest species;
 - f) Compliant with the *Final Land Use and Rehabilitation Plan* required by **condition F4**; and
 - g) Compliant with all conditions of this environmental authority.
- F2** Land disturbed by mining activities must be rehabilitated in accordance with **Table F1 – Final land use and rehabilitation approval schedule**.

Table F1 – Final Land Use and Rehabilitation Approval Schedule ('Table F1')

Disturbance Type	Post Mine Land Description	Post Mine Land Capability Classification ^[1]
Infrastructure	Marginal grazing	vii
Haul roads	Marginal grazing	vii
Pits	Marginal grazing	vii
	Water storages	n/a

Notes:

[1] Land capability as defined in the *DME Technical Guideline for the Environmental Management of Exploration and Mining in Queensland*.

Final land use and rehabilitation plan

- F3** The holder of this environmental authority must develop and implement a *Final Land Use and Rehabilitation Plan* to ensure that all areas disturbed by mining activities will be suitably rehabilitated in accordance with **condition F1** and **Table F1 – Final land use and rehabilitation approval schedule**. The plan must include, but is not limited to the following:
- a) A description of rehabilitation management techniques incorporating works and monitoring programs and timetables;
 - b) Indicators for success;
 - c) Completion criteria; and
 - d) Keeping of appropriate records or rehabilitation measures implemented including taking of photographs demonstrative of rehabilitation achieved and the preparation of annual rehabilitation progress reports.

Residual void outcome

- F4** Residual voids must not cause any environmental harm, other than the environmental harm constituted by the existence of the residual void itself, and subject to any other condition within this environmental authority.

Impacts to prescribed environmental matters

- F5** Significant residual impacts to prescribed environmental matters, are not authorised under this environmental authority or the *Environmental Offsets Act 2014*.

- F6** Records demonstrating that each impact to a prescribed environmental matter did not, or is not likely to, result in a significant residual impact to that matter must be:
- a) Completed by an appropriately qualified person; and
 - b) Kept for the life of the environmental authority.

END OF CONDITIONS FOR SCHEDULE F

Schedule G – Definitions

Key terms and/or phrases used in this document are defined in this section and bolded throughout this document. Applicants should note that where a term is not defined, the definition in the *Environmental Protection Act 1994*, its regulations or environmental protection policies must be used. If a word remains undefined it has its ordinary meaning.

“acceptance criteria” means the measures by which the actions implemented to rehabilitate the land are seemed to be complete (same as completion criteria).

“administering authority” is the agency that administers the environmental authority provisions under the *Environmental Protection Act 1994*.

“ANZECC (2000)” means the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)* published by the *Australian and New Zealand Environment and Conservation Council* and the *Agriculture and Resource Management Council of Australia and New Zealand* or any equivalent update/replacement guidelines.

“appropriately qualified person” means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relating to the subject matter using the relevant protocols, standards, methods or literature.

“associated works” in relation to a dam, means:

- (a) operations of any kind and all things constructed, erected or installed for that dam; and
- (b) any land used for those operations.

“authority” means environmental authority (mining activities) under the *Environmental Protection Act 1994*

“certification”, means assessment and approval must be undertaken by a suitably qualified and experienced person in relation to any assessment or documentation required by the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/1933)*, including design plans, ‘as constructed’ drawings and specifications, construction, operation or an annual report regarding regulated structures, undertaken in accordance with the Board of Professional Engineers of Queensland Policy “Certification by RPEQs (ID: 1.4 (2A)).

“certifying”, **“certify”** or **“certified”** have a corresponding meaning as ‘certification’.

“construction” or **“constructed”** in relation to a dam includes building a new dam and modifying or lifting an existing dam, but does not include investigations and testing necessary for the purpose of preparing a design plan.

“chief executive” means the chief executive of the Department of Environment and Heritage Protection or its successor.

“commercial place” means a place used as an office or for business or commercial purposes, other than a place within the boundaries of the operational land.

“competent person” means a person with the demonstrated skill and knowledge required to carry out the task to a standard necessary for the reliance upon collected data or protection of the environment.

“consequence category” means a category, either low, significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/1933)*.

“dam” means a land based structure or void that contains, diverts or controls flowable substances, and includes any substances that are hereby contained, diverted or controlled by that land based structure or void and associated works.

“disturbance” of land includes:

- a) Compacting, removing, covering, exposing or stockpiling of earth;
- b) Removal or destruction of vegetation or topsoil or both to an extent where the land has been made susceptible to erosion;
- c) Carrying out mining within a watercourse, waterway, wetland or lake;
- d) The submersion of areas by tailings or hazardous contaminant storage and dam/structure walls;
- e) Temporary infrastructure, including any infrastructure (roads, tracks, bridges, culverts, dam/structures, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be removed after the mining activity has ceased;
- f) Releasing of contaminants into the soil, or underlying geological strata.

However, the following areas are not included when calculating areas of ‘disturbance’:

- a) Areas off lease (e.g. roads or tracks which provide access to the mining lease);
- b) Areas previously disturbed which have achieved the rehabilitation outcomes and have been certified by the administering authority as completed rehabilitation;
- c) By agreement with the administering authority, areas previously disturbed which have not achieved the rehabilitation objective(s) due to circumstances beyond the control of the mine operator (such as climatic conditions);
- d) Areas under permanent infrastructure. Permanent infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dam/structures, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc.) which is to be left by agreement with the landowner
- e) Disturbance that pre-existed the grant of the tenure.

“environmental authority” means a licence or approval issued pursuant to the *Environmental Protection Act 1994*.

“environmental authority holder” means the holder of this environmental authority.

“infrastructure” means dams, roads and tracks, buildings and other structures built for the purpose of mining activities but does not include facilities required for the long-term management of mining impacts or the protection of potential resources. Such facilities include dams containing hazardous waste, waste rock dumps, voids, or ore stockpiles and buildings or other structures whose ownership can be transferred and which have a residual beneficial use for the next owner of the operational land or the background land owner.

“ $L_{A, 10, \text{adj}, 10 \text{ mins}}$ ” means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of sound) exceeded for 10% of any 10-minute measurement period, using Fast response. **“ $L_{A, 1, \text{adj}, 10 \text{ mins}}$ ”** means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of sound) exceeded for 1% of any 10-minute measurement period, using Fast response.

“ $L_{A, \text{max}, \text{adj}, T}$ ” means the average maximum A-weighted sound pressure level, adjusted for noise character and measured over any period 10 minute period, using Fast response. **“ $L_{Ar, 1hr}$ ”** means the rating level measured over any one hour period, defined as:

$L_{Ar,1hour} = L_{Aeq,1hour} + K_1 + K_2$, where

“**K₁**” means the tone adjustment applicable to any one hour measurement period, and

“**K₂**” means the impulse adjustment applicable to any one-hour measurement period.

“**L_{Aeq,1hour}**” means the time-average A-weighted sound pressure level over any one hour measurement period.

“**land**” in the “land schedule F” of this document means land excluding waters and the atmosphere.

“**land capability**” as defined in the *DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland*.

“**land suitability**” as defined in the *DME 1995 Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland*.

“**land use**” means the selected post mining use of the land, which is planned to occur after the cessation of mining operations.

“**leachate**” means a liquid that has passed through or emerged from, or is likely to have passed through or emerged from, a material stored, processed or disposed of at the operational land which contains soluble, suspended or miscible contaminants likely to have been derived from the said material.

“**levee**” means an embankment that only provides for the containment and diversion of stormwater or flood flows from a contributing catchment, or containment and diversion of flowable materials resulting from releases from other works, during the progress of those stormwater or flood flows or those releases; and does not store any significant volume of water or flowable substances at any other times.

“**mineral**” means a substance which normally occurs naturally as part of the earth’s crust or is dissolved or suspended in water within or upon the earth’s crust and includes a substance which may be extracted from such a substance, and includes—

- (a) clay if mined for use for its ceramic properties, kaolin and bentonite;
- (b) magnetite;
- (c) metal or metalloid compounds, including but not limited to compounds containing gold, copper, silver, lead, nickel, and zinc.
- (d) foundry sand;
- (e) hydrocarbons and other substances or matter occurring in association with shale or coal and necessarily mined, extracted, produced or released by or in connection with mining for shale or coal or for the purpose of enhancing the safety of current or future mining operations for coal or the extraction or production of mineral oil therefrom;
- (f) limestone if mined for use for its chemical properties;
- (g) marble;
- (h) mineral oil or gas extracted or produced from shale or coal by in situ processes;
- (i) peat;
- (j) salt including brine;
- (k) shale from which mineral oil may be extracted or produced;
- (l) silica, including silica sand, if mined for use for its chemical properties;
- (m) rock mined in block or slab form for building or monumental purposes;

but does not include—

- (n) living matter;
- (o) petroleum within the meaning of the *Petroleum Act 1923*;
- (p) soil, sand, gravel or rock (other than rock mined in block or slab form for building or monumental purposes) to be used or to be supplied for use as such, whether intact or in broken form;
- (q) water.

“**minimise**” is to reduce to the smallest possible amount or degree.

“natural flow” means the flow of water through waters caused by nature.

“non polluting” means having no adverse impacts upon the receiving environment.

“noxious” means harmful or injurious to health or physical wellbeing, other than trivial harm.

“offensive” means causing reasonable offence or displeasure; is disagreeable to the sense; disgusting; nauseous or repulsive, other than trivial harm.

“peak particle velocity (ppv)” means a measure of ground vibration magnitude, which is the maximum rate of change of ground displacement with time, usually measured in millimetres/second (mms-1).

“prescribed environmental matters” has the meaning in section 10 of the *Environmental Offsets Act 2014*, limited to the Matters of State Environmental Significance listed in schedule 2 of the *Environmental Offsets Regulation 2014*.

“progressive rehabilitation” means rehabilitation (defined below) undertaken to progressively or a staged approach to rehabilitation as mining operations are ongoing.

“receiving environment” in relation to an activity that causes or may cause environmental harm, means the part of the environment to which the harm is, or may be, caused. The receiving environment includes (but is not limited to):

- a) A watercourse;
- b) Groundwater;
- c) An area of land that is not specified in **Table A1 – Authorised disturbance** of this environmental authority.

The term does not include land that is specified in **Table A1 – Authorised disturbance** of this environmental authority.

“regulated structure” means any structure in the significant or high consequence category as assessed using the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)* published by the administering authority. A regulated structure does not include:

- A fabricated or manufactured tank or container, designed and constructed to an Australian Standard that deals with strength and structural integrity of that tank or container;
- A sump or earthen pit used to store residual drilling material and drilling fluid only for the duration of drilling and well completion activities.

“rehabilitation” the process of reshaping and revegetating land to restore it to a stable landform and in accordance with the acceptance criteria set out in this environmental authority and, where relevant, includes remediation of contaminated land.

“release” means the discharge of water (whether intentional or due to failure to prevent) to the receiving environment from any area, structure or feature located on a mining lease listed on this environmental authority.

“representative” means a sample set, which covers the variance in monitoring or other data, either due to natural changes or operational phases of the mining activities.

“residual void” means an open pit resulting from the removal of ore and/or waste rock, which will remain following the cessation of all mining activities and completion of rehabilitation processes.

“self sustaining” means an area of land, which has been rehabilitated and has maintained the required acceptance criteria without human intervention for a period nominated by the administering authority.

“sensitive place” means:

- a) A dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
- b) A motel, hotel, or hostel; or
- c) An educational institution; or
- d) A medical centre or hospital; or
- e) A protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 1992*, or a World Heritage Area; or
- f) A public park or gardens
- g) A place used as a workplace, an office or for business or commercial purposes which is not part of the mining activity and does not include employees accommodation or public roads.

“significant residual impact” has the meaning in section 8 *Environmental Offsets Act 2014*.

“stable” means land form dimensions are or will be stable within tolerable limits now and in the foreseeable future. Stability includes consideration of geotechnical stability, settlement and consolidation allowances, bearing capacity (traffic ability), erosion resistance and geochemical stability with respect to seepage and contaminant generation.

“structure” means dam or levee.

“µS/cm” means micro siemens per centimetre.

“watercourse” has the same meaning given in the *Water Act 2000*.

“water quality” means the chemical, physical and biological condition of water.

“waters” includes a river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea) or any part thereof.

END OF CONDITIONS FOR SCHEDULE G

Schedule H – Maps / Plans

Figure H 1 - Project Infrastructure Layout

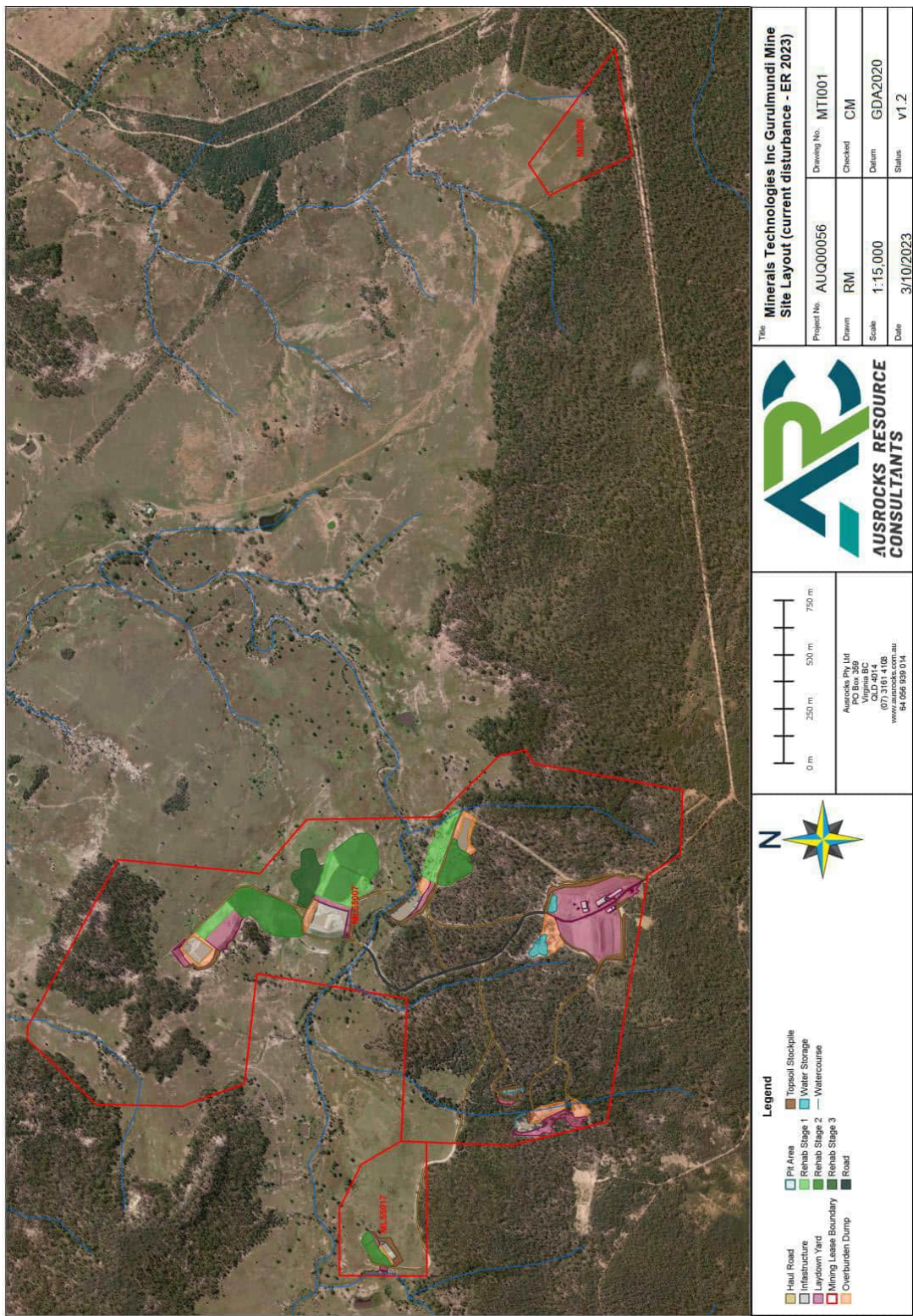


Figure H 2 – Maximum Disturbance Extent

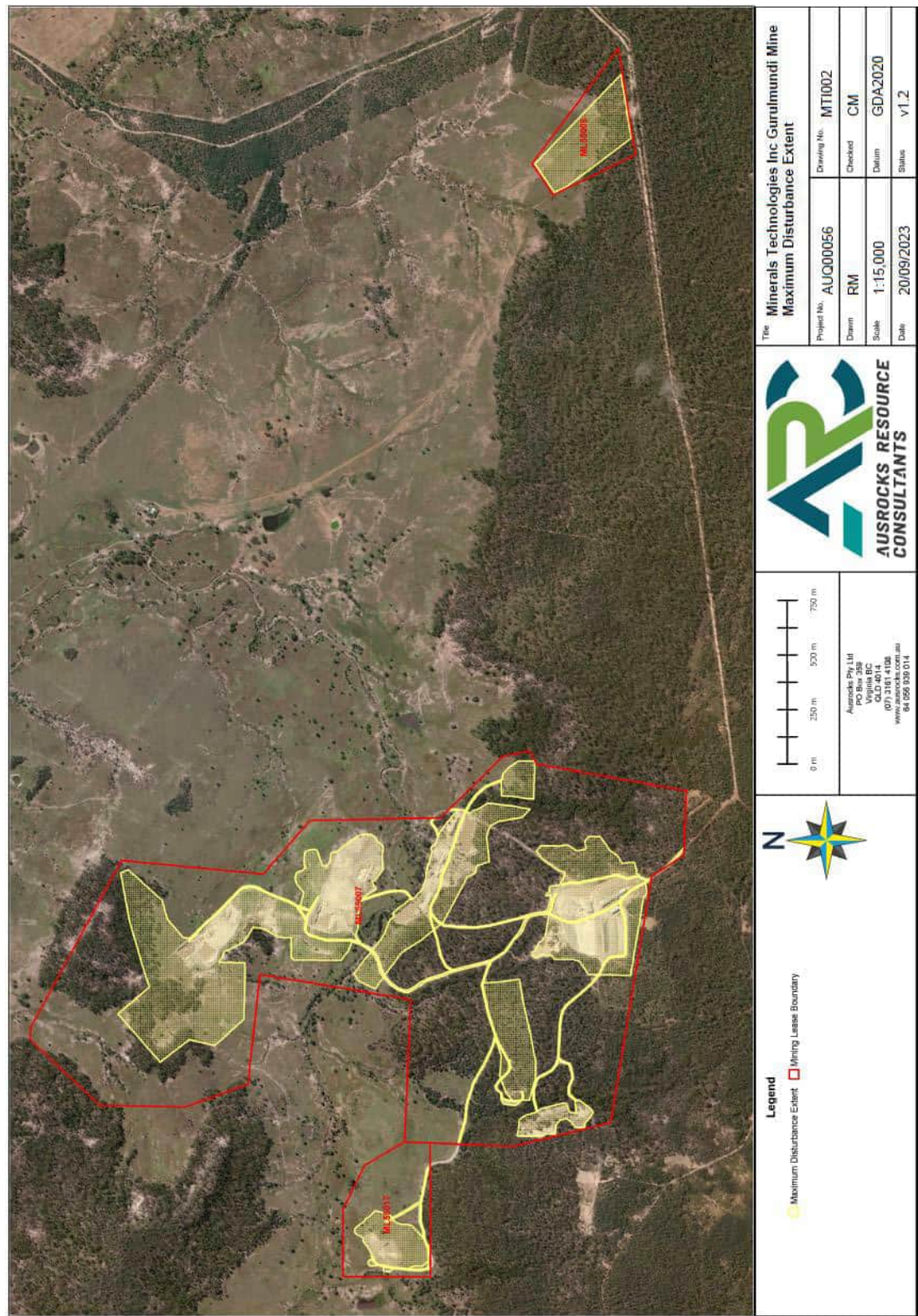
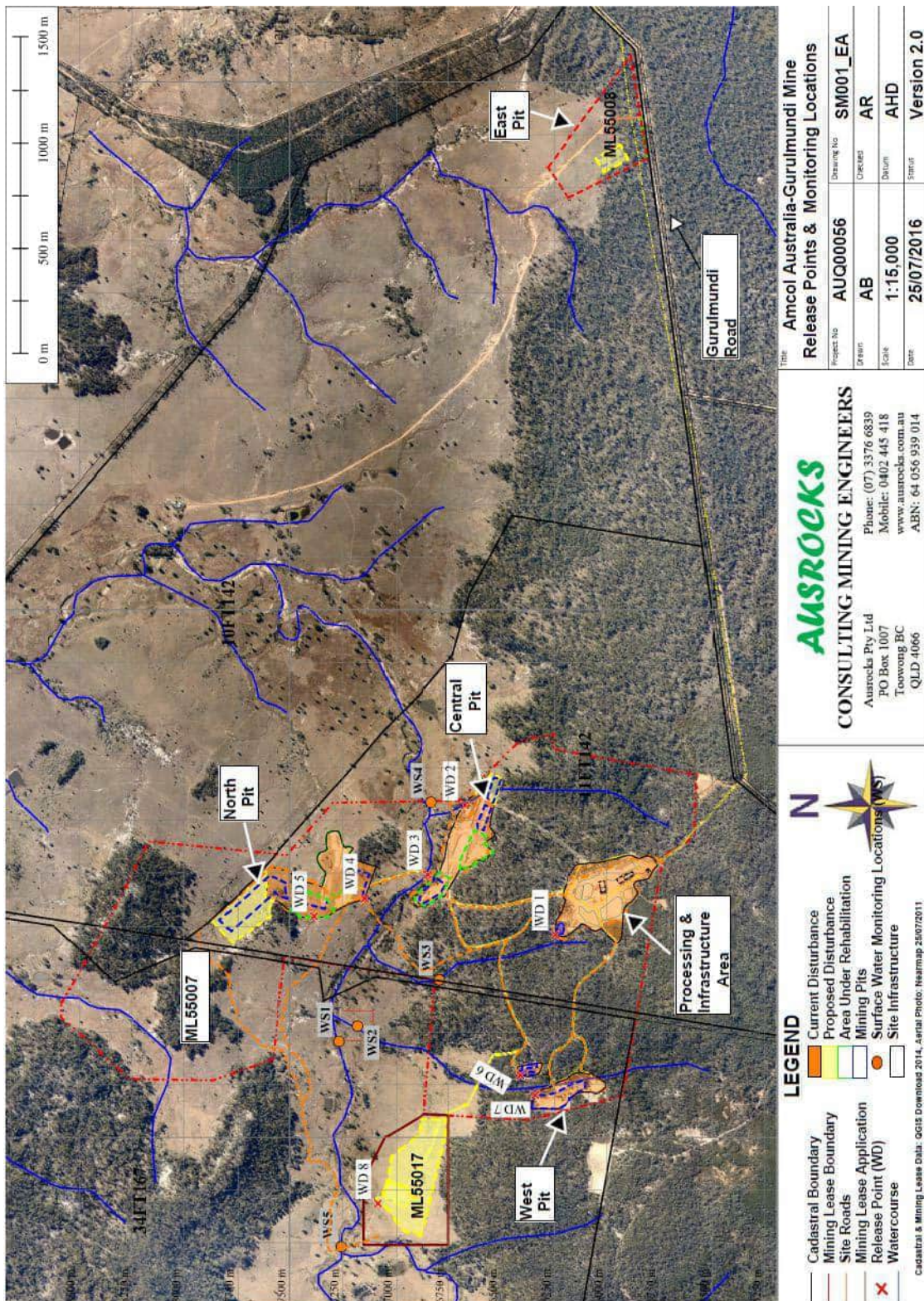


Figure H 3 - Release points and surface water monitoring locations



END OF ENVIRONMENTAL AUTHORITY



Appendix 2

Queensland Department of Environment and Science
Progressive Rehabilitation and Closure Plan Transition
Notice (via email) Ref. EPML0069913 (19 July 2021)

From: FABRIS Fred <Fred.Fabris@des.qld.gov.au>
Sent: Monday, 19 July 2021 2:26 PM
To: craig.duggan@mineralstech.com; carl.morandy@ausrocks.com.au
Cc: don.eisenhour@mineralstech.com; jessica.kozian@mineralstech.com;
eric.wang@mineralstech.com; RUTHERFORD Kate; WAKE Chris; HARDIE Tania
Subject: Amcol PRC Plan transition

Hi Craig,

Thanks for the time last week for the PRC Plan Pre Lodgement discussion for Amcol Australia (EPML00699113). During the discussion there were a number of items we were to provide advice on, including the proposed submission date for the final PRC Plan. Below I have included a summary of some key discussion points as well as the additional information we were going to supply. Note that we are proposing a PRC Plan submission date of **1 November 2022**. If you could please provide feedback on this date.

Meeting summary: Thursday 15 July 2021

- PRCP assessment timeframes: 10bd's to check if it's properly made, 20bd's to decide if additional information is required, and 20bd's to make the decision. This totals 50bd's though is based on it being properly made and there being no additional information.
- Land outcome documents (LOD's): The EA clearly defines Post Mine Land Uses and does not suggest there are Non-Use Management Areas (NUMA's). Milestones are currently not as clear, however some completion criteria in the Final Land Use and Rehabilitation Plan can be transitioned.
- DES will provide information relating to soil testing.
- There are two aspects of community consultation: 1) A consultation register to document consultation, and 2) a consultation plan on how engagement will occur for rehabilitation.
- For hydrogeology it is mandatory to have groundwater modelling. Considering the low-risk nature of the site and the fact that the EA does not monitor groundwater you may propose that you will focus on more of a regional approach. You will just need to further justify this approach.
- For risk assessments the key risks to failure of rehabilitation is what is required for the assessment.
- The preference is to split the PRC Plan and ERC submission, possibly with an early August PRC Plan submission. We will look at dates and get back to you.

Proposed submission date:

Following the meeting we had a review of the most suitable dates and are suggesting **1 November 2022**. This will be after the ERC submission and will give you a little more time to prepare.

Soil testing:

Following on from the meeting we can provide the following advice on soil testing:

The PRCP Guideline (S.3.6.1) specifies that a soil and capping material assessment must be carried out that, at a minimum, identifies and characterises the following:

- the quality and quantity of available resources (such as topsoil, clay material and competent rock) required to complete the target rehabilitation methodology
- the location (i.e. with respect to haul distance) and accessibility of cover material (i.e. is the material located on the tenure or are other approvals required?)
- an assessment to determine the need for ameliorants and fertilisers
- the relationship between soils and vegetation ecosystems for the PMLU and rehabilitation methodology.

Baseline information

Transitional sites may already have undertaken soil survey as part of their EA or EIS application. The [EIS information guide for Land \(ESR/2020/5303\)](#) states how this information should be collected etc. and provides good advice for soil surveys in general. Excerpt as follows:

- *Describe the soil types, horizons and profiles in accordance with relevant, best-practice guidelines and methods, such as:*
 - *Australian soil and land survey field handbook (National Committee on Soil and Terrain 2009)*
 - *Guidelines for surveying soil and land resources (McKenzie et al. 2008)*
 - *The Australian soil classification (Isbell 2016).*
- *Ensure the spatial extent of the soil survey, and the number and depth of pits, auger holes and/or cores, are sufficient to characterise all soils that would be disturbed and/or used in rehabilitation of the site.*
- *Report the results of soil tests and laboratory analyses of representative samples down the soil profile, with particular reference to the physical and chemical properties of the materials that would influence erosion potential, storm water run-off quality, rehabilitation and agricultural productivity of the land.*
- *For any proposed pipeline routes, undertake the analysis and classification at least to the depth of excavation.*
- *Provide geotechnical information on the soils' stability and suitability for construction of project facilities.*
- *For coastal land where acid sulfate soils may be present, or inland soils where conditions may have been conducive to the formation of ASS, undertake an investigation in accordance with relevant, best-practice sampling and laboratory guidelines and methods, such as:*
 - *Soil management guidelines in the Queensland acid sulfate soil technical manual (Dear et al. 2014)*
 - *National acid sulfate soils guidance: National acid sulfate soils sampling and identification methods manual (Sullivan et al. 2018)*
 - *National acid sulfate soils guidance: National acid sulfate soils identification and laboratory methods manual (Sullivan et al. 2018)*
 - *Queensland acid sulfate soils laboratory methods guidelines (Ahern et al. 2004).*

The first 3 references in the excerpt above, are industry recognised standards and should be used to inform the soil survey work. There are many consultants who can do this work. A CPSS (Certified Practicing Soil Scientist) is a recognised accreditation for soil scientists.

Demonstrating soils are suitable for a post mining land use (PMLU)

To **demonstrate soils are suitable for a post mining land use**, an EA holder would be expected to develop a set of milestone criteria (and accompanying monitoring plan) that are specific to the PMLU. The EA for the Gurulmundi site requires a marginal grazing outcome with Capability Class vii (based on the *DME Technical Guideline for the environmental management of exploration and mining in Queensland*). The following comments are based on an assumption that Amcol plan to transition the same outcome across to their proposed PRCP.

Land capability is determined by a number of 'limitations' which demonstrate what the capacity of the land will be to grow crops etc. The DME Technical Guideline states:

- *An assessment of land capability should be made based on limiting factors of [soil depth](#), [soil structure](#), [soil nutrient fertility](#), [soil salinity/sodicity](#), [soil water availability](#), [rockiness](#), [extent of gullying](#), [topographic relief](#) and [climate](#).*

The above parameters in blue, will assist demonstration that rehabilitation has achieved the outcome of marginal grazing. Additional criteria and monitoring may also be necessary such as groundcover, pasture biomass, species diversity etc. Further information is available in more recent Qld Land evaluation guidelines, available at <https://www.qld.gov.au/environment/land/management/soil/soil-data/land-evaluation>.

Regards,



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Appendix 3

Horizon Soil Science and Engineering: Report on the Soil
Survey of Leases of the Mineral Technologies Bentonite
Mine Rev 1.0 (October 2022)

Report on the Soil Survey of Leases of the Mineral Technologies Bentonite Mine



Prepared for: Ausrocks Consulting Mining Engineers (Ausrocks)

Revision 1.0 (Final)

Revision date: 11/10/2022

Disclaimer

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1. Scope and Deliverables

The Mineral Technologies Sodium Bentonite mine is an open-pit mining development operated by Mineral Technologies (parent company of the EA holder Amcol Australia Pty Ltd), hereafter referred to as the “project area”. The locality of the lease areas (ML55017, ML5507 and ML5508) are shown in Appendix 1 Maps: Mine Lease Boundaries. Note that the smaller lease area (ML55006) that is located to the East of the other main leases is shown inset into the main map. Bentonite mined at site is used in various industrial and commercial applications.

Horizon Soil Science and Engineering (Horizon) were engaged by Ausrocks Consulting Mining Engineers (Ausrocks) to conduct a land assess survey in non-disturbed areas of the project area to provide background data of the existing landscape as a baseline for rehabilitation purposes.

1.1 Scope

The scope of work was to conduct a land assessment of the project area to:

- Assist Ausrocks devise and execute a land assessment survey (including chemistry sampling) in non-disturbed areas to provide background data of the existing landscape as a baseline for rehabilitation purposes;
- Investigate the soil condition of any previously rehabilitated areas;
- Provide a report summarising the land assessment and previously rehabilitated areas characteristics across the project areas; and
- Assist Ausrocks to develop a soil rehabilitation methodology and topsoil amelioration procedure.

1.2 Deliverables

The key deliverables for the project included:

1. A soil survey report for the project area that:
 - o Maps the boundaries of soil types across the non-disturbed areas;
 - o Provides key physical and chemical characteristics of the mapped soils; and
 - o Classifies the project area agricultural land capability using an appropriate method.
2. Assist Ausrocks to develop:
 - o Soil rehabilitation methodology;
 - o Topsoil amelioration procedure;
 - o A soil testing program/procedure; and
 - o Metrics to measure future rehabilitation performance based on soil testing program results.

2. Desktop Review and Survey Design

2.1 Desktop Review

A desktop review was completed to assist with defining landscape characteristics and soil boundaries. The desktop review included geology, land resource and land management data.

2.1.1 Geology

The surface geology of the project area was reviewed in Queensland Globe (no map provided in this report). The project area is all mapped as Early Cretaceous derived sedimentary rock units with a mix of sandstone, siltstone, mudstone and conglomerate. The major geological unit being Orallo Formation (Kyo) to the north and the uplands to the south as Mooga sandstone (Kym).

2.1.2 Land Resources and Soils

Soils mapped for the project area was reviewed in Queensland Globe (no map provided in this report). Soils mapping available for the site includes The National scale (1:2,000,000) ASRIS mapping (<https://www.asris.csiro.au/>) which provides little detail at the scale of our investigation, and Land Resource land suitability survey for the Taroom Shire (Forster, 1985).

The ASRIS mapping describes the entire project area as classified under a single unit, Rq1. The primary soil associated with this unit are Duplex (texture contrast) soils with hard setting A horizon and pedal mottled B horizons.

In their evaluation of Agricultural Land in Taroom Shire (Forster, 1985) maps the northern portion of the project area (coinciding with the Orallo formation) as the Narran land resource unit (LRU), while the uplands (coinciding with the Mooga sandstones) as the Duaringa LRU. A general description of these LRU are:

- Narran. Predominantly shallow solodic and earthy sands, with small areas of stony grey clays. Soils have low fertility and may have saline, sodic subsoils. Soils are inherently very erodible, but provides a protective surface pasture cover is maintained, the erosion hazard remains low. Land suitability Class C2.
- Duaringa. Lithosols, red earths and solodics with low available water holding capacity and low fertility. Erodible soils and should be managed to main ground cover to prevent erosion of the sandy soil surface. Land suitability Class C2.

2.1.3 Grazing Land Management

The project area is mapped as grazing land management (GLM) unit IB19 – Spotted gum ridges (Source: Future Beef, 2018). Soils of this GLM unit are described as very shallow to shallow (<50 cm) sandy, loamy lithosols.

The GLM is described as suitable for light grazing on native pastures. Minimal ground disturbance of the landscape is recommended as the dispersive soils erode easily, and grazing pressures should be managed to maximise ground cover and minimise soil loss.

The unit is considered to have land use limitations that include:

- Shallow effective rooting depth;
- Low fertility and very low to low water holding capacity; and
- Very high erosion hazard.

2.2 Survey Design

The field survey was designed in accordance with sampling intensities recommended in the Australian Guidelines for Surveying Soil and Land Resources (McKenzie *et al.*, 2008). The footprint area of the project areas is approximately 356 ha with a sample density of 6.25-25 ha /site for soil mapping at 1:25,000 scale giving a range of 15 - 60 observation sites.

The number of sites sampled for detailed analysis and chemistry are shown and exceed the percentage of sites criteria required by McKenzie *et al.* (2008).

Table 1: Sample numbers

	Mapping Observations	Detailed Description	Soil profile Chemistry sites
Recommended	15-60	10-20% (2-12)	5-10% (1-6)
Proposed	30	6	6
Actual	42	7	6

In addition to the survey sites, 3 x surface (0-100 mm) samples were collected for chemistry in an area of uncertified rehabilitation.

2.2.1 Field Descriptions

Field descriptions were undertaken in accordance with the Australian Soil Survey and Land Survey Field Handbook 3rd edition (The National Committee on Soil and Terrain, 2009) and classified using The Australian Soil Classification (Isbell, 2016). Field descriptions included a combination of mapping observations and detailed observations with a subset of detailed observations analysed for chemistry as described below:

1. Mapping observations are primarily used to identify land type boundaries. They include a description of:
 - Landform;
 - Vegetation;
 - Other distinguishing surface characteristics (e.g., gilgai and rockiness); and
 - Where active erosion is evident.
2. Detailed observations make up ~20 % of the survey locations. The sample locations are provided in Appendix 2, profile logs and photographs are provided in Appendix 3. These sites were sampled using a hand auger include soil profile descriptions and observations of:
 - Horizon depths, designation and boundary distinctness;
 - Field texture;
 - Munsell Colour;
 - Mottles colour and abundance;
 - Coarse fragments size and abundance;
 - Structure;
 - Segregations and abundance.

2.2.2 Chemistry

Chemistry sites make up 20 % of the survey locations. Typically, 4 sample depths were analysed per site based on soil horizons; generally, this included the A1, upper and lower B2 and C horizon. Standard sampling depth targets were (0-100, 200-300, 500-600, 800-900mm). The key parameters analysed are provided in Table 2. Analysis was conducted by the NATA accredited ALS Laboratory. The Certificate of Analysis is provided in Appendix 3.

Table 2: Soil chemistry analysis parameters

Parameter	ALS Method/ Package Code	Technique/ Method Reference	Limit of Reporting
Electrical Conductivity (1:5)	IN-4S	APHA 2510 B 1:5	1 μ S/cm
pH (1:5)		APHA 4500 H B 1:5	0.1 pH Unit
CEC - Exchangeable Cations with pre-treatment (Ca, Mg, Na, K, Al)	ALS to determine based on pH and EC	calc	0.1 meq/100g
Exchangeable Sodium Percent (ESP) – base saturation calc		ALS to determine based on pH and EC	0.1 meq/100g
Ca:Mg ratio			0.10%
Chloride	ED045G	APHA 4500 Cl 1:5	10 mg/kg
Emerson Aggregate Test	EA058	AS1289.3.8.1	n/a
Total Organic Carbon (OC) in Soil	EP003	ALS In house	0.02 %

Saturated extract soil salinity (EC_{se}) was estimated from $EC_{1:5}$ data using Shaw (1994) soil chloride and cation exchange method.

For reference the following acronyms are used for soil chemistry in this report:

- EC_{se} - Saturated extract soil salinity.
- CEC – Cation Exchange Capacity.
- ESP -Exchangeable sodium Percentage.
- Ca:Mg – Calcium: Magnesium ratio.
- EAT – Emerson Aggregate Test.
- OC - Organic Carbon.

3. Soil Survey Results

A soil survey of the project area was conducted on the 10th and 11th August 2022. Sampling was conducted using a hand auger.

3.1 Soil Physical Characteristics Descriptions

Four soil types were described within the project area using the Australian Soil Classification (ASC) system (Isbell, 2021). A summary of the soils, the areal extent and number of sites described and sampled for chemistry are given in Table 3.

Table 3: Summary of soil type areal extent, number of sites described and sampled for chemistry

Australian Soil Classification	Mapped area (ha)	Number of Observations	Number of Detailed and Chemistry sites
Grey and Red Sodosol	60	10	2
Black and Grey Sodosol with Brown Rudosol	246	18	2
		10	1
Black Vertosol	93	10	2

Sodosols are texture contrast soils, typically characterised by sandy loam or clay loam surfaces over light to medium clay sub-soils that are sodic in the upper portion of the B-horizon. Example soil profiles for the ASC are given in **Error! Not a valid bookmark self-reference..** All full site descriptions are given in Appendix 2.

Table 4: Typical Physical Characteristics of Soil Types

Soil Description
<p>ASC: Brown Rudosol</p> <p>A1 Very dark grey (10YR 3/1) silty light clay with weak granular structure, common small to large gravel, to 0.1m., clear change to;</p> <p>B2 Brown (10YR 4/3) clayey coarse sand with weak granular structure, abundant small to large gravel, to 0.4m.</p> 
<p>ASC: Grey Sodosol</p> <p>A1 Very dark grey (2.5Y 3/1) silty clay loam with weak granular structure, to 0.15m., clear change to;</p> <p>B2 Very dark grey (2.5Y 3/1) heavy clay with weak blocky structure, to 0.6m., clear change to;</p> <p>C Dark grayish brown (10YR 4/2) fine sandy medium clay with weak blocky structure, a few small gravel, with common dark/yellow mottles, a few carbonates, to 1m.</p>

Soil Description

ASC: Black Vertosol A1 Black (10YR 2/1) heavy clay with strong blocky structure, a very few carbonates, to 0.1m., gradual change to; B21 Black (10YR 2/1) heavy clay with strong blocky structure, with a very few red mottles, a few carbonates, to 0.5m., diffuse change to; B22 Very dark grey (10YR 3/1) heavy clay with strong blocky structure, common carbonates, to 1.0m


3.2 Summary of Soil Chemistry

Six reference sites and three rehabilitation locations were selected for soil chemistry sampling. Site numbers, soil classification and sample depth are given in Table 5. The survey reference number can be cross referenced with the Appendix 1 Map: Soil Classification and Sample Locations, and the soil chemistry sample number with the Certificate of analysis in Appendix 3.

Table 5: Soil chemistry sample location reference

Survey reference	Australian Soil Classification	Sample depth (mm)
MT01	Black Vertosol	1200
MT02	Grey Sodosol	900
MT03	Brown Rudosol	300
MT04	Black Sodosol	900
MT05	Black Vertosol	900
MT06	Grey Sodosol	900
MT07, MT08, MT09	Rehabilitation	100

Soil chemistry profiles of the key characteristics are show in Figure 1 . Table 6 shows the classification of the profiles based on Hazelton and Murphy (2016). Emerson Aggregate Test (EAT) scores are given in

Table 7.

Summarising soil chemistry by soil type the soils were found to be:

- Grey and Red Sodosol;
 - pH profiles neutral at the surface to very strongly alkaline at depth;
 - Non-saline at surface to slightly saline at depth;

- Moderate organic carbon in the surface declining to low at depth, with
 - Low to moderate CEC, sodic at surface increasing to strongly sodic at depth with low Ca:Mg ratio;
 - EAT scores suggest dispersive topsoils and subsoils.
- Black and Grey Sodosol with Brown Rudosol;
 - pH profiles moderately acid at surface increasing to slightly acid to depth;
 - Non-saline throughout;
 - Moderate organic carbon in the surface declining to low at depth;
 - Very low CEC, non-sodic at surface to marginally sodic to depth with low Ca:Mg ratio;
 - EAT scores suggest slaking topsoils with dispersive subsoils.
 - Black Vertosol;
 - pH profiles strongly to very strongly alkaline;
 - Non-saline at surface to highly saline at depth;
 - Moderate organic carbon in the surface declining to low at depth.
 - Moderate CEC at surface increasing to high at depth, sodic at surface increasing strongly sodic at depth with balanced to low Ca:Mg ratio;
 - EAT scores suggest slaking topsoils with dispersive subsoils.

Table 6: Chemical Characteristics of Soil Types

Australian Soil Classifications	Profile	pH	ECse	CEC	ESP (%)	OC (%)
Grey and Red Sodosol	Topsoil	Neutral	Non-saline	Low	Sodic	Moderate
	Sub-soil	Very strongly alkaline	Slightly saline	Moderate	Strongly sodic	Low
Black and Grey Sodosol with Brown Rudosol	Topsoil	Slightly acid	Non-saline	Moderate	Non-sodic	High
	Sub-soil	Moderately acid to neutral	Non-saline	Moderate	Strongly sodic	Moderate
Black Vertosol	Topsoil	Strongly alkaline	Non-saline	Moderate	Sodic	Moderate
	Sub-soil	Very strongly alkaline	Slightly to highly saline	High	Strongly sodic	Low

Table 7: Emerson Aggregate Scores by soil type and depth

Emerson Class Number	Soil Type		
Soil depth (mm)	Grey and Red Sodosol	Black and Grey Sodosol with Brown Rudosol	Black Vertosol
0 -100	2	3	3
200- 300	2	3	3
500- 600	2	2	2
800- 900	2	3	2

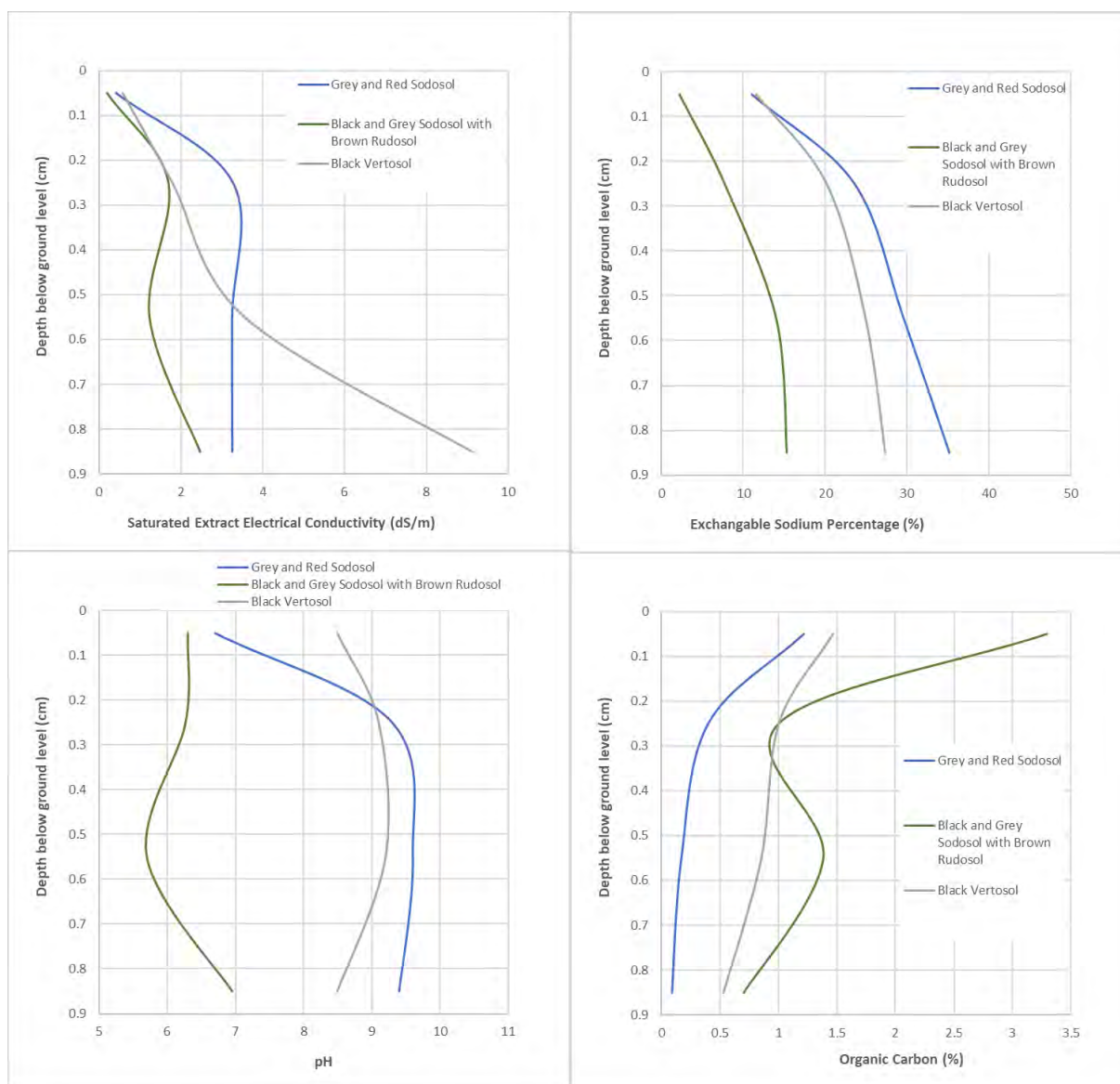


Figure 1: Chemistry by soil type and depth (Salinity EC_{se} , pH, ESP and OC)

3.3 Uncertified Rehabilitation Area

An assessment of an uncertified rehabilitation area (refer Detailed descriptions/chemistry map for locations) was made. Soil surfaces were black heavy clays with calcium carbonate presence observed. The area was actively eroding with deep rills observed (refer Figure 2).



Figure 2: Photo of uncertified rehabilitation area

Three samples of the topsoil (0-100 mm) were randomly sampled. Table 8 gives the chemistry. The chemical characteristics of the material can be described as:

- Very strongly alkaline pH;
- Slightly to moderately saline ;
- Moderate organic carbon;
- High CEC, strongly sodic with a balanced Ca:Mg ratio;
- EAT scores suggest dispersive soils.

Table 8: Uncertified Rehabilitation Area Soil Chemistry Summary

Site	EC _{se}	pH	ESP (%)	CEC	Ca:Mg ratio	OC (%)	EAT
MT07	2.78	9	28.7	26.6	4.9	1.12	2
MT08	1.44	9.3	28	26.6	5.6	0.88	2
MT09	4.68	9	35.3	28.7	4.5	1.19	2

4. Agricultural Land Evaluation

A number of frameworks and references are referred to establish the agricultural land evaluation for the project area.

4.1 Strategic Cropping Land

None of the area was defined as strategic cropping land (SCL) on the trigger maps. Queensland Globe (2022) (last access 5/10/2022). Therefore, no further assessment is required under this framework.

4.2 Agricultural Land Classification

Agricultural land classification in Queensland follows a simple hierarchical scheme that is applicable across the state (DSITI & DNRM, 2015). It allows the presentation of interpreted land evaluation data to indicate the location and extent of agricultural land that can be used sustainably for a wide range of land uses with minimal land degradation. Three broad classes of agricultural land and one non-agricultural land class are identified:

- **Class A** – Crop land
- **Class B** – Limited crop land
- **Class C** – Pasture land
- **Class D** – Non-agricultural land

A review of Forster (1985) define the project area as C2 class. C2 land is typically suited to livestock fattening with low stocking rates (DSITI & DNRM, 2015). The site is considered suitable for livestock fattening where stock can be removed as required to maintain vegetative cover, protecting the soils from erosion risk.

5. Land Management and Amelioration

5.1 Soil Erosion

Erosion can have an adverse effect on soil productivity and the associated agricultural value. Additional effects can include downstream sedimentation, and decline in fertility through loss of soil structure, and increased dust generation and poor rehabilitation.

Dispersive subsoils with high ESPs, low Ca:Mg ratios are susceptible to tunnel and gully erosion which is particularly difficult to manage once initiated. The subsoils of the project area have subsoils that have a low erosion rating when undisturbed. However, as the subsoils can be sodic to strongly sodic, these soils will erode due to clay dispersion where soil is exposed to rainfall or runoff. Management options involve minimising exposure, careful management of overland flow, maintaining vegetation cover, and where appropriate, the use of soil ameliorants such as gypsum (to reduce the degree of dispersion).

While site practices will be guided by site specific Erosion and Sediment Control plans. Where applicable, the following general erosion and sediment control measures are recommended:

- Methods such as contour banks, or Vetiver Monto along crests and contours to control surface flow speed, should be used at intervals appropriate to the slope and soil type to control the flow of surface water.
- Diversion and erosion and sediment control devices should be fully implemented to provide effective erosion control prior to land disturbance activities, and kept in place and maintained until the area has been effectively rehabilitated.
- Where diversion of runoff water around a construction/rehabilitation site is required, design will need to be mindful of possible erosion effects due to concentration of flow.

5.2 Soil Amelioration

Soil amelioration will vary for different soils depending on soil chemistry. Lower cation exchange capacity soils (i.e., sandy soils) generally have a lower amendment requirement due less exchange sites for cation transfer. The guiding principles for choosing chemical amendments, i.e., to use lime, gypsum, or sulphur ameliorants, depends on both pH, ESP and Ca:Mg ratio.

For the Sodosol/Rudosol unit (i.e., the spotted gum/ironbark country)

- Topsoil stripping of not greater than 200 mm is recommended due to sodic subsoils material.
- The surface 200mm of material is suitable for use in rehabilitation without amendment. It has no ph, salinity or sodicity limitations.
- This topsoil material will still be subject to erosion due to the concentrated runoff and therefore needs to be spread such that any runoff flows are not concentrated
- A broad-based fertiliser should be applied with suitable rates are around 40-50 kg/ha N, 20-30 kg/ha P and 20-30 kg/ha K to assist vegetation growth.

For the Vertosol and the cleared Sodosol unit (i.e., the Brigalow land type)

- Topsoil stripping of not greater than 200 mm is recommended due to increasing sodic subsoils material.
- The stripped material should be treated with gypsum at a rate not less than 15 t/ha (sufficient to treat 150 mm across 1 ha to an ESP <6%).
- These soils do not have salinity limitation, however their high pH may limit nutrient availability to vegetation. with lowering both the sodicity of the material and with nutrient availability.

- A broad-based fertiliser should be applied with suitable rates are around 40-50 kg/ha N, 20-30 kg/ha P and 20-30 kg/ha K to assist vegetation growth.

5.3 Uncertified Rehabilitation Area

It is recommended that the uncertified rehabilitation area should be treated with:

- gypsum at a rate not less than 20 t/ha (sufficient to treat 150 mm across 1 ha to an ESP <6%).

These soils have no salinity limitation, however their high pH may limit nutrient availability to vegetation. The uncertified rehabilitation area should be treated to reduce soil pH with:

- Sulphur bentonite at a rate of 700 kg/ha.

7. Rehabilitation Soil Testing and Monitoring Metrics

Horizon were requested to provide:

- A soil testing program/procedure; and
- Metrics to measure future rehabilitation performance based on soil testing program results.

Our proposed methodology is provided below:

7.1 Soil testing program/procedure

The following steps detail the proposed sampling program:

1. The testing program plan for each uniform rehabilitation area should be at a density of:
 - Minimum of 1 sample site per 6 hectares of rehabilitation: and
 - Have a minimum of 3 sample sites per rehabilitation area.
2. At each site, samples should be taken at a maximum of 100 mm increments to a depth not less than the topsoil capping depth. Sampling should ensure that soil from different depths does not mix.
3. Minimum sample size should 250 g. Samples to be labelled with sampler name, site, sample number, sample depth and date of sample.
4. Photograph to be taken of the samples, and surrounding area, with a hole identifier label and date visible.
5. Samples to be submitted to a NATA accredited laboratory for analysis of:
 - a. Moisture Content @ 40°C.
 - b. Electrical Conductivity (1:5).
 - c. pH (1:5).
 - d. Exchangeable Cations (Ca, Mg, Na, K, Al). With Ca:Mg ratio, and Exchangeable Sodium Percent (ESP) derived.
 - e. Chloride.
 - f. Total Organic Carbon (TOC) in Soil.

Soil salinity to be estimated as Saturated Extract Electrical Conductivity (EC_{se}) using the methods outlined in Shaw (1994).

7.2 Metrics for Soil Rehabilitation Performance.

The metrics for soil rehabilitation performance should be estimated using a minimum of three (3) samples for each uniform rehabilitation area. The measurement being expressed as a mean measurement with standard error of measurement presented.

The metric for success of the soil rehabilitation should be assessed against the following criteria:

1. The pH is between 5 and 8.5 pH units; and
2. The Exchangeable Sodium Percentage is less than six percent (< 6%); and
3. The soil salinity, expressed as EC_{se} is less than 5.5 dS/m; and
4. The organic carbon percentage (OC %) is greater than 1.0 %.
5. The site should be stable and not exhibiting evidence of rilling classified as severe.

8. References

- DSITI & DNRM (2015). Guidelines for agricultural land evaluation in Queensland (2nd edn). Queensland Government (Department of Science, Information Technology and Innovation and Department of Natural Resources and Mines), Brisbane, Queensland.
- Forster, B.A (1985) Evaluation of Agricultural Land in Taroom Shire. Queensland Department of Primary Industries. Project Report Q085032
- Future Beef (2018) *Queensland Land Types*. <https://futurebeef.com.au/knowledge-centre/grazing-land-management/land-types-of-queensland/> [Accessed 5 October. 2022].
- Globe.information.qld.gov.au, (2022) Queensland Globe User Guide - Featured Globes. [online] Available at: <http://globe.information.qld.gov.au/GlobeInformation/qldglobeUserGuide/featured-globes.htm> [Accessed 5 October. 2022].
- Hazelton, P. and Murphy, B. (2016) Interpreting Soil Test Results. What do all the numbers mean? Third Edition CSIRO Publishing, Collingwood. Victoria.
- Isbell, R.F. (2021) The Australian Soil Classification, Third Edition. CSIRO Publishing, Collingwood Victoria.
- McDonald, R. (1998). Australian soil and land survey field handbook. Canberra: Australian Collaborative Land Evaluation Program.
- McKenzie, N.J., Grundy, M.J., Webster, R. and Ringrose-Voase, A.J. (2007) Guidelines for Surveying Soil and Land Resources. CSIRO Publishing, Melbourne.
- Rayment, G. and Lyons, D. (2011) Soil Chemical Methods. CSIRO Publishing, Collingwood, Victoria.
- Shaw, R.J. (1994) Estimation of the electrical conductivity of saturation extracts from the electrical conductivity of 1:5 soil:water suspensions and various soil properties, Project report Q094025,

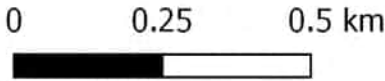
Appendix 1: Maps



Mine Lease Boundaries

Project:
Mineral Technologies Bentonite

Version Number: 1.1
Date: 11/10/2022

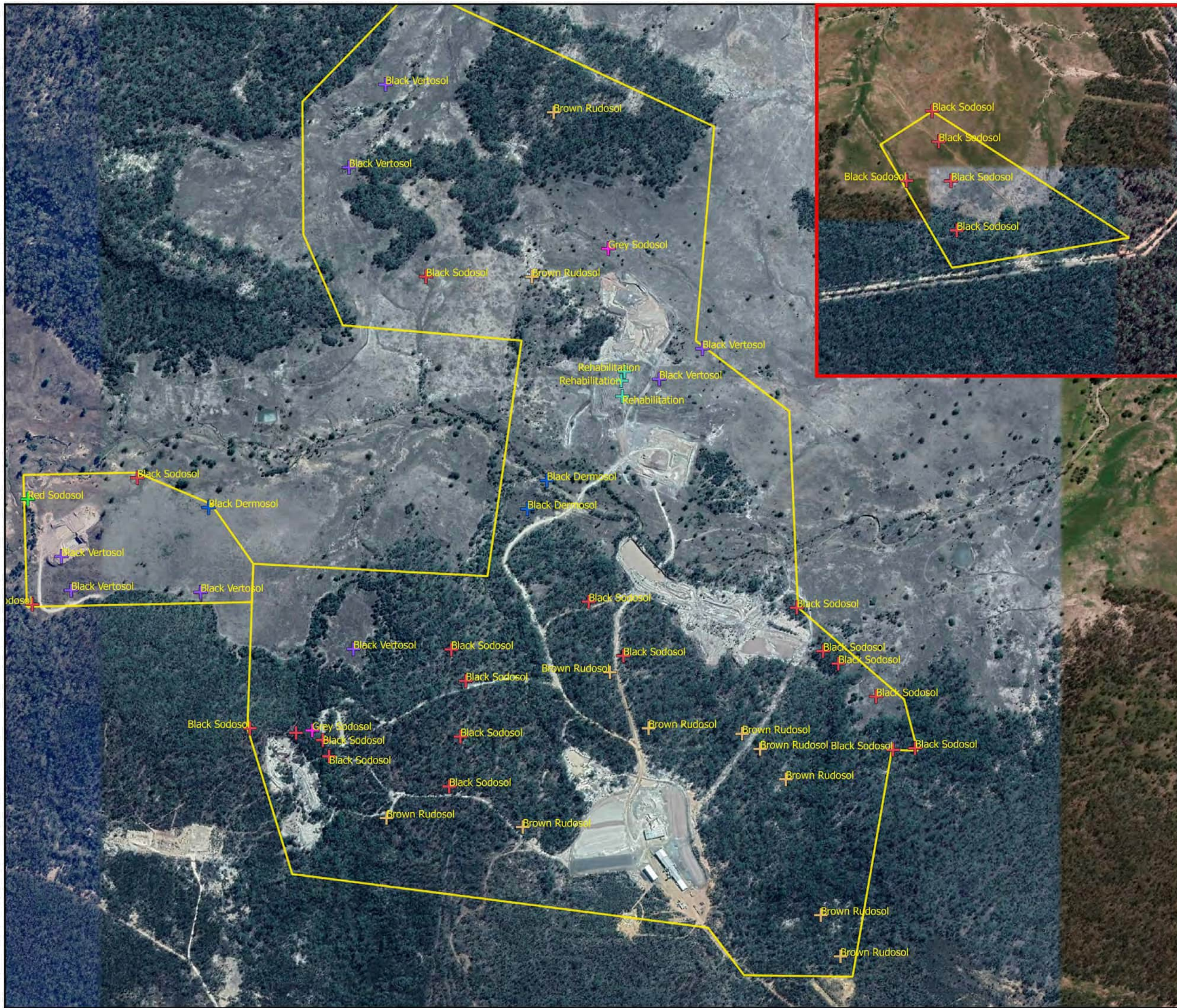


Legend

 Mining Leases
Google Satellite



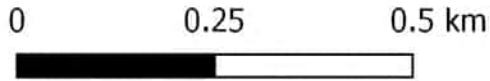
Horizon
Soil Science and Engineering



**Sample and Observation
Locations**

Project:
Mineral Technologies Bentonite

Version Number: 1.1
Date: 11/10/2022

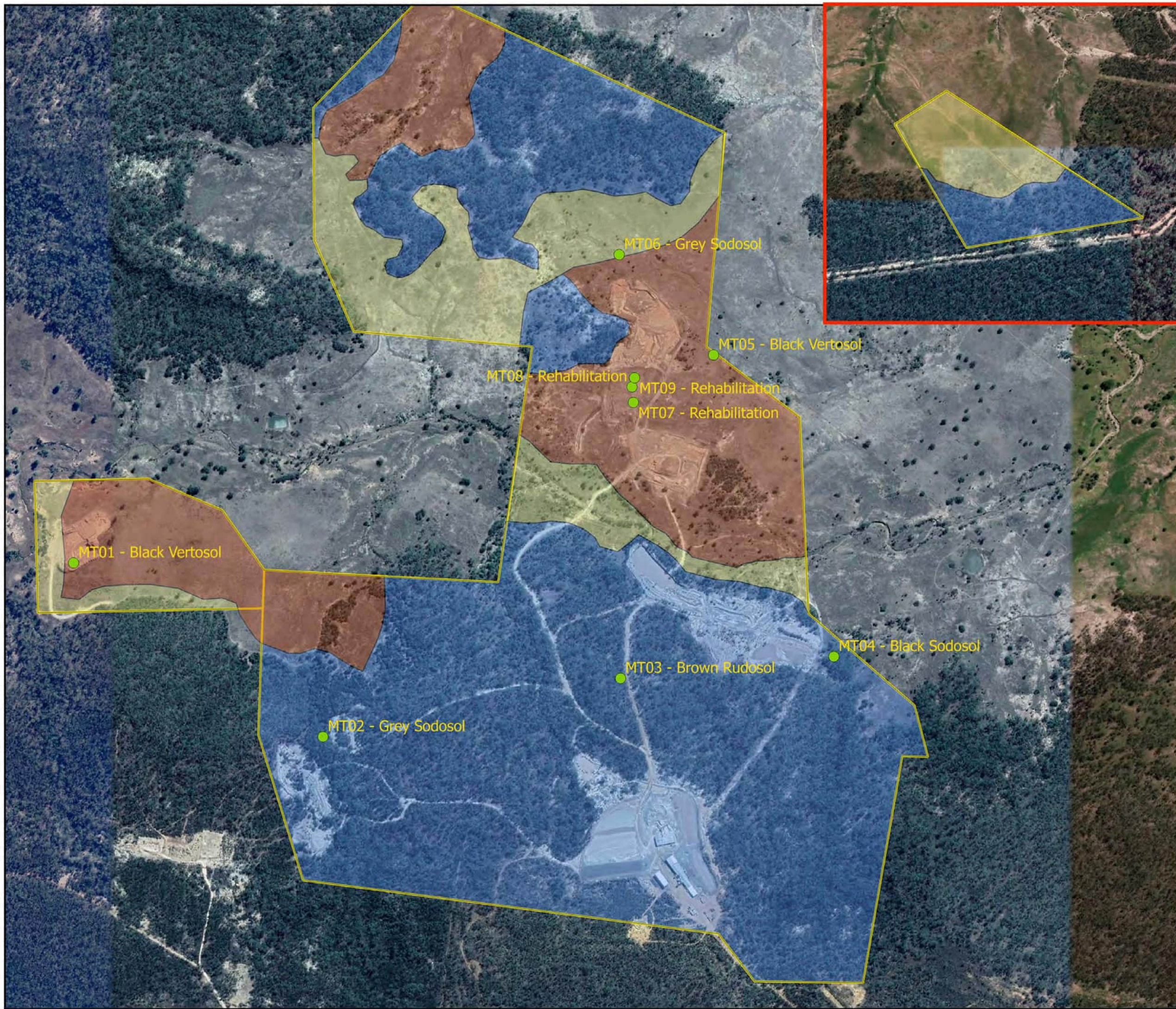


Legend

- Sample ID (ASC)
- + Black Dermosol
 - + Black Sodosol
 - + Black Vertosol
 - + Brown Rudosol
 - + Grey Sodosol
 - + Red Sodosol
 - + Rehabilitation
 - Mining Leases
- Google Satellite



Horizon
Soil Science and Engineering



Detailed Descriptions/Chemistry and Soil Boundaries	
Project: Mineral Technologies Bentonite	
Version Number: 1.1 Date: 11/10/2022	
0 0.25 0.5 km 	
Legend	
Sample sites	
● Description and Chemistry	
Soil map	
■ Black and Grey Sodosol with □	
■ Grey and Red Sodosol	
■ Black Vertosol	
■ Mining Leases	
Google Satellite	
Horizon Soil Science and Engineering	

Appendix 2: Detailed Descriptions

Site number	Description	Photos
<p>Site ID: MT01</p> <p>Location: S26° 23' 49.7" E149° 58' 40.3"</p> <p>Described by: Dan Rattray</p> <p>Date: 11/08/2022</p> <p>Geology: Sedimentary</p> <p>Landform pattern: Low Hills</p> <p>Element: Middle of landform</p> <p>Permeability: Moderately permeable</p> <p>Microrelief: None</p> <p>Drainage: Imperfectly drained</p> <p>Rock outcrop: Slightly rocky</p> <p>Surface coarse fragments: Small and large gravel</p> <p>Surface condition: Loose</p> <p>Disturbance: Completely cleared</p> <p>Chemistry sample site: Yes</p>	<p>Australian Soil Classification (ASC): Black Vertosol</p> <p>A1 Black (10YR 2/1) silty medium clay with strong blocky structure, many small to large gravel on surface, to 0.1m., gradual change to;</p> <p>B2 Black (10YR 2/1) silty medium clay with strong blocky structure, common small and medium gravel , to 1.2m., clear change to;</p> <p>C Brownish Yellow (10YR 6/6) clayey sand with massive structure, many small to large gravel ,to 1.8m.</p>	

Site number	Description	Photos
<p>Site ID: MT02 Location: S26° 24' 06.8" E149° 59' 04.9" Described by: Dan Rattray Date: 11/08/2022 Geology: Sedimentary Landform pattern: Hills Element: Top of landform Permeability: Moderately permeable Microrelief: None Drainage: Imperfectly drained Rock outcrop: None Surface condition: Loose Disturbance: Limited clearing Chemistry sample site: Yes</p>	<p>ASC: Grey Sodosol</p> <p>A1 Very dark grey (2.5Y 3/1) silty clay loam with weak granular structure, to 0.15m., clear change to;</p> <p>B2 Very dark grey (2.5Y 3/1) heavy clay with weak blocky structure, to 0.6m., clear change to;</p> <p>C Dark grayish brown (10YR 4/2) fine sandy medium clay with weak blocky structure, a few small gravel , with common dark/yellow mottles, a few carbonates, to 1m.</p>	
		

Site number	Description	Photos
<p>Site ID: MT03 Location: S26° 24' 01.1" E149° 59' 34.2" Described by: Dan Rattray Date: 11/08/2022 Geology: Sedimentary Landform pattern: Hills Element: Top of landform Permeability: Highly permeable Microrelief: None Drainage: Well drained Rock outcrop: Rocky Surface coarse fragments: Small and large gravel, a few cobbles Surface condition: Loose Disturbance: Limited clearing Chemistry sample site: Yes</p>	<p>ASC: Brown Rudosol</p> <p>A1 Very dark grey (10YR 3/1) silty light clay with weak granular structure, common small to large gravel ,to 0.1m., clear change to;</p> <p>B2 Brown (10YR 4/3) clayey coarse sand with weak granular structure, abundant small to large gravel ,to 0.4m.</p>	
		

Site number	Description	Photos
<p>Site ID: MT04 Location: S26° 23' 58.9" E149° 59' 55.3" Described by: Dan Rattray Date: 11/08/2022 Geology: Sedimentary Landform pattern: Hills Element: Bottom of landform Permeability: Slowly permeable Microrelief: None Drainage: Poorly drained Rock outcrop: None Surface condition: Loose Disturbance: Limited clearing Chemistry sample site: Yes</p>	<p>ASC: Black Sodosol</p> <p>A1 Black (10YR 2/1) silty clay loam with weak granular structure, to 0.15m., clear change to;</p> <p>B21 Black (10YR 2/1) silty medium heavy clay with moderate polyhedral structure, a few small gravel , to 0.5m., gradual change to;</p> <p>B22 Black (10YR 2/1) silty medium heavy clay with moderate polyhedral structure, common small and medium gravel , with a few yellow mottles, to 0.8m., clear change to;</p> <p>B3 Black (10YR 2/1) coarse sandy heavy clay with moderate polyhedral structure, many small and medium gravel , with a few yellow mottles , to 1.0m.</p> <p>C Yellow sandstone.</p>	
		

Site number	Description	Photos
<p>Site ID: MT05 Location: S26° 23' 29.2" E149° 59' 43.4" Described by: Dan Rattray Date: 11/08/2022 Geology: Sedimentary Landform pattern: Low Hills Element: Middle of landform Permeability: Moderately permeable Microrelief: None Drainage: Imperfectly drained Rock outcrop: None Surface condition: Cracking and self mulching Disturbance: Completely cleared Chemistry sample site: Yes</p>	<p>ASC: Black Vertosol</p> <p>Description</p> <p>A1 Black (10YR 2/1) heavy clay with strong blocky structure, a very few carbonates, to 0.1m., gradual change to;</p> <p>B21 Black (10YR 2/1) heavy clay with strong blocky structure, with a very few red mottles, a few carbonates, to 0.5m., diffuse change to;</p> <p>B22 Very dark grey (10YR 3/1) heavy clay with strong blocky structure, common carbonates, to 1.0m.</p>	
		

Site number	Description	Photos
<p>Site ID: MT06 Location: S26° 23' 19.3" E149° 59' 34.1" Described by: Dan Rattray Date: 11/08/2022 Geology: Sedimentary Landform pattern: Low Hills Element: Middle of landform Permeability: Slowly permeable Microrelief: None Drainage: Imperfectly drained Rock outcrop: None Surface condition: Loose Disturbance: Extensive clearing Chemistry sample site: Yes</p>	<p>ASC: Grey Sodosol</p> <p>A1 Very dark grayish brown (10YR 3/2) sandy loam with weak granular structure, to 0.1m., abrupt change to;</p> <p>B21 Dark grey (10YR 4/1) fine sandy heavy clay with strong blocky structure, a few carbonates, to 0.5m., abrupt change to;</p> <p>B22 Gray (10YR 5/1) fine sandy light clay with moderate polyhedral structure, many carbonates, to 1.0m., gradual change to;</p> <p>B3 Gray (10YR 5/1) clayey sand with weak polyhedral structure, a few medium gravel, common carbonates, to 1.1+m.</p>	
		

Site number	Description	Photos
<p>Site ID: MT10 Location: S26° 23' 44.1" E149° 58' 37.0" Described by: Dan Rattray Date: 11/08/2022 Geology: Sedimentary Landform pattern: Low Hills Element: Drainage line Permeability: Slowly permeable Microrelief: None Drainage: Imperfectly drained Rock outcrop: None Surface condition: Firm Disturbance: Extensive clearing Chemistry sample site: No</p>	<p>ASC: Red Sodosol</p> <p>A1 Brown (7.5YR 4/3) silty sand with weak granular structure, common small and medium gravel on surface, to 0.25m., abrupt change to;</p> <p>B21 Yellowish red (5YR 5/6) fine sandy medium clay with moderate blocky structure, , with common grey mottles, to 0.7m., gradual change to;</p> <p>B22 Yellowish red (5YR 4/6) fine sandy medium clay with moderate blocky structure, with many grey mottles, common carbonates and manganese, to 1.2m., abrupt change to;</p> <p>C Yellowish brown (10YR 5/6) sand with massive structure, to 1.3m.</p>	

Appendix 3: Certificate of Analysis

CERTIFICATE OF ANALYSIS

Work Order	: EB2223891	Page	: 1 of 9
Client	: HORIZON SOIL SCIENCE AND ENGINEERING	Laboratory	: Environmental Division Brisbane
Contact	: MR DAN RATTRAY	Contact	: Customer Services EB
Address	: CONDAMINE ALLIANCE ECOHUB 266 MARGARET STREET TOOWOOMBA Toowoomba 4350	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61-7-3243 7222
Project	: Amcol Miles	Date Samples Received	: 16-Aug-2022 09:45
Order number	: ----	Date Analysis Commenced	: 17-Aug-2022
C-O-C number	: ----	Issue Date	: 24-Aug-2022 14:10
Sampler	: DAN RATTRAY		
Site	: ----		
Quote number	: BN/158/21 V3		
No. of samples received	: 26		
No. of samples analysed	: 26		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Layla Hafner	Acid Sulphate Soils - Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- ED045G (Chloride): Sample EB2223891_002 (MT01_200_110822) was diluted due to matrix interference. LOR adjusted accordingly.
- ALS is not NATA accredited for the analysis of Exchangeable Aluminium and Exchange Acidity in soils when performed under ALS Method ED005.
- ALS is not NATA accredited for the analysis of Exchangeable Cations on Alkaline Soils when performed under ALS Method ED006.
- ED008 (Exchangeable Cations with pre-treatment): EB2223575-027 shows poor duplicate results due to sample heterogeneity. This has been confirmed by visual inspection.
- 6948884 T/O 6948881
- ED006 (Exchangeable Cations on Alkaline Soils): Unable to calculate Magnesium/Potassium Ratio results for some samples as required Exchangeable Potassium results are less than the limit of reporting.
- EA058 Emerson: V. = Very, D. = Dark, L. = Light, VD. = Very Dark
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity ($H^+ + Al^{3+}$).



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	MT01_0_110822	MT01_200_110822	MT01_500_110822	MT01_800_110822	MT01_1100_110822
Sampling date / time					11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00
Compound	CAS Number	LOR	Unit		EB2223891-001	EB2223891-002	EB2223891-003	EB2223891-004	EB2223891-005
				Result	Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		9.3	9.5	9.4	8.0	5.4
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		192	264	491	1600	2620
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		7.5	4.1	6.5	3.9	5.2
EA058: Emerson Aggregate Test									
Color (Munsell)	----	-	-		Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Very Dark Gray (10YR 3/1)	Very Dark Gray (10YR 3/1)
Texture	----	-	-		Clay Loam Sandy	Light Medium Clay	Medium Clay	Medium Clay	Medium Clay
Emerson Class Number	EC/TC	-	-		3	3	2	2	2
ED005: Exchange Acidity									
Ø Exchange Acidity	----	0.1	meq/100g		----	----	----	----	2.0
Ø Exchangeable Aluminium	----	0.1	meq/100g		----	----	----	----	<0.1
ED006: Exchangeable Cations on Alkaline Soils									
Ø Exchangeable Calcium	----	0.2	meq/100g		11.4	12.5	11.5	9.4	----
Ø Exchangeable Magnesium	----	0.2	meq/100g		2.6	4.8	5.0	4.9	----
Ø Exchangeable Potassium	----	0.2	meq/100g		<0.2	<0.2	<0.2	<0.2	----
Ø Exchangeable Sodium	----	0.2	meq/100g		1.8	4.6	7.1	6.6	----
Ø Cation Exchange Capacity	----	0.2	meq/100g		15.8	22.1	23.8	21.1	----
Ø Exchangeable Sodium Percent	----	0.2	%		11.2	20.8	29.8	31.3	----
Ø Calcium/Magnesium Ratio	----	0.2	-		4.4	2.6	2.3	1.9	----
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	----	----	----	7.2
Exchangeable Magnesium	----	0.1	meq/100g		----	----	----	----	5.4
Exchangeable Potassium	----	0.1	meq/100g		----	----	----	----	0.2
Exchangeable Sodium	----	0.1	meq/100g		----	----	----	----	5.4
Cation Exchange Capacity	----	0.1	meq/100g		----	----	----	----	20.4
Exchangeable Sodium Percent	----	0.1	%		----	----	----	----	29.6
Calcium/Magnesium Ratio	----	0.1	-		----	----	----	----	1.3
Magnesium/Potassium Ratio	----	0.1	-		----	----	----	----	28.6
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		20	<20	160	2630	4740
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		1.32	0.62	0.92	0.54	0.40



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	MT02_0_110822	MT02_200_110822	MT02_500_110822	MT02_800_110822	MT03_0_110822
Sampling date / time					11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00
Compound	CAS Number	LOR	Unit		EB2223891-006	EB2223891-007	EB2223891-008	EB2223891-009	EB2223891-010
				Result	Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		6.6	7.9	5.9	8.2	5.6
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		36	559	251	464	19
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		8.8	15.7	17.2	9.9	12.2
EA058: Emerson Aggregate Test									
Color (Munsell)	----	-	-		Black (5Y 2.5/1)	Dark Gray (N 4/)	Very Dark Gray (10YR 3/1)	Dark Gray (2.5Y 4/1)	Very Dark Gray (10YR 3/1)
Texture	----	-	-		Loam	Medium Heavy Clay	Medium Clay	Medium Clay	Sandy Loam
Emerson Class Number	EC/TC	-	-		3	2	2	2	3
ED005: Exchange Acidity									
Ø Exchange Acidity	----	0.1	meq/100g		----	----	<0.1	----	1.1
Ø Exchangeable Aluminium	----	0.1	meq/100g		----	----	<0.1	----	0.6
ED006: Exchangeable Cations on Alkaline Soils									
Ø Exchangeable Calcium	----	0.2	meq/100g		----	9.3	----	5.9	----
Ø Exchangeable Magnesium	----	0.2	meq/100g		----	7.7	----	4.7	----
Ø Exchangeable Potassium	----	0.2	meq/100g		----	0.6	----	0.3	----
Ø Exchangeable Sodium	----	0.2	meq/100g		----	3.6	----	2.5	----
Ø Cation Exchange Capacity	----	0.2	meq/100g		----	21.3	----	13.4	----
Ø Exchangeable Sodium Percent	----	0.2	%		----	17.1	----	18.6	----
Ø Calcium/Magnesium Ratio	----	0.2	-		----	1.2	----	1.2	----
Ø Magnesium/Potassium Ratio	----	0.2	-		----	13.4	----	14.0	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		10.4	----	9.9	----	1.9
Exchangeable Magnesium	----	0.1	meq/100g		5.0	----	9.1	----	1.2
Exchangeable Potassium	----	0.1	meq/100g		1.1	----	0.9	----	0.8
Exchangeable Sodium	----	0.1	meq/100g		0.7	----	4.5	----	<0.1
Cation Exchange Capacity	----	0.1	meq/100g		----	----	----	----	5.1
Cation Exchange Capacity	----	0.1	meq/100g		17.2	----	24.6	----	----
Exchangeable Sodium Percent	----	0.1	%		4.2	----	18.3	----	1.4
Calcium/Magnesium Ratio	----	0.1	-		2.1	----	1.1	----	1.6
Magnesium/Potassium Ratio	----	0.1	-		4.4	----	9.6	----	1.5
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		30	900	360	760	20



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				MT02_0_110822	MT02_200_110822	MT02_500_110822	MT02_800_110822	MT03_0_110822
Sampling date / time				11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00
Compound	CAS Number	LOR	Unit	EB2223891-006	EB2223891-007	EB2223891-008	EB2223891-009	EB2223891-010
				Result	Result	Result	Result	Result
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	2.56	0.65	0.97	0.23	1.70



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	MT03_200_110822	MT04_0_110822	MT04_200_110822	MT04_500_110822	MT04_800_110822
Sampling date / time					11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00
Compound	CAS Number	LOR	Unit		EB2223891-011	EB2223891-012	EB2223891-013	EB2223891-014	EB2223891-015
				Result	Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		5.2	6.7	5.7	5.5	5.7
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		7	26	23	49	30
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		14.0	23.7	18.8	20.9	22.7
EA058: Emerson Aggregate Test									
Color (Munsell)	----	-	-		Very Dark Grayish Brown (10YR 3/2)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)	Black (2.5Y 2.5/1)
Texture	----	-	-		Sandy Clay Loam	Loam	Medium Clay	Medium Clay	Clay Loam Sandy
Emerson Class Number	EC/TC	-	-		3	3	3	2	3
ED005: Exchange Acidity									
∅ Exchange Acidity	----	0.1	meq/100g		3.7	----	0.3	1.2	1.0
∅ Exchangeable Aluminium	----	0.1	meq/100g		2.6	----	0.1	0.7	0.5
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		0.2	16.2	6.6	4.6	3.9
Exchangeable Magnesium	----	0.1	meq/100g		2.6	10.7	8.1	8.9	7.9
Exchangeable Potassium	----	0.1	meq/100g		0.6	4.2	3.0	2.2	1.8
Exchangeable Sodium	----	0.1	meq/100g		0.1	0.3	0.6	1.7	1.9
Cation Exchange Capacity	----	0.1	meq/100g		7.2	----	18.6	18.6	16.5
Cation Exchange Capacity	----	0.1	meq/100g		----	31.3	----	----	----
Exchangeable Sodium Percent	----	0.1	%		2.8	0.9	3.2	9.7	12.0
Calcium/Magnesium Ratio	----	0.1	-		<0.1	1.5	0.8	0.5	0.5
Magnesium/Potassium Ratio	----	0.1	-		4.1	2.5	2.7	4.0	4.3
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		<10	<10	10	60	40
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		0.56	5.63	1.80	1.80	1.18



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	MT05_0_110822	MT05_200_110822	MT05_500_110822	MT05_800_110822	MT06_0_110822
Sampling date / time					11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00
Compound	CAS Number	LOR	Unit		EB2223891-016	EB2223891-017	EB2223891-018	EB2223891-019	EB2223891-020
				Result	Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		7.7	8.7	9.0	9.0	6.7
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		60	440	717	745	59
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		21.8	20.2	15.2	14.8	8.8
EA058: Emerson Aggregate Test									
Color (Munsell)	----	-	-		Black (2.5Y 2.5/1)	Black (10YR 2/1)	Black (5Y 2.5/1)	Very Dark Gray (2.5Y 3/1)	Very Dark Gray (10YR 3/1)
Texture	----	-	-		Medium Clay	Medium Clay	Medium Clay	Medium Clay	Clay Loam Sandy
Emerson Class Number	EC/TC	-	-		2	2	2	2	2
ED006: Exchangeable Cations on Alkaline Soils									
Ø Exchangeable Calcium	----	0.2	meq/100g		20.6	22.6	20.6	20.1	----
Ø Exchangeable Magnesium	----	0.2	meq/100g		5.4	7.0	7.1	7.2	----
Ø Exchangeable Potassium	----	0.2	meq/100g		0.2	<0.2	<0.2	0.2	----
Ø Exchangeable Sodium	----	0.2	meq/100g		3.6	7.2	7.0	8.4	----
Ø Cation Exchange Capacity	----	0.2	meq/100g		29.9	37.0	34.9	36.0	----
Ø Exchangeable Sodium Percent	----	0.2	%		12.0	19.6	20.1	23.4	----
Ø Calcium/Magnesium Ratio	----	0.2	-		3.8	3.2	2.9	2.8	----
Ø Magnesium/Potassium Ratio	----	0.2	-		21.2	----	----	30.7	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	----	----	----	5.1
Exchangeable Magnesium	----	0.1	meq/100g		----	----	----	----	3.9
Exchangeable Potassium	----	0.1	meq/100g		----	----	----	----	0.7
Exchangeable Sodium	----	0.1	meq/100g		----	----	----	----	1.2
Cation Exchange Capacity	----	0.1	meq/100g		----	----	----	----	10.9
Exchangeable Sodium Percent	----	0.1	%		----	----	----	----	11.0
Calcium/Magnesium Ratio	----	0.1	-		----	----	----	----	1.3
Magnesium/Potassium Ratio	----	0.1	-		----	----	----	----	5.6
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		40	430	920	900	30
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		1.62	1.39	0.79	0.52	1.22



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	MT06_200_110822	MT06_500_110822	MT06_800_110822	MT07_0_110822	MT08_0_110822
Sampling date / time					11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00	11-Aug-2022 00:00
Compound	CAS Number	LOR	Unit		EB2223891-021	EB2223891-022	EB2223891-023	EB2223891-024	EB2223891-025
				Result	Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		9.3	9.6	9.4	9.0	9.3
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		524	459	448	567	346
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		11.8	6.9	6.2	9.8	14.8
EA058: Emerson Aggregate Test									
Color (Munsell)	----	-	-		Dark Gray (10YR 4/1)	Dark Gray (10YR 4/1)	Gray (10YR 5/1)	Black (10YR 2/1)	Black (2.5Y 2.5/1)
Texture	----	-	-		Medium Clay	Clay Loam Sandy	Sandy Clay Loam	Medium Clay	Medium Clay
Emerson Class Number	EC/TC	-	-		2	2	2	2	2
ED006: Exchangeable Cations on Alkaline Soils									
∅ Exchangeable Calcium	----	0.2	meq/100g		9.9	5.7	4.5	15.2	15.9
∅ Exchangeable Magnesium	----	0.2	meq/100g		7.7	5.0	4.2	3.1	2.8
∅ Exchangeable Potassium	----	0.2	meq/100g		0.8	0.6	0.6	0.6	0.4
∅ Exchangeable Sodium	----	0.2	meq/100g		5.7	4.8	5.1	7.6	7.5
∅ Cation Exchange Capacity	----	0.2	meq/100g		24.1	16.2	14.4	26.6	26.6
∅ Exchangeable Sodium Percent	----	0.2	%		23.6	29.6	35.2	28.7	28.0
∅ Calcium/Magnesium Ratio	----	0.2	-		1.3	1.1	1.1	4.9	5.6
∅ Magnesium/Potassium Ratio	----	0.2	-		9.2	8.0	6.8	5.2	6.6
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		400	370	360	210	60
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	----	0.02	%		0.40	0.17	0.09	1.12	0.88



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	MT09_0_110822	----	----	----	----
			Sampling date / time	11-Aug-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2223891-026	-----	-----	-----	-----
Result				----	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	9.0	----	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	912	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	10.6	----	----	----	----
EA058: Emerson Aggregate Test								
Color (Munsell)	----	-	-	Black (2.5Y 2.5/1)	----	----	----	----
Texture	----	-	-	Medium Clay	----	----	----	----
Emerson Class Number	EC/TC	-	-	2	----	----	----	----
ED006: Exchangeable Cations on Alkaline Soils								
∅ Exchangeable Calcium	----	0.2	meq/100g	14.7	----	----	----	----
∅ Exchangeable Magnesium	----	0.2	meq/100g	3.2	----	----	----	----
∅ Exchangeable Potassium	----	0.2	meq/100g	0.6	----	----	----	----
∅ Exchangeable Sodium	----	0.2	meq/100g	10.1	----	----	----	----
∅ Cation Exchange Capacity	----	0.2	meq/100g	28.7	----	----	----	----
∅ Exchangeable Sodium Percent	----	0.2	%	35.3	----	----	----	----
∅ Calcium/Magnesium Ratio	----	0.2	-	4.5	----	----	----	----
∅ Magnesium/Potassium Ratio	----	0.2	-	5.7	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	450	----	----	----	----
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	1.19	----	----	----	----



Appendix 4

Ausrocks Resource Consultants: Final Land Use and
Rehabilitation Plan Rev 1.4 (February 2026)

FINAL LAND USE & REHABILITATION PLAN

GURULMUNDI BENTONITE MINE

For Department of Environment, Tourism, Science and Innovation
Prepared by Ausrocks Resource Consultants

AUQ00056



MINERALS TECHNOLOGIES INC.

**GURULMUNDI BENTONITE MINE –
FINAL LAND USE & REHABILITATION
PLAN**

19 FEBRUARY 2026

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This document has been reviewed and signed off by the undersigned:

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Terms & Abbreviations

3P	Desirable native pasture species (perennial, productive, palatable)
ARC	Ausrocks Resource Consultants (Ausrocks Pty Ltd)
ARC	Ausrocks Resource Consultants (Ausrocks Pty Ltd)
ARR	Annual Rehabilitation Report
Ca:Mg	Calcium and Magnesium Ratio
CEC	Cation Exchange Capacity
DES	Department of Environment and Science (now Department of Environment, Science and Innovation)
DNRM	Department of Natural Resources and Mines (Queensland)
DSITI	Department of Science, Information Technology and Innovation (Queensland)
EA	Environmental Authority
EAT	Emerson Aggregate Test
EC	Electrical Conductivity
FLURP	Final Land Use and Rehabilitation Plan
GPS	Global Positioning System
GQAL	Good Quality Agricultural Land
ML	Mining Lease
MTI	Mineral Technologies Inc.
OC	Organic Carbon
PMLU	Post-mining land use
PRC plan	Progressive Rehabilitation and Closure Plan
RA	Rehabilitation area
RE	Regional Ecosystem
SCL	Strategic Cropping Land
Site	Gurulmundi Bentonite Mine

1 INTRODUCTION

1.1 Project Description

This Final Land Use and Rehabilitation Plan (FLURP) is prepared for the AMCOL Australia¹ Gurulmundi Bentonite Mine (site) operated by Minerals Technologies Inc (MTI) for mining leases (MLs) 55007, ML55017 and ML55008 under environmental authority (EA) EPML00699113.

The aim of this FLURP is to provide guidance on how rehabilitation outcomes will ensure appropriate post-mining land uses (PMLU) are achieved upon surrender of the mining leases.

1.2 Statutory Background

MTI's mining activities within MLs 55007, 55008 and 55017 are currently authorised under EA EPML00699113. Current conditions attached to the EA require the holder of the EA to develop and implement a FLURP to ensure that all areas disturbed by mining activities will be suitably rehabilitated to achieve the following rehabilitation objectives:

- Safe for humans and wildlife;
- Non-polluting;
- Stable;
- Able to sustain an agreed PMLU in accordance with the FLURP;
- Revegetated with species endemic appropriate to achieve the agreed PMLU and free of declared pest species;
- Compliant with the FLURP; and
- Compliance with all conditions of the site's EA.

Additionally, land disturbed by mining activities must be rehabilitated in accordance with **Table 1.1**.

Table 1.1: Final land use and rehabilitation approval schedule (EA 'Table F1')

Disturbance Type	Post Mine Land Description	Post Mine Land Capability Classification ¹
Infrastructure	Marginal grazing	vii
Haul roads	Marginal grazing	vii
Pits	Marginal grazing	vii
	Water storage	n/a

¹ Land capability as defined in the DME Technical Guideline for the Environmental Management of Exploration and Mining in Queensland

Through consultation with the department, it is proposed that a portion of the land is rehabilitated to suit a hybrid ecosystem PMLU instead of marginal grazing. This is supported because a hybrid ecosystem PMLU will allow rehabilitation in specific areas to be more consistent with the surrounding landforms including areas

¹ AMCOL Australia Pty Ltd is a wholly owned subsidiary of Minerals Technologies Inc

characterised by steep slopes and Remnant Vegetation (RE11.10.1/11.7.2). Portions of the site intended to be rehabilitated to the hybrid ecosystem PMLU include;

- The southern portion of the Central Pit
- The Western Pit
- The northern portion of the Infrastructure Area.

The FLURP must include, but is not limited to the following:

- A description of rehabilitation management techniques incorporating works and monitoring programs and timetables;
- Indicators for success;
- Completion criteria; and
- Keeping of appropriate records or rehabilitation measures implemented including taking of photographs demonstrative of rehabilitation achieved and the preparation of annual rehabilitation progress reports.

1.3 Scope

This document represents the new FLURP for the current site (ML55007, ML55008 and ML55017) and is designed to provide MTI's long-term rehabilitation management strategy for its mining activities. The FLURP will be administered as an accompanying document to the Mine's transitional Progressive Rehabilitation and Closure Plan (PRC plan), and may be occasionally updated, as required or based on advances in rehabilitation techniques, changes to the proposed mining activities, changes to legal requirements, and/or correction of accidental omissions/errors.

1.4 Area and Disturbance Type

In carrying out the mining activity authorised by the EA EPML00699113, the Mine must comply with authorised disturbance areas listed in **Table 1.2**.

Table 1.2: Authorised disturbance (EA 'Table A1')

Mine Feature Name	Location (GDA2020 Zone 55)		Maximum Disturbance (ha)	Description / Purpose
	Northing	Easting		
North Pit	798,707	7,077,202	11.6	Extraction area
Far North Pit	798,413	7,077,818	28.2	Extraction area
West Pit	797,711 798,087	7,076,186 7,076,392	10.5	Extraction area
Central Pit	798,793 799,266	7,076,694 7,076,358	11.3	Extraction area
ML55008 Pit (Bailey's Gate)	802,205	7,076,028	8.8	Extraction area
ML55017 Pit (Far West Pit)	797,136	7,076,028	4.9	Extraction area
Topsoil Stockpiles	798,550 798,448 798,777 798,929 797,719 798,103 798,354 798,497 798,605 798,714	7,075,807 7,076,074 7,076,070 7,076,088 7,076,284 7,076,311 7,077,031 7,076,861 7,076,724 7,076,654	19.6	Total topsoil stockpile for all pits

	798,685 799,095 799,268 798,326 798,460 798,604 798,456 797,034 797,219 802,101	7,076,881 7,076,428 7,076,288 7,078,012 7,077,716 7,077,543 7,077,245 7,076,795 7,076,889 7,076,002		
Overburden and laydown area	798,576 798,542 798,725 798,852 798,855 798,998 798,770 798,855 798,725 797,023 797,052	7,075,833 7,076,022 7,076,001 7,075,985 7,076,586 7,076,684 7,077,055 7,077,302 7,077,485 7,076,947 7,077,019	22.5	Infrastructure areas for ancillary mine activities
Infrastructure	798,718	7,075,918	0.5	Office, laboratory, weighbridge and storage buildings/sheds
Haul roads	798,479 797,326 797,039 797,019 798,914 797,830 798,756 799,048 799,235 802,246	7,076,707 7,076,797 7,076,962 7,076,796 7,075,623 7,076,424 7,076,939 7,076,729 7,076,557 7,076,056	6.0	Access on site (haul roads and access tracks)
Sediment Basins and water storages	798,497 798,694 798,681 799,011	7,076,233 7,076,173 7,076,840 7,076,579	2.4	Sediment control structures (permanent) and water storage
Total			126.3	

1.4.1 ML55007

ML55007 is the main mining area with the largest area of disturbance from mining activities. The North Pit, Central Pit, and Processing and Infrastructure Area are housed within this ML. The mining operation is access from this ML via the main access road at the southern end of the ML via Bailey's Road. ML55017 is accessible via haul roads through ML55007.

1.4.2 ML55008

ML55008 is an approved ML that is undisturbed. Current mine planning estimate resources in this area will be exploited in two stages between 2037 and 2044. When mining activities commence, it is anticipated that the mined resource will be hauled to the Processing and Infrastructure area in ML55007 via Bailey's Road. Disturbance in this ML will consist of pits and access road.

1.4.3 ML55017

ML55017 houses a satellite pit (Far West Pit) and is accessible via haul roads through ML55007. Mine resource is hauled to the Processing and Infrastructure Area. Current mine planning estimate resources in this area will be exploited in three stages between 2023, 2027 and 2032.

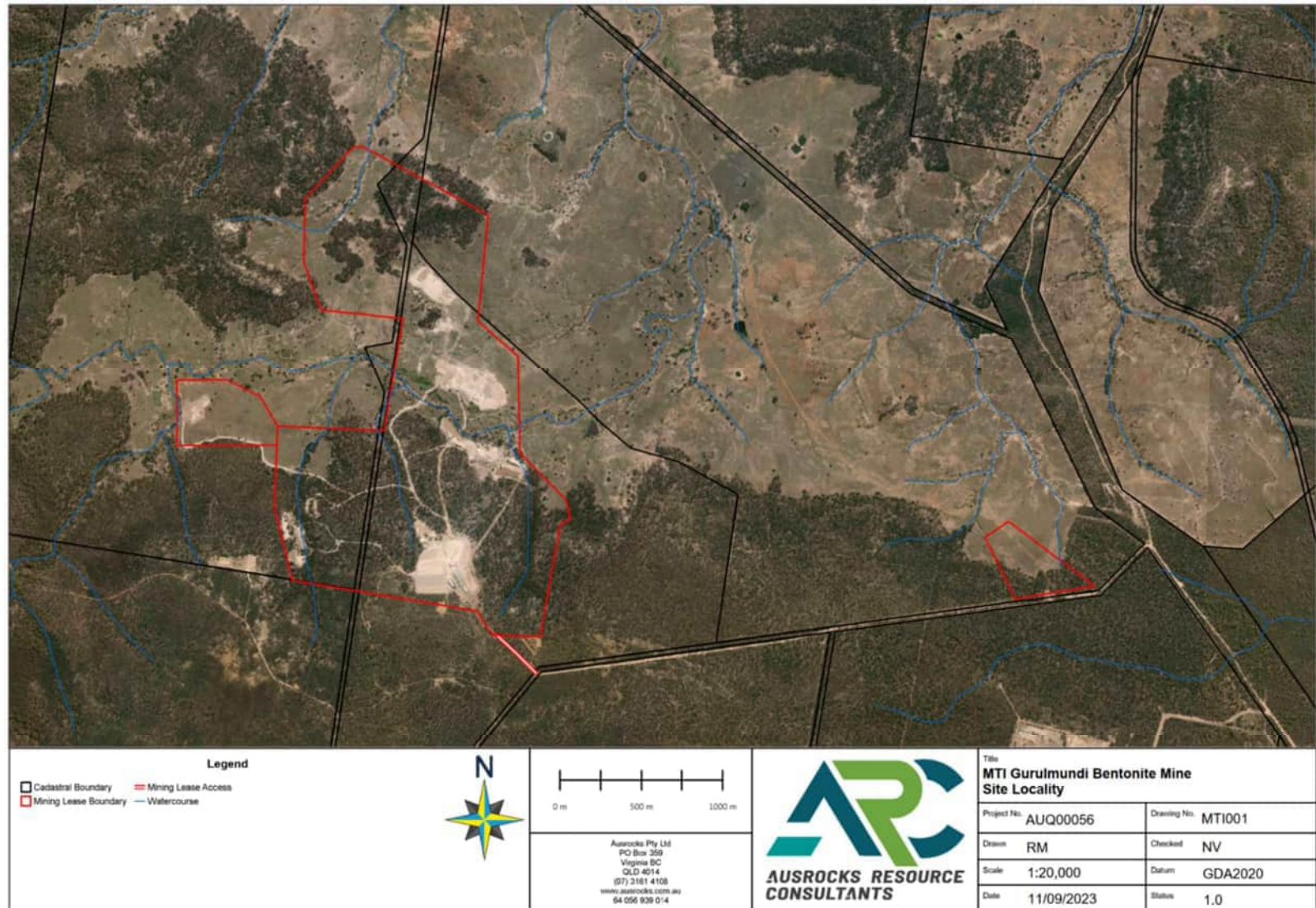


Figure 1: Site Layout Plan

2 SOILS

2.1 Background

A soil survey assessment was completed in 2022 to support the requirements of the site's Transitional PRC plan². The purpose of the survey was to conduct a land assessment of the project area to:

- Devise and execute a land assessment survey in non-disturbed areas to provide background information data of the existing landscape as a baseline for rehabilitation purposes;
- Investigate the soil condition of any previously rehabilitated areas;
- Provide a report summarising the land assessment and previously rehabilitated areas characteristics across the Mine; and
- Develop a soil rehabilitation methodology and topsoil amelioration procedure.

2.2 Soil Characteristics

Primary topsoil is defined as the uppermost layer of soil used in site rehabilitation. This is salvaged from the surface horizons of areas to be disturbed, is relatively stable, contains seeds and micro-organisms and is relatively fertile. If secondary topsoil is used, this is placed directly in contact with waste rock and may be obtained from subsurface soil horizons, including weathered rock.

Topsoil was examined to determine its physical and chemical properties. The main chemical properties analysed in the survey included pH (pH_{1.5}), electrical conductivity (EC_{1.5}), cation exchange capacity (CEC), exchangeable sodium percentage (ESP), calcium and magnesium ratio (Ca:Mg), Emerson aggregate test (EAT), and organic carbon (OC). Physical properties were inferred from soil profiles sampled using a hand auger such as horizon depths and boundary distinctness, field texture, Munsell colour, mottles colour and abundance, coarse fragments size and abundance, structure, and segregations and abundance.

Field descriptions were undertaken in accordance with the Australian Soil Survey and Land Survey Field Handbook and classified using the Australian Soil Classification^{3,4}.

² Horizon Soil Science and Engineering. (October 2022). Report on the Soil Survey of Leases of the Mineral Technologies Bentonite Mine. Rev 1.0 (Final).

³ McDonald, R.C. (1998). *Australian Soil and Land Survey: Field Handbook (Third Edition)*, National Committee on Soil Terrain. CSIRO Publishing.

⁴ Isbell, R.F. (2016). *The Australian Soil Classification*, National Committee on Soil Terrain. CSIRO Publishing.

3 LAND SUITABILITY ASSESSMENT

3.1 Pre-Mining Land Suitability

The site was assessed for land suitability for agricultural land use as outlined by Forster⁵. The site was also assessed for Good Quality Agricultural Land (GQAL) in accordance with the 'Guidelines for Agricultural Land Evaluation in Queensland (Second Edition)'⁶.

The land suitability class for a land area is determined by the highest ranking limiting factor or a combination of a number of factors defined by DSITI and DNRM⁶. The most severe two or three limiting factors typically determine the land suitability class whilst the remaining limiting factors become irrelevant. The five-class system is based on the physical and chemical limiting factors applied directly to specific uses. These are described in **Table 3.1**.

The DSITI and DNRM guidelines should be used to provide local authorities and development proponents to help identify areas of good quality agricultural land for planning and project approval purposes. A summary of the relationship between land suitability and GQAL is provided in **Table 3.2**.

Table 3.1: Land Suitability Classes

Class	Severity	Limitations	Description
1	Suitable	Negligible	Highly productive land requiring only simple management practices to maintain economic production.
2	Suitable	Minor	Land with limitations that either constrain production or require more than the simple management practices of class 1 land to maintain economic production.
3	Suitable	Moderate	Land with limitations that either further constrain production or require more than those management practices of Class 2 land to maintain economic production.
4	Unsuitable	Severe	Currently unsuitable land. The limitations are so severe that the sustainable use of the land in the proposed manner is precluded. In some circumstances, the limitations may be surmountable with changes to knowledge, economics or technology.
5	Unsuitable	Extreme	Land with extreme limitations that preclude any possibility of successful sustained use of the land in the proposed manner.

⁵ Forster, B. A. (1985). Evaluation of Agricultural land in Taroom Shire. Queensland Department of Primary Industries. Report No. QO85032

⁶ DSITI and DNRM. (December 2015). Guidelines for Agricultural Land Evaluation in Queensland (Second Edition). Queensland Government (Department of Science, Information Technology and Innovation and Department of Natural Resources and Mines).

Table 3.2: Scheme for classifying Good Quality Agricultural Land and correlations with Land Suitability Classes

GQAL Land Class	Land Suitability (Cropping)	Land Suitability (Grazing)	Description
A	1-3	1-3	[Crop Land] Land that is suitable for a wide range¹ of current and potential crops with nil to moderate limitations to production.
A1	1	1	Suitable for a wide range of current and potential broadacre and horticulture ² crops.
A2	1-2	1-2	Suitable for a wide range of current and potential horticulture crops only.
B	4	1-3	[Limited Crop Land] Land that is suitable for a narrow range³ of crops. The land is suitable for sown pastures and may be suitable for a wider range of crops with changes to knowledge, economics or technology.
C	5	1-2	[Pasture Land] Land that is suitable only for improved or native pastures due to limitations that preclude continuous cultivation for crop production. Some areas may tolerate a short period of ground disturbance for pasture establishment.
C1	5	2	Suitable for grazing sown pastures requiring ground disturbance for establishment, or native pastures on higher fertility soils.
C2	5	3	Suitable for grazing native pastures, with or without the introduction of pasture species, and with lower fertility soils than C1.
C3	5	4	Suitable for light grazing of native pastures in accessible areas and includes steep land more suited to forestry or catchment protection.
D	5	5	[Non-Agricultural Land⁴] Land not suitable for agricultural use, including land alienated from agricultural use.
A/C A/D B/C C/D	-	-	[Complex Codes] Land that is a complex of class A, B, C or D land where it is not possible to delineate the land class at the map scale. The dominant class is the first code in the sequence and is assumed to be >50% of the area, but <70% ⁵ .

¹ A wide range of crops is four or more crop types of local commercial significance.

² Horticulture includes intensively grown small crops (e.g. vegetables) as well as tree crops (e.g. grown for nuts, seeds or fruit). Silviculture (plantation forestry) is not included.

³ A narrow range of crops is three or fewer crop types (broadacre or horticulture) of local commercial significance. Silviculture (plantation forestry) may be included. Crops with similar agronomic requirements e.g. maize and grain sorghum, peaches and nectarines are not generally regarded as different crop types. Different management regimes (including irrigation strategies) for the same crop do not increase the number of crops.

⁴ Non-agricultural land includes land that cannot be placed in any of the other land classes and includes land such as urban areas and stream channels.

⁵ In cases where two or more land classes are equally dominant and none are greater than 50%, judgement is used to identify the most appropriate agricultural land class/es for the unit.

3.2 Post-Mining Land Suitability

The EA acts as the Land Outcome Document (LOD) for the site and post-mining land suitability is determined by the EA 'Table F1' (**Table 1.1**).

3.3 Good Quality Agricultural Land

The site is within the Western Cropping Zone strategic cropping area under the *Regional Planning Interests Act 2014* and is categorised as class C2 agricultural land. The Western Downs Regional Council Planning Scheme does not map the mine as GQAL.

3.4 Erosion Hazard and Control

3.4.1 Erosion Hazard

Open cut mining activities involve land disturbance that can pre-dispose an area to erosion risks. Mining activities that require erosion mitigation strategies include:

- Topsoil stripping prior to mining development and/or for infrastructure development (e.g. haul roads, hard stands, access tracks);
- Drainage line crossing (e.g. for pipes and roads);
- Spoil dump placement (a fractured mix of earthen fines with a high erosion potential); and
- Topsoil stockpiles.

3.4.2 Erosion Control

Progressive rehabilitation will be undertaken to stabilise disturbed areas as soon as practicable to limit erosion. Erosion and sediment control measures consistent with best practice methods will be employed⁷. Design parameters for the construction of erosion control works will be in accordance with established principles for engineering and soil conservation earthworks (e.g. rock armoured or grass lined waterways).

Erosion will be controlled by the following:

- Install sediment barriers, as required;
- Rehabilitate pits (via filling) as soon as practicable after mining;
- Revegetate final profiles;
- Limit bench heights and angles;
- Maintain fencing to prevent cattle access to rehabilitation areas; and
- Maintain drains around pit areas, repairing as required.

Strategies summarised in **Table 3.3** will be implemented throughout the life of the mine.

Table 3.3: Erosion control measures

⁷ Department of Minerals and Energy. (1995). Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland.

Area	Control measure
Cleared land	<ul style="list-style-type: none"> • Limit clearing to areas essential for mining operations • Minimise soil exposure time • Divert run-off from undisturbed areas away from mining operations • Direct run-off from cleared areas to sediment dams
Exposed soils	<ul style="list-style-type: none"> • Minimise subsoil exposure time (where required) • Direct run-off from exposed areas to sediment dams
Active pits	<ul style="list-style-type: none"> • Divert run-off from away from pits
Active waste rock dumps	<ul style="list-style-type: none"> • Direct run-off from cleared areas to sediment dams • Control surface drainage to minimise formation of active rills and/or gullies
Rehabilitation	<ul style="list-style-type: none"> • Install drainage control works • Assessment of suitability of growth media/topsoil, and development of an amelioration and physical treatment plan completed by an AQP. • Replace topsoil (incl amelioration if recommended), rip on the contour and seed • Direct run-off from rehabilitated areas to sediment dams
Infrastructure	<ul style="list-style-type: none"> • Limit traffic to maintained tracks and roads • Install sediment traps, silt fences, and other appropriate sediment controls • Rehabilitated disturbed areas around infrastructure sites as soon as practicable

Appendix 2 provides a desktop Surface Erosion Assessment for the final landform of the site.

3.5 Strategic Cropping Land

The objectives of the *Strategic Cropping Land Act 2012* are to:

- Protect land that is highly suitable for cropping;
- Manage the impacts of development on that land; and
- Preserve the productive capacity of that land for future generations.

No mining leases are defined as strategic cropping land on trigger maps⁸. No known historical cropping has occurred on the subject land. Therefore no further assessment is required under this framework.

⁸ <https://qldglobe.information.qld.gov.au/> (accessed October 2022)

4 POST MINING LAND USE & REHABILITATION

4.1 Rehabilitation Principles and Hierarchy

The overriding principles for rehabilitation at the Mine are to achieve rehabilitation objectives outlined in EA condition F1:

- Safe for humans and wildlife;
- Non-polluting;
- Stable;
- Able to sustain an agreed PMLU in accordance with the FLURP;
- Revegetated with species endemic appropriate to achieve the agreed PMLU and free of declared pest species;
- Compliant with the FLURP; and
- Compliance with all conditions of the environmental authority.

4.2 Post-Mining Rehabilitation Goal

The primary rehabilitation goal is to achieve proposed PMLU descriptions per **Table 1.1** – marginal grazing for all disturbance types and water storage for pit disturbance only. However through the PRCP process it has been identified that portions of the land are wholly unsuitable to be rehabilitated to marginal grazing due to the underlying slope characteristics (pre-existing and post-mining). Therefore an additional PMLU – hybrid ecosystem has been proposed to allow areas of the mine to be rehabilitated to conditions that are similar to marginal grazing but have different slope and cover characteristics. These areas are still likely to sustain grazing activities by the landholder, but are not strictly classified as marginal grazing.

Rehabilitation objectives for a PMLU of marginal grazing will be achieved by:

- Creating stable rehabilitated landforms that are safe to humans and wildlife and are non-polluting;
- Ensuring rehabilitated landforms are able to support sustainable marginal grazing activities;
- Implementing and monitoring measurable standards to assess rehabilitation success to agreed marginal grazing land use (acceptance criteria);
- Ensuring progressive rehabilitation of disturbed land over the life of mine to minimise extent of disturbed land and to reduce rehabilitation burden prior to mine closure; and
- Achieving regulatory approvals for surrender of the mining tenements to allow complete mine closure.

Rehabilitation objectives for a PMLU of hybrid ecosystem will be achieved by:

- Creating stable rehabilitated landforms that are safe to humans and wildlife and are non-polluting;
- Ensuring rehabilitated landforms are able to support limited grazing activities under controlled conditions;
- Implementing and monitoring measurable standards to assess rehabilitation success to agreed native ecosystem land use (acceptance criteria);
- Ensuring progressive rehabilitation of disturbed land over the life of mine to minimise extent of disturbed land and to reduce rehabilitation burden prior to mine closure; and

- Achieving regulatory approvals for surrender of the mining tenements to allow complete mine closure.

Rehabilitation objectives for a PMLU of water storage will be achieved by:

- Creating stable rehabilitated landforms that are safe to humans and wildlife and are non-polluting;
- Ensuring rehabilitated landforms are geotechnically stable to support long-term water storage use;
- Implementing and monitoring measurable standards to assess rehabilitation success to water storage land use (acceptance criteria) and water quality testing for livestock suitability; and
- Achieving regulatory approval for surrender of the mining tenements to allow complete mine closure.

4.3 Post-Mining Land Use

The PMLU for disturbed areas of the Mine will be a combination of marginal grazing using native and pasture (3P and exotic) grass species and native ecosystem (hybrid) with native grass and shrub species. The nominated land use will ensure that land suitable for grazing remains agriculturally productive, to suit land suitability classes, and the remaining land is consistent with existing surrounding land uses.

4.4 Rehabilitation Strategies

MTI's rehabilitation strategy relies on the progressive rehabilitation of areas disturbed by mining using a range of techniques including, but not limited to:

- appropriate pre-disturbance preparation to efficiently coordinate mining activities;
- implementation of practical landform designs to prevent erosion and establish long-term geotechnical stability;
- identification of an appropriate post-mine land use consistent with local environmental constraints;
- progressive rehabilitation of disturbed areas using appropriate rehabilitation procedures;
- a corrective action program to address areas of substandard rehabilitation.

4.4.1 Progressive Rehabilitation

A progressive rehabilitation program will continue to be implemented for the site. Progressive rehabilitation will commence as soon as possible, and as areas become available within operation site areas.

The main features of progressive rehabilitation include:

- development of stable slope designs that incorporate appropriate water management structures (e.g. contour banks, etc.);
- use of suitable topsoil, which will either be stockpiled until recontoured areas are available or respread immediately across available recontoured areas;
- seeding with an appropriate seed mix (e.g. groundcover & shrub species) prior to the commencement of the wet season to maximise benefits of subsequent rainfall;
- application of appropriate fertiliser and/or other soil ameliorants to encourage establishment of vegetation (where required); and
- battering down of final void slopes to create free-draining landforms that can safely support the proposed final land use.

4.4.2 Revegetation

MTI's revegetation methods for land disturbed by mining activities will consist of the following activities:

- resspreading stockpiled or freshly stripped topsoil;
- contour ripping;
- application of appropriate fertiliser and/or other soil ameliorants to encourage establishment of vegetation (where required); and
- seeding with an appropriate seed mix

4.4.3 Rehabilitation Maintenance

Rehabilitation will be monitored in order to identify any areas requiring maintenance or repair. Rehabilitated areas that have not achieved the designated acceptance criteria will be repaired.

Supplementary planting and/or seeding campaigns may be required to increase species diversity and/or groundcover. Maintenance work will be performed to repair any areas of existing rehabilitation, particularly in areas of excessive erosion. In the event problem areas occur, these will be investigated to determine the cause of degradation and implement appropriate corrective actions.

4.4.4 Decommissioning

On the completion of mining activities, infrastructure will be treated as follows:

- mine roads will be left behind for use as farm roads, or if not required, these will be rehabilitated;
- water storage(s) will remain if required for use as stock drinking water, or if not required, these will be rehabilitated;
- buildings, plant and equipment will remain per the site landholder agreement, where infrastructure is not agreed to remain, these will be appropriately decommissioned, demolished and/or removed; and
- contaminated land management will be completed as required and if contamination is suspected under the *Environmental Protection Act 1994*.

A Final Rehabilitation Report and other relevant statements will be produced as a statutory requirement of the surrender process for environmental authorities and their associated mining tenures.

5 SELECTION AND DESCRIPTION OF ANALOGUE SITES

5.1 Methodology for Selection of Analogue Sites

Analogue sites were selected as representative of Grazing Land Suitability Class VII and Native Ecosystems (for Hybrid Ecosystem PMLU). Analogue sites are used as a means of providing a baseline to which future land use rehabilitation can be measured against to prove achievement of success criteria and rehabilitation outcomes. The sites are intended to represent a typical example of that Land Suitability Class and provide an opportunity for meaningful monitoring to continue into the future. Note, monitoring of analogue sites is not a requirement of the EA.

5.2 Description of Analogue Sites

5.2.1 Land Suitability Class VII – Marginal Grazing

The analogue sites chosen for Land Suitability Class VII are located areas north of ML55017 and within the northern portion of ML55007, selected as representative examples of marginal grazing on lands undisturbed by mining activities (**Appendix 1**). The approximate coordinates are listed in **Table 5.1** (A1 and A2). The analogue sites are positioned within areas currently used for marginal grazing land use by the landowner (██████████). The sites are also an example of the typical landscapes immediately surrounding MTI Gurulmundi. The analogue sites exhibit natural rates of erosion in areas adjacent to Juandah Creek; where observed rates of erosion seem typical of sodic soils found in the region.

5.2.2 Hybrid Ecosystem

The analogue sites chosen for Hybrid Ecosystem are located areas in central ML55007 and Southern ML55007, selected as representative examples of native ecosystem on lands undisturbed by mining activities (**Appendix 1**). The approximate coordinates are listed in **Table 5.1** (A3 and A4). The analogue sites are positioned within areas that are typical landscapes immediately surrounding MTI Gurulmundi. Site A3 is positioned on the plateau with relatively low slope angles (between 0-15%), which is representative of the infrastructure and processing area and the hybrid ecosystem rehabilitation areas. Site A4 is positioned on a slope (between 15-60%), which is representative of several rehabilitation areas including portions of the West, North and Central pits. The analogue sites exhibit natural rates of erosion on the upper elevated portions of the site, in both flat topography as well as slopes.

Table 5.1: Coordinates of Analogue Site (MGA GDA2020)

Analogue Site Locations				
LABEL	EASTING	NORTHING	LAT	LONG
A1	796,987	7,077,364	-26.392974	149.976727
A2	798,811	7,077,405	-26.392225	149.994980
A3	798,244	7,076,029	-26.404751	149.989620
A4	799,022	7,076,279	-26.402329	149.997349

6 PROPOSED REHABILITATION ACCEPTANCE CRITERIA

6.1 Proposed Rehabilitation Acceptance Criteria

6.1.1 Grazing Land PMLU

Proposed rehabilitation acceptance criteria have been developed to monitor the progress of rehabilitation efforts for the site. **Table 6.1** summarises the acceptance criteria to achieve a PMLU of marginal grazing. These acceptance criteria are considered appropriate to achieving the rehabilitation goals of creating a safe, stable and non-polluting environment.

Table 6.1: Marginal grazing PMLU objectives, indicators and acceptance criteria

Rehabilitation goal	Objective	Indicator	Acceptance criteria
Safe to humans and wildlife	Safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use	Hazard assessment	No significant difference
Non-polluting	Rainfall runoff from rehabilitation achieves relevant water quality objectives for receiving waters	ANZECC 95% aquatic ecosystem threshold	No significant difference
	Deep drainage from rehabilitation achieves relevant water quality objectives for groundwater	ANZECC 95% aquatic ecosystem threshold	Not significantly different to local water quality objectives in accordance with the Queensland Water Quality Guidelines ¹
Stable	Rehabilitation is geotechnically stable	Factor of Safety (FoS)	FoS $\geq 1.5^2$
	Rehabilitation is erosionally stable	Extent, slope gradient and groundcover	Groundcover $\geq 70\%$ 95% slopes $\leq 15\%$ gradient
Able to sustain an agreed post-mining land use	Rehabilitation is suitable for sustainable grazing pasture	Land suitability assessment for grazing pasture	Land suitability ≥ 3 or not different from pre-mining class if ≥ 4
		Native plant richness	≥ 4 ground cover species per hectare

¹ Queensland Department of Environment and Heritage Protection (re-published July 2013) Queensland Water Quality Guidelines 2009

² ANCOLD (2017): Factor of Safety

6.1.2 Grazing Revegetation Species

The EA Condition F1 e) requires the site to be '*Revegetated with species endemic appropriate to achieve the agreed post mining land use and free of declared pest species*'. Native pastures are grazing environments that are usually dominated by native grasses but also contain many other native herbs and shrubs. Healthy, relatively undisturbed native pastures commonly have a mix of introduced species, such as annual and perennial grasses, clovers and herbs.

The species mix selected for revegetation has been developed based on selecting a combination of primarily native (endemic) species suited to the topsoils present within the site. The surrounding pasture land already contains a mix of native and exotic pasture grasses which are considered as perennial, productive and palatable (3P). Species availability is prone to annual fluctuation and in the event of unavailability, species will be substituted with other species listed in this table.

Table 6.2: Recommended species list and sowing rates for grazing PMLU

Common name	Scientific name	Sowing rate (kg/ha)
Black Speargrass	<i>Heteropogon contortus</i> (3P)	<1kg to 5kg/ha
Cotton Panic	<i>Digitaria brownii</i>	
Michell Grass	<i>Astrebla</i> (3P)	
Native Millet	<i>Panicum decompositum</i> (3P)	
Brigalow grass	<i>Paspalidium species</i> (3P)	
Curly bluegrass	<i>Dichanthium fecundum</i> (3P)	
Giant speargrass	<i>Heteropogon tiliaceus</i> (3P)	
King bluegrass	<i>Dichanthium queenslandicum</i> (3P)	
Desert bluegrass	<i>Bothriochloa ewartiana</i> (3P)	
Bull Mitchell grass	<i>Astrebla squarrosa</i> (3P)	
Kangaroo grass	<i>Themeda australis</i>	
Golden Beard Grass	<i>Chrysopogon fallax</i> (3P)	
Queensland bluegrass	<i>Dichanthium sericeum</i> (3P)	
Narrow-leaved ironbark	<i>Eucalyptus crebra</i>	
Windmill grass/es	<i>Enteropogon species</i> (3P)	
Tall cup grass	<i>Eriochloa crebra</i> (3P)	
Lemon Sented	<i>Corymbia citriodora</i>	
Red Ash	<i>Alphitonia excelsa</i>	
Grass tree	<i>Xantheria johnstonii</i>	
Total		<15kg/ ha

6.1.3 Hybrid Ecosystem PMLU

Proposed rehabilitation acceptance criteria have been developed to monitor the progress of rehabilitation efforts for the site. **Table 6.3** summarises the acceptance criteria to achieve a PMLU of hybrid ecosystem. These acceptance criteria are considered appropriate to achieving the rehabilitation goals of creating a safe, stable and non-polluting environment.

Table 6.3: Hybrid Ecosystem PMLU objectives, indicators and acceptance criteria

Rehabilitation goal	Objective	Indicator	Acceptance criteria
Safe to humans and wildlife	Safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use	Hazard assessment	No significant difference
Non-polluting	Rainfall runoff from rehabilitation achieves relevant water quality objectives for receiving waters	ANZECC 95% aquatic ecosystem threshold	No significant difference
	Deep drainage from rehabilitation achieves relevant water quality objectives for groundwater	ANZECC 95% aquatic ecosystem threshold	Not significantly different to local water quality objectives in accordance with the Queensland Water Quality Guidelines ¹
Stable	Rehabilitation is geotechnically stable	Factor of Safety (FoS)	FoS $\geq 1.5^2$
	Rehabilitation is erosionally stable	Extent, slope gradient and groundcover	Groundcover $\geq 70\%$ slopes with comparable gradient to surrounding undisturbed slopes
Able to sustain an agreed post-mining land use	Rehabilitation is able to sustain hybrid ecosystem	Native plant richness	≥ 3 ground cover species per hectare ≥ 2 shrub species per hectare

¹ Queensland Department of Environment and Heritage Protection (re-published July 2013) Queensland Water Quality Guidelines 2009

² ANCOLD (2017): Factor of Safety

6.1.4 Hybrid Ecosystem Revegetation Species

There are no specific EA conditions which describe the rehabilitation of areas to suit a PMLU of hybrid ecosystem. The reasoning behind these areas being specified as hybrid ecosystem rather than grazing is due to the slope characteristics in a portion of these areas, and the suitability of the grazing rehabilitation when the surrounding area is predominantly Regional Ecosystem (RE). Therefore to maintain the intent of the EA conditions, the hybrid ecosystem areas will be rehabilitated using a similar groundcover species mix as the grazing, but also include a portion of shrub species that are commonly found in the surrounding RE. This is intended to provide suitable connectivity between the areas for wildlife habitat but also provide some value as low intensity grazing for the landowner. In time these rehabilitation areas may naturally recruit tree species from the surrounding RE, but due to the overall land use preference for grazing tree species are not considered mandatory for the hybrid ecosystem to function as a connectivity area. Revegetation species have been referenced from a varied of sources including:

- BioCondition Benchmarks for Regional Ecosystems 11.10.1 and 11.7.2 with a preference for 11.10.1 as it dominates the landscape 90%.

- Regional Ecosystem Descriptions Database

The species mix selected for revegetation has been developed based on selecting a combination of native (endemic) species and exotic species suited to the topsoils present within the site.

Table 6.4: Recommended species list for Hybrid ecosystem

Common name	Scientific name	Sowing rate (kg/ha)
Black Speargrass	<i>Heteropogon contortus</i>	<1kg to 5kg/ha
Cotton Panic	<i>Digitaria brownii</i>	
Desert Bluegrass	<i>Bothriochloa ewartiana</i>	
Kangaroo Grass	<i>Themeda australis</i>	
Golden Beard Grass	<i>Chrysopogon fallax</i>	
Soap Tree / Red Ash	<i>Alphitonia excelsa</i>	
Hickory Wattle	<i>Acacia glaucocarpa</i>	
Henderson's bloodwood	<i>Corymbia hendersonii</i>	
Clarkson's bloodwood	<i>Corymbia clarksoniana</i>	
Moreton Bay ash	<i>Corymbia tessellaris</i>	
Brown bloodwood	<i>Corymbia trachyphloia</i>	
Gympie messmate	<i>Eucalyptus cloeziana</i>	
Wild pear	<i>Persoonia falcata</i>	
Rare Panic	<i>Paspalidium rarum</i>	
Burrow's wattle	<i>Acacia burrowii</i>	
Queensland peppermint	<i>Eucalyptus exserta</i>	
Gum-top ironbark	<i>Eucalyptus decorticans</i>	
Blake's wattle	<i>Acacia blakei</i>	
Currawong tree	<i>Acacia sparsiflora</i>	
Quinine bush	<i>Petalostigma pubescens</i>	
Lancewood	<i>Acacia shirleyi</i>	
Bendee	<i>Acacia catenulata</i>	
Turkey bush	<i>Acalypha eremorum</i>	
Mountain yapunyah	<i>Eucalyptus thozetiana</i>	
Steel Geass	<i>Xanthorrhoea johnsonii</i>	
White croton	<i>Croton phebaloides</i>	
Conkerberry	<i>Carissa ovata</i>	
Leafy panic	<i>Urochloa foliosa</i>	
Many-headed Wiregrass	<i>Aristida caput-medusae</i>	
Narrow-leaved ironbark	<i>Eucalyptus crebra</i>	

Common name	Scientific name	Sowing rate (kg/ha)
Lemon-scented gum	<i>Corymbia citriodora</i>	
Red Ash	<i>Alphitonia excelsa</i>	
Grass tree	<i>Xantheria johnstonii</i>	
Black Wattle	<i>Acacia leiocalyx</i>	
Native Blackthorn	<i>Bursaria spinosa</i>	
	Total	<20kg/ ha

6.1.5 Water storage PMLU

Proposed rehabilitation acceptance criteria have been developed to monitor the progress of rehabilitation efforts for the site. **Table 6.5** summarises the acceptance criteria to achieve a water storage PMLU. These acceptance criteria are considered appropriate to achieving the rehabilitation goals of creating a safe, stable and non-polluting environment.

Table 6.5: Water storage PMLU objectives, indicators and acceptance criteria

Rehabilitation goal	Objective	Indicator	Acceptance criteria
Safe to humans and wildlife	Safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use	Hazard assessment	No significant difference
			Steep slopes adequately fenced
Non-polluting	Rainfall runoff from rehabilitation achieves relevant water quality objectives for receiving waters	ANZECC 95% aquatic ecosystem threshold	No significant difference
	Deep drainage from rehabilitation achieves relevant water quality objectives for groundwater	ANZECC 95% aquatic ecosystem threshold	Not significantly different to local water quality objectives in accordance with the Queensland Water Quality Guidelines ¹
Stable	Rehabilitation is geotechnically stable	Factor of Safety (FoS)	FoS $\geq 1.5^2$
	Rehabilitation is erosionally stable	Extent, slope gradient and groundcover	Groundcover $\geq 70\%$ slopes $\leq 33\%$ gradient (1V:3H)
Able to sustain an agreed post-mining land use	Rehabilitation is suitable for sustainable grazing pasture	ANZECC 90% stock drinking water threshold	Water quality modelling shows water column is not predicted to dry out or overflow
		Water balance	Residual voids are not predicted to dry out or overflow
		Floodplain modelling	Residual voids are not in a floodplain zone 1% AEP modelling

7 REPORTING FRAMEWORK

7.1 Monitoring of Rehabilitation Works

At the commencement of rehabilitation works in a new area, permanent photograph points will be established and delineated by star pickets (or some other suitable physical marker). The geographic location and coordinates of the photograph should be recorded using GPS. This point will form the start of a permanent rehabilitation monitoring site. Rehabilitation sites will be monitored in an on-going process for the duration of the mine life, and up to progressive certification and/or surrender of the mining lease.

7.2 Annual Rehabilitation Reports

An Annual Rehabilitation Report (ARR) will be completed for each calendar year to document rehabilitation progress, per condition F3d), and will be provided to the administering authority upon request. This report will be qualitative and comprise a pictorial record of new rehabilitation areas and any significant rehabilitation events over the 12-months in older existing rehabilitation areas. The ARR will include, but is not limited to the following:

- A summary description of visual monitoring for active rill/gully erosion within the first 12-months after seeding and after heavy rainfall events;
- Photographs of new rehabilitation areas from permanent photographic point locations;
- A summary of the new rehabilitation areas, including seeding rates, soil treatment, topsoil source; and
- A summary description of any rehabilitation failure works, and maintenance conducted or proposed to be conducted for these areas.

7.3 Revegetation Monitoring Program

Formal revegetation monitoring (across all PMLU's) will be conducted by a competent person and will occur in 6-month intervals (minimum). New rehabilitation areas will be added progressively and as necessary – dependent on establishment success and climatic conditions such as rainfall, seasonal factors. This monitoring program will be applied to all areas disturbed by mining activities from the adoption of this FLURP (i.e. following the replacement of the Mine's previous FLURP) and will remain in place until all rehabilitation works are deemed to be successful at Gurulmundi Mine for surrender of the associate mining tenure(s).

7.3.1 Grazing and Hybrid ecosystem PMLU monitoring

Rehabilitation will be monitored in 6-month intervals until it achieves all the relevant rehabilitation milestones, then intermittently until ML surrender. During the monitoring program, revegetation areas will be compared against the success criteria proposed in **Table 6.1** and **Table 6.3**. The following information will be collected during each monitoring visit:

- Photo images of existing and new rehabilitation areas (RAs) for comparison with surrounding areas of similar land uses and/or composition;
- Records of treatments used for each new RA including seeding rate, soil treatment, and topsoil source;
- Summary of plant species within RAs including cover percentages and species diversity;
- Presence and abundance of weed species;

- Soil testing program for each uniform RA (testing >1 sample locations per 6ha, and >3 sample locations per RA) – samples taken at a maximum of 100mm increments and at depth no less than topsoil capping depth;
- Soil testing conducted by NATA accredited laboratory for pH, ESP, ECse and OC;
- Summary of any fauna re-settling in rehabilitated areas;
- Landform monitoring (slope angle, contour bank spacing, waterways, presence/absence of severe rill or gully erosion); and
- Summary of poor rehabilitation activities and maintenance applied and/or proposed for each affected area RA.

7.3.2 Water storage PMLU and water quality monitoring

Rehabilitation will be monitored in 6-month intervals until it achieves all the relevant rehabilitation milestones, then intermittently until ML surrender. During the monitoring program, revegetation areas will be compared against the success criteria proposed in **Table 6.5**. The following information will be collected during each monitoring visit:

- Photo images of existing and new RAs for comparison with surrounding areas of similar land use;
- Records or treatments and/or works applied for each new RA including, but not limited to backfilling, re-profiling, geotechnical and/or safety inspections;
- All requirements approved and prescribed in the Site Water Management Plan;
- Landform monitoring (slope angle, contour bank spacing, waterways, presence/absence of severe rill or gully erosion); and
- Summary of poor rehabilitation activities, maintenance applied and/or proposed for each affected RA.

Additional to the PMLU rehabilitation monitoring further monitoring is required for the water storage PMLU. Water quality monitoring is required to ensure that the water storages will be safe for use and there is no adverse contamination in streams across the site. Water storages will be monitored every 3-months for water quality to ensure the water quality will achieve the rehabilitation goals.

When flow is observed in any of the downstream monitoring locations (**Table 7.1**) samples must be taken monthly (when flow is observed) to ensure downstream locations are not negatively impacted. If samples indicate an exceedance the corresponding upstream location must be compared to determine the source of exceedance.

Table 7.1: Surface water monitoring locations

Monitoring locations	Receiving water location description	Latitude	Longitude
		Decimal degree, GDA2020	
Upstream monitoring locations			
WS5	Juandah Creek upstream of ML55017	-26.3940	149.9767
WS6		-26.4022	150.0251
WS8		-26.3864	149.9848
Downstream monitoring locations			
WS1		-26.3937	149.9865
WS2	Tributary of Juandah Creek downslope from Dam 2	-26.3944	149.9872
WS3	Tributary of Juandah Creek downslope from Dam 2	-26.3979	149.9865
WS4	Juandah Creek – downstream of operations	-26.3973	149.9979
WS7		-26.3967	150.0288
WS9		-26.3821	149.9882

7.4 Identification of Remedial Works

Remedial works may be required at various stages during the rehabilitation process, and may include the following actions:

- Soil remediation may be required prior to the seeding/planting of rehabilitation areas – these requirements will be based on the soil type, recommended and applied stripping depths, and if applicable, the residence time in storage;
- Failure to achieve the desired levels of vegetation cover and/or species diversity – this will require supplementary seeding and/or planting;
- Weed infestation – will require treatment to an appropriate standard or as defined by legislation;
- Erosion damage repair is dependent on the level of severity – the potential for erosion will be controlled by the establishment of ground cover and through the correct design and maintenance of water management structures. Areas identified with a high potential for erosion will be treated with appropriate erosion controls to reduce the erosion rate to <5t/ha/yr.

8 REFERENCES

- DME. (1995). Technical Guidelines for Environmental Management of Exploration and Mining in Queensland. Department of Minerals and Energy, Queensland.
- DSITI & DNRM. (2015). Guidelines for Agricultural Land Evaluation in Queensland, second edition. The State of Queensland (prepared by Department of Science, Information Technology and Innovation and Department of Natural Resources and Mines), Brisbane.
- Forster, B. A. (1985). Evaluation of Agricultural land in Taroom Shire. Queensland Department of Primary Industries. Report No. QO85032
- Herza, J., Ashley, M. & Thorp, J. (2017). Factor of Safety? – Do we use it correctly? Australian National Committee on Large Dams Incorporated.
- Horizon Soil Science and Engineering. (2022). Report on the Soil Survey of Leases of the Mineral Technologies Bentonite Mine. Rev 1.0 (Final).
- Isbell, R.F. (2016). The Australian Soil Classification, National Committee on Soil Terrain. CSIRO Publishing.
- McDonald, R.C. (1998). Australian Soil and Land Survey: Field Handbook (Third Edition), National Committee on Soil Terrain. CSIRO Publishing.
- QGov. (2024). Queensland Globe. Queensland Government. <https://qldglobe.information.qld.gov.au/>



Appendix 1

Analogue Site Images & Plan



Appendix 2

Surface Erosion Modelling



Appendix 3

Proposed Monitoring Plan_PRCP



Proposed Monitoring Plan - Gurulmundi					
LABEL	EASTING	NORTHING	LATITUDE	LONGITUDE	TYPE
WS1	797,957	7,077,266	-26.3937	149.9865	Water Sampling Point
WS2	798,030	7,077,178	-26.3944	149.9872	Water Sampling Point
WS3	798,249	7,076,791	-26.3979	149.9895	Water Sampling Point
WS4	799,088	7,076,832	-26.3973	149.9979	Water Sampling Point
WS5	796,981	7,077,255	-26.3940	149.9767	Water Sampling Point
WS6	801,795	7,076,225	-26.4022	150.0251	Water Sampling Point
WS7	802,174	7,076,832	-26.3967	150.0288	Water Sampling Point
WS8	797,809	7,078,073	-26.3864	149.9848	Water Sampling Point
WS9	798,164	7,078,539	-26.3821	149.9882	Water Sampling Point
WRP01	798,192	7,078,138	-26.3857	149.9886	Water Release Point
WRP02	798,161	7,077,615	-26.3905	149.9884	Water Release Point
WRP03	798,339	7,077,601	-26.3906	149.9902	Water Release Point
WRP04	798,635	7,077,748	-26.3892	149.9931	Water Release Point
WRP05	798,621	7,077,425	-26.3921	149.9931	Water Release Point
WRP06	798,653	7,077,080	-26.3952	149.9935	Water Release Point
WRP07	798,552	7,077,092	-26.3951	149.9925	Water Release Point
WRP08	798,483	7,077,022	-26.3957	149.9918	Water Release Point
WRP09	798,792	7,076,780	-26.3979	149.9949	Water Release Point
WRP10	799,042	7,076,697	-26.3986	149.9975	Water Release Point
WRP11	799,254	7,076,425	-26.4010	149.9996	Water Release Point
WRP12	797,751	7,076,262	-26.4028	149.9846	Water Release Point
WRP13	797,804	7,076,376	-26.4017	149.9851	Water Release Point
WRP14	797,977	7,076,427	-26.4012	149.9869	Water Release Point
WRP15	798,335	7,076,520	-26.4003	149.9904	Water Release Point
WRP16	798,480	7,076,281	-26.4024	149.9919	Water Release Point
WRP17	798,942	7,076,265	-26.4025	149.9966	Water Release Point
WRP18	802,097	7,076,262	-26.4018	150.0281	Water Release Point
WRP19	797,228	7,077,080	-26.3955	149.9792	Water Release Point



Appendix 4

Mining Sequence



Appendix 5

Ausrocks Resource Consultants: Annual Rehabilitation
Report 2023 Rev 1.1 (April 2024)

Annual Rehabilitation Report 2023

GURULMUNDI BENTONITE MINE

prepared by Ausrocks Resource Consultants
for Department of Environment, Tourism, Science & Innovation

AUQ00056



MINERALS TECHNOLOGIES INC.

**GURULMUNDI BENTONITE MINE –
ANNUAL REHABILITATION REPORT
2023**

01 APRIL 2024

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This document has been reviewed and signed off by the undersigned:

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Terms & Abbreviations

Term / abbreviation	Description
ANZECC	Australian and New Zealand Environment and Conservation Council
ARC	Ausrocks Resource Consultants (Ausrocks Pty Ltd)
ARR	Annual Rehabilitation Report
EA	Environmental Authority
FoS	Factor of Safety
Ha	Hectares
ML	Mining Lease
MTI	Mineral Technologies Incorporated
PMLU	Post-mining land use
PRC plan	Progressive Rehabilitation and Closure Plan in terms of the <i>Environmental Protection Act 1994</i> (Queensland)
PRCP Guideline	Progressive Rehabilitation and Closure Plan Guideline April 2023, Department of Environment and Science (Queensland)
RA	Rehabilitation Area

1 INTRODUCTION

This Annual Rehabilitation Report (ARR) for the Gurulmundi Bentonite Mine has been prepared by Ausrocks Resource Consultants (ARC) on behalf of Mineral Technologies Incorporated (MTI). Amcol is a wholly owned subsidiary of MTI who is the title holder of mining tenements ML55007, ML55008 and ML55017 (**Figure 2**).

This ARR has been prepared in accordance with Condition F3(d) of the site's environmental authority (EA) EPML00699113. This ARR for the Gurulmundi Bentonite Mine (also referred to as "MTI Gurulmundi") is applicable for the period 1 January 2023 to 31 December 2023 (the "reporting period").

Annual rehabilitation progress reporting is conducted to satisfy the requirements of Condition F4(d) and is supported by appropriate record keeping of rehabilitation measures implemented including, but not limited to, photographs demonstrative of rehabilitation achieved, and the preparation of an annual rehabilitation progress report.

Ownership and management of the Gurulmundi Bentonite Mine remained unchanged during the reporting period.

1.1 Description of mining tenements

1.1.1 ML55007

ML55007 (Permit name 'IMT0401') covers an area of 318.55 hectares (ha). This is the main mining area comprising most of the disturbance caused by mining activities. Mining in this area is undertaken in three (3) satellite pits referred to as the North (and Far North) Pit, Central Pit, West Pit; the area also includes a central processing and stockpiling area; an infrastructure area has also been developed (**Figure 2**).

The mining area is accessed via a southern access road intersecting Bailey's Road.

1.1.2 ML55008

ML55008 (Permit name 'BG2012') covers an area of 15.37ha and is located to the east of ML55007 (**Figure 2**). This area is not currently disturbed by mining activities however, future mining activities are proposed. Extracted resources will be hauled to ML55007 for processing and/or stockpiling. The extent of future proposed disturbance will comprise of exploration and/or extraction pit(s) and access road(s) which are aligned to disturbance types described in the EA 'Table F1 – Final Land Use and Rehabilitation Approval Schedule'.

1.1.3 ML55017

ML55017 (Permit name 'West Amcol') covers an area of 21.67ha and is located to the west of ML55007, sharing a portion of the mining lease boundary. Mining in this area is undertaken in one (1) satellite pit referred to as the Far West Pit (**Figure 2**).



1.2 Authorised Disturbance

In carrying out the mining activity authorised by the site's EA, the holder of the EA must comply with the authorised disturbance areas as described in 'Table A1 – Authorised Disturbance' summarised below.

Table 1: Authorised Disturbance (Environmental Authority 'Table A1')

Mine feature name	Location (GDA94)		Maximum disturbance (ha)	Description / purpose
	Northing	Easting		
North Pit	7077522.03	798684.28	25.50	Extraction area, topsoil and overburden stockpiles
West Pit	7076239.38	797714.85	3.54	Extraction area, topsoil and overburden stockpiles
Central Pit	7076694.56	798808.97	7.55	Extraction area, topsoil and overburden stockpiles
ML55008 Pit	7076050.70	802138.53	2.00	Extraction area, topsoil and overburden stockpiles
ML55017 Pit (Far West Pit)	7076962.99	797267.42	3.07	Extraction area, topsoil and overburden stockpiles
Processing and infrastructure area	7075952.77	798719.44	18.29	Infrastructure areas for ancillary mine activities
Haul roads	-	-	5.91	Access on site (haul roads and access tracks)
Total			65.86	

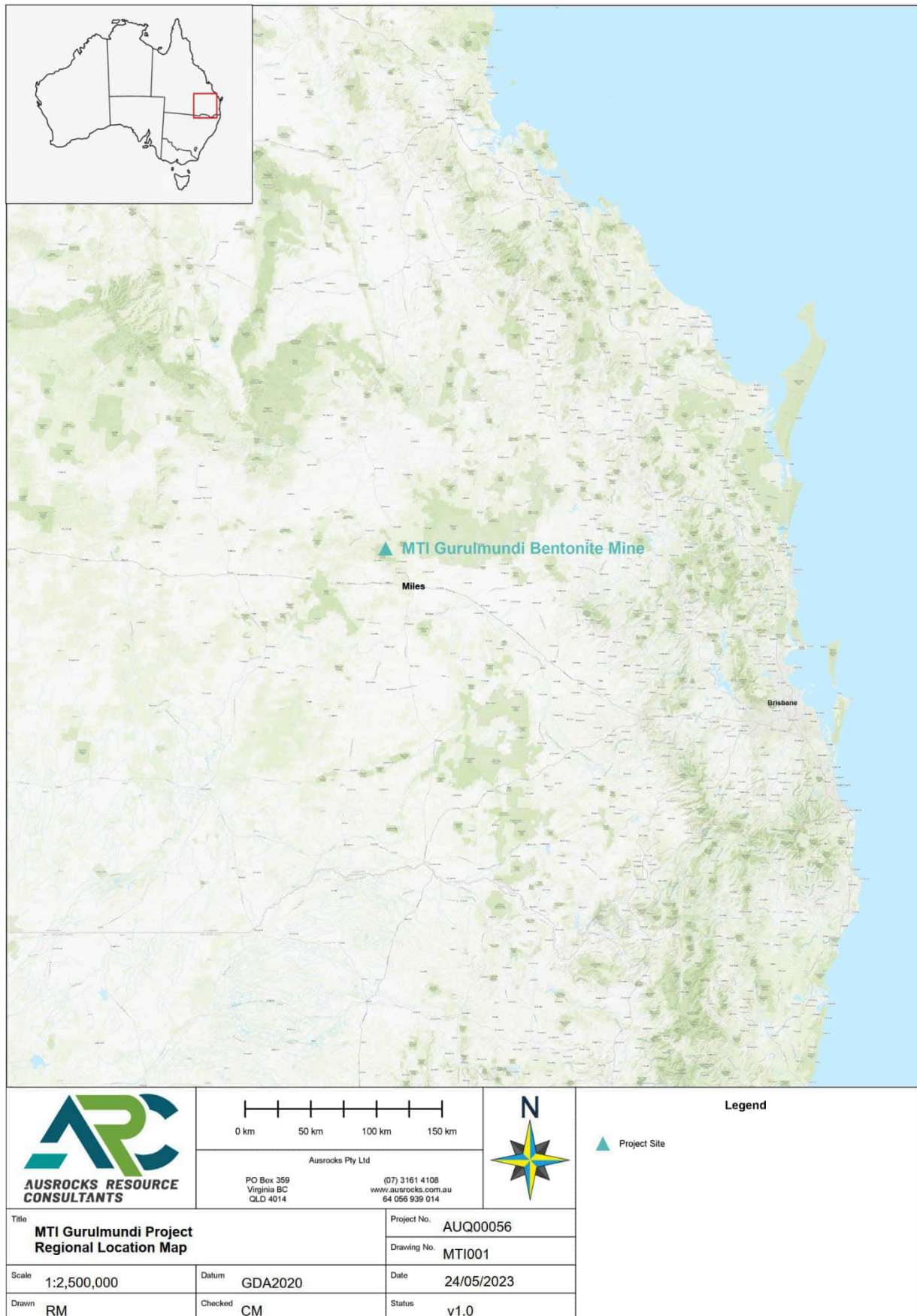


Figure 1: Gurulmundi Bentonite Mine location map

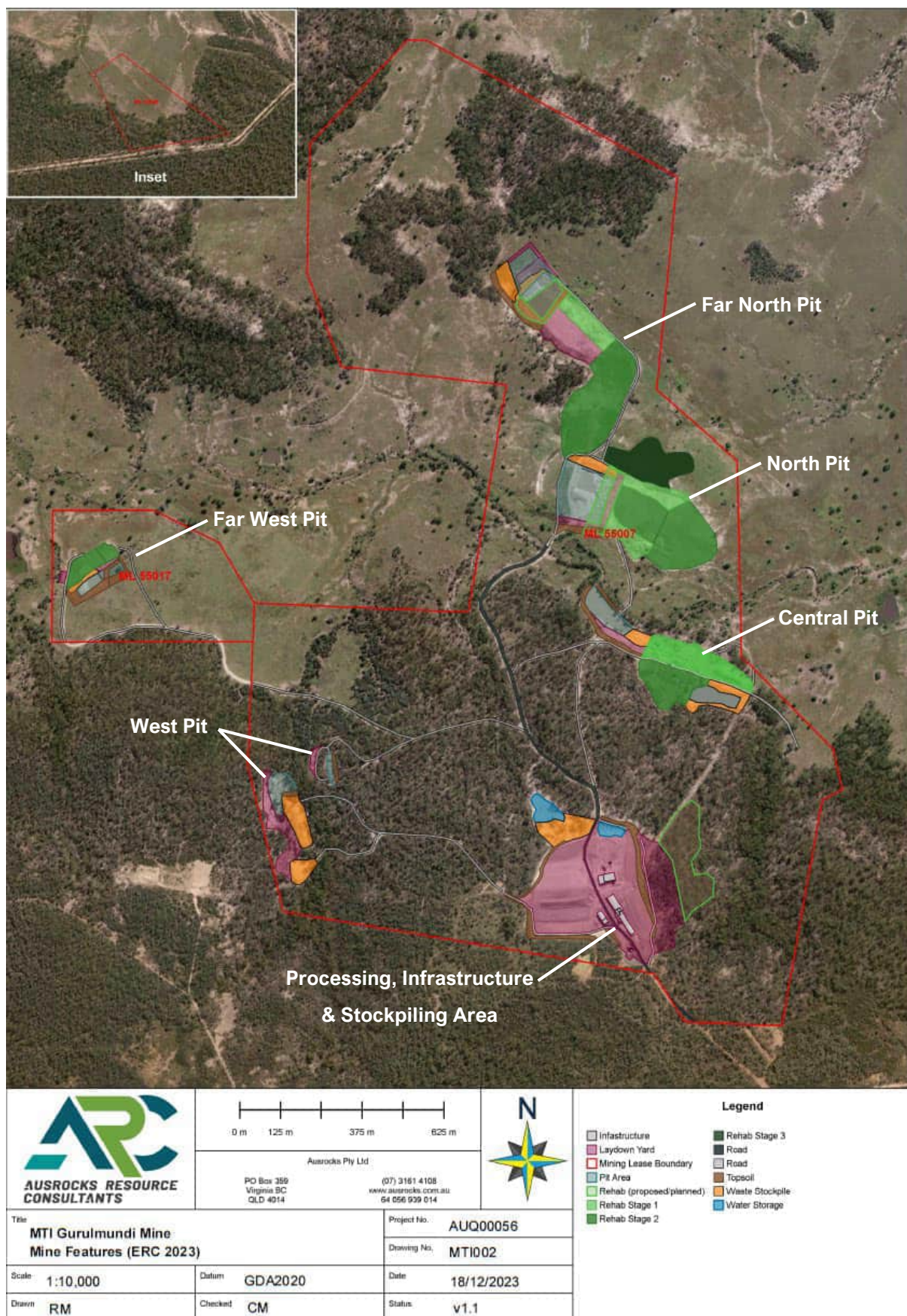


Figure 2: Gurulmundi Bentonite Mine mining tenements including primary mine features and infrastructure

2 REHABILITATION OBJECTIVES

2.1 Rehabilitation objectives

Land disturbed by mining activities must be progressively rehabilitated as it becomes available, to minimise the risks of environmental impacts and reduce cumulative areas of disturbed land¹. Disturbed land associated with mining activities is considered available for rehabilitation unless it is:

- Being actively mined; or
- Being used for operating mining infrastructure; or
- Overlaying a probably or proven resource reserve identified for extraction in an approved PRC plan within 10-years; or
- The site of built infrastructure will be retained as a beneficial asset in an approved PRC plan.

The EA holder must rehabilitate all significantly disturbed land caused by mining activities in a manner that ensures rehabilitated areas achieve the following rehabilitation goals:

- Safe to humans and wildlife;
- Non-polluting (i.e. does not cause environmental harm);
- Stable;
- Able to sustain an agreed post-disturbance land use in accordance with the site Final Land Use and Rehabilitation Plan² (FLURP);
- Revegetated with species endemic appropriate to achieve the agreed post-mining land use and free of declared pest species;
- Compliant with the Final Land Use and Rehabilitation Plan; and
- Compliance with all conditions of the site's environmental authority.

2.2 Final land use and rehabilitation approval

Per Condition F2 of the EA, land disturbed by mining activities (**Table 1**) must be rehabilitated as follows (**Table 2**):

Table 2: Final land use and rehabilitation approval schedule (Environmental Authority 'Table F1')

Disturbance type	Post mine land description	Post-mine land capability classification ¹
Infrastructure	Marginal grazing	vii
Haul roads	Marginal grazing	vii
Pits	Marginal storage	vii
	Water storage	n/a

¹ Land capability as defined in the DME Technical Guideline for the Environmental Management of Exploration and Mining in Queensland

¹ Mined Land Rehabilitation Policy

² Ausrocks Resource Consultants (April 2017) MTI Gurulmundi Final Land Use and Rehabilitation Plan. Version 1.1



2.3 Acceptance criteria

Acceptance criteria have been derived in accordance with the EA 'Table F1 – Final Land Use and Rehabilitation Approval Schedule', the FLURP and the transitional Progressive Rehabilitation and Closure Plan (PRC plan) (pending approval) to ensure rehabilitation objectives are achieved to attain a post-mining land use (PMLU) of marginal grazing and/or water storage (pits). Acceptance criteria and analogue site locations are provided in the FLURP.

3 REHABILITATION PROGRESS

3.1 Current rehabilitation activities

3.1.1 Topsoil management

Gurulmundi Bentonite Mine is positioned on hard-setting sandy loam soils with little to no topsoil existing within mining tenements. The most recent Estimated Rehabilitation Cost calculated approximately 51,143m³ of suitable topsoil stockpiled adjacent to site disturbance areas (Far West Pit, West Pit, Far North Pit, North Pit, Central Pit, and the Processing and Stockpiling area). The total amount of topsoil required for rehabilitation activities is currently estimated at 49,624m³ to cover approximately 33.1ha of land at 0.15m thickness.

Topsoil stockpiles have been managed as follows:

- Topsoil stripping limited to no greater than 200mm due to the sodic nature of subsoil materials³;
- Stockpiles are maintained at 1.5m–3m maximum height;
- Storage time is minimised wherever practical and applicable;
- Stockpiles are located outside of mine disturbance areas;
- Stockpiles are located away from drainage lines or windy areas to minimise erosion;
- Stockpiles are delineated to avoid vehicle and pedestrian traffic, and accidental removal/disturbance;
- Stockpiles are seeded (if natural revegetation does not provide adequate cover protection);
- Good vegetation cover will be maintained on stockpiles and on top-dressed areas until ground cover is well established (preventing stock access and controlling weed growth);
- Appropriate weed control strategies implemented particularly for noxious weeds; and
- Stockpiles possess a suitable embankment grade to limit potential erosion of the outer pile face.

3.1.2 Revegetation

No re-vegetation activities were undertaken during the reporting period.

3.1.3 Weed control

Appropriate noxious weed control methods and programs will be undertaken, if necessary. For the duration of the reporting period no infestation of weeds or noxious weeds were reported.

No flora or fauna survey was conducted during the reporting period. Additionally due to the age of the mine, there is no record of any flora or fauna surveys being conducted. Information regarding the presence of weeds is sourced from online government databases and from reporting of observations made by on-site personnel.

Table 3 summarises invasive weeds that are known to exist in the area⁴.

³ Horizon Soil Science and Engineering (October 2022) Report on the Soil Survey of Leases of the Mineral Technologies Bentonite Mine Rev 1.0 (Final

⁴ Department of Agriculture and Fisheries (2019) Queensland Weed Map. Version 2

Table 3: Weeds known to exist in the areas surrounding the Gurulmundi Bentonite Mine

Common name	Scientific name	State declaration ^A	Potential risks ^B
African boxthorn	<i>Lycium feroxissimum</i>	Category 3	<ul style="list-style-type: none"> Aggressively invades pastures, reduces useability and provides habitat suited to pest animals such as rabbits. Forms impenetrable, sharp-spined thickets, which can inhibit the movement of stock and hinders mustering.
African lovegrass	<i>Eragrostis curvula</i>	Not Declared	<ul style="list-style-type: none"> Produces vast quantities of seeds and developing a large viable seed bank. Extremely competitive with other pasture species. Aggressively invades, quickly overtaking sparse, overgrazed or poor-quality pastures, particularly in sandy soils. Fire hazard and creating competition with native species regeneration.
Mother-of-millions	<i>Byrophyllum delagoense</i> , <i>B. x houghtonii</i>	Category 3	<ul style="list-style-type: none"> The plant, especially its flowers, are toxic and occasionally causes a significant number of cattle deaths. One plant can reproduce a new generation of masses making it difficult to eradicate; follow up controls are essential.
Prickly pear	<i>Opuntia tomentosa</i> , <i>O. stricta</i> , <i>O. monacantha</i> , <i>O. aurantiaca</i>	Category 3	<ul style="list-style-type: none"> Potential to reduce biodiversity by supressing plant growth. Dense populations can impede access and reduce stock-carrying capacity. Reduce land use and pastures. Spines can cause injury to stock, humans and native animals, reducing or preventing grazing activities and productivity.

^A Biosecurity Act 2014

^B per information available from Department of Agriculture and Fisheries

Weed control has been managed as follows:

- Monitor new and existing rehabilitation areas for signs of weed growth;
- Vehicle and equipment wash down for suspected weed contamination; and
- When required, manual or chemical weed control and removal.

3.1.4 Erosion

Erosion can have an adverse effect on soil productivity and the associated agricultural value. Additional effects also include downstream sedimentation, and decline in fertility through loss of soil structure, and increased dust generation, and poor and prolonged rehabilitation. A soil survey of the soils within mining tenements identified

the subsoils have a low erosion rating when undisturbed however, due to their sodic–strongly sodic nature, these soils are likely to erode due to clay dispersion where exposed to rainfall or runoff ⁵.

Erosion has been managed as follows:

- Installation and maintenance of sedimentation barriers (as required);
- Maximising the direct return of overburden into pit voids to reduce stockpiling needs;
- Re-vegetation and maintenance of final slope profiles;
- Maintenance of drains around pits repairing where required; and
- Implementation of soil ameliorants (e.g. gypsum) to reduce the degree of dispersion.

3.2 Existing rehabilitation

At the end of the reporting period, twelve (12) areas of rehabilitation exist within the site's mining tenements (**Table 4**). Per Table F1 of the site EA the final land use of these rehabilitation areas is marginal grazing, with four areas now scheduled for Hybrid Ecosystem as per the PRC Plan. These areas are undergoing various stages of rehabilitation (**Figure 3**).

Table 4: Summary of existing progressive rehabilitation areas

ID (PRC Plan)	Previous Rehab ID	Rehabilitation Area (RA) Description	Final Land Use ¹	Land size (ha)
RAGS1_1	NPRA4 (part)	Far North Pit	Marginal grazing	1.4270
RAGS1_4	FWRA1 & FWRA2	Far West Pit	Marginal grazing	0.9394
RAGS2_1	NPRA1 (part)	Far North Pit	Marginal grazing	3.0707
RAGS2_2	NPRA3 & NPRA5	North Pit	Marginal grazing	6.5434
RAGS2_3	CPRA1 (part)	Central Pit	Marginal grazing	0.2818
RAGS3_1	NPRA2	North Pit	Marginal grazing	2.3493
RAHS1_1	NPRA4 (part)	Far North Pit	Hybrid Ecosystem	1.3767
RAHS2_1	NPRA1 (part)	Far North Pit	Hybrid Ecosystem	1.8500
RAHS2_2	CPRA1 (part)	Central Pit	Hybrid Ecosystem	1.6365
RAHS2_3	New area	Infrastructure Area	Hybrid Ecosystem	2.9022
Total				22.3770

¹ per final land use and rehabilitation approval schedule (EA 'Table F1')

Activities completed at existing rehabilitation areas described consisted of, but were not limited to:

- Landform re-profiling/shaping to suit the surrounding topography;
- Topsoil spreading;
- Seeding and/or tube stock planting;

⁵ Horizon Soil Science and Engineering (October 2022) Report on the Soil Survey of Leases of the Mineral Technologies Bentonite Mine. Rev 1.0 (Final)



- Initial watering regime (ongoing if required); and
- Weed management.

The following sections provide an assessment of the condition of existing rehabilitation areas against the relevant acceptance criteria.

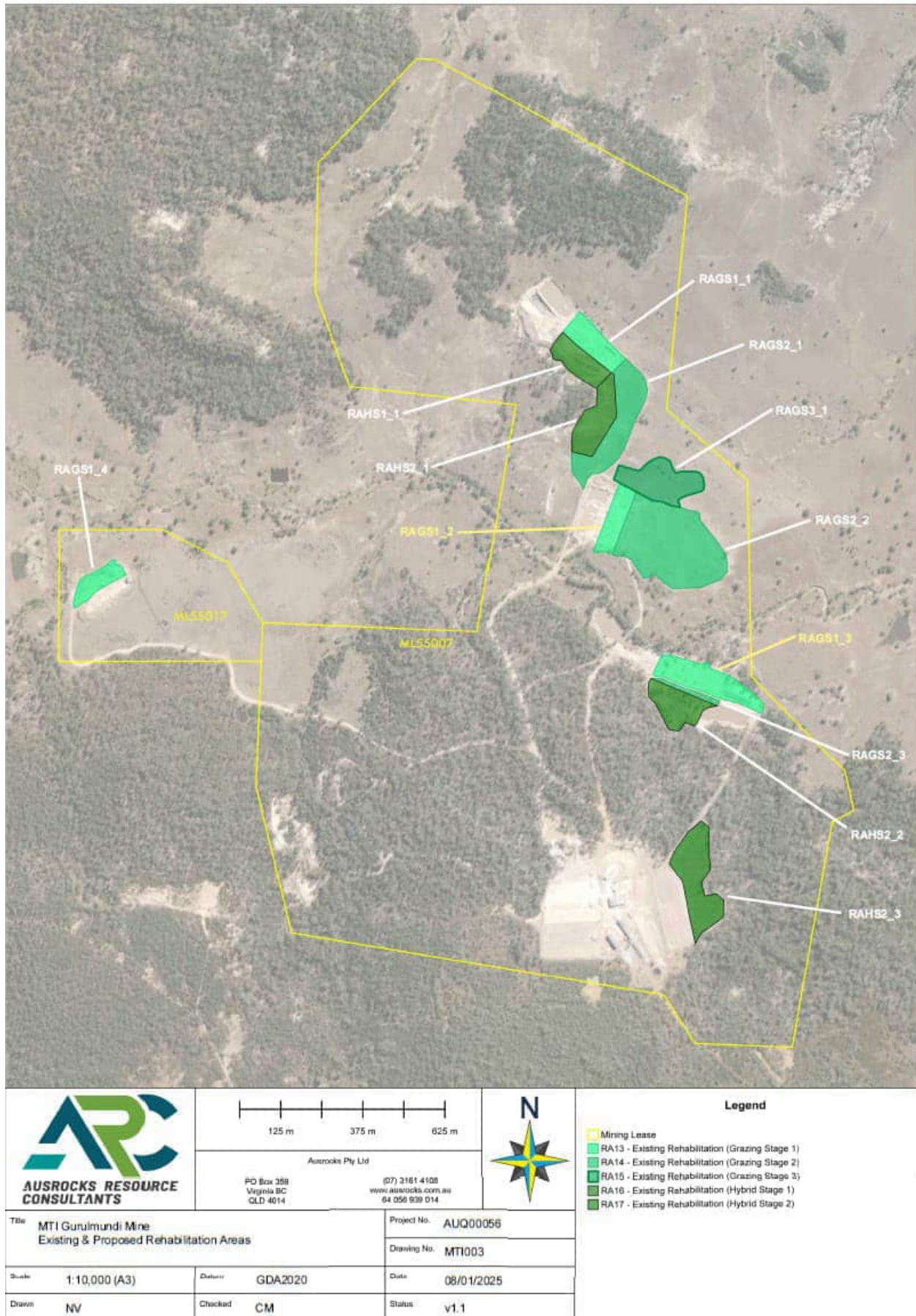


Figure 3: Existing and planned rehabilitation areas within MTI Gurulmundi Bentonite Mine

3.2.1 Central Pit

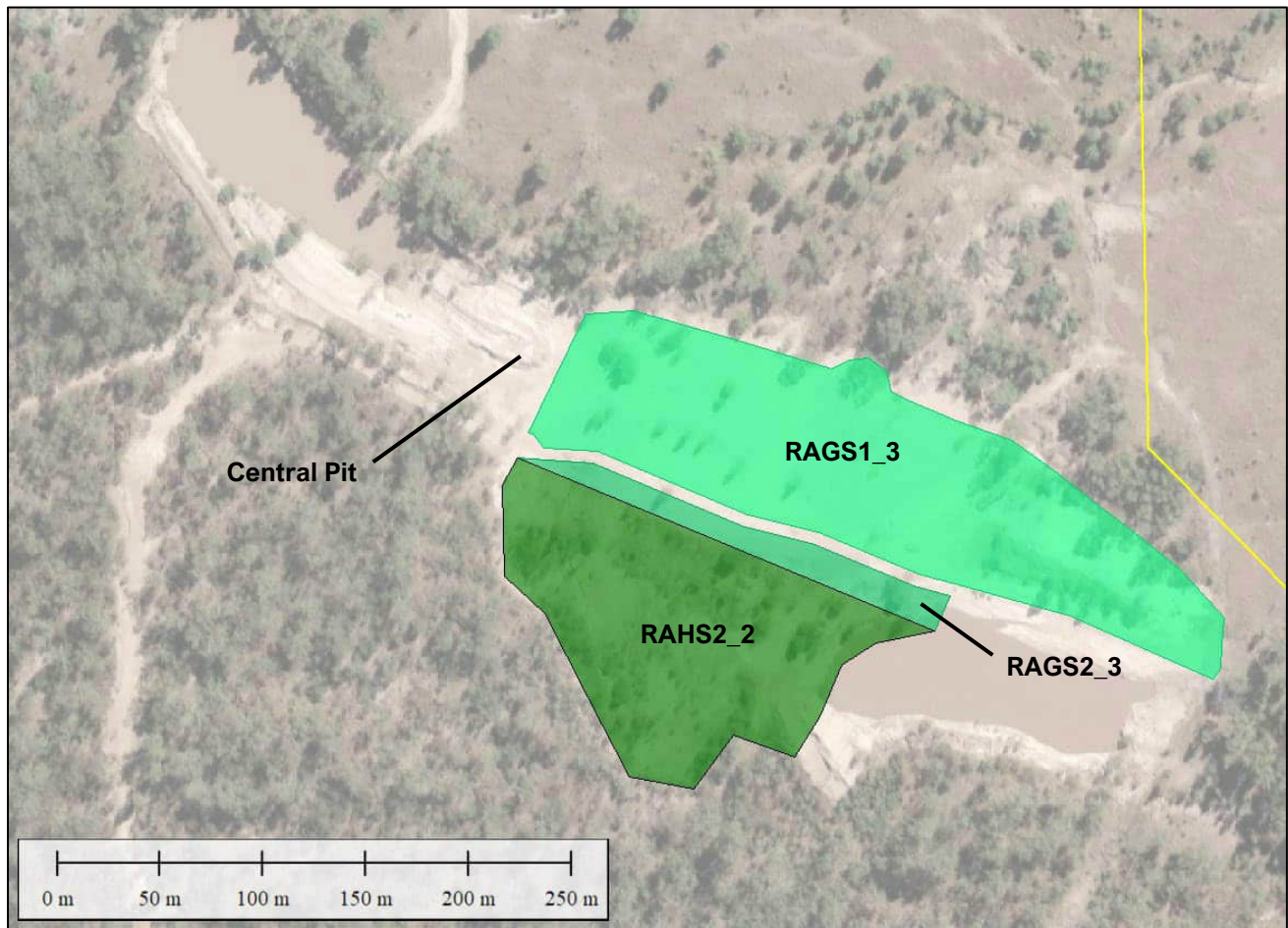


Figure 4: Central Pit rehabilitation area

Rehabilitation in the Central Pit (RAHS2_2 & RAGS2_3) commenced between 2015 – 2016 and has been backfilled, contoured and partially topsoiled. This area has not achieved the requirements of acceptance criteria and has therefore not achieved the rehabilitation goals described in **Section 2** of this report and Condition F1 of the site EA. Assessment of the area identified that minor repair is required, particularly to remedy erosion and to increase vegetation cover and species diversity. Additional topsoil and seeding is recommended in areas where erosional damage has occurred.

Table 5 summarises the commentary to each rehabilitation goal and objective for RAHS2_2 & RAGS2_3 only as these are the most advanced rehabilitation areas. **Figure 5** provides a comparison of rehabilitation condition between 2019 and 2022.

Table 5: Assessment summary of RAHS2_2 & RAGS2_3 to rehabilitation acceptance criteria

Rehabilitation goal	Safe to humans and wildlife
Objective	<ul style="list-style-type: none"> Safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use
<p>Contouring of landform and slopes are similar to surrounding topography and analogue site. No further works are required. 'Safe to humans and wildlife' acceptance criteria is achieved.</p>	
Rehabilitation goal	Non-polluting
Objective	<ul style="list-style-type: none"> Rainfall runoff from rehabilitation achieves relevant water quality objectives for receiving waters Deep drainage from rehabilitation achieves relevant water quality objectives for groundwater
<p>Material is non-polluting and has low risk of contaminating the surrounding environment. Land contoured to suit surrounding topography with runoff designed to flow into nearby naturally occurring watercourses (unnamed tributaries off Juandah Creek). 'Non-polluting' acceptance criteria is achieved.</p>	
Rehabilitation goal	Stable
Objective	<ul style="list-style-type: none"> Rehabilitation is geotechnically stable Rehabilitation is erosionally stable
<p>Contoured landform is assessed to be geotechnically stable. Aerial imagery indicates minor rill erosion is present and will require repair to support achievement of erosional suitable for hybrid ecosystem PMLU. Repair works will also protect against potential for future geotechnical instability. 'Stable' acceptance criteria is not achieved.</p>	
Rehabilitation goal	Able to sustain an agreed post-mining land use
Objective	<ul style="list-style-type: none"> Rehabilitation is suitable for sustainable hybrid ecosystem
<p>Ground cover is sparse leaving rocky bare ground exposed and at risk of erosional damage. Vegetation cover is estimated at approximately 20% cover however, density is poor. Species diversity of tree species includes Wattles, Narrow-leaved Ironbark, Lemon-scented Gum and Acacias. Improvement required on grass cover and diversity required. 'Able to sustain an agreed post-mining land use' acceptance criteria is not achieved.</p>	

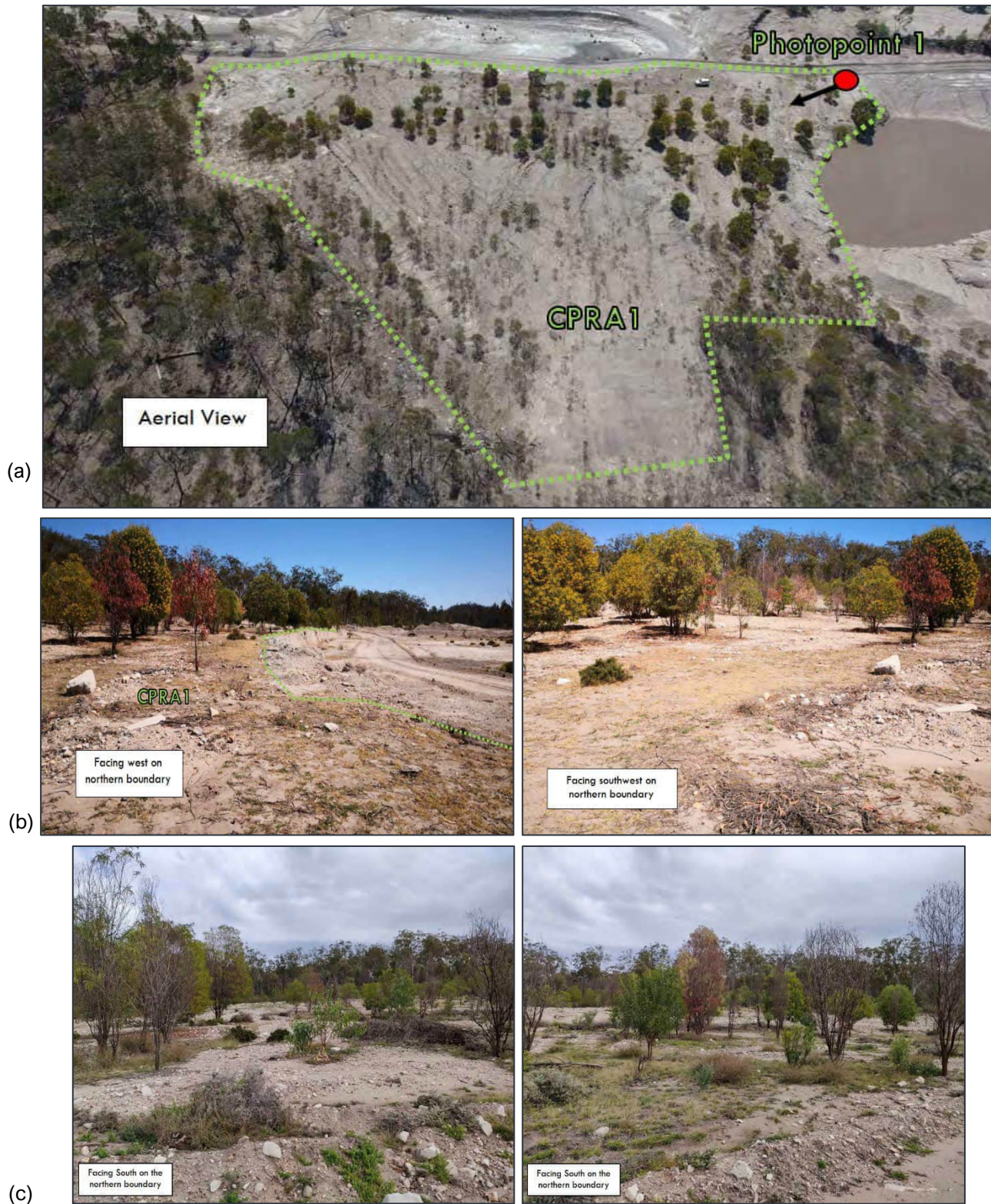


Figure 5: Aerial view (a) and comparison of rehabilitation condition at RAHS2_2 & RAGS2_3 (previously named CPRA1) between 2019 (b) and 2022 (c)



3.2.1.1 RAGS1_3

Rehabilitation of RAGS1_3 is planned to commence in 2024. Initial rehabilitation works planned include:

- Removal of equipment and/or machinery, rubbish and waste;
- Backfill in pits with waste rock and/or overburden via dozer push on an ad-hoc basis when spare machinery is available (primarily due to this area being a historical disturbance, no current extraction occurring);
- Re-contouring the land to suit surrounding topography and post-mine land use.

As rehabilitation has not commenced, assessment of acceptance criteria has not been completed.

3.2.2 North and Far North Pits

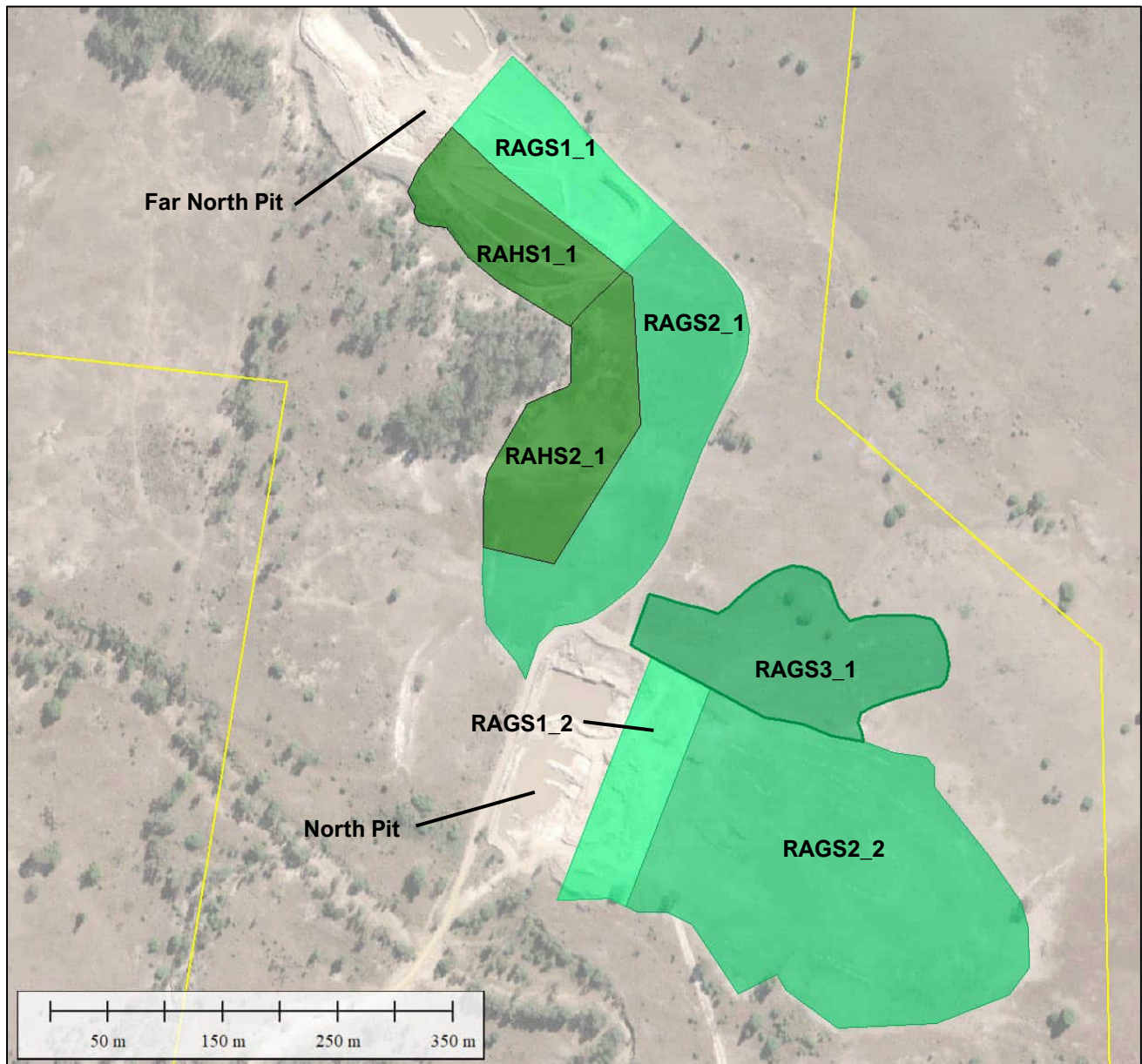


Figure 6: Far North Pit and North Pit rehabilitation areas

3.2.2.1 RAGS1_1, RAGS1_2 & RAHS1_1

Rehabilitation of RAGS1_1 & RAHS1_1 only commenced in 2023 and has not yet been finished. Initial rehabilitation works will include, but is not limited to:

- Removal of equipment and/or machinery, rubbish and waste;
- Backfill in pits with waste rock and/or overburden via dozer push;
- Re-contouring the land to suit surrounding topography and post-mine land use.

As rehabilitation activities are not finished yet, assessment of acceptance criteria has not been completed. RAGS1_2 is planned to commence in 2024, as rehabilitation has not commenced, assessment of acceptance criteria has not been completed.

3.2.2.1 RAGS2_1 & RAGS2_2

Rehabilitation of RAGS2_1 commenced in 2015 – 2016 and has been backfilled, contoured, topsoiled and seeded with pasture species. RAGS2_2 was more recently rehabilitated but is considered to be in a similar stage to RAGS2_1, owing to more advanced rehabilitation techniques and favourable weather conditions. Overall neither area has fully achieved the requirements of acceptance criteria and has therefore not achieved the rehabilitation goals. Assessment of the areas identified that minor erosion repair works are required along the eastern zone of RAGS2_1 and around the southern portion of RAGS2_2. This is evidenced by aerial imagery confirmed by on-the-ground assessment which found the area was actively eroding with deep rills. A seeding campaign will be across the rehabilitation area to increase cover and growth of pasture species. **Table 6** summarises the commentary to each rehabilitation goal and objective and **Figure 7** Error! Reference source not found. provides photo evidence of rehabilitation requiring repair.

Table 6: Assessment summary of RAGS2_1 & RAGS2_2 to marginal grazing acceptance criteria

Rehabilitation goal	Safe to humans and wildlife
Objective	<ul style="list-style-type: none"> Safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use
Contouring of landform and slopes are similar to surrounding topography and analogue site. No further works are required. 'Safe to humans and wildlife' acceptance criteria is achieved.	
Rehabilitation goal	Non-polluting
Objective	<ul style="list-style-type: none"> Rainfall runoff from rehabilitation achieves relevant water quality objectives for receiving waters Deep drainage from rehabilitation achieves relevant water quality objectives for groundwater
Material is non-polluting and has low risk of contaminating the surrounding environment. Land contoured to suit surrounding topography with runoff designed to flow into nearby naturally occurring watercourses (unnamed tributaries of Juandah Creek). 'Non-polluting' acceptance criteria is achieved.	
Rehabilitation goal	Stable
Objective	<ul style="list-style-type: none"> Rehabilitation is geotechnically stable Rehabilitation is erosionally stable
Contoured landform is assessed to be geotechnically stable at slope angles suitable for grazing use. Aerial imagery indicates minor erosion repair is required to remedy formed rills. Seeding and improvement of vegetation cover will aid in the prevention and minimisation of erosion. 'Stable' acceptance criteria is not yet achieved.	
Rehabilitation goal	Able to sustain an agreed post-mining land use
Objective	<ul style="list-style-type: none"> Rehabilitation is suitable for sustainable marginal grazing pasture
Ground cover had improved after a period of frequent and sufficient rainfall; following this cover has become patchy exposing the ground to erosion and the development of rills (Figure 7). Vegetation cover is estimated to be approximately 50% throughout the areas (Error! Reference source not found. & Figure 10). A seeding campaign may be required to overseed patchy areas to improve vegetation cover and species diversity. 'Able to sustain an agreed post-mining land use' acceptance criteria is not achieved.	



Figure 7: Deep rill erosion observed in an area of uncertified rehabilitation (RAGS2_1)

Source: Horizon Soil Science and Engineering (October 2022)

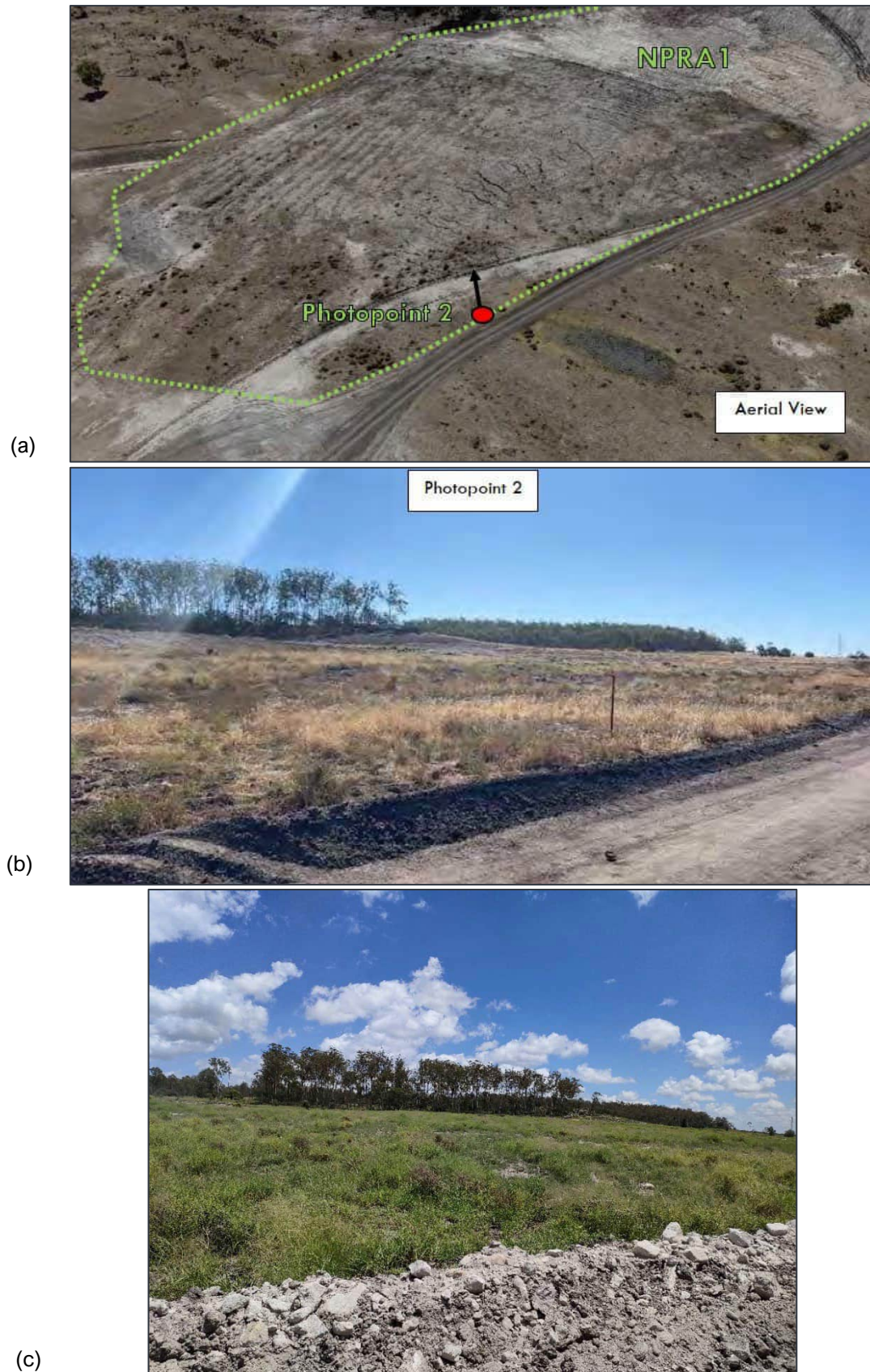


Figure 8: Aerial view (a) and comparison of rehabilitation condition at RAGS2_1 (previously NPRA1) between 2019 (b) and 2022 (c)



Figure 9: Image of ground cover taken from the western boundary of RAGS2_1 looking east in 2023

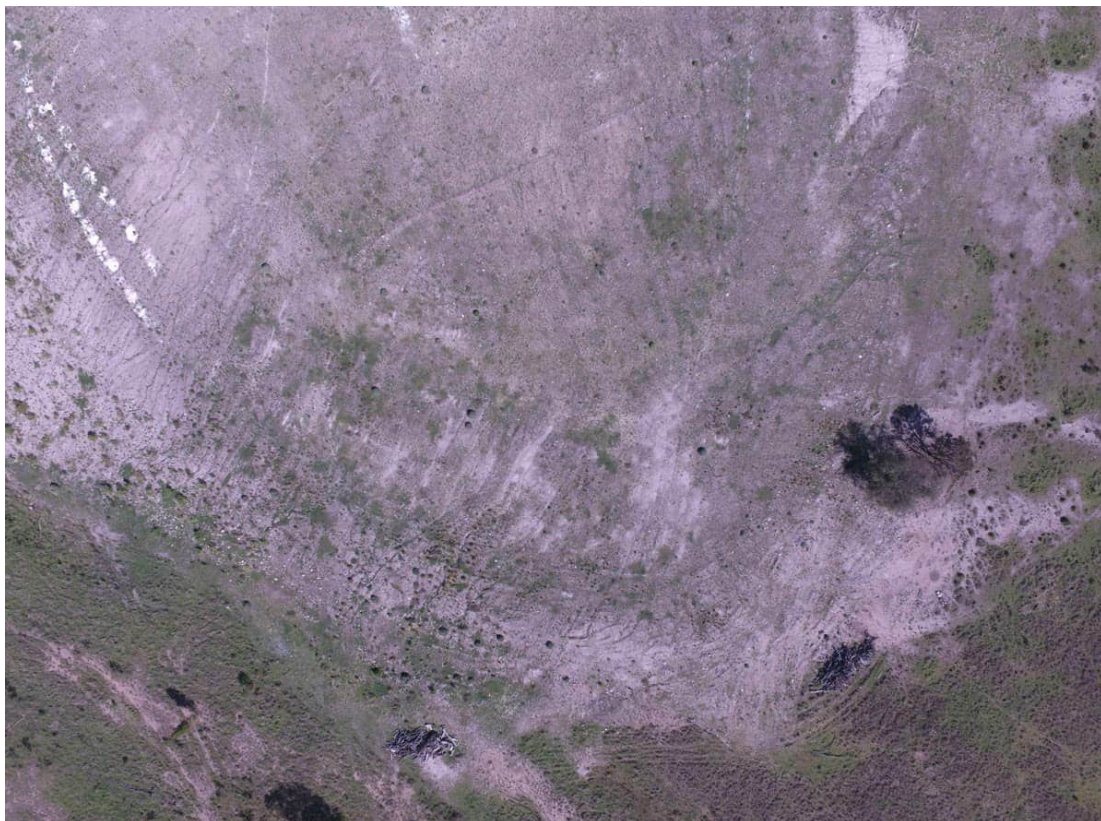


Figure 10: Aerial view image of minor erosion in southern portion of RAGS2_2 in 2023

3.2.2.2 RAGS3_1

Rehabilitation of RAGS3_1 (previously NPRA2) commenced around 2014–2015. The area has been backfilled, contoured, topsoiled and seeded with pasture species. The area has previously been assessed as an area ready to apply for progressive rehabilitation certification⁶. Due to a period of significant and frequent rainfall in 2022, the area has experienced some deterioration in rehabilitation condition, namely the development of rill erosion and occurrence of some ponding. Remediation efforts are informed by recommendations provided by soil survey assessment undertaken by Horizon Soil Science and Engineering⁷. summarises the commentary to each rehabilitation goal and objective and provides a comparison of rehabilitation condition between 2019 and 2022.

Table 7: Assessment summary of RAGS3_1 to marginal grazing acceptance criteria

Rehabilitation goal	Safe to humans and wildlife
Objective	<ul style="list-style-type: none"> Safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use
Contouring of landform and slopes are similar to surrounding topography and analogue site. No further works are required. 'Safe to humans and wildlife' acceptance criteria is achieved.	
Rehabilitation goal	Non-polluting
Objective	<ul style="list-style-type: none"> Rainfall runoff from rehabilitation achieves relevant water quality objectives for receiving waters Deep drainage from rehabilitation achieves relevant water quality objectives for groundwater
Material is non-polluting and has low risk of contaminating the surrounding environment. Land contoured to suit surrounding topography with runoff designed to flow into nearby naturally occurring watercourses (unnamed tributaries off Juandah Creek). 'Non-polluting' acceptance criteria is achieved.	
Rehabilitation goal	Stable
Objective	<ul style="list-style-type: none"> Rehabilitation is geotechnically stable Rehabilitation is erosionally stable
Contoured landform is assessed to be geotechnically stable. Aerial imagery indicates no sign of significant erosion however, on-the-ground assessment identified evidence of some minor erosion and ponding following significant rainfall events (Figure 12). Minor works will be required to remedy these. 'Stable' acceptance criteria is not achieved.	
Rehabilitation goal	Able to sustain an agreed post-mining land use
Objective	<ul style="list-style-type: none"> Rehabilitation is suitable for sustainable marginal grazing pasture
Vegetation cover has maintained ≥50% cover for the last few years and is considered naturally self-sustaining (Figure 13). Species diversity is considered acceptable with at least four (4) different species present across different grasses, small shrubs and trees. Cattle have been observed to graze in the area suggesting the land is suitable to support a marginal grazing land use. 'Able to sustain an agreed post-mining land use' acceptance criteria is achieved. Note, rill erosion and ponding will need to be remedied for the area to continue to be able to meet this criterion.	

⁶ Progressive certification for resource activities under *Environmental Protection Act 1994*.

⁷ Horizon Soil Science and Engineering (October 2022): Report on the Soil Survey of Leases of the Mineral Technologies Bentonite Mine. Rev 1.0 (Final).



(a)



(b)



(c)

Figure 11: Aerial view (a) and comparison of rehabilitation condition at RAGS3_1 (previously NPRA2) between 2019 (b) and 2022 (c)

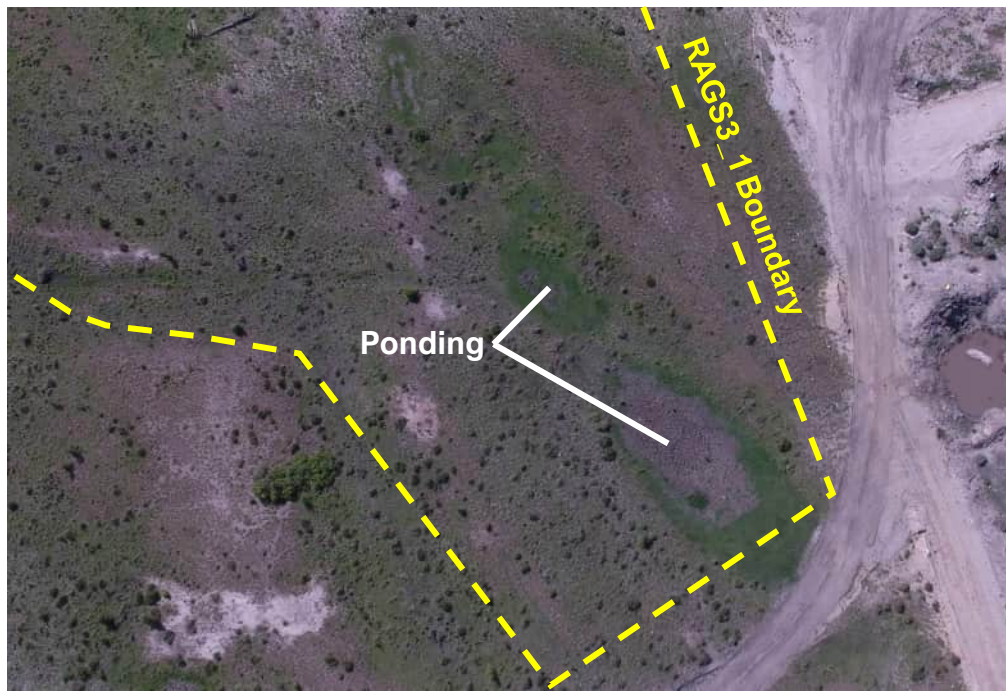


Figure 12: Evidence of ponding in 2023



Figure 13: Sample photos of ground cover condition within RAGS3_1

3.2.3 Far West Pit

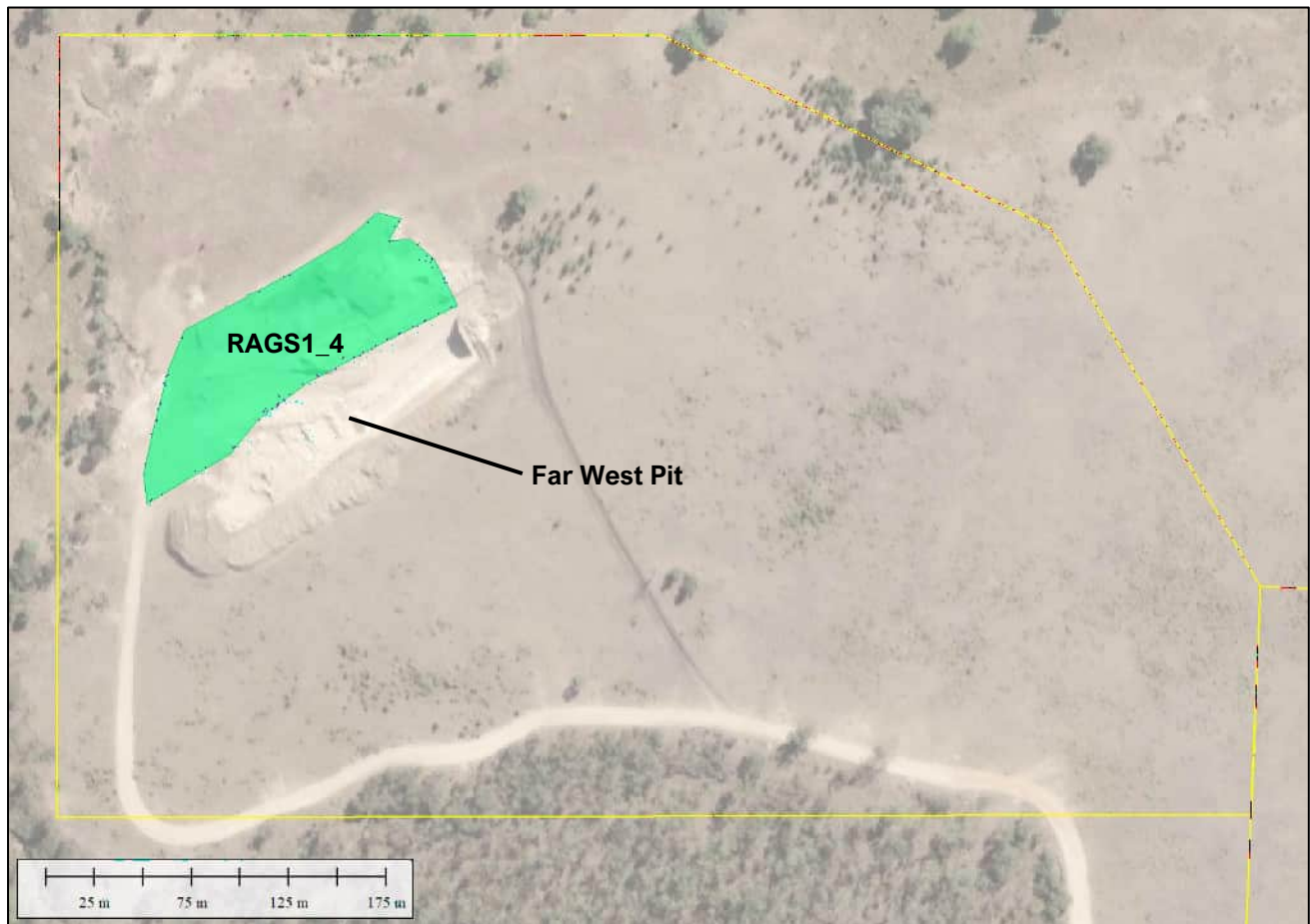


Figure 14: Far West Pit rehabilitation area

Rehabilitation in the Far West Pit (RAGS1_4) has commenced in 2023. Initial rehabilitation works include:

- Removal of equipment and/or machinery, rubbish and waste;
- Backfill in pits with waste rock and/or overburden via dozer push;
- Re-contouring the land to suit surrounding topography and post-mine land use.

As rehabilitation is not yet finalised, assessment of acceptance criteria has not been completed.

3.2.4 Infrastructure Area

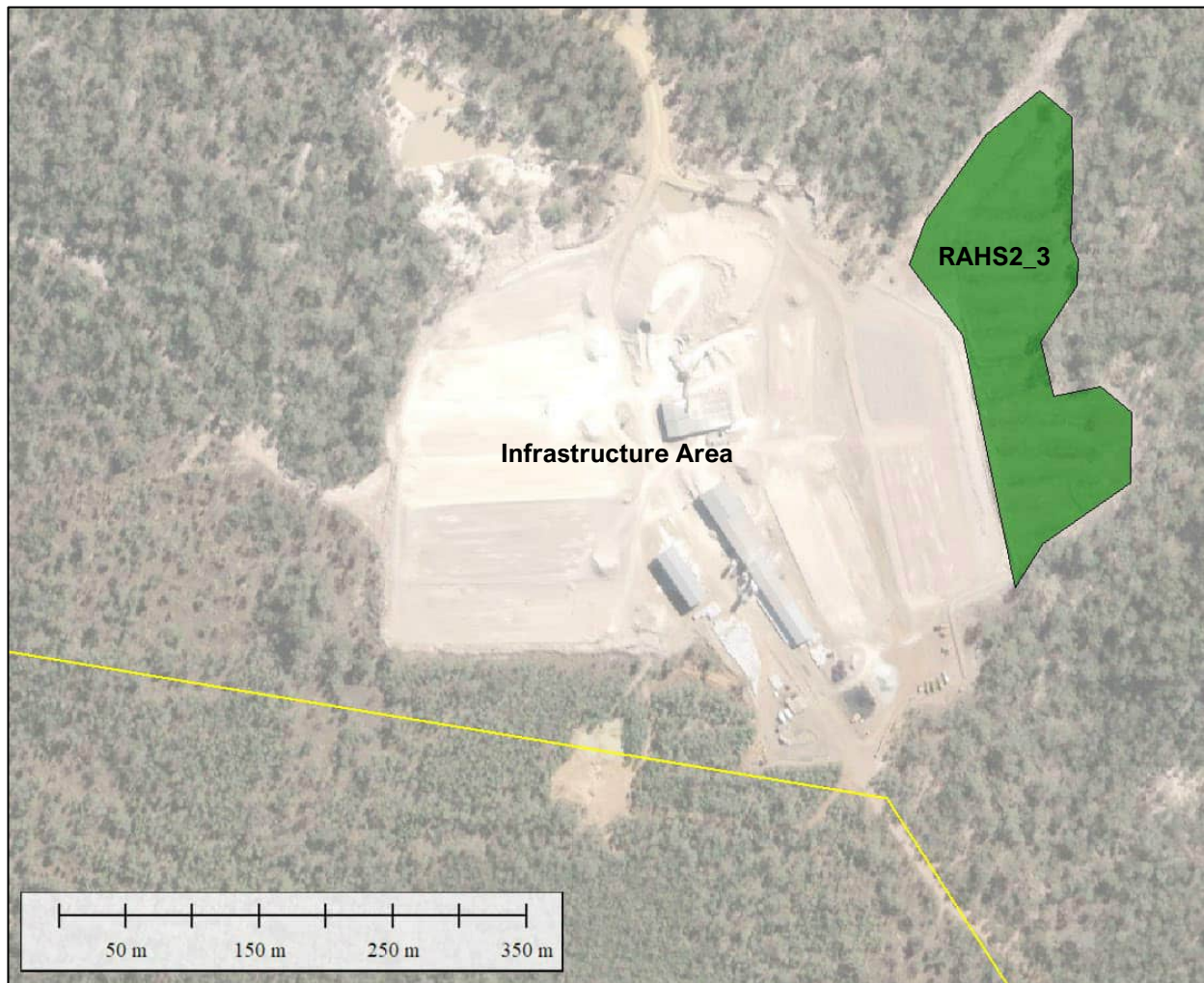


Figure 15: Infrastructure rehabilitation area

Rehabilitation in RAHS2_3 has commenced in 2023. Initial rehabilitation works include:

- Segregating the area from through traffic (bundling & signage)
- Recontouring any topsoil disturbed during clearing and spreading debris from clearing activities
- Encouraging regrowth from natural seed bank

As rehabilitation is not yet finalised, assessment of acceptance criteria has not been completed.

3.3 Planned rehabilitation

At the end of the reporting period, three (3) areas have been identified as being suitable for continuation and completion of progressive rehabilitation. These are summarised in **Table 8** and illustrated in **Figure 3**.

Table 8: Summary of planned progressive rehabilitation areas

ID	Rehabilitation Area (RA) Description	Final Land Use ¹	Commenced Year / Completed Year	Land size (ha)
RAGS1_2	North Pit	Marginal grazing	2024 / 2029	1.2229
RAGS1_3	Central Pit	Marginal grazing	2024 / 2029	2.3549
			Total	3.5778

¹ per final land use and rehabilitation approval schedule (EA 'Table F1')

Due to the significant increase in rehabilitation efforts over the last 3 years, the surface area included in the areas in **Table 8** are considered sufficient to maintain disturbances below the maximum allowable limit in the EA. To align with the site's PRC plan, **Figure 16** illustrates current estimates for land availability to commence progressive rehabilitation.

3.4 Progressive rehabilitation certification

No application for progressive rehabilitation certification was submitted to the administering authority during the reporting period.

It is proposed an application for rehabilitation area RAGS3_1 is submitted during the next reporting period in 2024.

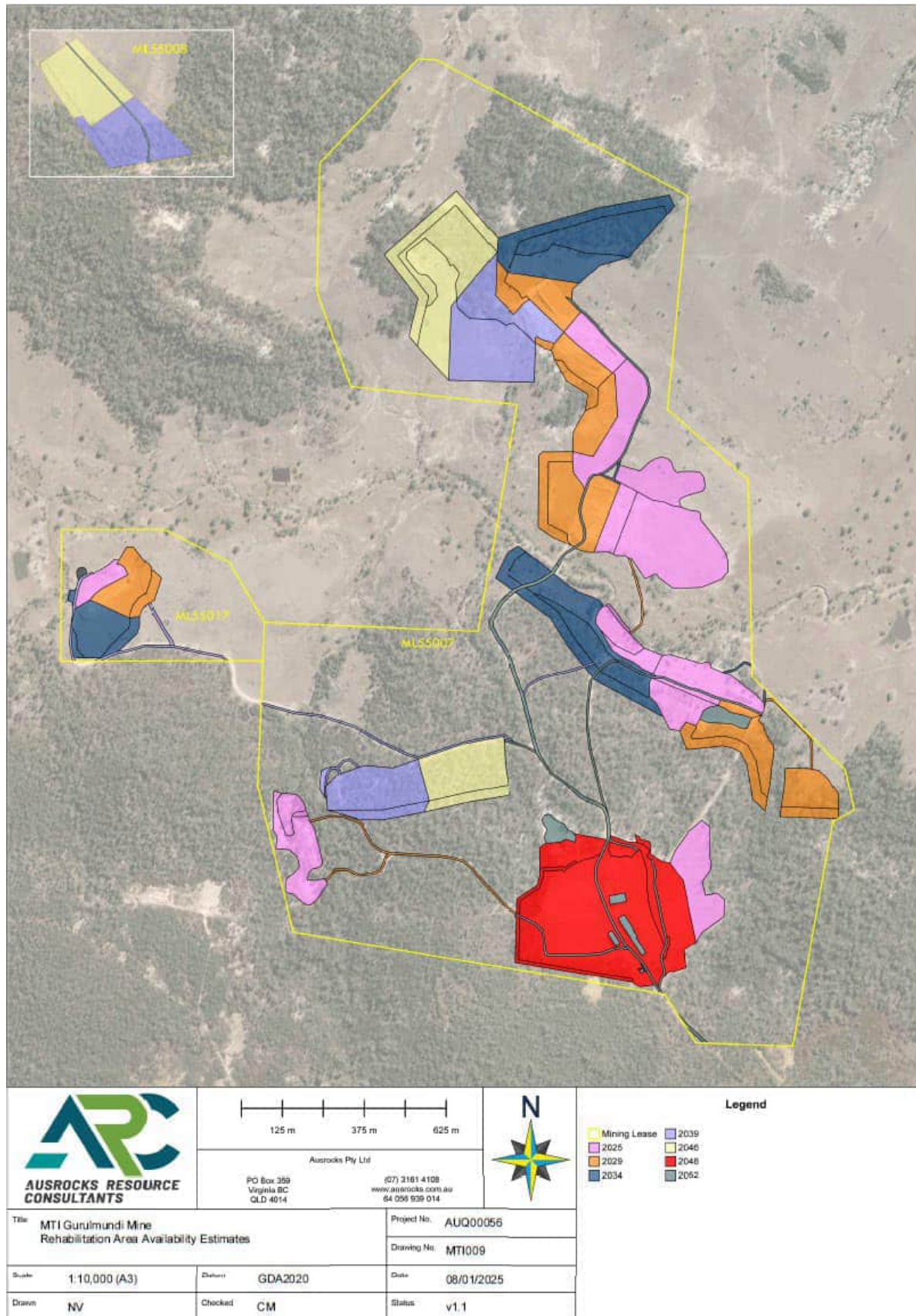


Figure 16: Progressive rehabilitation planning estimates

4 REFERENCES

The following references were used to support the development of this document:

Ausrocks Resource Consultants. (2017). Final Land Use & Rehabilitation Plan MTI Gurulmundi Mine April 2017. Version 1.1.

Department of Agriculture and Fisheries (2019). *Queensland Weed Map*.

<http://qgsp.maps.arcgis.com/apps/webappviewer/index.html?id=6d325b2e476d4113be6490225308428c>

Department of Agriculture and Fisheries. (2020). *Common pest pear or prickly pear*.

https://www.daf.qld.gov.au/__data/assets/pdf_file/0008/1492910/common-pest-pear.pdf

Department of Agriculture and Fisheries. (2021). *African lovegrass*.

https://www.daf.qld.gov.au/__data/assets/pdf_file/0011/69284/african-lovegrass.pdf

Department of Agriculture and Fisheries. (2023). *African boxthorn*.

https://www.daf.qld.gov.au/__data/assets/pdf_file/0016/64042/african-boxthorn.pdf

Department of Agriculture and Fisheries. (2023). *Mother-of-millions*.

https://www.daf.qld.gov.au/__data/assets/pdf_file/0018/61461/mother-millions.pdf

Horizon Soil Science and Engineering (October 2022): Report on the Soil Survey of Leases of the Mineral Technologies Bentonite Mine. Rev 1.0 (Final).



Appendix 6

Ausrocks Resource Consultants: Community Consultation
Plan Rev 1.1 (February 2026)

Community Consultation Plan

MTI GURULMUNDI MINE

prepared by Ausrocks Resource Consultants
for Department of Environment and Science

AUQ00056



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COMMUNITY CONSULTATION PLAN

11 FEBRUARY 2026

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Document Control

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This document has been reviewed and signed off by the undersigned:

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Terms & Abbreviations

Term / abbreviation	Description
ARC	Ausrocks Resource Consultants (Ausrocks Pty Ltd)
CCP	Community Consultation Plan
EA	Environmental Authority
ML	Mining Lease
MTI	Minerals Technologies Incorporated
PMLU	Post-mining land use
PRC plan	Progressive Rehabilitation and Closure Plan
PRCP Guideline	Progressive Rehabilitation and Closure Plan Guideline (November 2024) (DETSI, Queensland)



1 INTRODUCTION

1.1 Purpose

Ausrocks Resource Consultants (Ausrocks) has been commissioned by Minerals Technologies Inc. (MTI) to develop a Community Consultation Plan (CCP) to support the transitional Progressive Rehabilitation and Closure Plan (PRC plan) under the site Environmental Authority (EA) EPML00382513¹.

The purpose of this CCP is to comply with the requirements of section 126C(1)(c)(iv) of the *Environmental Protection Act 1994* (EP Act) and section 3.5 of the Guideline for Progressive Rehabilitation and Closure Plans (PRCP Guideline)². The aim is to define how community and stakeholder consultation will be carried out in relation to the rehabilitation of the land for the PRC plan.

1.2 Site details

The MTI Gurulmundi Mine (MTI Gurulmundi) is located in the Western Downs Regional Council area and consists of several mining tenements (**Table 1**).

Table 1: MTI Gurulmundi mining tenements

Mining lease	Permit Name	EA holder ¹	Purpose	Area (ha)
ML55007	IMT0401	Amcol Australia Pty Ltd	Far North pit, North pit, Central pit, West pit, Plant (processing and stockpiling)	318.55
ML55008	BG2012	Amcol Australia Pty Ltd	Undisturbed land	15.37
ML55017	West Amcol	Amcol Australia Pty Ltd	Far West pit	21.67
Total				355.59

¹ Amcol Australia Pty Ltd is a wholly owned subsidiary of Minerals Technologies Inc.

Due to the age mine and acquisition from previous operators, access to historical community and stakeholder engagement records is limited. It is however, anticipated that consultation is likely to have occurred both formally and informally throughout the mine life to inform any rehabilitation planning, and to produce positive socio-economic and environmental outcomes for the mine operator and the Western Downs Regional Council community.

This CCP provides a framework for continued consultation with community and stakeholders, with a specific focus on achieving rehabilitation outcomes and milestones.

¹ Queensland Department of Environment and Science (18 July 2014): Environmental Authority (EPML00382513)

² Queensland Department of Environment and Science (November 2019): Progressive Rehabilitation and Closure Plan Guideline

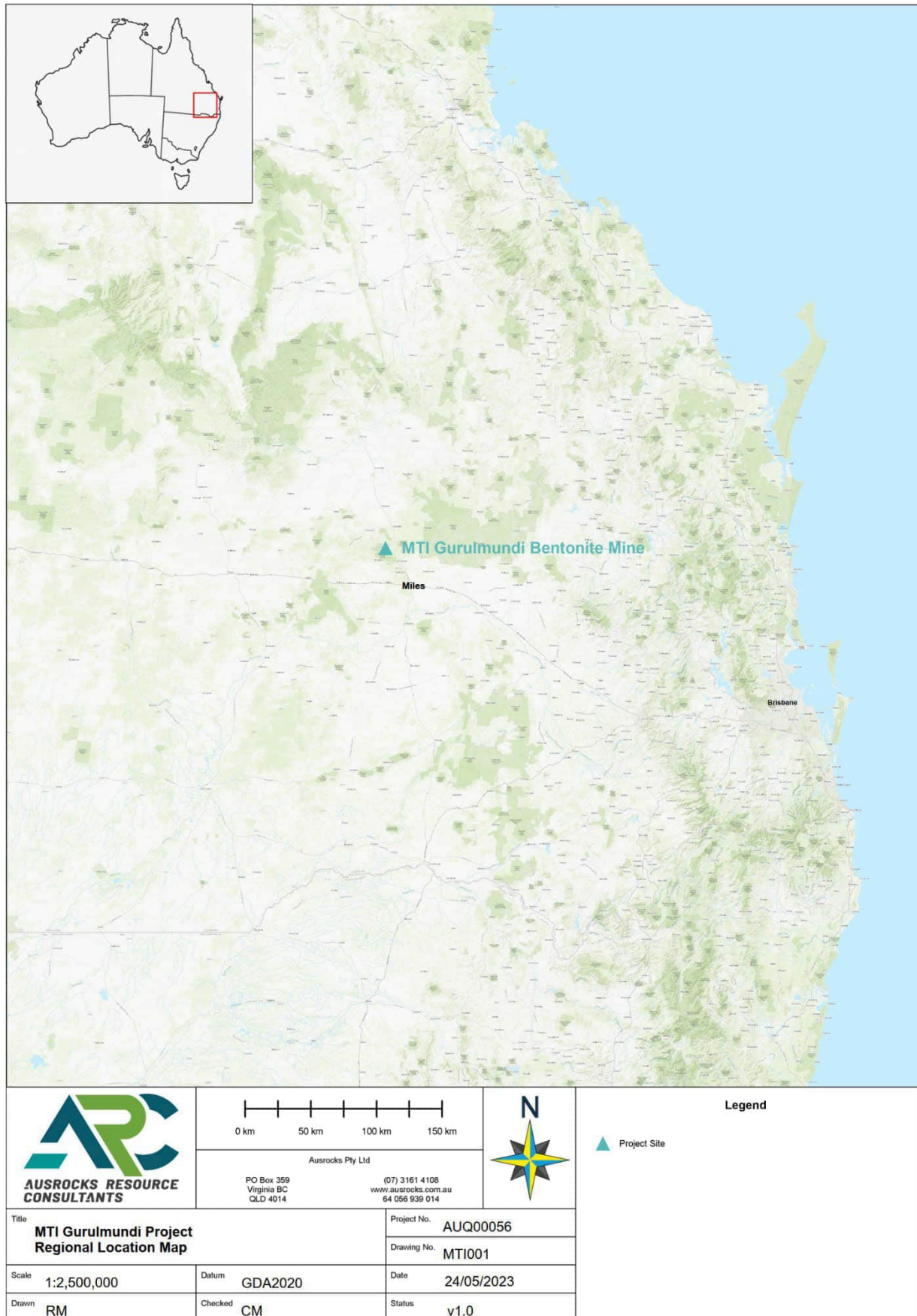


Figure 1: MTI Gurulmundi Mine location map



2 COMMUNITY ENGAGEMENT

2.1 Key objectives

The objectives of the CCP are as follows:

- To strengthen corporate social responsibility and promote/maintain on-going community relationships and trust;
- To ensure transparent, open, and informative stakeholder communication;
- To inform and liaise with relevant stakeholders to ensure rehabilitation activities are completed to achieve agreed PMLU outcomes (per the EA);
- To promote key avenues stakeholders may utilise to provide feedback on rehabilitation activities; and
- To identify processes for MTI to appropriately respond to community concerns and better manage stakeholder expectations.

2.2 Key responsibilities

The responsibilities to facilitate and uphold the CCP objective are as follows:

- Executive Directors (MTI):
 - Executive team have the overarching responsibility for environmental and social governance; and
 - Final approval of all company policy.
- Mine Manager (MTI):
 - Manage the overall direction of MTI Gurulmundi;
 - Responds to media enquiries (if any);
 - Manage direct, formal notification of intentions and actions relating to the project; and
 - Interacts with community and engages on issues and/or concerns at all levels.
- Environmental Managers (Ausrocks):
 - Development of the CCP with MTI;
 - Technical support in regulatory and community engagement, as led by MTI;
 - Technical support for MTI media releases and responses (if required and/or relevant); and
 - Technical input for development of project materials such as fact sheets, posters, newsletters, etc. (if required and/or relevant).

3 STAKEHOLDER MAPPING

3.1 Identified relevant stakeholder(s)

Gurulmundi Mine is in the Western Downs Regional Council approximately 34km northeast of Miles. Located on the border of Woleebee and Gurulmundi, the area has a total population of 81³.

It is important to identify of all relevant stakeholders as their engagement on rehabilitation objectives is a critical aspect of objective-setting and to ensure regional concerns and/or issues relating to the Project are adequately addressed during rehabilitation activities and the relinquishment of mining leases (MLs) under the EA.

Table 2 summarises all identified relevant stakeholders have been categories into stakeholder groups and, for the purpose of this SEP, are defined by the communities surrounding the Project and within Western Downs Regional Council.

Table 2: Stakeholder register for Gurulmundi Mine

Stakeholder(s)	Details	Related issues
Affected stakeholders		
Traditional owners – Iman People	The Iman People hold an active claim with the NNTT (National Native Title Tribunal) over a large area of land (approximately 10,603.1km ²) of which the Gurulmundi Mine is located within. Tribunal No. QC2017/008 Federal Court No. QUD413/2017	<ul style="list-style-type: none"> • Cultural heritage impacts • Impacts on Native Title • Potential for impacts on the cultural landscape and/or connections to Country • Post-mining land use and landform/ landscape • Environmental management/ stewardship • Employment and business opportunities in exploration, environmental management and monitoring, and rehabilitation
Affected landowners and lessees	MTI has agreements with the two landholders within the Gurulmundi Mine MLs. Land on which the MLs are located is used for grazing. There are no properties in place within the MLs therefore there are current no Compensation Agreements in place.	<ul style="list-style-type: none"> • Future access to and ownership of lands • Compensation impacts on land use • Water access – water allocations, water pipelines • Environmental management/ stewardship • PMLU and landform/landscape • Rehabilitation
Utility owners	Implementation of the PRC plan will trigger requirements to update agreements with utility owners who have assets within the Gurulmundi Mine MLs.	<ul style="list-style-type: none"> • Impact on asset/asset value • Remediation of impacts on assets • Service disruptions and mitigations • Crossing/interface agreements
Owners of overlapping tenures	There are no overlapping tenures with the Gurulmundi Mine MLs	<ul style="list-style-type: none"> • Not applicable
Adjacent private landholders	A land parcel (lot plan 164FTY1242) to the east of Gurulmundi Mine MLs is State owned forest.	<ul style="list-style-type: none"> • Environmental management/ stewardship • PMLU and landform/landscape • Rehabilitation schedule • Future access to and ownership of lands

³ Australian Bureau of Statistics: Woleebee 2021 Census Community Profiles; Gurulmundi 2021 Census Community Profiles



Stakeholder(s)	Details	Related issues
Local government Western Downs Regional Council	Western Downs Regional Council is the local government and planning authority for the Woleebee and Gurulmundi LGA.	<ul style="list-style-type: none"> Local job opportunities Economic and community sustainability and transformation (towards post-mining) Environmental management/ stewardship Effects on Council services and infrastructure (e.g. road maintenance, water supply) Mine rehabilitation progress Management of closure impacts on employment and businesses Accordance of MTI rehabilitation plans with local and regional planning goals
Interested stakeholders		
Other nearby landholders	Several surrounding private freehold and State-owned land around Gurulmundi Mine	<ul style="list-style-type: none"> Post-mining land use and landform/ landscape Access to land Rehabilitation schedule Future access to and ownership of lands
MTI employees and contractors	Interest in closure planning if they believe it will affect employment security	<ul style="list-style-type: none"> Job opportunities Loss of jobs relating to closure Closure planning Worker conditions Sustainability of communities dependent on mining
Businesses	Local business	<ul style="list-style-type: none"> Economic transformation (post-mining) Economic and community sustainability
Community members and groups	Woleebee and Gurulmundi communities	<ul style="list-style-type: none"> Community and regional sustainability Environmental management Future use of mined land Rehabilitation schedules
Federal Government	The Department of Agriculture Water and Environment (DAWE) is the lead agency for environmental protection at the Commonwealth level.	<ul style="list-style-type: none"> Legislative compliance Public interest Environmental management Financial assurance Environmental risk identification and management Future use and landform Company response to stakeholder views
Queensland Government	State government representatives and agencies with an interest in PRC planning include: <ul style="list-style-type: none"> Office of the Minister for Resources Office for the Minister of Environment, Great Barrier Reef, Science and Youth Affairs Shadow Minister for Natural Resources, Mine and Energy Member for Woleebee and Gurulmundi Department of Natural Resources, Mining and Energy (DNRM) Department of Environment and Science (PRCP Team and Sunshine Coast Business Centre 	



4 STAKEHOLDER ENGAGEMENT METHODS AND FREQUENCY

4.1 Primary engagement methods

1.1.1 Face-to-face meetings and phone calls

Face-to-face and/or online meetings and phone calls will be the primary method of engagement for the rehabilitation phases of Gurulmundi Mine. These will occur on an as-required and/or complaint-received basis providing stakeholders the opportunity to raise any concerns and/or issues relating to rehabilitation activities in accordance with the PRC plan.

Consultation will occur on an as-required-basis, for example when changes are made to rehabilitation plans changing on-the-ground circumstances which may impact stakeholders.

The key objectives of face-to-face (including virtual) meetings are as follows:

- Ensure on-going communications with stakeholders for the life of MTI Gurulmundi;
- Provide current information and updates and proposed rehabilitation activities at MTI Gurulmundi;
- Provide opportunities for stakeholders to initiate enquiries relating to rehabilitation activities at MTI Gurulmundi; and
- Operate as a feedback function to facilitate accurate collation and reporting of community consultations in relation to MTI Gurulmundi and rehabilitation activities.

1.1.2 Webpage

A website for the purposes of community consultation will not be developed nor be available. Alternatively, community and stakeholders may consult the MTI website⁴ for general information about the company and products produced at the site.

4.2 Additional engagement options

1.1.3 Public displays and community information sessions

There are no proposed plans for public displays or community information sessions for the purposes of community consultation, due to the small size and wide spread of the surrounding communities. Furthermore, the mine has operated in the area for several years prior to the development of this CCP.

⁴ <https://www.mineralstech.com/>

5 STAKEHOLDER ENGAGEMENT TOOLS AND MATERIALS

5.1 Company phone and email

The company contact phone number is the primary tool provided to community members and stakeholders to facilitate open, honest, and timely streams of communication. Alternatively, community members and stakeholder members may submit a form describing their enquiry and/or concern via the MTI company website. Details are as follows:

- phone number: +61 (07) 3277 9563
- online contact form: <https://www.mineralstech.com/our-company/contact-us/contact-us-email-form>

The general contact phone number is available by an office reception during weekdays, Monday to Friday between 9.00am to 5.00pm. Out-of-hours phone traffic will be responded to as soon as possible and practicable the following weekday.

It is proposed that the office reception receiving these calls will be advised to forward messages to the designated MTI team and/or manager for action and recording. The email address will be available at any time for stakeholders to send any queries and/or concerns which will be directed to the relevant team to record and respond to.

5.2 Fact sheets and newsletters

Fact sheets may be developed to support engagement and provide relevant key information to the community, where required. Fact sheets provided may include, but are not limited to, the most updated and relevant information relating to rehabilitation activities at Gurulmundi Mine. These will be distributed to community members and stakeholders via stakeholder meetings and may be used at any community events.

Where fact sheets are developed, it is anticipated that factsheets will include, but are not limited to, the following:

- General site updates;
- Project maps and diagrams;
- Updates on site rehabilitation and rehabilitation studies;
- Updates on planned consultation activities; and
- Progressive rehabilitation success and scheduled timelines.

Newsletters aim to provide more site-specific information on a regular and frequent basis which is better suited to a broader community audience.

Currently, the CCP does not propose to produce newsletters.

5.3 Community consultation register

To comply with requirements of Section 126C(1)(c)(iii) of the EP Act and the Guideline for Progressive Rehabilitation and Closure Plans (ESR/2019/4964) (PRCP Guideline), MTI has developed a community consultation register as part of the approval requirements for the PRC Plan. Although historical records are limited, MTI has engaged with relevant community members and stakeholders to discuss Project milestones and any concerns raised since their acquisition of the mine; these have been integrated into rehabilitation planning activities.

Following the approval of the PRC Plan, the register will continue to be used to document individual stakeholder consultation event, including all meetings, presentations, feedback, phone calls and written submissions, etc. The register will ensure all future stakeholder and community interactions are documented including dates,



engaged community member(s) and/or stakeholder(s), mode of communication, information provided, and key issues raised, and corresponding outcomes of the interaction. The purpose of maintaining the register is to provide an efficient mechanism for record keeping and reporting. It is also a useful tool for measuring stakeholder and community attitudes towards the Project and its rehabilitation.

An example community consultation register template is provided below to record stakeholder engagement activities, progress, and development (**Table 3**).

5.4 Feedback protocols

Routine protocols will be implemented to facilitate a feedback process that is timely and transparent ensuring all existing communications received from the stakeholders and the broader community are responded to. MTI is committed to integrity in reporting of stakeholder engagement and to demonstrate accountability during consultation processes. The feedback protocol is designed to support constructive relationships with all key stakeholders.

The feedback protocol is shown in **Figure 2**.

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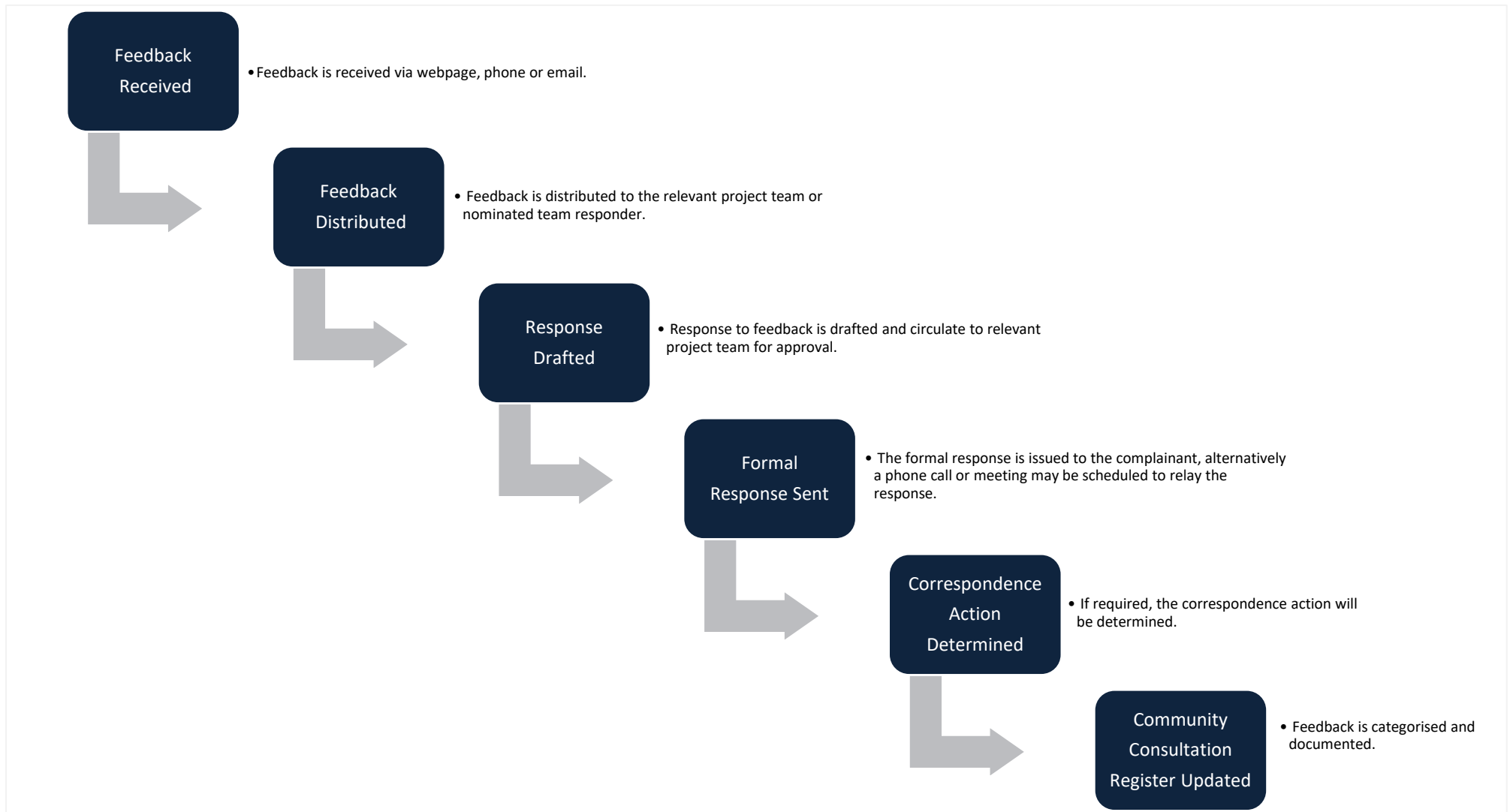


Figure 2: Feedback protocol process



6 REFERENCES

- ABS. (2021). 2021 Gurulmundi Census All persons QuickStats. Australian Bureau of Statistics via <https://abs.gov.au/census/find-census-data/quickstats/2021/SAL31277>
- ABS. (2021). 2021 Woleebee Census All persons QuickStats. Australian Bureau of Statistics via <https://abs.gov.au/census/find-census-data/quickstats/2021/SAL33109>
- DES. (2023). Environmental Authority EPML00699113 (issued 24 October 2023). Department of Environment and Science, Queensland.
- DETSI. (2024). Progressive rehabilitation and closure plans (PRC plans) guideline. Version 3.01. ESR/2019/4964. Department of the Environment, Tourism, Science & Innovation, Queensland.



Community Consultation Register

Date	Stakeholder group	Stakeholder title / organisation	Consultation type	Information supplied	Issues raised /discussed	Outcomes
January 2012	State government	Mining Registrar, Dalby Mining District	Letter	n/a	Application form submitted to the registrar regarding: MRA21 – conditional surrender of ML50179 MRA15 – extension to existing ML and addition of smaller ML EA amendment Plan of Operations Royalty Return	n/a
June 2012	State government	Department of Employment, Economic Development and Innovation	Letter	Information notice	n/a	Response to application for ML55007
May 2014	State government	Mining Registrar, Dalby Mining District	Letter	n/a	Addressing information notice and assessment criteria relating to proposed ML application	n/a
May 2016	State government	Department of Natural Resources and Mines	Letter	Mines Inspector notice letter	Inspection visit conducted December 2015	n/a
June / July 2017	State government	Department of Environment and Heritage Protection	Letter and Email	n/a	Pre-lodgement meeting advice regarding application to amend EA to undertake mineral processing on-site	Meeting with the department organised
December 2018	State government	Department of Environment and Heritage Protection	Meeting	n/a	Pre-lodgement Meeting (online) to discuss application	Advice provided by the department
January 2019	State government	Department of Environment and Heritage Protection	Letter	Response letter addressing pre-lodgement meeting	Proposed changes to current ERA approval	n/a
September 2019	Landholder	Landholder	Letter	Landholder Agreement to review and sign	n/a	n/a
July 2020	State government	Department of Environment and Science	Letter	Notice of ERC cost decision 10 July 2020 – 31 December 2022	n/a	n/a
July 2021	State government	Department of Environment and Science	Virtual Meeting	Discussion points: Transitional PRC plan PRC plan assessment timeframes Land outcome documents DES provide information relating to soil testing Community consultation register and plan Hydrology and groundwater assessment requirements Risk assessment requirements	n/a	n/a



Date	Stakeholder group	Stakeholder title / organisation	Consultation type	Information supplied	Issues raised /discussed	Outcomes
July 2021	State government	Department of Environment and Science	Email	Department provided the following: Follow up actions from meeting Proposed submission date 1 November 2022 Soil testing requirements Baseline information for soil i.e. soil survey data	n/a	n/a
January 2023	State government	Department of Environment and Science	Email	Submission of PRCP to Department	n/a	n/a
March 2023	State government	Department of Environment and Science	Email	Request for information in regard to submitted PRCP	n/a	n/a
August 2023	State government	Department of Environment and Science	Virtual Meeting	Meeting to discuss change application letter submitted to department, ERC and PRCP	ERC: no extension still required to submit response EA amendment: once approved a new ERC can be submitted PRCP: extension can be granted, as long as justification is given and requested at least 10 days before submission date	Ausrocks to reply to Department advising ERC change application withdrawal and ERC response submission
August 2023	State government	Department of Environment and Science	Phone & Email	Query in regards to shapefiles and disturbance footprint and differences for each component (Annual Return, ERC and EA compliance)	n/a	n/a
August 2023	State government	Department of Environment and Science	Email	PRCP information request extension requested by Ausrocks	n/a	n/a
September 2023	State government	Department of Environment and Science	Email	Further EA amendment discussion	Several pathways to move forward with amendment (major and minor) depends on timeframes	n/a
October 2023	State government	Department of Environment and Science	Email	EA approval and sign off from Department	n/a	n/a
March 2024	State government	Department of Environment, Science and Innovation	Phone & Email	Extension request for PRCP decision	Availability of technical experts have delayed the review process	n/a
May 2024	State government	Department of Environment, Science and Innovation	Email	Notice from Department with agreed extension request for decision period	n/a	n/a
May 2025	State government	Department of Environment, Tourism, Science and Innovation	Phone	Disturbance area discrepancy determined to be an EA issue not PRCP issue Continue with PRCP	n/a	n/a
August 2025	State government	Department of Environment, Tourism, Science and Innovation	Virtual Meeting	Issues with approving PRCP due to disturbance sizes between both EA and PRCP	n/a	n/a



Date	Stakeholder group	Stakeholder title / organisation	Consultation type	Information supplied	Issues raised /discussed	Outcomes
January 2026	State government	Department of Environment, Tourism, Science and Innovation	Email	Final draft of PRCP schedule received Planning Part due 10 business days after	n/a	n/a
February 2026	State government	Department of Environment, Tourism, Science and Innovation	Email	Final PRCP schedule has been issued Planning Part due 23/02	n/a	n/a



Appendix 7

Landowner Agreements

13/12/2019

Department of Environment and Science

PO Box 7230

Cairns QLD 4870

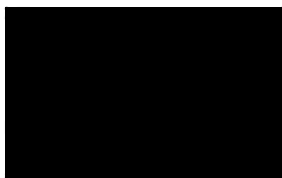
**Landowner Agreement upon Surrender of ML 55007, ML55008 & ML55017 under EA
EPML00699113**

Dear DES,

All the Above listed ML's are held by Amcol Australia Pty Ltd which are situated on freehold land known as Lot 10 & 11 on FT142 and Lot 34 on FT167. As landowner for the property I have made an agreement with Amcol Australia to take ownership of the following Infrastructure upon surrender of the leases;

- Main access road from the front gate to Juandah Creek in its current state as an unsealed dirt road
- All fixed buildings including Office Shed, Toilet, Weighbridge, Dispatch Office, Site Office and Lab, Lunchroom, USA Clay/Coal Shed, Cat Litter Storage Shed, Mill Feed Shed, Mill Shed, Mill Warehouse and Silos. Subject to the removal of all bentonite processing plant including conveyors, screens etc and any other mobile equipment or plant. Power connection including lights and power supply points may remain within the buildings.
- Removal of any excess bentonite or foreign materials from processing and stockpiling area.
- Central Extraction Area Pit (Water Storage) following clean out of sediment dam and conversion to clean water storage area. This will be applied to the two storage areas known as the following on the accompanying map. Water left in storage areas must be suitable for livestock use.
 - Lower basin
 - CP Dam 1
- I am comfortable leaving the infrastructure relating to electricity supply (namely the poles and wires owned by Ergon Energy) to remain. As long as Amcol Australia Pty Ltd has paid Ergon for any outstanding consumption at the time, Ergon will not charge me for the poles and wires (as per attached email).

It is intended that these items of infrastructure may be utilised for future business opportunities following the surrender of the mining operations. Please contact the undersigned if you require any further information on this matter.



(b)

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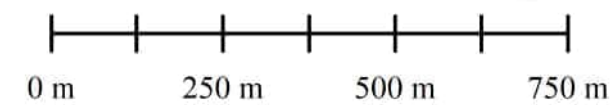
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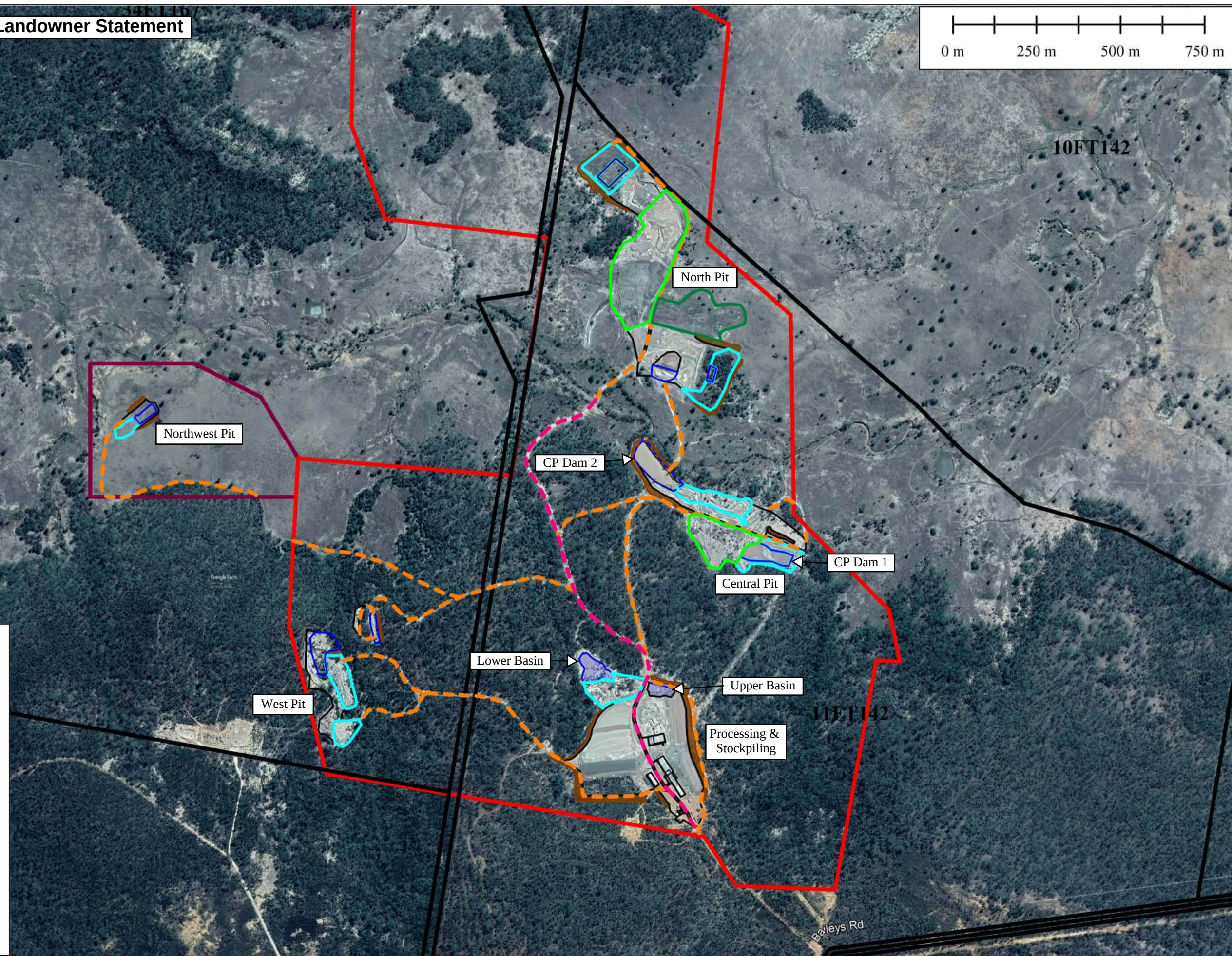
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(b)

ERC Plan 2019 - Landowner Statement



- ▣ Cadastral
- ▣ Infrastructure
- ▣ Laydown Yard
- ▣ Laydown Yard
- ▣ Pit 1
- ▣ Pit 1
- ▣ Pit 2
- ▣ Rehabilitation 1
- ▣ Rehabilitation 2
- ▣ Sediment Control Structures
- ▣ Stockpiles
- ▣ Stockpiles
- ▣ Topsoil Stockpile
- ▣ ML55007
- ▣ ML55008
- ▣ ML55017
- ▣ Roads - Ancilliary
- ▣ Roads - Main Access





Appendix 8

Gurulmundi Mine Risk Assessment

Risk scenario	Potential impacts	Inherent risk	Mitigation / management measure (proposed actions)	Justification of proposed action	Responsibility	Resource requirement	Performance measure	Reporting and monitoring requirements	Residual risk	Applicable rehabilitation milestones
PMLU is degraded and/or is of poorer quality than pre-mine land	<ul style="list-style-type: none"> Unable to achieve PMLU option; Unable to blend PMLU with surrounding land use; Unable to achieve EA final landform requirements; Poor land function; Low pasture diversity and/or productivity; Increased risk of and/or faster rates of erosion; Revegetation unsuccessful; Final landform unsuitable for final land use; and Extended water ponding potential. 	High	<ul style="list-style-type: none"> Ongoing monitoring and assessment of landform stability; Adaptive implementation of PRCP and regular monitoring to facilitate early intervention (where required); and Erosion and sediment control practices to manage soil quality and landform stability. Hybrid Ecosystem PMLU chosen to be more suited to the landscape, and to provide a positive integration between the rehabilitation areas and the surrounding RE. 	<ul style="list-style-type: none"> Regular monitoring of rehabilitation to provide early indicators of risk and facilitate time to implement adaptive measures; and Compliance with EA. 	<ul style="list-style-type: none"> Environment team Contractors (rehabilitation) 	<ul style="list-style-type: none"> PRCP schedule Geotechnical report Soil survey report 	Rehabilitation monitoring	Rehabilitation monitoring and reporting	Low	RM7 RM8 RM9
Ground compaction	<ul style="list-style-type: none"> Formation of new residual voids; Long-term vegetation not established; Erosion of good quality soil; Degradation of soil integrity; and Extended water ponding potential. 	Moderate	<ul style="list-style-type: none"> Use of reclaimed and co-mingled stockpile materials to backfill voids; Sufficient time allowed for settlement prior to topsoiling; Management of temporary stockpiles; and Adhesion to soil testing and monitoring procedures and metrics. 	<ul style="list-style-type: none"> Regular monitoring of rehabilitation to provide early indicators of risk and facilitate time to implement adaptive measures; and Compliance with EA. 	<ul style="list-style-type: none"> Environment team Site personnel Contractors (rehabilitation) 	<ul style="list-style-type: none"> Environmental management plan Soil survey report 	Rehabilitation monitoring	Rehabilitation monitoring and reporting	Low	RM3 RM4 RM5
Subsoil and topsoil deficit for rehabilitation activities	<ul style="list-style-type: none"> Degraded physical and chemical properties; Substrate inadequate to support long-term vegetation and grazing land use; and Carrying capacity impacted. 	High	<ul style="list-style-type: none"> Maintain proper storage of stockpiled topsoil and/or subsoil; Maintain other stockpiled materials relevant for rehabilitation efforts. 	<ul style="list-style-type: none"> Regular monitoring of rehabilitation to provide early indicators of risk and facilitate time to implement adaptive measures; and Compliance with EA. 	<ul style="list-style-type: none"> Environment team Contractors (rehabilitation) 	<ul style="list-style-type: none"> Soil survey report 	Rehabilitation monitoring	<ul style="list-style-type: none"> Stockpile monitoring and reporting Adequate auditing of stockpile quality 	Moderate	RM5
Impacts to aquifers and groundwater drawdown impacting other users	<ul style="list-style-type: none"> Surrounding groundwater users will have limited/impacted supply; Water quality decline; and EV and WQO are affected. 	Moderate	<ul style="list-style-type: none"> Implement applicable water monitoring; Location of site is not in proximity to major aquifers, and geology restricts groundwater seepage, therefore no detailed hydrological assessment required for the site; and Regular monitoring of rehabilitation areas to ensure occurrence and/or impact of draw down is mitigated. 	<ul style="list-style-type: none"> No record of groundwater interaction in the history of the mine. >20 boreholes drilled on the neighbouring property (& Environmental Impact Assessment) concluded this area, due to the geology, has very limited vertical migration of groundwater and no major aquifers near surface. 	<ul style="list-style-type: none"> Environment team Site personnel Contractors 	<ul style="list-style-type: none"> PRCP schedule Water management plan 	Rehabilitation monitoring	<ul style="list-style-type: none"> Rehabilitation monitoring and reporting Water management monitoring and reporting 	Low	RM2 RM3 RM4 RM8 RM9
Redirection of creek and river flows	<ul style="list-style-type: none"> Fluvial networks surrounding Gurulmundi Mine altered due to mining activities 	Moderate	<ul style="list-style-type: none"> Regular monitoring of rehabilitation areas to ensure likelihood of alteration and/or redirection of watercourses mitigated; Monitoring for redirection will protect against water erosion and/or formation of severe gullies near pits and/or bunds. 	<ul style="list-style-type: none"> Maintenance of bunds and water management structures on site will ensure surface flows on site are contained and do not affect and/or interact with waters or fluvial networks outside Gurulmundi Mine. 	<ul style="list-style-type: none"> Environment team Site personnel Contractors 	<ul style="list-style-type: none"> PRCP schedule Water management plan 	Rehabilitation monitoring	<ul style="list-style-type: none"> Rehabilitation monitoring and reporting Water management monitoring and reporting 	Low	RM2 RM3 RM4
Poor weed management	<ul style="list-style-type: none"> Proliferation of weeds and declared weed species on site and in rehabilitation areas; Rehabilitation progress and success is delayed and impacted; Establishment of declared species for revegetation are inhibited; and Unsuitable grazing pasture due to significant weeds (e.g. declared, Weeds of National Significance WONS) 	Moderate	<ul style="list-style-type: none"> Strict vehicle washdown management for vehicles entering/exiting Gurulmundi Mine; and Conduct regular weed monitoring programs to allow for early identification of weed presence, or any established weed communities, to allow for early intervention and management. Weed identification & awareness program in site induction 	<ul style="list-style-type: none"> Regular monitoring of rehabilitation areas during early stages of rehabilitation; Implement annual weed monitoring program; Wherever possible, prevent the introduction and establishment of significant weeds (e.g. declared, WONS); and Uphold requirements of biosecurity. 	All personnel	<ul style="list-style-type: none"> PRCP schedule Environmental management plan 	Rehabilitation monitoring	Rehabilitation monitoring and reporting	Low	RM6 RM7 RM8
Unidentified contamination during decommissioning activities	<ul style="list-style-type: none"> Contamination of groundwater, surface water, and/or soil; Additional costs for remediation; and Delays rehabilitation works and PRCP schedule 	Very High	<ul style="list-style-type: none"> Ensure all personnel working and/or visiting Gurulmundi Mine receive adequate induction training relating to contamination sources, identification, and reporting; Maintain accurate records of incidents with potential for contamination risk (e.g. spills, leaks); and Conduct site investigation and/or remediation as required. 	<ul style="list-style-type: none"> Ensure compliance with legislative requirements of the EA and the EP Act. 	All personnel	<ul style="list-style-type: none"> Environmental management plan Incident reporting 	Investigation and remediation conducted by a suitably qualified person	<ul style="list-style-type: none"> Monitoring of incident areas to manage newly identified and/or suspected contamination Review of documentation 	Moderate	RM1
Rehabilitation is not progressively completed	<ul style="list-style-type: none"> Rehabilitation works not completed to PRCP schedule; Unable to seed/revegetate land for grazing and grazing on/near native ecosystem; Additional costs for rehabilitation and repair works; Delays rehabilitation works and PRCP schedule. 	Very High	<ul style="list-style-type: none"> Ongoing review of PRCP schedule; Regular monitoring of rehabilitation areas; Regular monitoring of mine operations near rehabilitation areas; and Staggering rehabilitation work across the life of mine. 	<ul style="list-style-type: none"> Budget allocated for rehabilitation will be a driving factor for the achievement of work to schedule. 	<ul style="list-style-type: none"> Environment team Site personnel Contractors (rehabilitation) 	<ul style="list-style-type: none"> PRCP schedule Rehabilitation plan Rehabilitation monitoring data 	Rehabilitation monitoring	Rehabilitation monitoring and reporting	Moderate	RM7 RM8
Incorrect, inappropriate, or unsuitable seed mix/revegetation species	<ul style="list-style-type: none"> Unable to achieve final land use for grazing; Unable to blend landform with surrounding areas; Additional costs for rehabilitation and repair works; Seed and/or tube stock unable to establish due to poor viability or dormancy. 	High	<ul style="list-style-type: none"> Contractual agreement with seed supplies to provide specified seeds required for rehabilitation; Seed mix determined based on landholder input; Seed mix determined based on species typical of the area; and Conduct revegetation and seeding works during periods of predicted wet weather to provide favourable growing conditions. 	<ul style="list-style-type: none"> Ensure compliance with legislative requirements of the EA and the EP Act. Compliance with landholder statement. 	<ul style="list-style-type: none"> Project team Environment team Site personnel Contractors (rehabilitation) 	<ul style="list-style-type: none"> PRCP schedule Rehabilitation monitoring Environmental management plan Climate data 	Rehabilitation monitoring	Rehabilitation monitoring and reporting	Low	RM6 RM7 RM8
Revegetation does not become self-sustaining	<ul style="list-style-type: none"> Rehabilitation milestones not achieved; Unable to achieve rehabilitation goals and outcomes; Additional costs for rehabilitation and repair works; Degraded soil integrity and/or quality; and Unable to certify rehabilitation areas as progressively rehabilitated. 	High	<ul style="list-style-type: none"> Engage reputable tube stock and seed supplier and ensure sufficient stock is available; Regular monitoring and reporting to ensure suitable growing rates are maintained; Implement manual watering and/or fertiliser application as needed; Procure coated seed to provide added protection and security for successful growing; and Inclusion of cover crops to protect species growth. 	<ul style="list-style-type: none"> Ensure compliance with legislative requirements of the EA and the EP Act. 	<ul style="list-style-type: none"> Environment team Site personnel Contractors (rehabilitation) 	<ul style="list-style-type: none"> PRCP schedule Rehabilitation monitoring Environmental management plan 	Rehabilitation monitoring	Rehabilitation monitoring and reporting	Low	RM7 RM8
Stock fence failure	<ul style="list-style-type: none"> Livestock intrude and harm themselves (pits) or degrade rehabilitation areas; Soil is compacted; and Success and longevity of pasture species inhibited by premature grazing. 	Low	<ul style="list-style-type: none"> Regular monitoring and reporting of any damage or fence failures. Good communication with landowner Proactive maintenance of fencing around all active rehabilitation areas 	<ul style="list-style-type: none"> Ensure compliance with legislative requirements of the EA and the EP Act. Reduce re-work caused by rehabilitation damage 	<ul style="list-style-type: none"> Environment team Site personnel Landowner 	<ul style="list-style-type: none"> PRCP schedule Environmental management plan 	Rehabilitation monitoring	Rehabilitation monitoring and reporting	Very Low	RM7 RM8 RM9
Unsuccessful rehabilitation	<ul style="list-style-type: none"> Rehabilitation works do not achieve desired outcome and works not completed to PRCP schedule; Land cannot be progressively certified or relinquished; Additional costs for remediation; Increased liability; and Unable to surrender the land. 	Very High	<ul style="list-style-type: none"> Regular monitoring and reporting of rehabilitation failures; Implement early intervention when rehabilitation failures are recorded. 	<ul style="list-style-type: none"> Ensure compliance with legislative requirements of the EA and the EP Act. 	<ul style="list-style-type: none"> Project team Environment team Site personnel Contractors (rehabilitation) 	<ul style="list-style-type: none"> PRCP schedule Environmental management plan 	Rehabilitation monitoring	<ul style="list-style-type: none"> Rehabilitation monitoring and reporting PRCP schedule 	Low	RM7 RM8 RM9
Improper maintenance and/or storage of topsoil stockpiles	<ul style="list-style-type: none"> Topsoil not stored and/or maintained using best management practices; Material invaded by pest and/or weed species; Integrity, quality and health of soil is degraded; Topsoil material is eroded; Additional costs for rehabilitation and repair works; and Delays rehabilitation works and PRCP schedule. 	High	<ul style="list-style-type: none"> Implement current best practice management strategies for the maintenance and storage of topsoil; Stockpile topsoil and subsoil materials separately and identify stockpiles on mapping; Where applicable, directly place topsoil in rehabilitation areas after stripping to avoid double handling (via stockpiling) material; and Implement appropriate erosion and sediment controls around stockpiles. 	<ul style="list-style-type: none"> Ensure compliance with legislative requirements of the EA and the EP Act. Reduced risk of having to import additional topsoil to facilitate rehabilitation. 	<ul style="list-style-type: none"> Environment team Site personnel Contractors (rehabilitation) 	<ul style="list-style-type: none"> Environmental management plan 	<ul style="list-style-type: none"> Rehabilitation monitoring AQP inspection 	<ul style="list-style-type: none"> Rehabilitation monitoring and reporting PRCP schedule 	Moderate	RM5

Risk scenario	Potential impacts	Inherent risk	Mitigation / management measure (proposed actions)	Justification of proposed action	Responsibility	Resource requirement	Performance measure	Reporting and monitoring requirements	Residual risk	Applicable rehabilitation milestones
Overburden material causes Acid Mine Drainage	<ul style="list-style-type: none">• Backfilled pit(s) cause water quality damage to ground and/or surface water;• Topsoil material rendered unusable;• Failed rehabilitation of pit(s);• Downstream negative effects on flora and fauna values;• Overburden dumps cause downstream water quality and ecological impacts;• Additional costs for rehabilitation and repair works; and• Delays rehabilitation works and PRCP schedule.	Very Low	<ul style="list-style-type: none">• Visual monitoring of overburden dumps for signs of Acid Mine Drainage;• Visual monitoring of backfilled pits rehabilitation progress; and• Monitoring of water quality downstream of any overburden dump.	<ul style="list-style-type: none">• Waste Characterisation shows that overburden is comprised of Sandstone with a very low Sulphur content, therefore the risk of Acid Mine Drainage emanating from the overburden at the mine is considered very low or “non-existent”. Minimal mitigation action is warranted as a result;• Overburden does not have the potential to generate neutral metalliferous drainage or saline drainage;• Overburden is moderately susceptible to weathering where exposed to the elements, this is backed up by the Horizon Soil Report.	<ul style="list-style-type: none">• Environment team• Site personnel	<ul style="list-style-type: none">• PRCP schedule• Water management plan• Rehabilitation monitoring• Environmental management plan	<ul style="list-style-type: none">• Rehabilitation monitoring	<ul style="list-style-type: none">• Rehabilitation monitoring and reporting• PRCP schedule	Very Low	RM3 RM4 RM7 RM8 RM9
Inadequate Water Resources to sustain Water Storage PMLU	<ul style="list-style-type: none">• Aridification of the land due to limited water• Inability to sustain grazing land uses through lack of available water for stock.• Degradation of water storage infrastructure incl wind erosion, livestock damage when dry.	Moderate	<ul style="list-style-type: none">• Water balance provides estimate of water storage characteristics using long term data.• Site historical records of dam use and weather cycles.• Landowner invested in water resources infrastructure to back up mining infrastructure. Landowner agreement supports water storage.• Removal of water diversion bunds to restore original water flow paths will increase long term viability of water storages.	<ul style="list-style-type: none">• Water balance suggests site’s ability to sustain an acceptable grazing use.	<ul style="list-style-type: none">• Environment team• Site personnel	<ul style="list-style-type: none">• PRCP schedule• Water management plan	<ul style="list-style-type: none">• AQP inspection	<ul style="list-style-type: none">• Rehabilitation monitoring and reporting	Low	RM2 RM7 RM8



Appendix 9

Waste Characterisation Assessment

Waste Characterisation

No work has been carried out directly to characterise the waste or overburden of the mine, however, an understanding of these materials has been derived from both site geological investigations into the Bentonite resource and the Draft Impact Assessment Study (IAS) for the Gurulmundi Landfill Facility¹ which is sited immediately south of ML5508 on Gurulmundi Road.

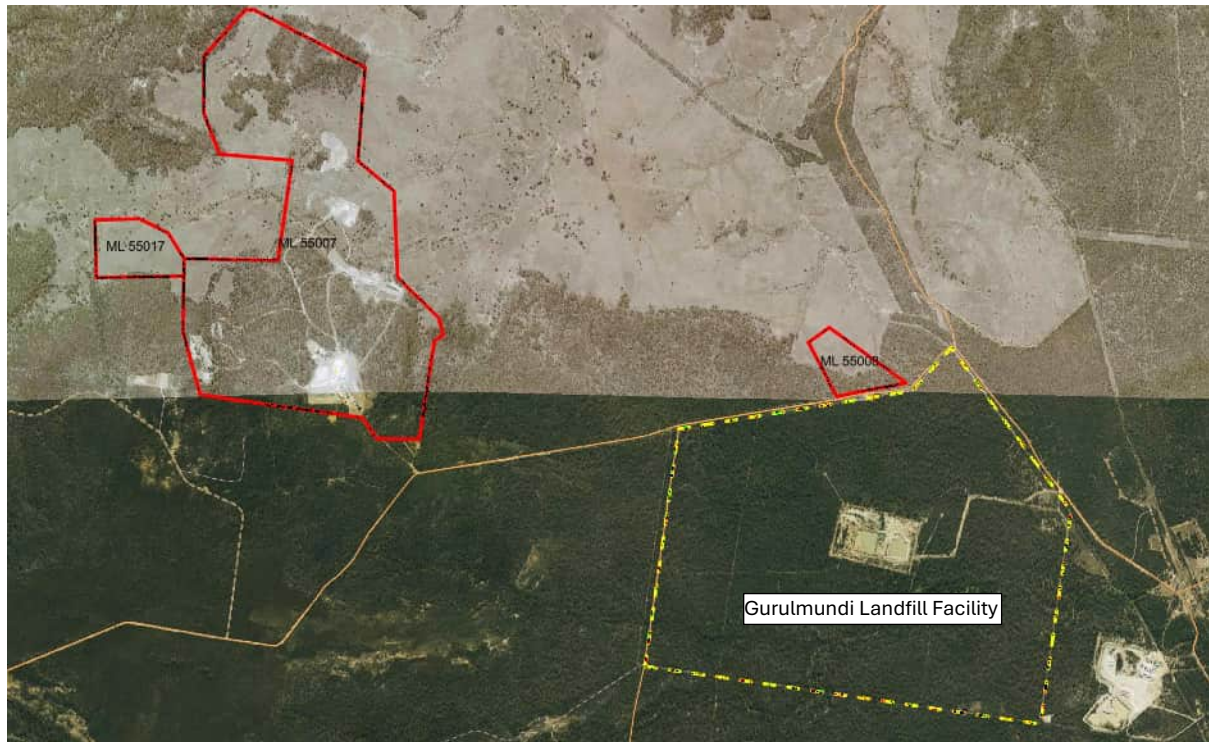


Figure.7; Area map showing proximity of the Gurulmundi Landfill Facility to the MTI-Amcol Bentonite Mine

The now inactive landfill facility resides in a notably weathered zone of the same geological unit compared to the majority of the mine site, the Orallo Formation, which is described as comprised of sandstone, siltstone, mudstone, conglomerate and coal.

Drilling conducted for the Landfill Facility IAS confirms this as shown in the table below.

Table.7; Summary of Subsurface Units, IAS

GEOLOGICAL UNIT NO.	TYPICAL INTERSECTION DEPTH (m)	GEOLOGICAL DESCRIPTION
1	0-2	Silty sand topsoil to clay residual soil
2	2-8	Sandstone – jointed with minor clay lensing
3	8-13	Sandstone – fine to medium grained, with clay interbeds and clasts
4	13-20	Mixed clays – with some traces of sand and bentonitic units
5	20 to 30+	Tuffaceous sandstone

Note. _No groundwater was intersected in the any of the upper sequences (i.e; above 96m depth);

_Units can be seen in cross section in Figure.9

The subsurface units encountered in the IAS study are all sedimentary deposits, with the non-bentonite units predominantly comprised of sandstone. Whilst no testing has been carried out on the sandstones encountered at the mine site, sandstones are typically mostly comprised of

¹ AGC Woodward-Clyde, 1991. Secure Landfill Gurulmundi - Draft Impact Assessment Study Report

MTI/Amcol Gurulmundi Bentonite Mine

quartz, but can also contain significant amounts of feldspar, and minor amounts of other clays and minerals².

Samples of core drilled for the IAS investigation were taken for heavy metal analysis and ground to a fine powder in a tungsten-carbide and iron-chrome swing mills³. Analysis shown in the table below was determined by :

- X-ray fluorescence spectrometry (XRF) for Iron, Manganese, Lead, Arsenic, Nickel and Zinc;
- Flame atomic absorption spectrometry (acid digested) for Copper, Cobalt and Chromium;
- Graphite furnace AAS (acid digested) for Cadmium;
- Hydride generation AAS for Selenium; and
- Cold vapour AAS for Mercury.

ELEMENT	RANGE (MG/KG)	QLD CRITERIA (MG/KG)*
Arsenic	2 - 16	3
Mercury	<0.002 – 0.047	2
Copper	4 - 9	100
Zinc	11 - 175	500
Lead	8 - 16	200
Cobalt	10 - 30	50
Chromium (total)	10 - 30	250
Nickel	3 - 16	100
Cadmium	<1	3
Selenium	<0.1 - 0.2	20
Iron (%Fe ₂ O ₃)	1.15 - 2.96%	-
Manganese (%MnO)	<0.01 - 0.01%	-

*As per 1991 Draft.Guidelines.for.Assessment.of.Contaminated.Land.in.Queensland. Chemical Hazards Emergency Management (CHEM) Unit, March 1991.

Whilst the major components of sandstones (i.e. quartz and feldspar) do not hold potential for Acid Mine Drainage (AMD) themselves, whether a particular sandstone can hold that potential is generally based on whether or not they hold minor amounts of pyrite. When exposed to air or water, Pyrite will fully oxidise in a short period of time which produces sulfuric acid⁴. The chemical assessment of the core sample above shows no FeS₂ and the operator indicates that there have been no site observations of pyrite or sulphide minerals during mining in the site's history.

The geological similarity between the Gurulmundi landfill and the MTI/Amcol Bentonite Mine site can be seen when comparing the stratigraphy prepared for the two operations as seen in the two figures below.

² [Minerals Education Coalition \(web page\) - Minerals Database - Sandstone - Accessed 22/07/2025.](#)

³ AGC Woodward-Clyde, 1991. Secure Landfill Gurulmundi - Draft Impact Assessment Study Report

⁴ Valentina R. Leotaud, 2020. [The causes behind pyrite oxidation – and acid mine drainage.](#) Accessed 23/07/2025

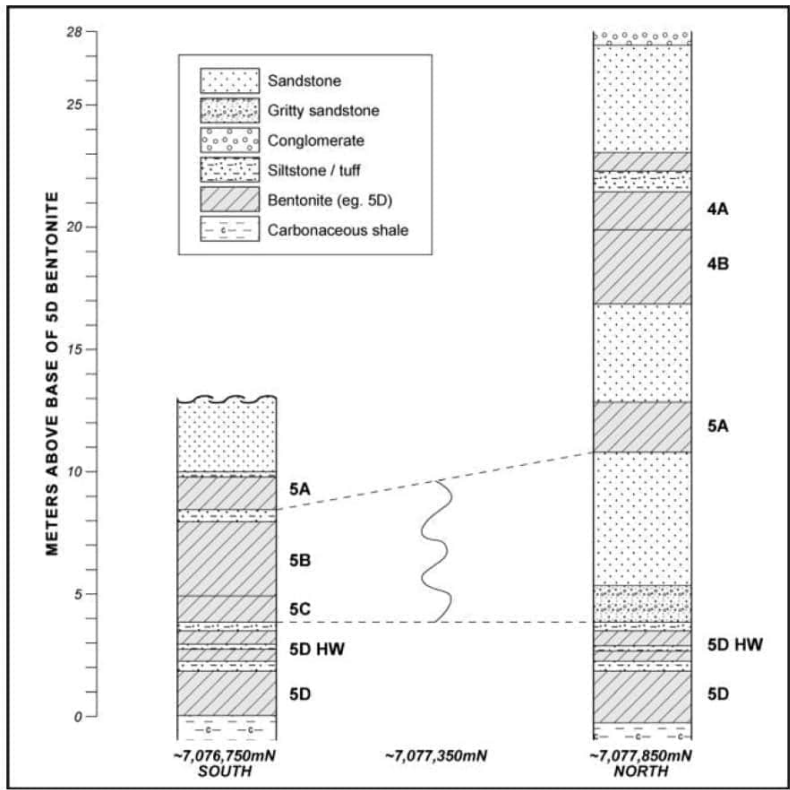


Figure.8: Generalised stratigraphy of Beds 4 and 5 within ML00666⁵

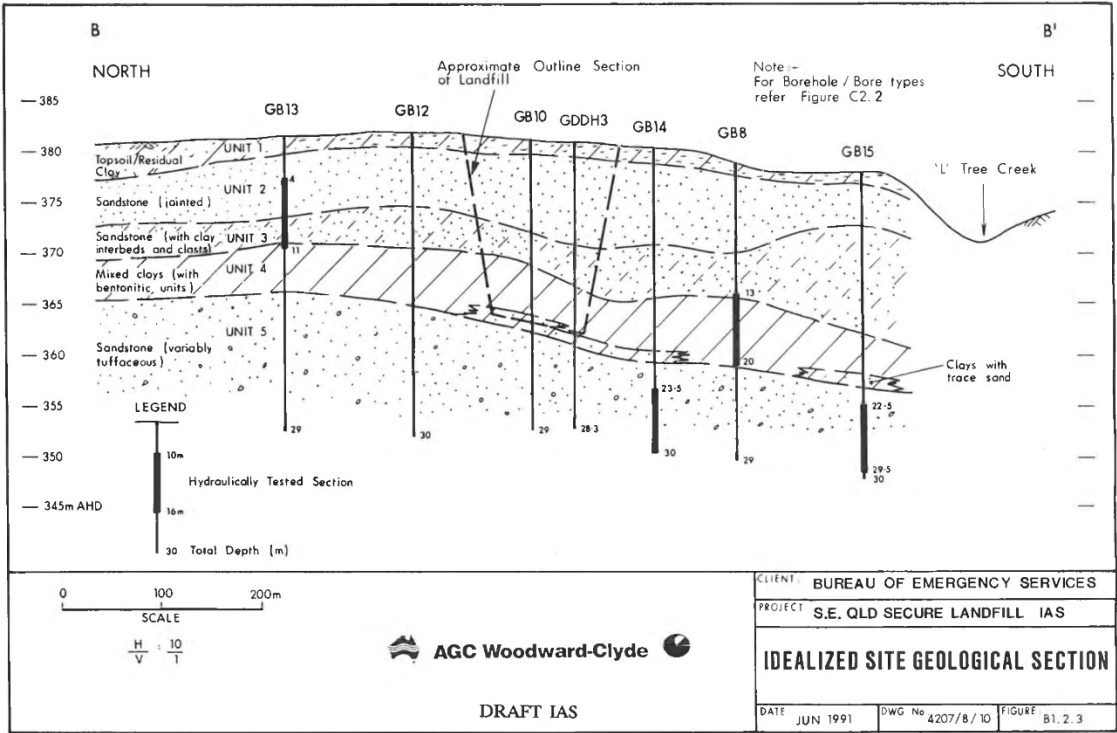


Figure.9: Idealised site geological section⁶

⁵ AJ Scogings, 2021. Gurulmundi Mineral Resource & Reserve Report – Summary

⁶ AGC Woodward-Clyde, 1991. Secure Landfill Gurulmundi - Draft Impact Assessment Study Report

Conclusion

The resource and reserve report for the mine, confirmed by the earlier draft IAS for the Gurulmundi Landfill Facility, show that the overburden expected to be extracted in the future of the mine will be predominantly made up of variably weathered sandstone. The testing of some of the overburden materials show minimal heavy metal contaminants and shows no records of substantial Pyrite or sulphide minerals.

This demonstrates, with reasonable confidence, that the overburden to be extracted at the mine contains predominantly quartz and feldspar dominated minerals and therefore should have near to zero AMD potential. The material's use as a subsoil should be handled as per the soil survey recommendations to achieve a non-dispersive subsoil outcome.

There are no recommended precautions in rehabilitation design that are required to accommodate use of the waste for pit backfill, and no cover system is required to contain any chemically reactive waste. In conclusion, the waste rock at the site is assessed as a low risk to the successful rehabilitation outcomes as planned and based on this assessment additional testing for net acid forming/contamination potential is not required.