



Lake Lindsay Coal Mine

Progressive Rehabilitation and Closure Plan

Issue: 04

Date: 3 November 2025

Tenure No.(s): ML70336 and ML700076

EA Holder(s): Anglo Coal (German Creek) Pty Ltd, Jena Pty Ltd and Mitsui German Creek Investment Pty Ltd

EA Holder Contact Details: Jesse Perrott



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1 Introduction

In accordance with the *Environmental Protection Act 1994* (EP Act), all mining activities approved through a site-specific Environmental Authority (EA) must develop and submit a Progressive Rehabilitation and Closure Plan (PRCP) to the Department of the Environment, Tourism, Science and Innovation (DETSI) for assessment.

The purpose of a PRCP is for the EA holder to plan how (Rehabilitation Planning part) and when (PRC Schedule part) progressive rehabilitation activities will be carried out on the mining leases (ML) in a way that maximises the progressive rehabilitation of the land to a “stable condition”. According to section 111A of the EP Act, land is deemed to be in a stable condition if it 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 post mining land use (PMLU). Further, the PRCP allows for documentation of milestones and completion criteria for progressive rehabilitation and EA surrender.

This PRCP has been prepared for Lake Lindsay Mine (LLM), which is operated and managed by Anglo Coal (German Creek) Pty Ltd, Jena Pty Ltd and Mitsui German Creek Investment Pty Ltd, here from collectively referred to as “Anglo American”.

A transition notice was issued under section 754 of the EP Act on 14/04/2023 to Anglo American, requiring submission of a PRCP for LLM to DETSI by 14 January 2024. A first revision of the PRCP was submitted on 18 August 2024 to include updates required as part of a “Not Properly Made” Information Request. This is a second revision to the PRCP to make updates in accordance with the requirements of an Information Request received from DETSI dated 13 December 2024 (reference: C-EATPRCP-100118300).

This PRCP complies with sections 126C and 126D of the EP Act and the statutory guideline: *Progressive Rehabilitation and Closure Plan (ESR2019/4964)* (PRCP Guideline) (Queensland Government, 2024a).

As an existing operation, LLM is subject to the transitional provisions under the *Mineral and Energy Resources (Financial Provisioning) Act 2018* (MERFP Act), classifying this as a transitional PRCP. It is important to note that this PRCP does not impose any regulatory standards on LLM beyond what is legally required or previously approved. For more information on legislative requirements, refer to **Section 2.0**.

1.1 Project Overview

Anglo American operate LLM, the subject of this PRCP. LLM operations are currently authorised by EA EPML00739113 (**Appendix A**), with coal extraction rate of up to 6.5 million tonnes per annum (Mtpa) authorised within two MLs, ML70336 and ML700076.

LLM forms part of the broader ‘Capcoal Complex’, which includes LLM and German Creek Mine (GCM). GCM operates under a separate EA (EPML00732613) and is

not included in this PRCP. All processing activities and run of mine (RoM) from LLM are processed within the GCM MLs and are hence out of scope for this PRCP.

2 Relevant Legislation and Policies

2.1 Mined Land Rehabilitation Policy

The Mined Land Rehabilitation Policy is a joint departmental policy between the DETSI, the Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (DNRMMRRD) and the Queensland Treasury. The Policy presents Queensland Government's position on mine rehabilitation and is the basis of the changes made through the MERFP Act.

The Policy states that, *"land disturbed by mining is considered to be rehabilitated when it can be demonstrated it is safe, stable, does not cause environmental harm, and is able to sustain the post-mining land use approved in the PRCP (referred to as 'stable condition'). An area of land that does not sustain a post-mining land use (referred to as a 'non-use management area') may be approved if best practice management can be demonstrated, and rehabilitating the area would cause greater environmental risk than not rehabilitating; or the environmental risks from the area are localised, and the cost of rehabilitation would be so excessive as to not be in the public interest."*

2.2 Environmental Protection Act (EP Act) 1994

The EP Act requires mines with a site-specific EA to develop and implement a PRCP. The EP Act states the legislative information requirements for the rehabilitation planning part (s126C) and PRCP schedule (s126D). The EP Act also details the assessment process for the approval of a proposed PRCP.

The EP Act contains transitional provisions relating to existing mines with a site-specific EA. During the three-year transition period (1 November 2019 to 1 November 2022), DETSI issued notices to all approved site-specific mines requiring them to develop and submit a proposed PRCP by a specific date. The transitional provisions also state that approved PMLUs/Non-use Management Area (NUMA(s)) may be transitioned into a PRCP without additional assessment or public notification. Additionally, any post mining land outcomes identified in a Land Outcome Document (LOD) can be transitioned into the PRCP.

2.3 Environmental Protection Regulation 2019

The Environmental Protection Regulation 2019 (EP Regulation) includes PRCP objectives and performance outcomes (Schedule 8A) that the administering authority must consider when approving a PRCP. The EP Regulation also contains additional requirements for deciding the extent of a floodplain (0.1% Annual Exceedance Probability (AEP)) of 4th order stream or greater.

2.4 PRCP Guideline

The PRCP Guideline (Queensland Government, 2024) is a statutory guideline made under s550 of the EP Act that identifies information that the administering authority deems necessary or desirable to be included within a PRCP.

The PRCP Guideline also provides information that is expected to be included in the PRCP, including the Rehabilitation Planning and PRCP Schedule.

2.5 PRCP Application Form

The PRCP must be submitted in accordance with the Application Form '*Submission of a Progressive Rehabilitation and Closure Plan*' (ESR/2019/4957), approved under section 126C of the EP Act. This PRCP has been submitted in accordance with the requirements of the Application Form.

2.6 EA Conditions Relevant to LLM Closure and Rehabilitation

Table 1 below details the EA conditions applicable to closure and rehabilitation at LLM as stipulated by LLM's EA EPML00739113 (**Appendix A**).

Table 1 EA Conditions Relevant to LLM Closure and Rehabilitation

Condition No.	Condition
D34	Decommissioning and Rehabilitation Structures must not be abandoned but be either: - Decommissioned and rehabilitated to achieve compliance with Condition H1; or - Be left in-situ for a beneficial use(s) provided that: - It no longer contains contaminants that will migrate into the environment; and - It contains water of a quality that is demonstrated to be suitable for its intended beneficial use(s); and - The administering authority, the holder of this environmental authority and the landholder agree in writing that the dam will be used by the landholder following the cessation of the environmentally relevant activity(ies).
G1	All areas significantly disturbed by mining activities must be rehabilitated to a safe, stable and non-polluting landform with self-sustaining vegetation.
G2	All areas significantly disturbed by mining activities must be rehabilitated to meet or exceed the requirements of Table G1 - Final land use and rehabilitation approval schedule and Table G2 - Landform design.
G3	Progressive rehabilitation must commence when areas become available within the operation land.

Condition No.	Condition
G4	The acceptance criteria will be reviewed in consultation with the administering authority as research continues to meet the outcomes in Table G1 - Final Land Use and Rehabilitation approval schedule and landform design criteria in Table G2 - Landform Design.
G5	Monitoring rehabilitation must be undertaken for the purpose of reviewing the rehabilitation process undertaken with the intent to improve rehabilitation practices and validating the proposed PMLU. The rehabilitation monitoring must at a minimum include: a) Species diversity; b) Vegetation ground cover; c) Tree density and stem thickness; d) Visible indicators of erosion; and e) Foliage projective cover.
G9	Residual void outcome Residual voids must comply with the following outcomes: a) Residual voids must not cause any serious environmental harm to land surface waters or any recognised groundwater aquifer, other than the environmental harm constituted by the existence of the residual void itself and subject to any other condition within this environmental authority; and b) Residual voids must comply with Table G3 - Residual Void Design.
G10	Monitoring of residual void slope is to be undertaken every four (4) years to validate the predictive model of the long-term geotechnical behaviour of the voids as outlined in the 'Slope Design for Longterm Geotechnical Stability at German Creek Mine' by Geotechnical Consulting Service Pty Ltd, report 109.
G11	Infrastructure All infrastructure, constructed by or for the environmental authority holder during the mining activities including water storage structures, must be removed from LLM prior to mining lease surrender, except where agreed in writing by the post mining land owner/holder. NOTE: Condition G11 is not applicable where the landowner/ holder is also the environmental authority holder. Refer Table G1, Table G2 and Table G3 of EA reproduced as Table 16, Table 23 and Table 18 in this PRCP.
G12	Topsoil and capping material The topsoil requirements for rehabilitation of LLM and the availability of suitable topsoil on site must be detailed in the plan of operations.
G13	The capping material (other than topsoil) requirements for rehabilitation of LLM and the availability of suitable capping material

Condition No.	Condition
	(other than topsoil) on site must be detailed in the plan of operations.

3 Project Planning

3.1 Regional Locality

LLM is located approximately 27 kilometres (km) south south-east of the township of Middlemount, 70 km north-west of Emerald and 200 km south-west of Mackay, Queensland (**Figure 1**). LLM area lies within Isaac Regional council, which is predominantly used for cattle grazing on native and introduced pastures.



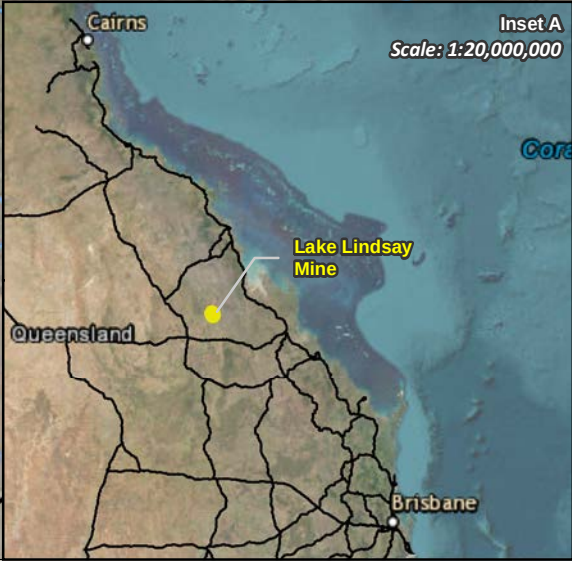
LAKE LINDSAY

PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 1 - REGIONAL LOCALITY

LEGEND

- Major Watercourse
- Minor Watercourse
- Road
- Mining Lease



0 250 500 Meters

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:40,000 at A3
Project Number:	626.30126
Date:	05-Dec-2023
Drawn by:	LC

3.2 Project Ownership and Mining Tenements

Mining and associated activities at LLM are undertaken in accordance with LLM's EA (EPML00739113). EA holders (**Table 2**) and mining tenements associated with LLM (

Table 3 and **Figure 1**) are detailed below. The approved Environmentally Relevant Activities (ERA) conducted on LLM's MLs are presented in the EA (**Appendix A**).

Table 2 EA Holders

Holder	Name	Ownership (%)
Primary Holder	Anglo Coal (German Creek) Pty Ltd	56.97
Joint Holder	Mitsui German Creek Investment Pty Ltd	30.00
Joint Holder	Jena Pty Ltd	13.03

Table 3 LLM Mining Tenements

Tenure	Authorised Holder Name	Grant Date	Expiry Date	Area (hectare (ha))
ML 70336	Anglo Coal (German Creek) Pty Ltd Jena Pty Ltd Mitsui German Creek Investment Pty Ltd	6 April 2006	30 April 2036	4,171
ML 700076	Anglo Coal (German Creek) Pty Ltd Jena Pty Ltd Mitsui German Creek Investment Pty Ltd	1 November 2023	30 November 2048	680.7

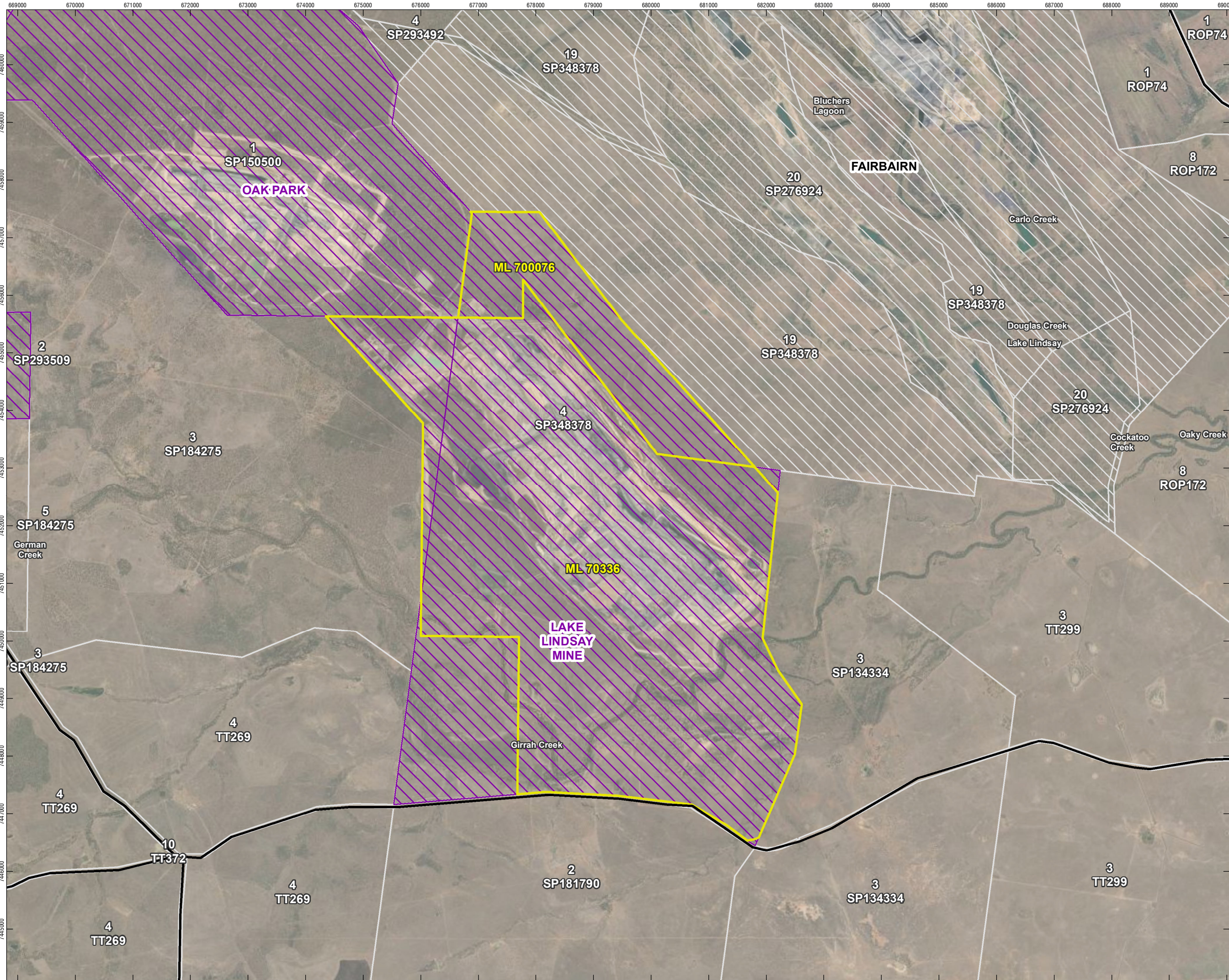
3.3 Underlying Landholders

LLM is a freehold, owned by Anglo Coal (Capcoal Management Pty Ltd) (**Table 4** and **Figure 2**).

Lake Lindsay Coal Mine

Table 4 Underlying Landholders

Mining Lease	Lot No.	Plan No.	Land Tenure Type	Name	Land Use
ML70336 and ML700076	4	SP348378	Freehold	Anglo Coal (Capcoal Management) Pty Ltd	Mining Activities

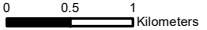


LAKE LINDSAY

**PROGRESSIVE REHABILITATION
AND CLOSURE PLAN**

**FIGURE 2 - UNDERLYING LAND-
HOLDERS AND ADJOINING
TENEMENTS**

- LEGEND**
- Road
 - Mining Lease
 - Property Boundary
 - ▨ Anglo Coal (Capcoal Management) Pty Ltd Property
 - ▨ Mining Lease Access Property

Coordinate System: GDA2020 MGA Zone 55

Scale: 1:60,000 at A3

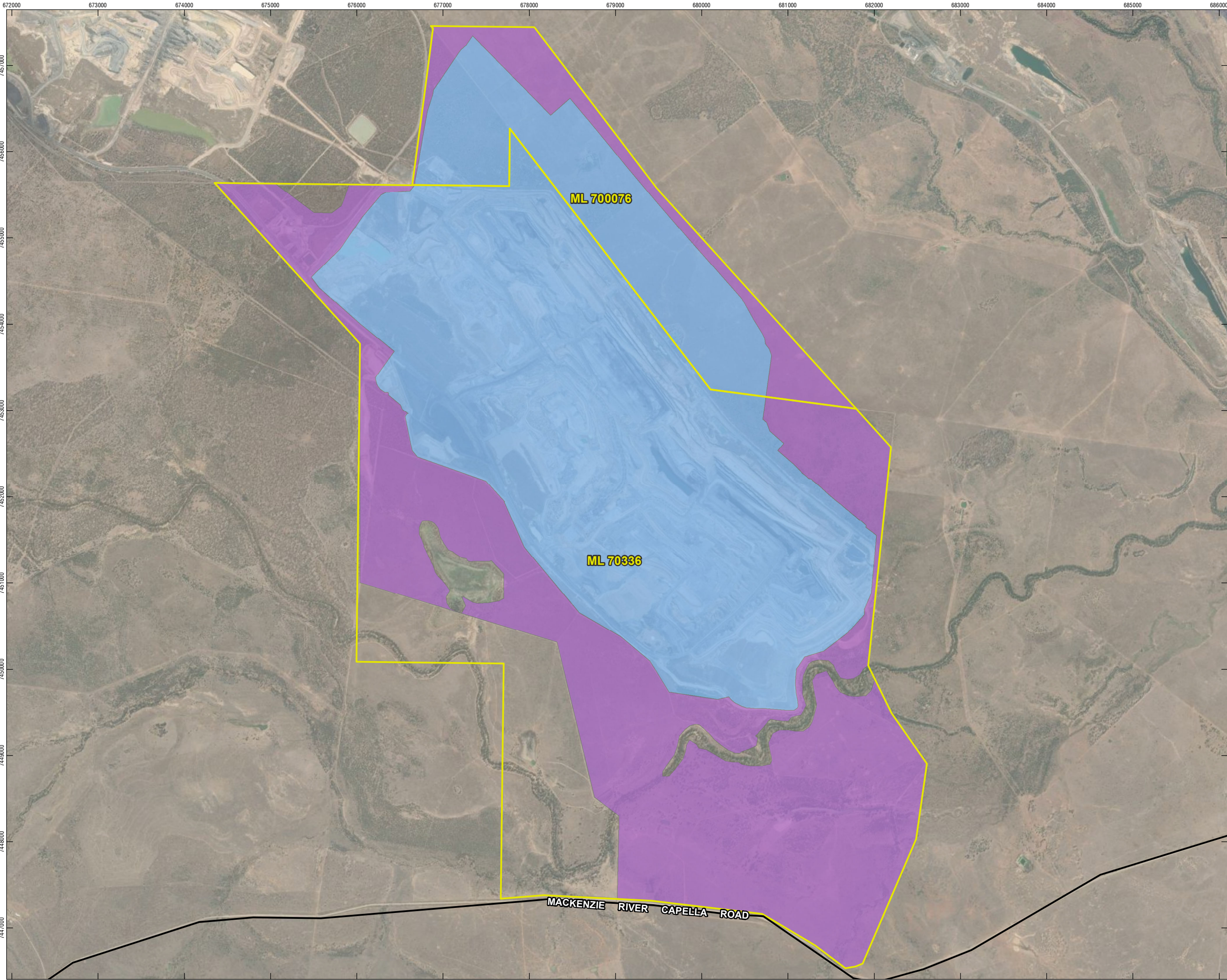
Project Number: 626.30126

Date: 18-Jun-2025

Drawn by: LC

3.4 Authorised Extent of Disturbance

LLM holds authorisation to undertake surface and subsurface disturbance activities for the duration of the Life of Asset Plan (LoAP) within ML70336 and ML700076 (**Figure 3**). **Areas outside** the surface and sub surface footprints outlined in Figure 3 are subject to condition A6, A7 and A8 of EA EPML00739113 (20 May 2025). Rehabilitation Area four (RA4) covers areas outside surface and subsurface footprints.



LAKE LINDSAY

PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 3 - LOM AUTHORISED
DISTURBANCE EXTENT

LEGEND

- Road
- Mining Lease
- Surface Disturbance
Authorised
- Surface and Subsurface
Disurbance Authorised



0 250 500
m

Coordinate System: GDA2020 MGA Zone 55

Scale: 1:40,000 at A3

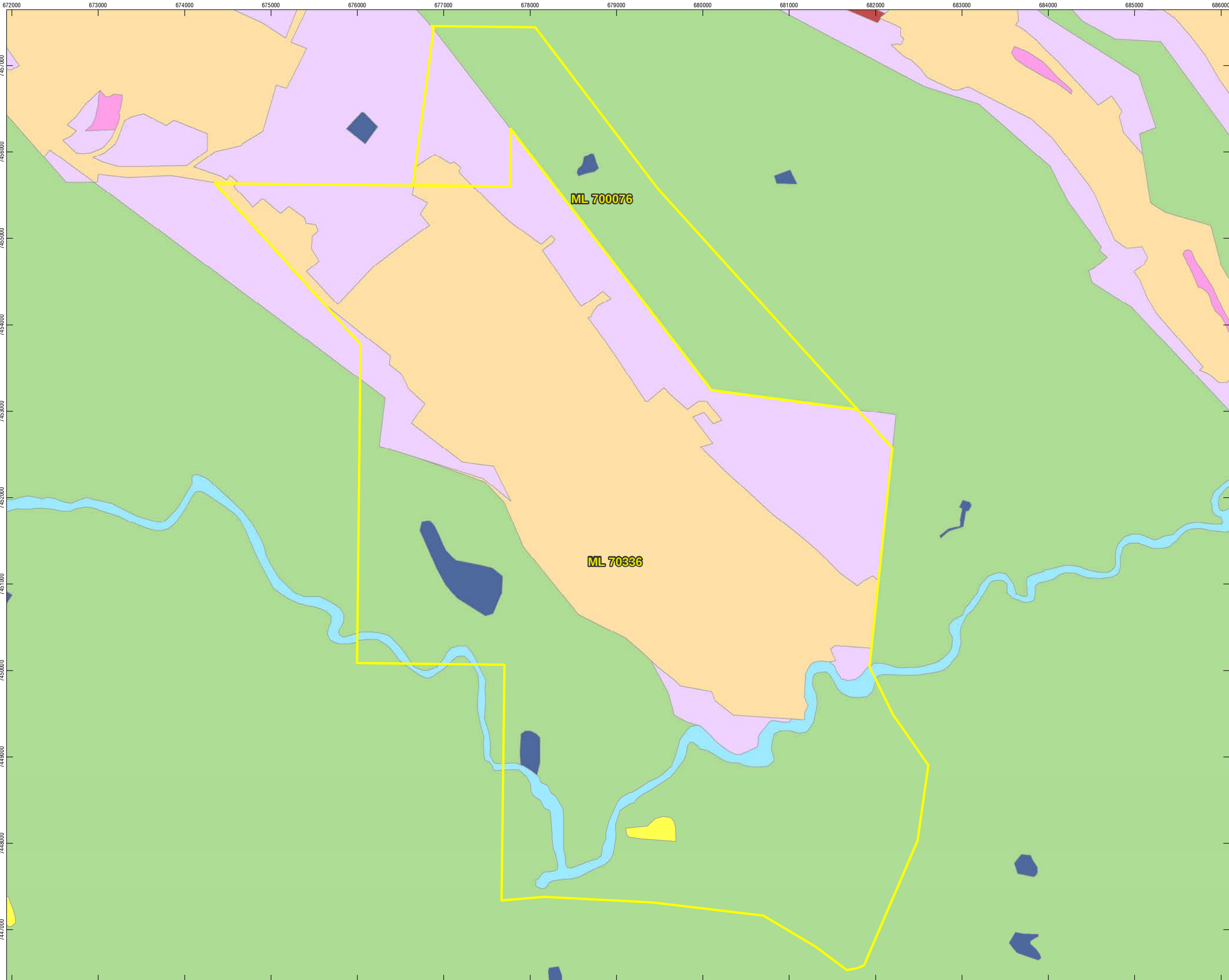
Project Number: 626.30126

Date: 17-Jun-2025

Drawn by: AS

3.5 Surrounding Land Use

LLM is located within the Mackay, Isaac and Whitsunday region and within the Bowen Basin, in Central Queensland (**Figure 4**). The region's natural assets and abundant resources have seen the region predominantly utilised for both agricultural and mining activities. As of June 2024, there were 48 coal mines and one metalliferous mine in operation within this region (Queensland Government Statistician's Office (QGSO), 2024). In addition to coal mining, coal seam gas and conventional gas production activities also occur within the Bowen Basin. Middlemount is the closest town to LLM, located ~27 km to the south south-east.



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FIGURE 4 - SURROUNDING LAND
USES

- LEGEND
- Mining Lease
- Surrounding Land Uses**
- Farm buildings/infrastructure
 - Grazing native vegetation
 - Marsh/wetland - production
 - Mining
 - Other minimal use
 - Reservoir
 - Roads
 - Water storage - intensive use/farm dams



0 250 500 Meters

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:40,000 at A3
Project Number:	626.30126
Date:	05-Dec-2023
Drawn by:	LC

3.6 Surrounding Receptors

The closest residential settlement to LLM is a small mining town of Middlemount, located approximately 27 km to the south south-east. Middlemount township was established in the early 1980s by the then owners of mine (Capricorn Coal Management Pty Ltd) to serve the needs of the mine workers.

In June 2024, Middlemount had a Full Time Equivalent (FTE) population of 3,275 persons (QGSO, 2024) comprising an estimated resident population of 1,890 persons (~58% of the FTE population) and an estimated non-resident worker population of 1,390 persons (~42% of the FTE population). The resident population represented approximately 8.1% of the Isaac Regional Council Local Government Areas (LGA(s)) estimated resident population of 23,325 persons in June 2024.

Private home ownership is extremely low in Middlemount, with most houses owned by Anglo American and a small amount of housing stock owned by other mining companies or individuals (AECOM Australia Pty Ltd (AECOM), 2013). A small portion of the mine-owned houses also provide accommodation for service employees that work in the town e.g. child care workers and the shopping centre workers (AECOM, 2013). It is currently estimated that Anglo American own 602 houses in Middlemount.

The 'Girrah Homestead', located within the existing LLM ML, on land owned by Anglo American, is the closest residential dwelling and is approximately 5 km to the south of LLM. In accordance with the Guideline 'Model mining conditions' (ESR/2016/1936) (Queensland Government, 2024b), the Girrah Homestead is not considered to be a sensitive place and for being within the area of a ML and a place owned by Anglo American or its related companies. In addition to Girrah Homestead, the following residences (**Figure 5**) are located within 15 km of LLM:

- Lake Lindsay Homestead located approximately 5.7 km to the east;
- Mount Stuart Homestead located approximately 10.3 km to the south-west;
- Oak Park Homestead located approximately 10.8 km to the west; and
- Foxleigh Homestead located approximately 14.8 km to the north.

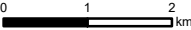


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FIGURE 5 -
SURROUNDING RECEPTORS

- LEGEND
- Surrounding Receptor
 - Road
 - Mining Lease
 - Life Of Mine Disturbance Extent



Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:90,000 at A3
Project Number:	626.30126
Date:	23-Jun-2025
Drawn by:	AS

3.7 Operations Overview and Mining Methodology

LLM commenced operations in late 2005, targeting the coal seams of the Rangal Coal Measures of the Bowen Basin.

LLM has 4 active open cut pits (Pits X1, X2, X3 and X4) ranging from about 40 m to approximately 135 m in depth, mined using the conventional dragline, and truck and shovel methods for strip mining. The mining sequence begins with topsoil stripping and drilling and blasting of overburden. With their large bucket sizes and efficient digging and dumping capacities, draglines along with bulldozer fleets, are primarily responsible for moving overburden post-blasting, influencing the excavation sequence.

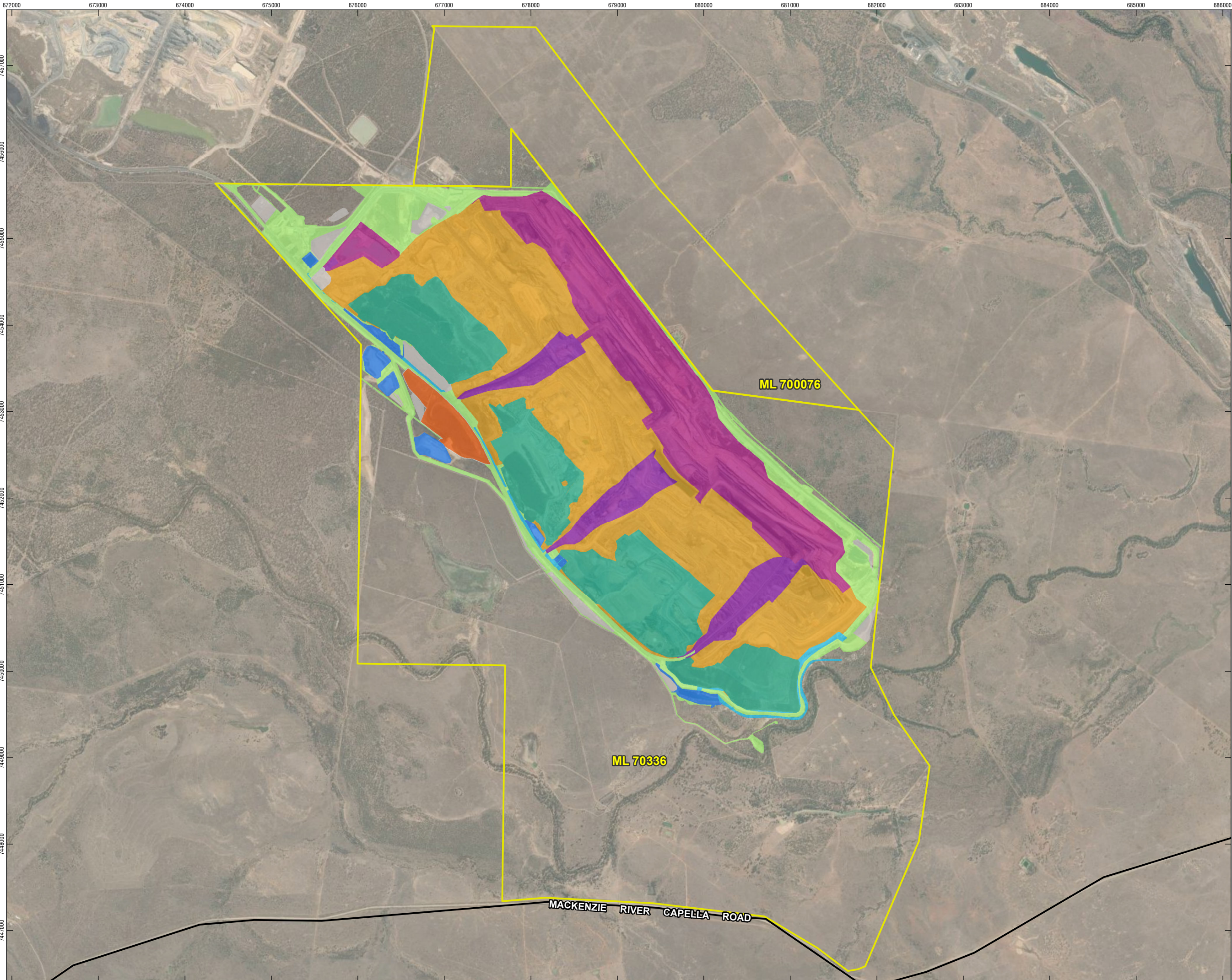
Truck and shovel fleets move overburden and extract coal from the pits. Areas with faults or pits of shorter strip lengths, unsuitable for dragline operations, are mined using truck and shovel techniques. The typical open cut mining process encompasses vegetation clearing, topsoil stripping and stockpiling, drilling, and blasting, overburden removal, coal extraction and processing, followed by re-contouring and progressive rehabilitation.

3.7.1 Current Infrastructure

No coal processing occurs at LLM. Coal Handling and Processing Plant (CHPP) and Tailings storage Facility (TSF) are located outside LLM MLs, within the GCM MLs, and hence are out of scope of this PRCP.

Mine infrastructure at LLM is only associated with extraction of coal, vehicle operation and maintenance and provision of office facilities. Key infrastructure (**Figure 6**) includes:

- Heavy equipment workshop, vehicle wash down and tyre storage area within LLM Mine Infrastructure Area (MIA);
- Fuel and oil storage facility;
- Access tracks and haul roads;
- RoM pad;
- A 21 km overland conveyor transport system to the GCM CHPP;
- An extensive water management system including the ability to pump excess water to the German Creek East (located within GCM MLs) void for water storage;
- 66 kV power transmission lines which were extended from GCM to LLM;
- Water Treatment Plant (WTP) and Sewage Treatment Plant (STP); and
- Temporary offices and buildings.



LAKE LINDSAY

PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 6 - CURRENT SITE
LAYOUT

- LEGEND
- Road
 - Mining Lease
- Current Site Layout**
- Infrastructure Areas, Roads, Tracks and Laydowns
 - Existing Rehabilitation
 - Overburden Dump
 - Water Storage
 - Drains and Diversions
 - Pit
 - Ramp
 - Rom Pad
 - Topsoil Stockpile

Coordinate System: GDA2020 MGA Zone 55

Scale: 1:40,000 at A3

Project Number: 626.30126

Date: 23-May-2025

Drawn by: LC

3.8 Baseline Information

3.8.1 Climate

Central Queensland has a sub-tropical continental climate characterised by high variability in rainfall, temperature, and evaporation. The region can experience droughts, floods, heatwaves, and frosts. In general, winter days are warm, and nights are cool, while summer days are hot, and nights are warm. Rainfall is summer dominant, with almost half falling from December to February from thunderstorms and tropical low-pressure systems associated with monsoonal activity.

Climate data was collected from the Bureau of Meteorology (BoM) (accessed on 25 June 2025). The closest weather monitoring station was located at Essex (034027), 12.9 km from Middlemount township, operating from January 1967 to January 2023. The Emerald Airport weather station is now the closest long-term BoM meteorological station in the vicinity of LLM. Data for this station is available from 1992 to 2025, which is a shorter record than the Essex station.

Mean temperature variations across the year are taken at Emerald Airport BoM weather station (**Figure 7**). The mean maximum temperature is 30°C, with highest temperature recorded at 34.7°C in January. The mean minimum temperature is 16.4°C, with lowest recorded temperature at 9.1°C in July. Rainfall generally occurs between October to March with an annual rainfall of 610.3 millimetres (mm) (BoM, 2025). Winds are typically south-easterly and consist of a light-to-moderate gust.

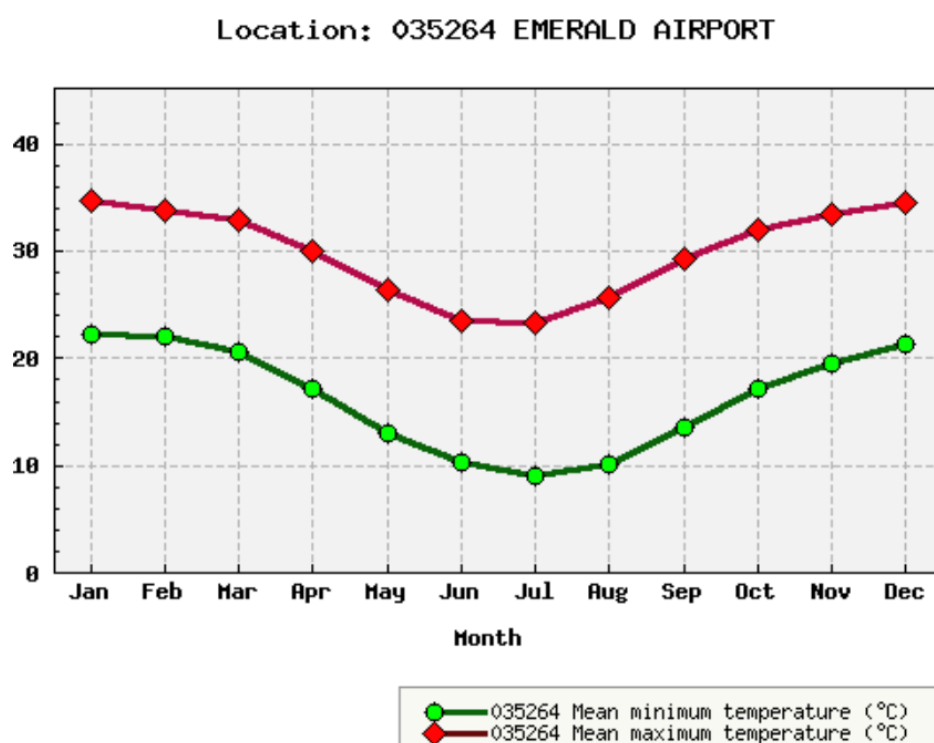


Figure 7 Monthly Mean Maximum and Minimum Temperature from the Emerald Airport (1992-2022) (Source: BoM, accessed on 25 June 2025)

The region is prone to variable rainfall and periodic droughts. Recent periods of long-term droughts (consecutive years of below average rainfall) in the region

include 1982 – 1983, 1991 – 1995 and 2001 – 2007. LLM area experiences a distinct summer rainfall, receiving an average of 604 millimetres per year (mm/yr) in the months between December and March when average monthly rainfall exceeds 50mm. The frequency of days per week with rainfall of greater than 50 mm is greater than 0.5 days in weeks 1 to 10 and 49 to 52. Evaporation significantly exceeds rainfall in all months of the year.

In addition to these historical drought periods, there is also evidence of longer periods where there is generally low rainfall. The greatest bushfire danger for the region usually occurs after the dry winter/spring period and before the onset of rains in the summer months.

Due to its distance from the coast, LLM is unlikely to experience cyclonic winds, however rain and flooding associated with cyclones and storms have affected the region historically as well as floods associated with monsoonal trough systems.

The BoM operates rainfall and evaporation gauges for several locations in the vicinity of LLM. The historical rainfall and evaporation records for the gauge locations (**Table 5**) were analysed to determine the climate conditions at LLM.

Table 5 Rainfall Gauge Data (Source: BoM)

Gauge Number	BoM Name	Period	Elevation (m AHD)	Location (Latitude/ Longitude)	Distance & Direction from LLM
35109	Booroondarra	1929- Open	200	-22.82, 148.49	35 km northwest
35131	Talagai	1968- Open	305	-23.13, 148.53	26 km southwest
35170	Wilpeena	1972- 2011	110	-23.10, 148.92	19 km southeast
35195	Maywin Park	1965- 2019	220	-23.03, 148.47	29 km west
35295	Bingegang Weir	2011- Open	107	-23.07, 149.04	29 km southeast

Data from the Scientific Information for Land Owners (SILO) database hosted by the Science Delivery Division of the DETSI was also obtained for the area. SILO provides rainfall data from 1889 to present as both a Patched Point Data (historical data whereby missing data is infilled from interpolated estimates from surrounding gauges) and/ or gridded data set, which provides an interpolated grid of 5 x 5 km over the whole of Australia. Data Drill information (**Table 5**) is also available for points derived from interpolated estimates from the gridded data set.

Average rainfall data from the SILO data and the BoM gauge data were analysed. The graph (**Figure 8**) illustrates the dry winters and wet summers with approximately 60% of the annual rainfall occurring over the wet season between December and March. It also indicates that the SILO data provides a good estimate of regional rainfall. The following annual average rainfall totals were recorded for

Lake Lindsay Coal Mine

the gauges: 743 mm at Booroondarra, 532 mm at Bingegang, 584 mm at Talagai, 612 mm at Maywin Park, 539 mm at Wilpeena, and 584 mm from the SILO dataset.

SILO data is considered as sufficiently representative of the rainfall at LLM. This data was therefore adopted for the various technical assessments due to its completeness and duration. There were limited evaporation gauges within the vicinity of LLM. Therefore, SILO data was used for various technical studies undertaken as it was considered the most reliable data source.

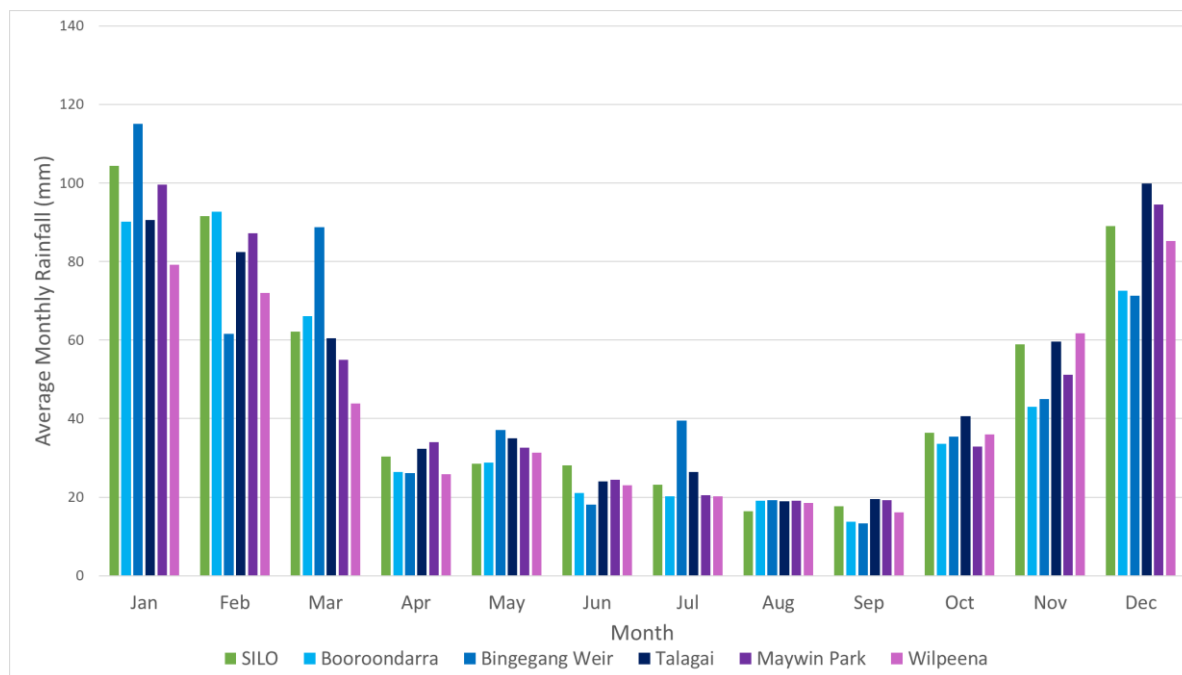


Figure 8 Average Monthly Data

The Queensland Government (2020a) have developed the Queensland Future Climate Dashboard which summarises information from 11 state-of-the-art climate models. The predicted change for annual mean temperature, precipitation and pan evaporation in the Isaac Regional Council area are discussed below, changes are relative to the reference period of 1986 – 2005:

- The mean annual temperature is expected to increase approximately 4 degrees over the next 70 years (**Figure 9**);
- Annual precipitation is predicted to not significantly change over the next 70 years (**Figure 10**); and
- Annual pan evaporation is predicted to increase slightly over the next 70 years (**Figure 11**). With slight increases in temperature and evaporation, slightly less available water may be available within the local environment after 70 years.

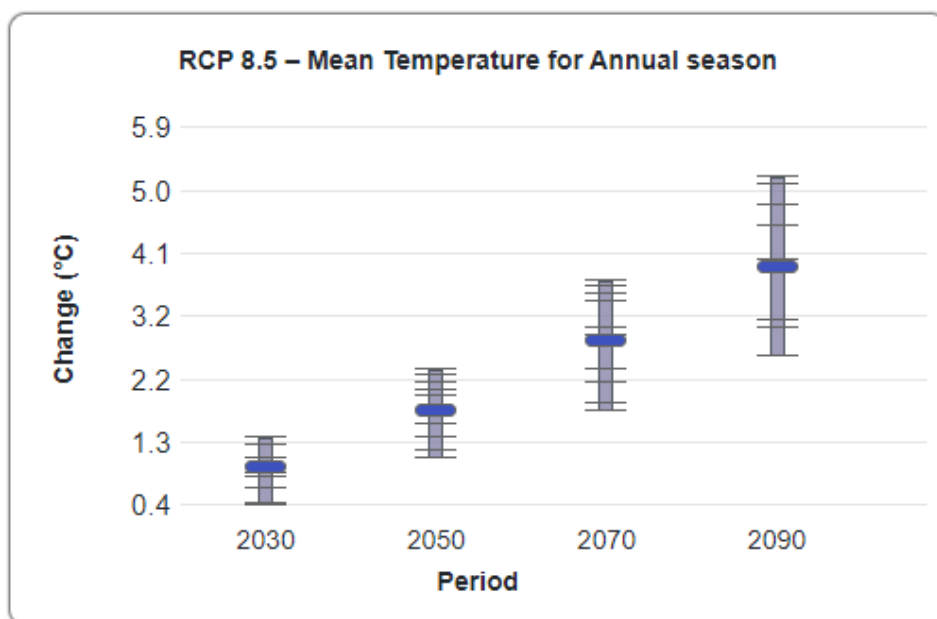


Figure 9 Mean Temperature Predictions from 2030 to 2090 in Isaac Regional Council Area (Queensland Government, 2023c).

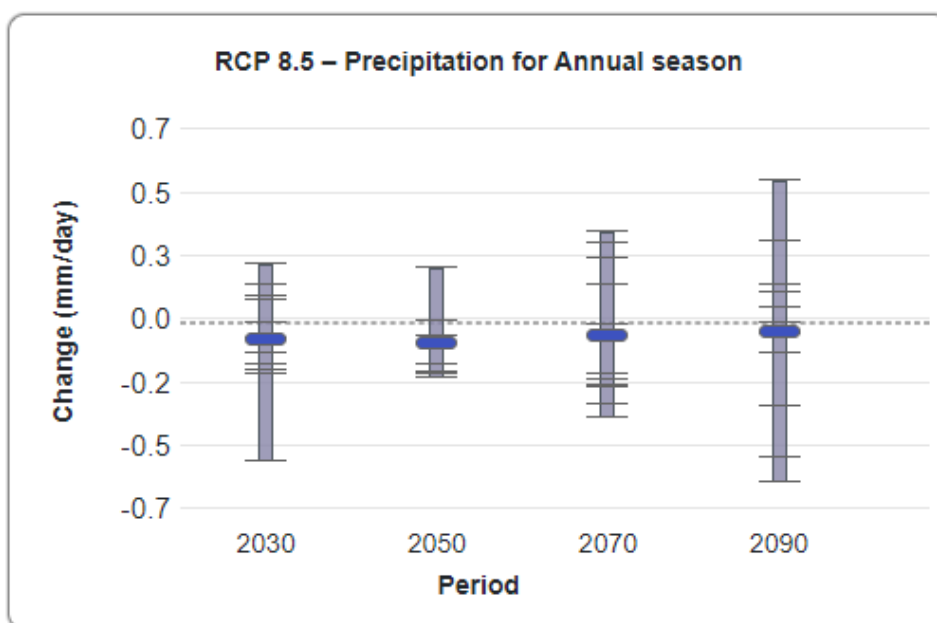


Figure 10 Precipitation Predictions from 2030 to 2090 in Isaac Regional Council Area (Queensland Government, 2023c).

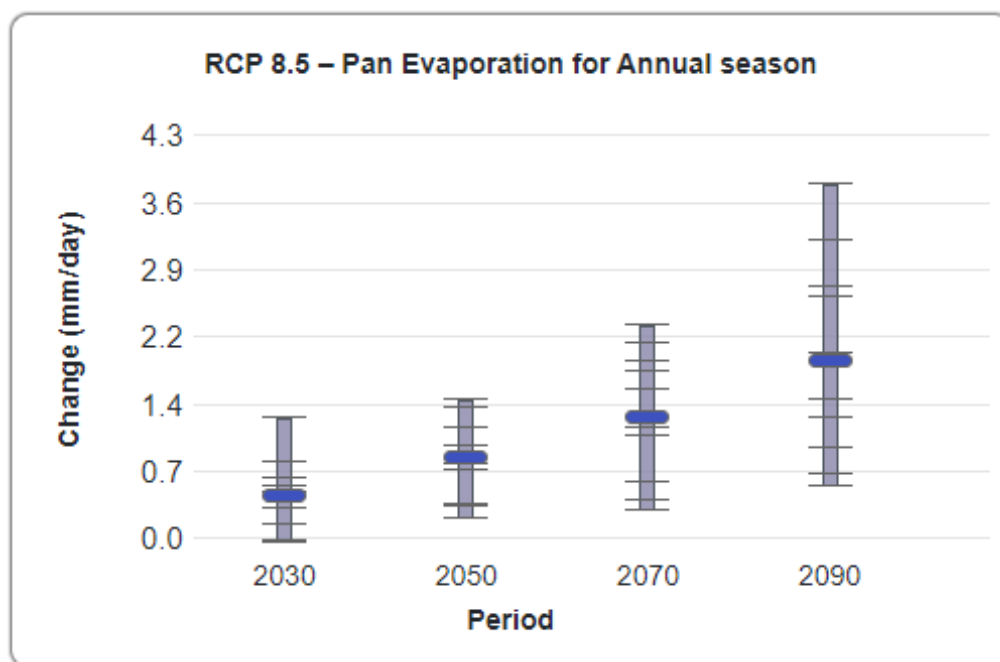


Figure 11 Pan Evaporation Predictions from 2030 to 2090 in Isaac Regional Council Area (Queensland Government, 2023c)

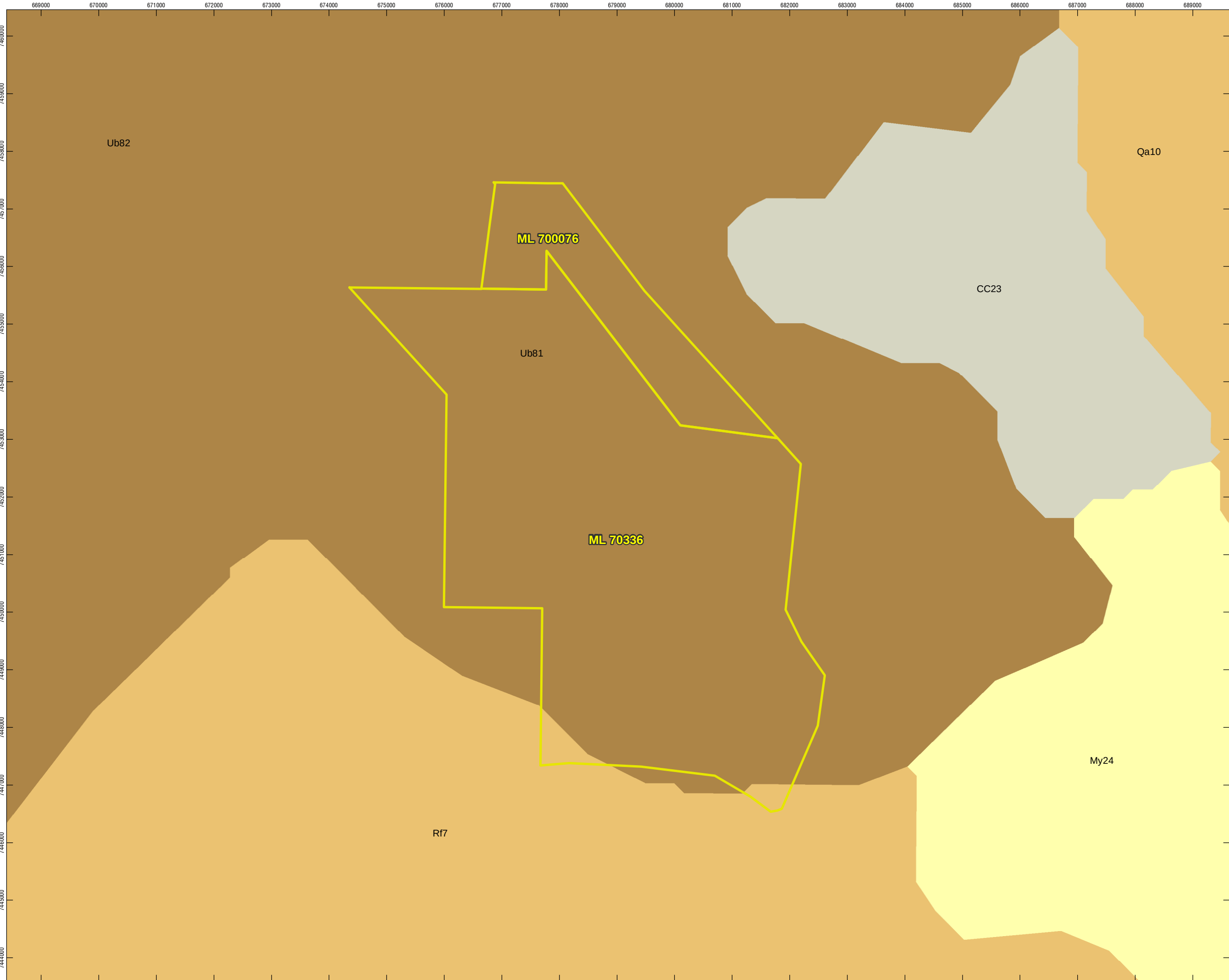
3.8.2 Geography and Topography

LLM is sited on generally flat to undulating open eucalypt and acacia woodland most of which has previously been cleared for cattle grazing within Oaky Creek catchment, with Oaky Creek itself forming the southern boundary of the mining area. The land on which most of the mining operations take place is Land Capability Class VII (Anglo American, 2018a).

The elevation in LLM area ranges from about 130 meters above Australian Height Datum (m AHD) in the south-west to about 170 m AHD in the north-west, with gentle sloping to the south-east. Oaky Creek drains to the east through the south of the ML and discharges to the Mackenzie River about 25 km to the east. The creeks and gullies within and near LLM are ephemeral and typically flow only after significant rainfall in the summer wet season (AGE, 2021a).

3.8.3 Soils

Regional soil map at LLM (Figure 12) and in its vicinity is presented.



LAKE LINDSAY

PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 12 - REGIONAL SOIL
MAP

LEGEND

 Mining Lease

Australian Soil Classification

 Chromosol

 Kandosol

 Sodosol

 Vertosol

 0 0.5 1 Kilometers

Coordinate System: GDA2020 MGA Zone 55

Scale: 1:60,000 at A3

Project Number: 626.30126

Date: 06-Dec-2023

Drawn by: LC

Pre-Mining Land Capability and Soil Suitability

In 2005, Parsons Brinckerhoff Australia Pty Ltd (Parsons Brinckerhoff) (now WSP Australia Pty Limited (WSP)) (**Appendix B**) assessed the land capability based on Rosser's Land Capability System (Rosser, et al., 1974) previously used by DNRMMRRD. Land capability classification ranges between Class I and Class VIII with Class I being the most suitable for agricultural and pastoral uses and Class VIII having severe limitations that is unsuited for either cultivation or grazing. Land within the LLM area was classed as follows:

- Class V: Land that in all other characteristics would be arable but has limitations which unless removed make cultivation impractical and/ or uneconomic;
- Class VI: Land which is not suitable for cultivation, but is well suited to pastoral use on which pasture improvement involving the use of machinery is practicable; and
- Class VII: Land which is not suitable for cultivation but on which pastoral use is possible only with careful management. Pasture improvement involving the use of machinery is not practicable.

Aurecon Australasia Pty Ltd (Aurecon), 2021 applied the 'Guidelines for Agricultural Land Evaluation in Queensland' prepared by Department of Science, Information Technology and Innovation (DSITI) and Department of Natural Resources and Mines (DNRM) (DSITI and DNRM, 2015) for the land evaluation of the LLM expansion project. The limitations for assessment are presented in the 'Regional Land Suitability Frameworks for Queensland' –Chapter 10 prepared by DNRM and Department of Science, Information Technology, Innovation and the Arts (DSITIA) (DNRM and DSITIA, 2013).

A land use is the combination of a crop and/ or pasture and its management options. Land uses have been selected for a number of regional areas in Queensland. The LLM expansion project area falls within the 'Suitability framework for the Inland Fitzroy and Southern Burdekin area' (DNRM and DSITIA, 2013). The land uses included for the Fitzroy and Southern Burdekin area are dryland cropping (barley, chickpea, maize, millet, mung bean, oat, safflower, sorghum, soybean, sunflower, triticale, and wheat) and irrigated cotton-furrow.

The overall suitability class is determined by the most severe suitability subclass that applies in a particular Soil Mapping Unit (SMU) (DNRM and DSITIA, 2013). The land limitations for each SMU within the LLM expansion project area were summarised in the Aurecon (2021) assessment. The overall land suitability classification was calculated as unsuitable for all SMUs with extreme limitations for Foxleigh, Foxleigh clay loamy phase, Racetrack and Warwick and severe limitations for the Roper SMU.

The land within the LLM and LLM expansion project area is generally unsuitable for agriculture. Existing land use is coal mining and the grazing of cattle on native and improved pastures following land clearing (Anglo American, 2019a).

Soil Map Units

A pre-mining soil survey for LLM was completed by Parsons Brinckerhoff (Parsons Brinckerhoff, 2005) as part of the initial Environmental Impact Statement (EIS) for

LLM (Anglo American, 2005) (**Appendix B**). Parsons Brinckerhoff assessed the soil and land capability at LLM by excavating 56 test pits. These locations were spread across the entire LLM area, with increased survey density in areas of proposed disturbance at the time - i.e., in areas of mining activity.

Parsons Brinckerhoff (2005) identified 6 SMUs within the ML70336: Foxleigh; Foxleigh clay loamy phase; Racetrack; Warwick; Thirteen Mile; and Parrot soils, which are described in detail in Burgess (2003). The report (Burgess, 2003) details the soil landscapes, geology, and vegetation associations, including Foxleigh, Foxleigh clay loamy phase (FxLp), Racetrack, Warwick and Roper. These are also summarised as follows:

- Soils derived from unconsolidated Tertiary (TQa) sediments (*Duaringa Formation*) with Eucalypt vegetation:
 - **Foxleigh (Fx):**
 - Brown or grey Sodosol.
 - A sandy-surfaced, conspicuously bleached, alkaline, mottled, brown or grey, sodic, texture-contrast soil with coarse columnar structure;
 - Common vegetation associations include Poplar box (*Eucalyptus populnea*), Poplar box–bloodwood–Moreton Bay ash (*Corymbia tessellaris*), occasionally Poplar box–ironbark (*Eucalyptus crebra*) or Eucalypts with bull oak (*Allocasuarina luehmannii*); and
 - Landscapes are generally level to gently undulating plains.
 - **Foxleigh clay-loamy phase (FxLp):**
 - Brown Sodosol;
 - A hard-setting, loamy or clay-loamy surfaced, conspicuously or sporadically bleached, alkaline, brown, sodic, texture-contrast soil with coarse columnar structure (the loamy-surfaced version of Foxleigh (Fx));
 - Common vegetation associations include Poplar box (*Eucalyptus populnea*), occasionally Shrubby poplar box (*Eucalyptus virens*), Poplar box–ironbark (*Eucalyptus crebra*), Gum-topped box (*Eucalyptus moluccana*), or Yapunyah (*Eucalyptus ochrophloia*); and
 - Landscapes are generally level to gently undulating plains and low rises.
- Soils derived from unconsolidated Tertiary (TQa) sediments (*Duaringa Formation*) with Brigalow (*Acacia harpophylla*) vegetation:
 - **Racetrack (Rt):**
 - Brown Sodosol;
 - A hard-setting, clay-loamy surfaced, conspicuously or sporadically bleached, alkaline, brown soil;

- Common vegetation associations include Brigalow (*Acacia harpophylla*)–Dawson gum (*Eucalyptus cambageana*); occasionally Brigalow, Dawson gum; and
- Landscapes are generally level to gently undulating plains.
- **Warwick (Ww):**
 - Grey or brown Vertosol;
 - A normal or shallow melonhole gilgai complex with a hard-setting, firm pedal or weakly self-mulching, alkaline, grey or brown, sodic, cracking clay on mounds and shelves; and a hard-setting, firm pedal or weakly to moderately self-mulching, acid, grey, sodic cracking clay in depressions;
 - Common vegetation associations include Brigalow (*Acacia harpophylla*), Blackwood (*Acacia argyrodendron*) or Brigalow–Blackwood; occasionally Brigalow–Dawson gum (*Eucalyptus cambageana*); and
 - Landscapes are generally level to gently undulating plains.
- Soils commonly derived (but not exclusive to) Quaternary alluvium (Qa):
 - **Roper (Rp):**
 - Brown or black Chromosol / brown or black Sodosol;
 - A hard-setting, sandy- to clay-loamy-surfaced, sporadically or conspicuously bleached, alkaline, brown or black, texture-contrast soil; and
 - Shallow A horizon < 0.35 m.

The SMUs of Foxleigh, Foxleigh clay loamy phase and Racetrack, as described in the Burgess (2003), have similar physiochemical properties. The Foxleigh clay loamy phase and Racetrack soils occur as intermediates between Foxleigh soils and are generally present in elevated positions on the landscape. The heavier Brigalow soils such as Warwick, occupy low lying areas lacking relief.

The fertility of the soils (as indicated by bicarbonate-extractable phosphorus and total nitrogen) is generally characterised as follows:

- Low levels on sandy surfaces of Foxleigh soils;
- Low/ moderate on Foxleigh clay loamy phase and Racetrack; and
- Moderate to high on low lying vertosols such as Warwick.

A brief description of the SMUs identified at LLM and potential risks for reuse for rehabilitation for each SMU (**Table 6**) is provided.

The following general observations apply to the soils at LLM:

- Soils have poor to moderately fertility;
- Soils are potassium and nitrogen deficient;

Lake Lindsay Coal Mine

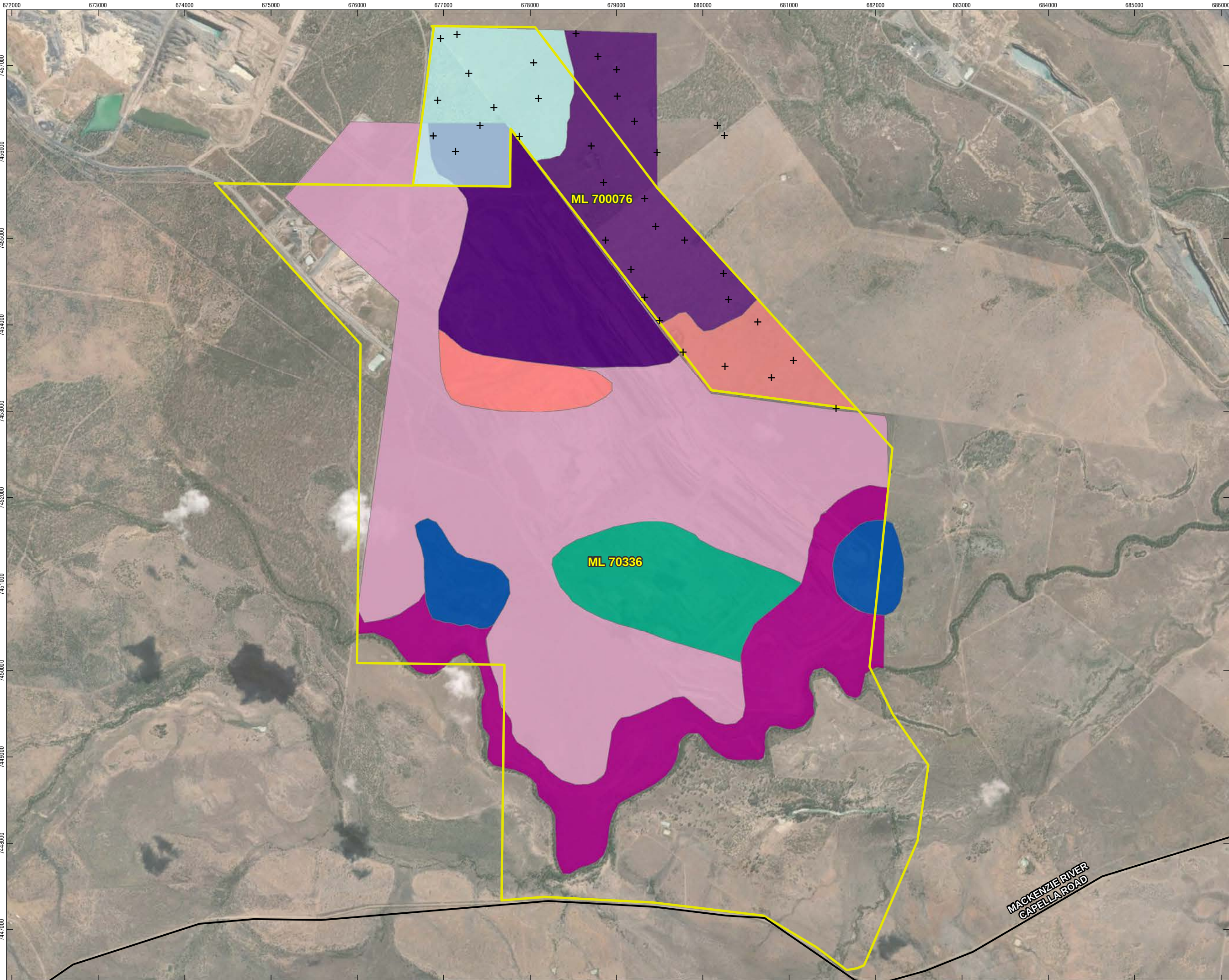
- Soils in the area generally has acceptable levels of calcium and magnesium; and
- 4 of the 5 (excluding Roper) SMU profiles were identified as having sodic subsoils.

Table 6 Soil Map Units at LLM

SMU	ASC	Description	Potential Risks for Reuse
Soils derived from unconsolidated Tertiary (TQa) sediments (i.e., Duaringa Formation) with Eucalypt Vegetation			
Foxleigh (Fx)	Sodosol	Sandy, sandy loam surface, sodic texture contrast soil, brown or grey sodosol, poplar box vegetation association.	• Erosion on slopes of >1%; and • Poor growth medium.
Foxleigh Clay/ Loamy Phase (Fx.Lp)	Sodosol	Sandy loam, clay loam surface, sodic texture contrast soil, brown sodosol, brigalow vegetation association.	• Erosion on slopes of >1%; and • Slightly saline and potential for dispersion.
Racetrack (Rt)	Sodosol	Sandy clay loam surface, sodic cracking clay, grey to brown vertosols, brigalow vegetation association.	• Slightly saline and high potential for dispersion; and • Poor growth medium.
Warwick (Ww)	Vertosol	Shallow gilgai complex, sodic cracking clay, grey to brown vertosols, brigalow vegetation association.	• Thin surface soil; and • Moderately high salinity.
Soils on Quaternary alluvium			
Thirteenmile (Tt)	Sodosol/ Dermosol	Slightly cracking dark clay, grey to brown sodosols and dermosols. Blue gum and coolabah vegetation association.	• Poor workability; and • Thin surface soil.
Parrot (Pr)	Sodosol/ Chromosol	Clay loam surface texture contrast soil with clay subsoil, brown chromosols and brown sodosols, poplar box	• Erosion on slopes of >1%; and • Thin surface soil.

SMU	ASC	Description	Potential Risks for Reuse
		vegetation association current bus? Understory.	
		Soils commonly derived but not exclusive to Quaternary alluvium	
Roper (Rp)	Sodosol/ Chromosol	Hard setting, firm clay, sandy clay loam surfaced, brown to dark brown sodosol or chromosol,	• Erosion on slopes of >1%; and • Thin surface soil.

A soil survey for the ML700076 was also completed by Aurecon (2022) with 28 test pits and 7 hand auger sites evaluated. SMUs identified by Parsons Brinckerhoff (2005) and Aurecon (2021) for both MLs is compiled and presented as **Figure 13**.



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FIGURE 13 - SOIL MAPPING
UNITS

- LEGEND
- + Soil Test Pit
 - Road
 - ▭ Mining Lease
- Soil Test Pit Results**
- ▭ Foxleigh Clay/Loamy Phase (Fx.LP)
 - ▭ Racetrack (Rt)
 - ▭ Roper
- Pre-mining Soil Resource - Soil Map Unit**
- ▭ Foxleigh (Fx)
 - ▭ Foxleigh Clay/Loamy Phase (Fx.Lp)
 - ▭ Parrot (Pr)
 - ▭ Racetrack (Rt)
 - ▭ Thirteenmile (Tt)
 - ▭ Warwick (Pr)

 0 0.5 1 Kilometers

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:40,000 at A3
Project Number:	626.30126
Date:	12-Dec-2023
Drawn by:	LC

3.8.4 Geochemistry

Parsons Brinckerhoff (2005) (**Appendix B**) conducted laboratory tests on selected overburden and interburden samples to characterise their acid drainage - generating potential, actual acidity, electrical conductivity (salinity), sodicity, and dispersivity. Samples were sourced from five exploration boreholes within the overburden. Materials comprising both the overburden and interburden layers were determined to be either non - acid forming (NAF) or to possess sufficient acid-neutralising capacity to prevent acid mine drainage.

Significant variations in electrical conductivity and pH were observed within the Tertiary sequence. These variations likely reflect differences in depositional conditions and subsequent drainage history. Sediments from the Tertiary - Quaternary transition ranged from mildly acidic (pH 5.0 - 6.0) to strongly alkaline (pH > 9.0), and from low salinity (~200 $\mu\text{S}/\text{cm}$) to moderately elevated salinity (~1,400 $\mu\text{S}/\text{cm}$). The mildly acidic sediments predominantly occur at depths between approximately 3.5 m and 15 m, potentially indicating the presence of acidic basal lateritic clays.

Weathering is inferred to have affected the Permian rocks at depths of approximately 6 - 22 m beneath the Tertiary materials. These weathered sandstones, siltstones, and mudstones exhibit moderate salinity, a moderate dispersion potential, and high sodicity. It is hypothesised that when exposed as spoil surfaces, these rocks would weather further. Consequently, the weathering byproducts of the Permian rocks would likely produce a saline, sodic, and dispersive material with a high propensity for erosion and limited capacity to support vegetation growth.

In their unweathered state, the Permian rocks exhibit substantial alkaline content and moderate salinity. Elevated alkalinity indicates a potential for dispersivity after exposure to weathering. Among the claystones, mudstones, siltstones, and sandstones, the claystones are more prone to rapid deterioration into dispersive, erosion-susceptible weathered material.

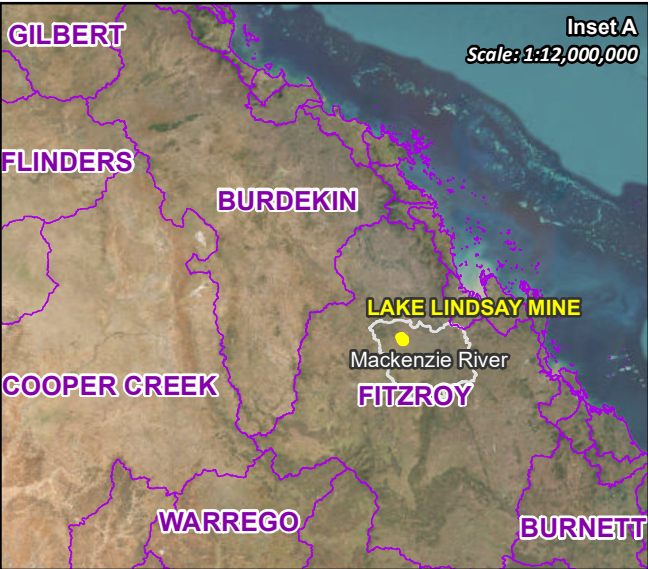
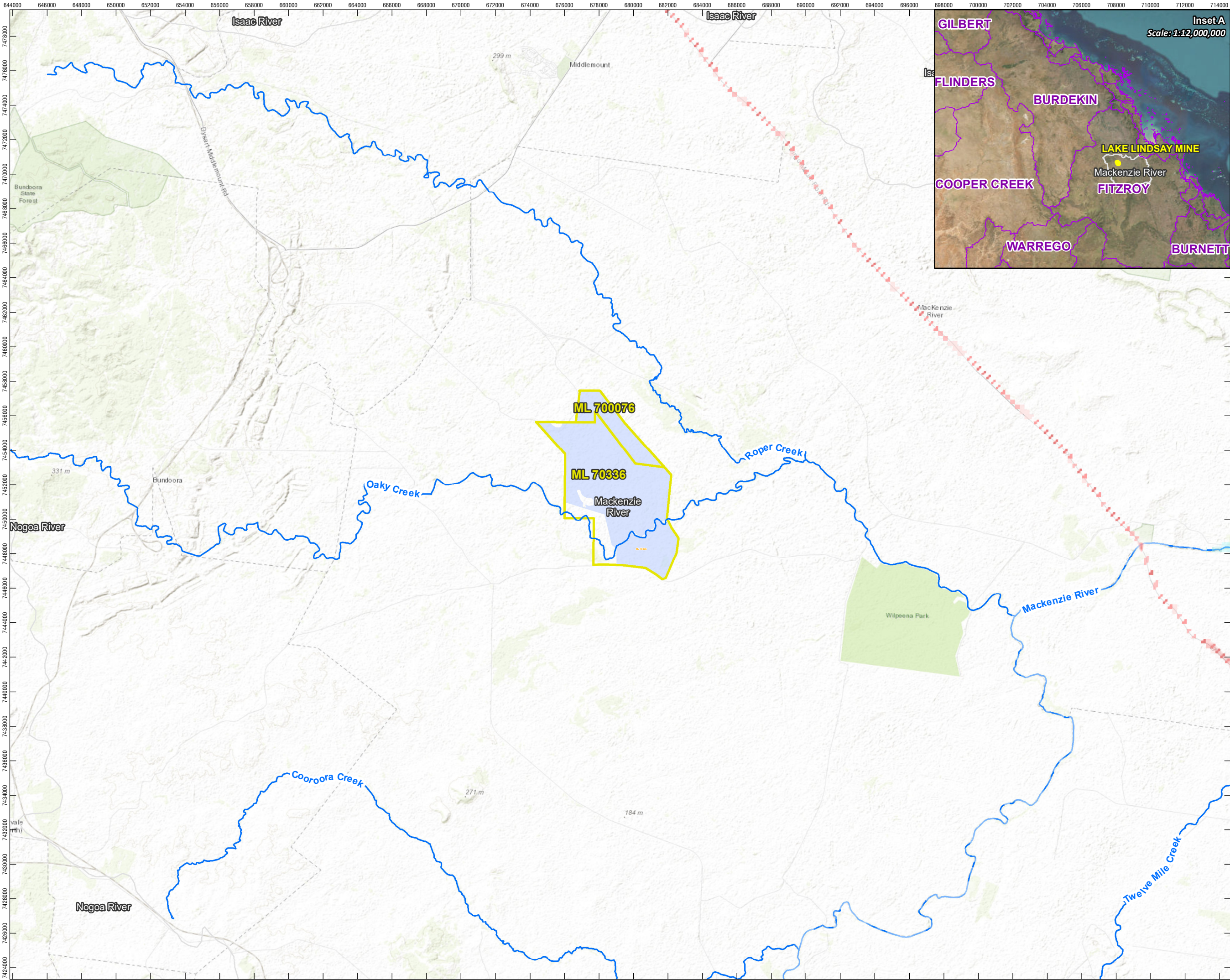
When excavated, fresh sandstones within the overlying and intervening layers are less prone to rapid weathering than claystones, mudstones, and siltstones. Based on electrical conductivity, dispersion ratio, and pH, these sandstones have the potential to generate fine particles that may become dispersive, sodic, and saline if breakdown occurs (Parsons Brinckerhoff, 2005, **Appendix B**).

3.8.5 Surface Water

Regional Catchment

The LLM is located within the north-western region of the Mackenzie River sub-basin, part of the Fitzroy Drainage Basin (**Figure 14**). The Fitzroy Drainage Basin lies in central Queensland and discharges into the Coral Sea at Port Alma, Rockhampton. It is the second-largest seaward drainage basin in Australia.

The Mackenzie River sub-basin spans approximately 1,305,897 ha and extends downstream to its confluence with the Dawson River, where it becomes the Fitzroy River. The Mackenzie River and its tributaries exhibit highly ephemeral, short-duration surface water flows that are generally restricted to the wet season (typically November to March).



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PROGRESSIVE REHABILITATION
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FIGURE 14 -
SURFACE WATER FEATURES
AND REGIONAL CATCHMENT

- LEGEND
- Major Watercourse
 - Drainage Basin
 - Fitzroy Sub-basins
 - Mining Lease
 - Life Of Mine Disturbance Extent

Coordinate System: GDA2020 MGA Zone 55

Scale: 1:200,000 at A3

Project Number: 626.30126

Date: 23-Jun-2025

Drawn by: AS

Local Waterways

Locally, the LLM lies within the Oaky Creek and Roper Creek catchments (**Figure 14**), primarily within grazing lands that contain areas of remnant vegetation.

Aurecon (2022) summarised local conditions associated with surface water as following:

- Roper Creek catchment is characterised by the following attributes:
 - Gently undulating topography with slopes generally less than 5%;
 - Ecosystems that have been significantly modified due to historical clearing of native vegetation for agricultural activities;
 - Land uses dominated by agriculture, including cropping and grazing;
 - Degraded riparian environments resulting from stock grazing;
 - Soil compaction and degradation due to long-term grazing practices; and
 - Floodplain landscapes dissected by an ephemeral creek system (Anglo American, 2018a).
- Oaky Creek flows along the southern boundary of the LLM, where an operational flood levee (the “Oaky Creek Levee”) has been constructed to protect the LLM during operations. Oaky Creek flows eastward until its confluence with Roper Creek. It is an ephemeral watercourse with highly seasonal and variable flows. Under the LLM EA, mine water from the current LLM operations is authorised for controlled discharge to Oaky Creek at one release point, within the discharge limits specified in the LLM EA; and
- Roper Creek flows southeast between the LLM and the adjacent Foxleigh mine (operated by others) before converging with Oaky Creek. Roper Creek is also ephemeral, with highly variable, seasonal flows and most high-flow events occurring during the summer months.

Measured Water Quality

Water quality monitoring sites (**Table 7**) are located on Oaky Creek, both upstream (background) and downstream of LLM by GHD in the *Receiving Environment Monitoring Report* (REMP) (GHD, 2022).

Table 7 Background Water Quality Monitoring Sites (GHD, 2022)

Name	Code	Latitude	Longitude
Oaky Creek upstream	OCUS	-23.070	148.742
Oaky Creek Downstream	OCDS	-23.057	148.888

The key findings from the REMP report are as follows:

- pH in the LLM receiving environment was generally neutral;
- Turbidity values typically exceeded Water Quality Objectives (WQOs) across all sampling periods and sites. Where exceedances occurred, they were often an

order of magnitude greater than guideline values. These exceedances were attributed to ephemeral, unconsolidated sediment mobilisation from catchments and indicated sediment deposition into the receiving environment. Elevated total suspended solids (TSS) supported this observation and suggested that turbidity was driven by suspended solids rather than dissolved components (e.g. salts or tannins);

- Electrical conductivity (EC) was generally within WQOs, although occasional exceedances were noted. Elevated EC was observed at multiple sites across the receiving environment and was not considered to reflect any significant localised impact;
- Dissolved oxygen (DO) concentrations were typically below WQOs at both upstream and downstream sites, indicating limited water quality for aquatic biota. Given that water temperatures ranged between 25°C and 35°C and water flows were minimal, low DO is most likely attributable to natural site and hydrological conditions rather than mine-affected water discharges;
- Sulphate concentrations were within mine-affected water release limits for drinking water environmental values, but generally exceeded WQOs for aquatic ecosystem protection. These exceedances were typically minor and occurred at both upstream and downstream sites;
- Ammonia concentrations frequently exceeded WQOs for aquatic ecosystem protection, suggesting limited assimilative capacity within the receiving environment and anthropogenic influences across the broader catchment. This was supported by co-occurring total petroleum hydrocarbon exceedances. Ammonia exceedances were observed both upstream and downstream and were often at least double the mine-affected water release limits;
- The majority of dissolved metals were within WQOs across all sites. Exceedances were observed for aluminium, arsenic, chromium, copper, iron, lead, manganese, mercury, nickel, and zinc. Persistent exceedances across the entire monitoring period were noted for aluminium, copper, and iron. Total metals closely reflected dissolved metals for these analytes. None of the observed exceedances (except for aluminium) were substantially higher than mine-affected water release limits. Aluminium exceeded both mine-affected water release limits and WQOs; however, the near-neutral pH of the receiving environment was expected to reduce aluminium bioavailability and toxicity, mitigating its overall impact; and
- Sediment metals analyses were consistent with water column results, showing elevated aluminium, copper, and iron. Increased TSS and turbidity indicated that metals transport was occurring alongside sediment mobilisation during episodic flow events.

In summary, water and sediment quality results from the REMP were considered representative of the LLM's receiving environment. These results were strongly influenced by the natural, ephemeral hydrological regime and indicated limited assimilative capacity due to existing water quality conditions.

Further water quality data were collected and analysed by GHD Pty Ltd (GHD) in 2022. The upstream (background) monitoring site showed elevated EC (367 $\mu\text{S}/\text{cm}$) and sulphate (35 mg/L) relative to guideline values; all other analytes were within guideline limits, including pH, turbidity, TSS, fluoride, sodium, and ammonia (ammonia was below the limit of reporting (LoR)).

Metals at the background site were mostly at or below the LoR, with any detectable metals comparable to regional background levels and below guideline values.

The downstream monitoring site recorded EC of 430 $\mu\text{S}/\text{cm}$ and sulphate of 41 mg/L. Other physicochemical parameters and metals were either similar to or slightly higher than background levels and all remained below guideline values. Slightly elevated concentrations of dissolved metals, including aluminium and copper, were also noted at the downstream site.

3.8.6 Geology

Regional Geology

The LLM is located within the Bowen Basin, a sedimentary basin comprising Permian to Triassic-aged geology. The Bowen Basin contains up to 70% of Queensland's state reserves of Permian coal deposits. Coal deposits across this sequence exhibit considerable variation in quality and thickness, although they are typically characterised by uniform stratigraphy and relatively low sulphur content in some areas (KCB Australia Pty Ltd (KCB), 2020).

The stratigraphic profile of the Bowen Basin coalfields reflects both marine and non-marine depositional environments. Evidence of oceanic conditions is preserved from the early to middle Permian, followed by volcanic and fault-line activity and a regressing shoreline during the late Permian. From the late Permian into the early Triassic, the area was dominated by swamps and shallow lakes, which created internal drainage systems and fluvial floodplains across the basin (KCB, 2020).

The regional geology (**Figure 15** and **Figure 16**) consists of Tertiary sediments unconformably overlying gently dipping Permian sedimentary deposits. Tertiary sediments located adjacent to creeks appear to have been partially eroded and reworked into more recent alluvial deposits. The thickness of Tertiary sediments generally ranges between approximately 10 m and 15 m, with local variations attributed to erosional processes (KCB, 2020).

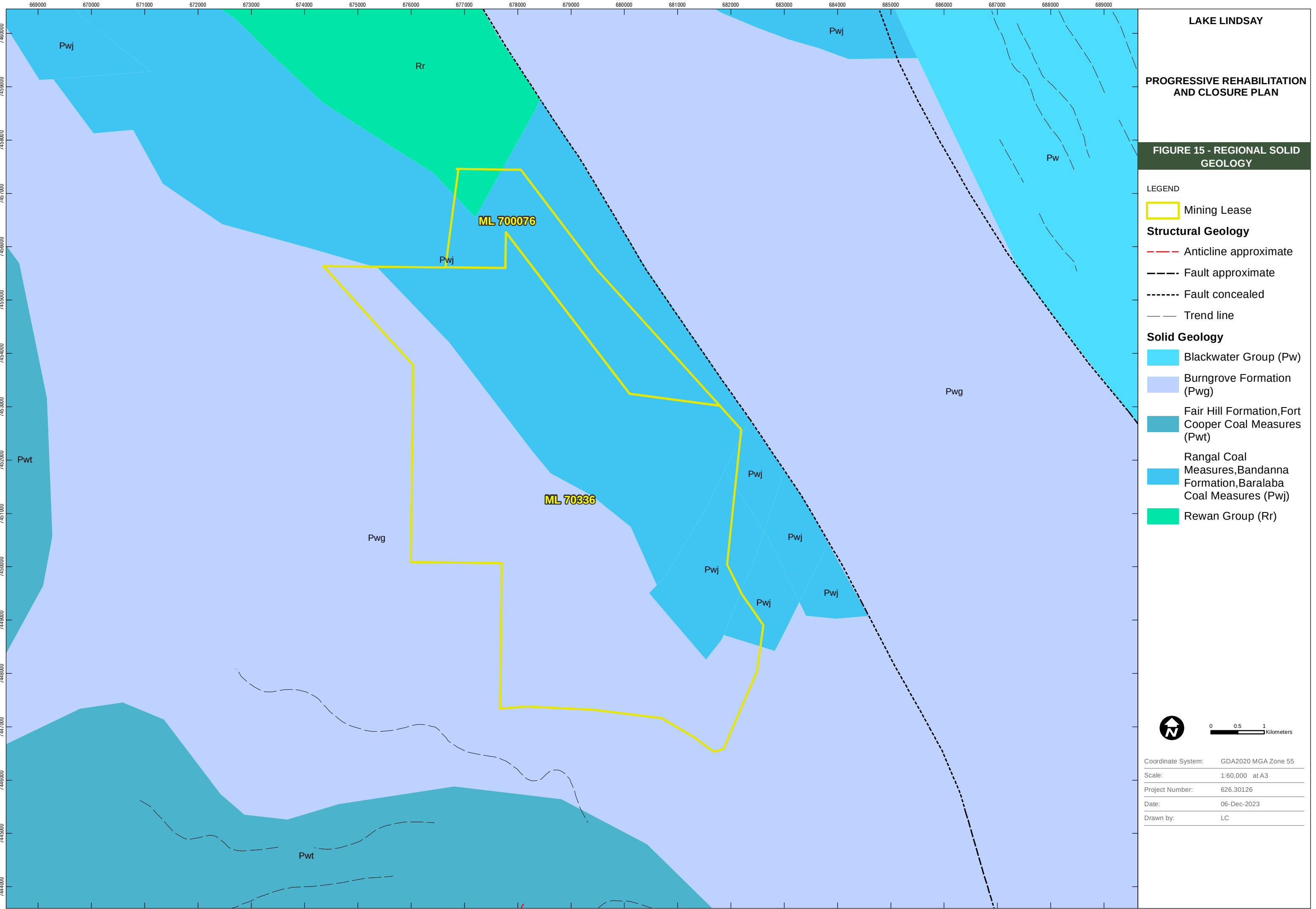
A detailed lithological description of each unit is provided below (KCB, 2020) (**Table 8**).

Table 8 Summary of Regionally Mapped Geology (Source: KCB, 2020)

Age	Unit	Map Code	Coal Seams	Lithological Summary
Quaternary	Alluvium	Qa		Silts, sand and clays
Tertiary	Tertiary Duaringa Formation	Tu		Sandy clays, cemented in places, discontinuous sand and gravel bodies

Lake Lindsay Coal Mine

Age	Unit	Map Code	Coal Seams	Lithological Summary
Permian	Rangal Coal Measures	Pb		Lithic sandstones with high clay content, lesser siltstones, mudstones
	Fair Hill Formation	Pwt	Hercules, Canis, Fair Hill	Lithic and feldspathic sandstone, siltstone and mudstone, calcareous and tuffaceous sandstone, volcanic conglomerate, coal
	Macmillan Formation	Pbn		Lithic sandstone, siltstone, shale and mudstone
	German Creek Formation	Pbd	German Creek: Pleiades, Aquilla, German Creek Grasstree: German Creek	Lithic sandstone, thick interbedded sandstone and mudstone



LAKE LINDSAY

PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 15 - REGIONAL SOLID
GEOLOGY

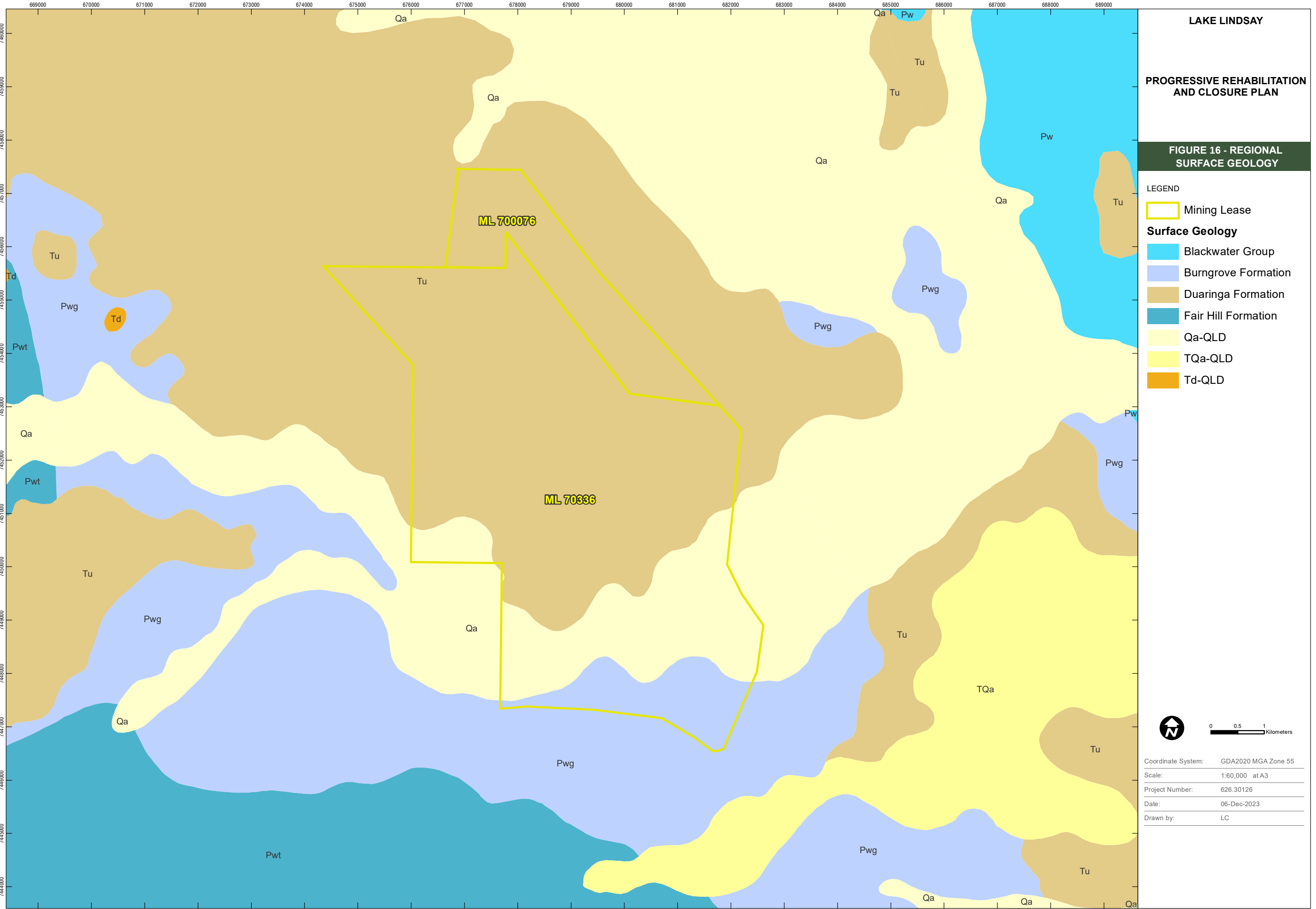
LEGEND

- Mining Lease
- Structural Geology**
 - Anticline approximate
 - Fault approximate
 - Fault concealed
 - Trend line
- Solid Geology**
 - Blackwater Group (Pwj)
 - Burngrove Formation (Pwg)
 - Fair Hill Formation, Fort Cooper Coal Measures (Pwt)
 - Rangal Coal Measures, Bandanna Formation, Baralaba Coal Measures (Pwj)
 - Rewan Group (Rr)



0 0.5 1 Kilometers

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30126
Date:	06-Dec-2023
Drawn by:	LC



LAKE LINDSAY

PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 16 - REGIONAL
SURFACE GEOLOGY

LEGEND

 Mining Lease

Surface Geology

-  Blackwater Group
-  Burngrove Formation
-  Duinga Formation
-  Fair Hill Formation
-  Qa-QLD
-  TQa-QLD
-  Td-QLD



0 0.5 1 Kilometers

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30126
Date:	06-Dec-2023
Drawn by:	LC

Local Geology

Locally, the economic coal seams at LLM are the Middlemount, Tralee and the Pisces coal seams (**Figure 17**). These seams are characterised by complex splitting and coalescing, which, combined with extensive faulting, can make it difficult to distinguish individual coal seams in certain areas. The Permian stratigraphic sequence strikes north–south and dips eastward at angles of approximately 1 to 10 degrees.

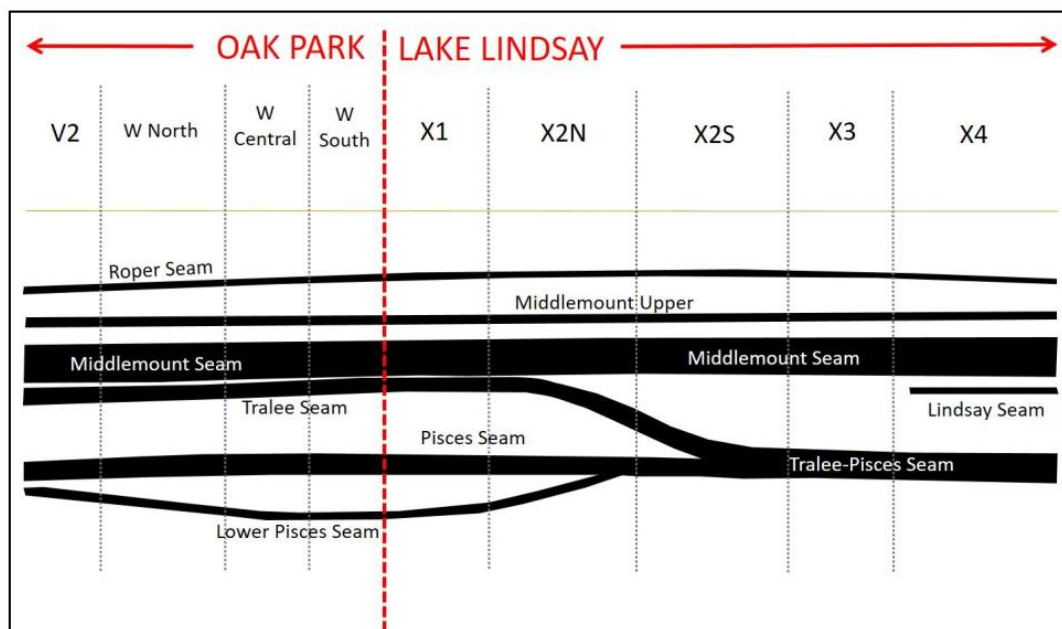


Figure 17 Coal Seam Overview (Source: Anglo American, 2020)

The main stratigraphic units at LLM (AGE, 2021a) are summarised (**Table 9**). A stratigraphic column showing the coal seams of interest in LLM is provided (**Figure 18**) (Anglo American, 2020a).

Table 9 Summary of Stratigraphy of LLM (Source: AGE, 2021)

Age	Unit	Lithology	Notes
Quaternary	Alluvium	Colluvium, sand, gravel, clay and silts	Confined to Oaky Creek in the south of the ML (not assessed in the investigation).
Cainozoic (Tertiary)	Tertiary	Soils, clays, silts, sands and gravels, cemented in places.	Generally, less than 20 m thick.
Rangal Coal Measures	Late Permian	Lithic sandstone, siltstone, shale and mudstone calcareous and tuffaceous sandstone, and coal.	Contains the Middlemount, Tralee and Pisces coal seams
Burngrove Formation	Permian	Grey lithic sandstone, siltstone, and coal.	Outcrops to the north-east of LLM.

Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) (2021) (**Appendix C**) summarised localised geology at LLM as follows:

- Shallow, localized, discontinuous accumulations of loosely packed Quaternary clays, silts, sands, and gravels are commonly found near the main drainage channels in the region, such as Oaky Creek;
- LLM is defined by a relatively thin layer of Tertiary sediments that rest unevenly over gently sloping Permian sedimentary deposits. These Tertiary sediments consist of a heterogenous profile of semi-consolidated sandstone, mudstone, and other minor sediment types. These Tertiary sediments have undergone surface weathering, leading to the creation of a thin, varied layer of loosely packed residual soils and weathered clays;
- The Permian Rangal Coal Measures are overlain comfortably by the Rewan Group and underlain by the Burngrove Formation. Within the Rangal coal Measures, there exists a series of coal seams that are interspersed with layers of sandstones, siltstones, mudstones, and minor amounts of carbon-rich mudstones and shales. The upper part of the Rangal coal Measures has undergone extensive and profound weathering. This process of weathering is evident in multiple open cut pits within the current Capcoal Complex areas, where it typically reaches a thickness of around 25 m;
- The Jellinbah thrust fault extends in a northwest to southeast direction, situated about 2.5 km northeast of LLM. It is believed to exert certain structural effects in LLM area. Currently, it remains uncertain whether these fault systems contribute to or impede the movement of groundwater within LLM; and
- To the southwest of LLM, the Burngrove Formation is exposed and can be found beneath the Rangal coal Measures at a certain depth. This Burngrove Formation is composed of gray lithic sandstone and siltstone, with the inclusion of certain coal deposits. Within the Burngrove Formation at LLM, the coal seams named Pisces 2, Barwon, and Girrah Seams are present. Notably, the Girrah Seam holds a thickness ranging from 15 to 20 m.

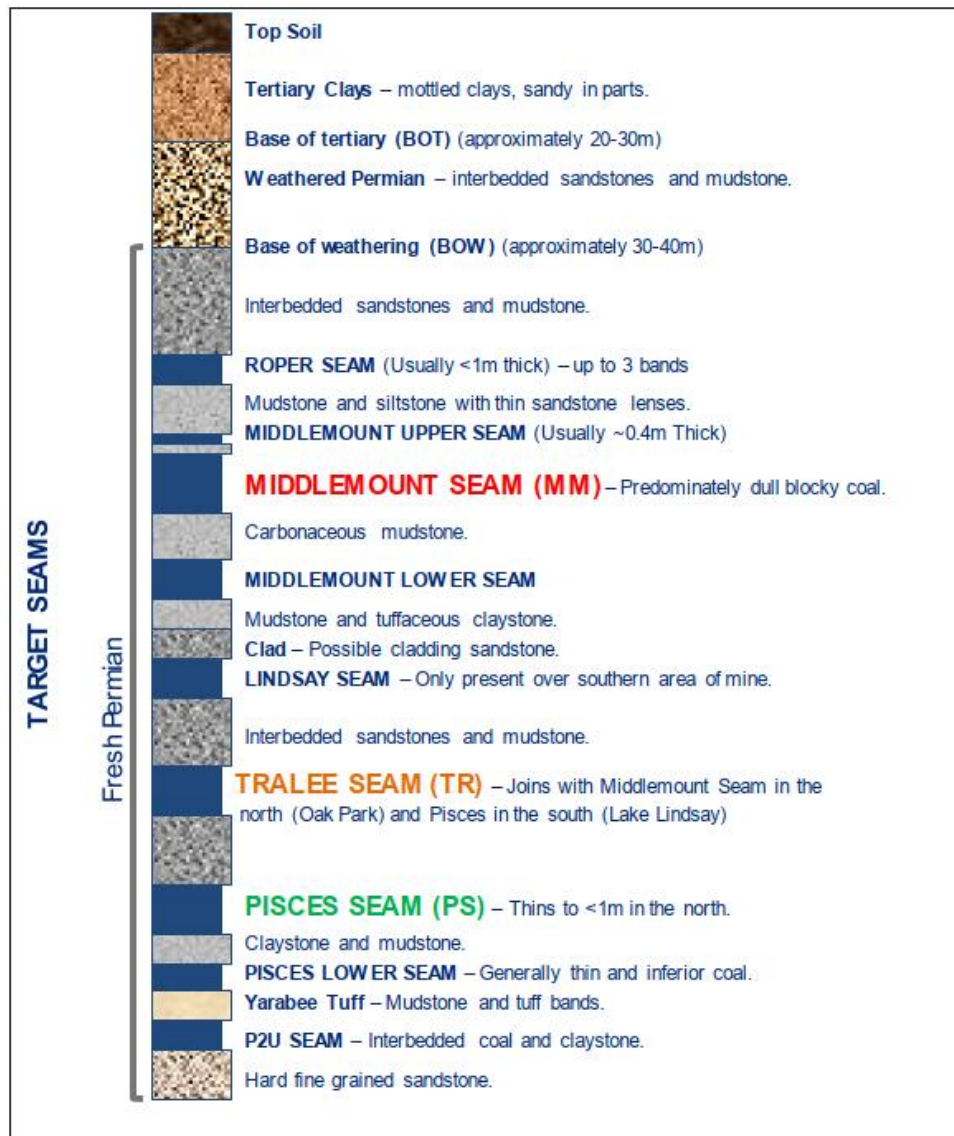


Figure 18 LLM Stratigraphic Section (Source: Anglo American, 2020a)

3.8.7 Hydrogeology

Groundwater Monitoring Network

Sonic geophysical logs have been collected by Anglo American during exploration and resource drilling campaigns. Hydraulic testing of coal seams, interburden, overburden and geological structure have also been undertaken to characterise the permeability of these units. Piezometers have been installed to provide information on pore pressures, vertical hydraulic gradients, and existing depressurisation from the open pit. This data, in conjunction with the geological model including structure discontinuities, has been used to inform Anglo American with making decisions for highwall stability and mine planning.

Location of the monitoring network bores at LLM is provided (Figure 19) and investigations undertaken to date include:

- 3 multilevel vibrating wire piezometers (VWPs) were installed in boreholes RDL3479, RDL3482 and RDL3483 in the highwall of the LLM Pit in March 2018 to obtain pore pressure information. The VWPs in RDL3482 and RDL3483 were

decommissioned in the last quarter of 2018 because of the advancing highwall activity, while the VWP in RDL3479 was decommissioned by mid-2019 (AGE, 2021b);

- Site investigations were undertaken within 4 boreholes (RDL3579A, LDL3598, LDL3604 and RDL3613) in the highwall of the LLM pit in September 2018. This included permeability testing of geological strata and the boreholes being equipped with multilevel VWPs (LLEX19_R_009A, LLEX19_Q_003, LLEX19_Q_005 and LLEX19_R_032) (AGE, 2021b); and
- 2 multilevel VWPs were installed in bore LDL3800 and RDL3806 at LLM in November 2020 and equipped with multilevel VWPs (LLEX20_Q_005 and LLEX20_R_006) (AGE, 2021b).

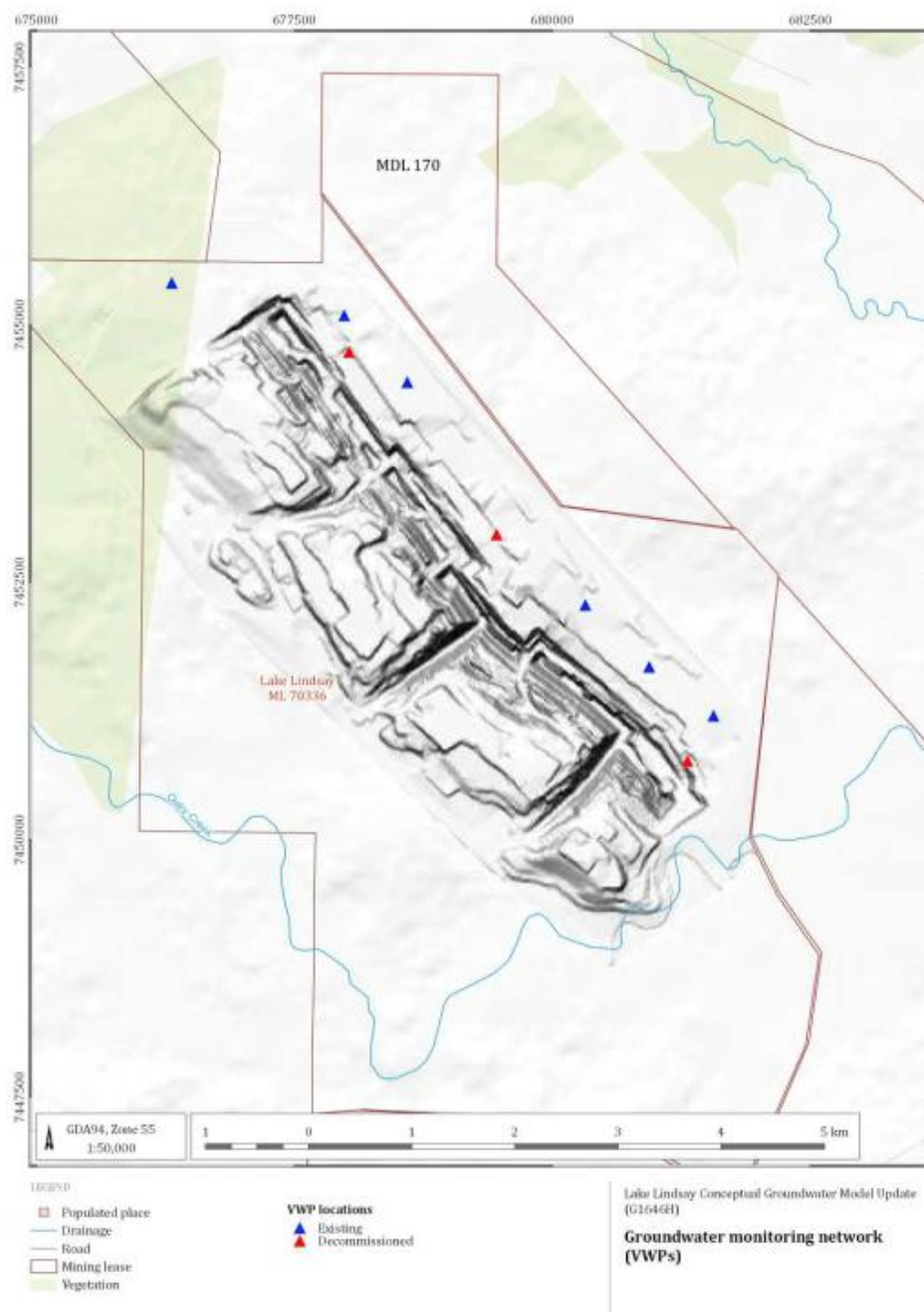


Figure 19 Location of Groundwater Monitoring Network (Source: AGE, 2021b)

For further information on the groundwater monitoring network, refer to **Appendix C**.

Groundwater Levels and Flow Directions

The groundwater records presented in the hydrological assessment (AGE, 2021a; **Appendix C**) indicate groundwater elevations at LLM range from approximately 20 metres below ground level (m bgl) to 50 m bgl in the south, and 30 m bgl to 75 m bgl in the north.

Pore pressures recorded at each multilevel vibrating wire piezometer (VWP) site are presented as time-series hydrographs of groundwater elevation (m AHD) in AGE (2021). Data collected at the six multilevel VWP sites provide information on groundwater elevations and the extent of hydraulic connectivity between monitored formations. Declines in groundwater elevation can generally be attributed to mining activities. Similar groundwater elevations across formations suggest hydraulic connectivity, which is most evident in the Pisces Seam at Pit X1. Groundwater is also present in the deeper Tertiary sediments and the weathered Rewan Formation. Variations in groundwater elevation within these units are likely due to mining-induced drawdown, while localized increases may reflect recharge processes.

Local groundwater flow is approximately to the southeast, as inferred from groundwater contours shown in **Figure 20**, which are based on data from 2019 or earlier. Groundwater elevations to the northeast of the LLM highwall are approximately 95 to 105 m AHD. Near the pit wall, groundwater flow is locally altered due to dewatering and drains into the pit. Flow paths along permeable coal seams toward the pits may exceed 1 km and can also follow permeable geological structures intersecting the pit or coal seams.

Regional groundwater flow in the Tertiary sediments is directed toward the southeast. Groundwater flow within the Permian coal seams is influenced by local geomorphology and structural geology, including faults. Groundwater flow across the Jellinbah Fault is uncertain. However, vertical displacement along the fault is interpreted to have juxtaposed the Rangal Coal Measures coal seams against lower permeability Fort Cooper Coal Measures and Burngrove Formation interburden, resulting in hydraulic compartmentalisation and impeded groundwater movement. Other mapped faults in the area may have similar hydraulic effects.

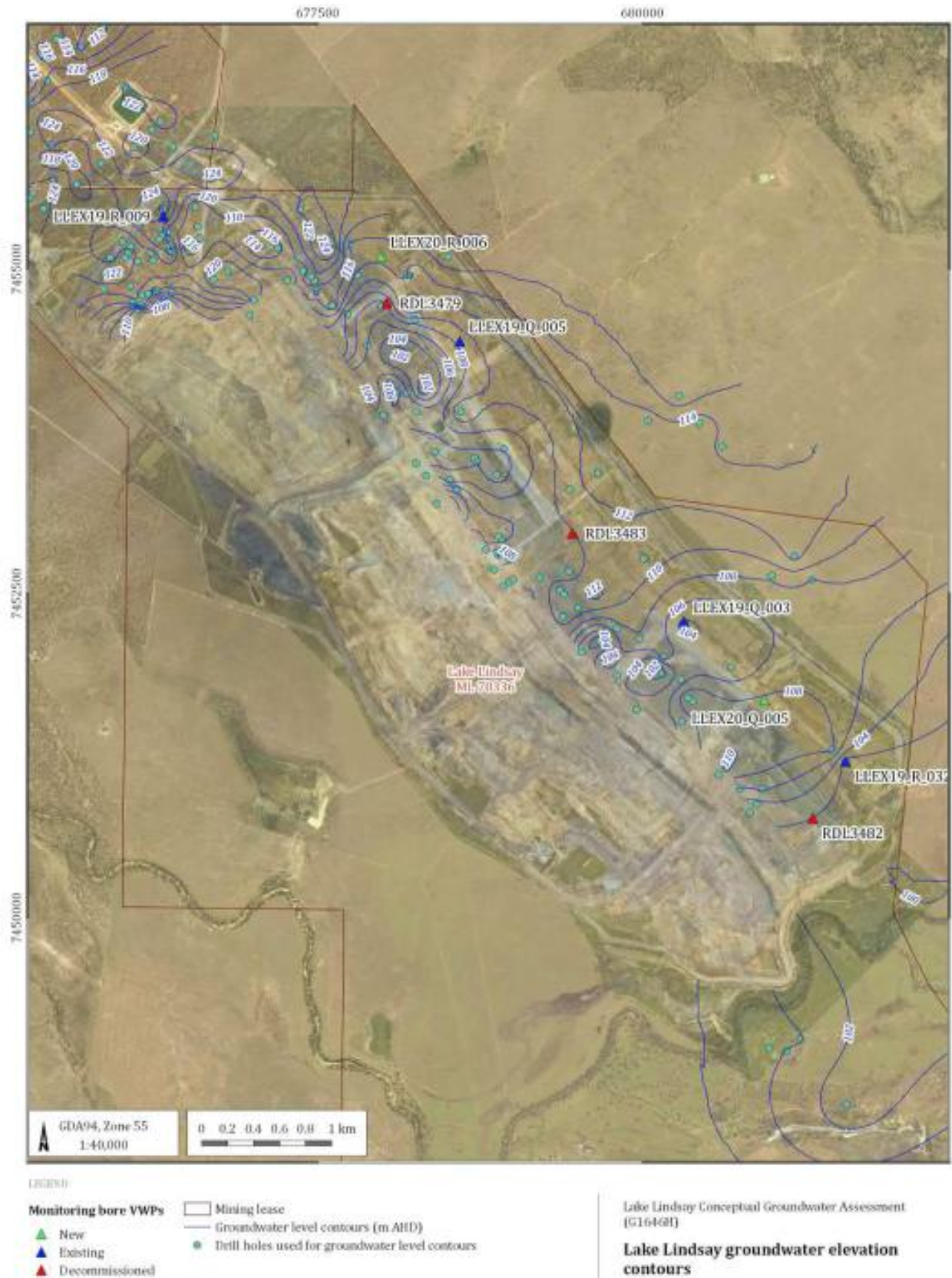


Figure 20 Groundwater Elevation Contours (Source: AGE, 2021b)

Aquifer Occurrence and Distribution

Typically, throughout the Bowen Basin, coal seams serve as the primary groundwater systems within the Permian coal measures. The surrounding overburden and interburden formations at most mines are generally of low permeability and act as aquitards, with groundwater movement largely restricted over mining time frames except along structural features or bedding contacts. Coal seams themselves are confined groundwater systems that typically exhibit low transmissivity and recharge rates. Groundwater is predominantly stored and transmitted within cleats, fissures, and fractures intersecting the seams. Accordingly, the Permian coal measures can be categorised into the following hydrogeological units:

- Hydrogeologically “tight,” low-yielding to essentially dry claystone, mudstone, sandstone, and siltstone representing most of the Permian interburden and overburden;
- Coal seams of low to moderate permeability; and
- Localised fracture or fault systems that remain open and have not been sealed by clay or carbonate deposition.

Significant aquifers that may support agricultural water supplies or irrigation within the Bowen Basin are typically associated with thick alluvial sand and gravel deposits along major drainage lines. These alluvial deposits, comprising silts, clays, sands, and gravels, occur along Oaky Creek and Roper Creek. They tend to be narrow and limited to areas immediately adjacent to these creeks and are often incised into the underlying Tertiary and Permian sediments. Bed and bank materials are intermittently influenced by exposed bedrock, and floodplain alluvium is generally confined to the inner bends of meanders and to sections of the channels where incised slopes decrease, allowing flooding to overtop the banks (KCB, 2018).

Borehole water level and pore pressure data (AGE, 2021a) indicate that the coal seams at the LLM are generally saturated. Recharge to the coal measures occurs where coal seams subcrop against overlying strata or outcrop at the surface. Recharge also occurs via vertical leakage from overlying Tertiary sediments; however, the predominantly clayey nature of the weathered materials restricts vertical infiltration. Consequently, the overall recharge rate is considered to be very low.

Hydrogeological Characteristics

The hydrogeological characteristics of local geological units can be broadly divided into two classes:

- Porous aquifers associated with unconsolidated Quaternary and Tertiary sediments, as well as weathered Permian–Triassic Formation sediments; and
- Fractured aquifers associated with consolidated, unweathered Permian and Triassic Formation sediments.

The lithology, thickness, degree of consolidation, and extent of fracturing of these units strongly influence the hydrogeological properties of the formations present within and around LLM.

AGE (2021) reported groundwater intercepts in the Rangal Coal Measures and at the base of the Rewan Formation (Permian).

Quaternary Alluvium

Available groundwater monitoring data for the section of Oaky Creek south of LLM (e.g. borehole RDL3307) indicate that the alluvium is partially but consistently saturated, with groundwater at depths of approximately 11 to 12 m bgl. This corresponds to a groundwater elevation of around 116 m AHD and a saturated thickness of approximately 6 m. Groundwater levels in the Quaternary alluvium are notably higher than those measured in the underlying Rangal Coal Measures and generally similar to those in the adjacent Tertiary sediments.

Recharge to the Quaternary alluvium is provided by direct rainfall infiltration and by infiltration of surface water during episodic streamflow and flood events. The alluvium is locally classifiable as an unconfined aquifer.

Vertical leakage to the deeper coal measures is negligible due to the significant thickness of consolidated low-permeability sediments separating the Quaternary alluvium from the underlying Rangal Coal Measures. Intergranular flow is the primary mechanism of groundwater movement within the alluvium, especially where coarse-grained lenses or bands are present. The hydraulic conductivity of the alluvium ranges from very low to moderate (~0.01 to 10 m/d), depending on the relative proportion of coarse- to fine-grained material.

Groundwater within the Quaternary alluvium south of LLM is slightly to moderately saline (3,600 to 12,000 $\mu\text{S}/\text{cm}$) and slightly to moderately alkaline (pH 7.6 to 9.7).

Tertiary Sediments

Groundwater monitoring data (AGE, 2021a) indicate that the Tertiary sediments within the LLM area are partially saturated, with groundwater encountered at depths of approximately 21 to 35 m bgl (104 to 123 m AHD) and saturated thicknesses of between 4 and 21 m. Drawdown is evident in the Tertiary sediments, attributed to ongoing mining at LLM. Recharge to these sediments occurs via direct rainfall infiltration and local hydraulic connection to the overlying Quaternary sediments.

Recent hydraulic testing (AGE, 2021a, 2021b) indicates low hydraulic conductivity values in the Tertiary sediments, typically between 0.0025 and 0.7 m/d depending on lithology. Groundwater within these sediments, and in the weathered Permian sequences, is highly saline (28,700 to 31,300 $\mu\text{S}/\text{cm}$) and slightly alkaline (pH 7.33 to 8.03).

Triassic Sediments

Groundwater occurrence within the Triassic sediments is primarily governed by secondary porosity (fracture density and aperture). These sediments are typically low yielding across the local and regional area, with the exception of areas affected by faulting where increased fracture density enhances permeability. Recharge to the Triassic sediments is limited to vertical leakage from overlying Tertiary and Quaternary sediments. Groundwater flow is predominantly confined to faults, fractures, and bedding contacts.

Permeability data for the Triassic sediments around LLM are limited, but they are assumed to be comparable to the overburden and interburden units of the Permian sediments (~0.001 to 0.007 m/d). The DNRMMRRD groundwater database (Queensland Government, 2023) reports a maximum yield of 0.1 L/s for these sediments. Groundwater chemistry is presumed to be similar to that of the underlying Permian interburden and overburden—highly saline, moderately alkaline, with elevated trace metals.

Permian Rangal Coal Measures Formation

The Rangal Coal Measures underlie the Tertiary and Quaternary sediments across most of the LLM and extend beneath Triassic sediments to the northwest. Recharge to these coal measures is limited to vertical leakage from the overlying formations and direct recharge where the coal measures outcrop at surface. Recharge rates are very low due to the low permeability and significant thickness of the overlying mudstone, siltstone, sandstone, and shale interburden.

Groundwater flow within the Rangal Coal Measures is primarily through fracture networks, with cleated coal seams serving as the most permeable and productive aquifer units. Interburden units act as confining layers between seams, restricting vertical flow and generating semi-confined to confined conditions.

Groundwater monitoring data (AGE, 2021a) show increasing pore pressure elevations away from the mine. Pore pressures rise from approximately 74 m AHD immediately north of LLM to approximately 112 m AHD at 1.2 km north of the existing void. These observations reflect partial depressurisation of the coal measures due to mining.

Hydraulic testing (AGE, 2021b) indicates generally low hydraulic conductivity for the Permian sediments. Airlift testing results show yields typically <0.2 L/s in undisturbed coal measures north of LLM and up to 6 L/s in and around the pit footprint due to stress-relief fracturing and fault damage.

Groundwater within the Rangal Coal Measures is highly saline (19,110 to 31,500 µS/cm) and moderately alkaline (pH 8.85 to 9.25). Groundwater in these coal seams is considered hydraulically isolated from other regional coal seam aquifers due to compartmentalisation by regional faulting and synclinal structure.

Permian Burngrove Formation

The Burngrove Formation underlies the Rangal Coal Measures at LLM and is also juxtaposed against the Rangal Coal Measures north of the Jellinbah Fault due to reverse (thrust) faulting. Lithologically, the Burngrove Formation comprises interbedded claystone, siltstone, and sandstone with minor carbonaceous seams. Recent drilling (AGE, 2021b) did not identify any significant aquifer units. Airlift testing yielded less than 0.03 L/s, indicating very low hydraulic conductivity. Hence, the Burngrove Formation can be regarded as an aquitard forming a local hydraulic barrier north of LLM.

Jellinbah Fault

The Jellinbah Fault places low-permeability Burngrove Formation sediments adjacent to the Rangal Coal Measures. This juxtaposition, coupled with low-permeability interburden, restricts northward groundwater flow and forms a

hydraulic barrier, effectively compartmentalising groundwater in the Rangal Coal Measures around LLM.

The hydraulic behaviour of the fault itself is not fully understood. The damage zone surrounding the fault may enhance local permeability along its strike, allowing vertical and lateral movement of groundwater along fractures. However, clay smearing within the fault core may restrict flow perpendicular to the fault. Accordingly, the Jellinbah Fault acts as both a barrier to flow across the fault plane and a potential conduit along the damaged fault zone.

Existing Groundwater Quality

Groundwater within the Tertiary sediments and uppermost weathered Permian sequences around the existing LLM is highly saline (approximately 28,700 to 34,100 $\mu\text{S}/\text{cm}$), slightly alkaline (pH 7.33 to 8.03), and elevated in naturally occurring trace elements, principally boron, zinc, and manganese.

In comparison, groundwater within the Quaternary alluvium south of LLM is slightly to moderately saline (3,600 to 18,000 $\mu\text{S}/\text{cm}$), slightly to moderately alkaline (pH 7.6 to 9.7), and contains elevated concentrations of trace elements including boron, iron, and manganese.

Compliance Groundwater Monitoring Locations

Ongoing groundwater quality monitoring is used for determining post closure quality limits. Groundwater bores used for ongoing groundwater quality monitoring (Table 10) are monitored several times per year for a range of parameters. Post closure limits derived from these monitoring locations are provided in Section 10.2.2. Locations are subject to change with PRCP condition PRCP16.

Table 10 Groundwater Monitoring Locations

Monitoring Bore	Hydrogeological Unit	Latitude (GDA2020)	Longitude (GDA2020)	Comments
Lake Lindsay Bore Hole (RDL3307)	Alluvium	-23.0541	148.7650496	Subject to change associated with condition H8 of EA
LAL_MB001	Middlemount Coal Seam	-22.9856	148.7462863	EPML00739113 and condition PRCP16 & PRCP17 of the PRCP Schedule.
LAL_MB002	Middlemount Coal Seam	-22.9973	148.7466401	
LAL_MB003	Tertiary Sediments / Permian	-23.0255	148.7680024	
LAL_MB004	Pisces Coal Seam	-23.0125	148.7604757	
LAL_MB005	Middlemount Coal Seam	-23.0218	148.7689614	
LAL_MB006	Tertiary Sediments /	-22.9839	148.7157388	

Monitoring Bore	Hydrogeological Unit	Latitude (GDA2020)	Longitude (GDA2020)	Comments
	Base of Weathering			

Hydrogeological Conceptual Model

A hydrogeological assessment conducted by AGE was undertaken by Anglo American in July 2021 (**Appendix C**). This scope of work involved assessing piezometric data with existing hydrogeological models at LLM to conceptualise a hydrogeological model for LLM.

The reported hydrogeological model (**Figure 21**) which was utilised by SLR Consulting Australia Pty Ltd (SLR) in their understanding of pre-existing geological profile and groundwater conditions at LLM. This model has been adopted into technical assessment conducted as part of this PRCP (and detailed further in **Section 7**).

Lake Lindsay Coal Mine

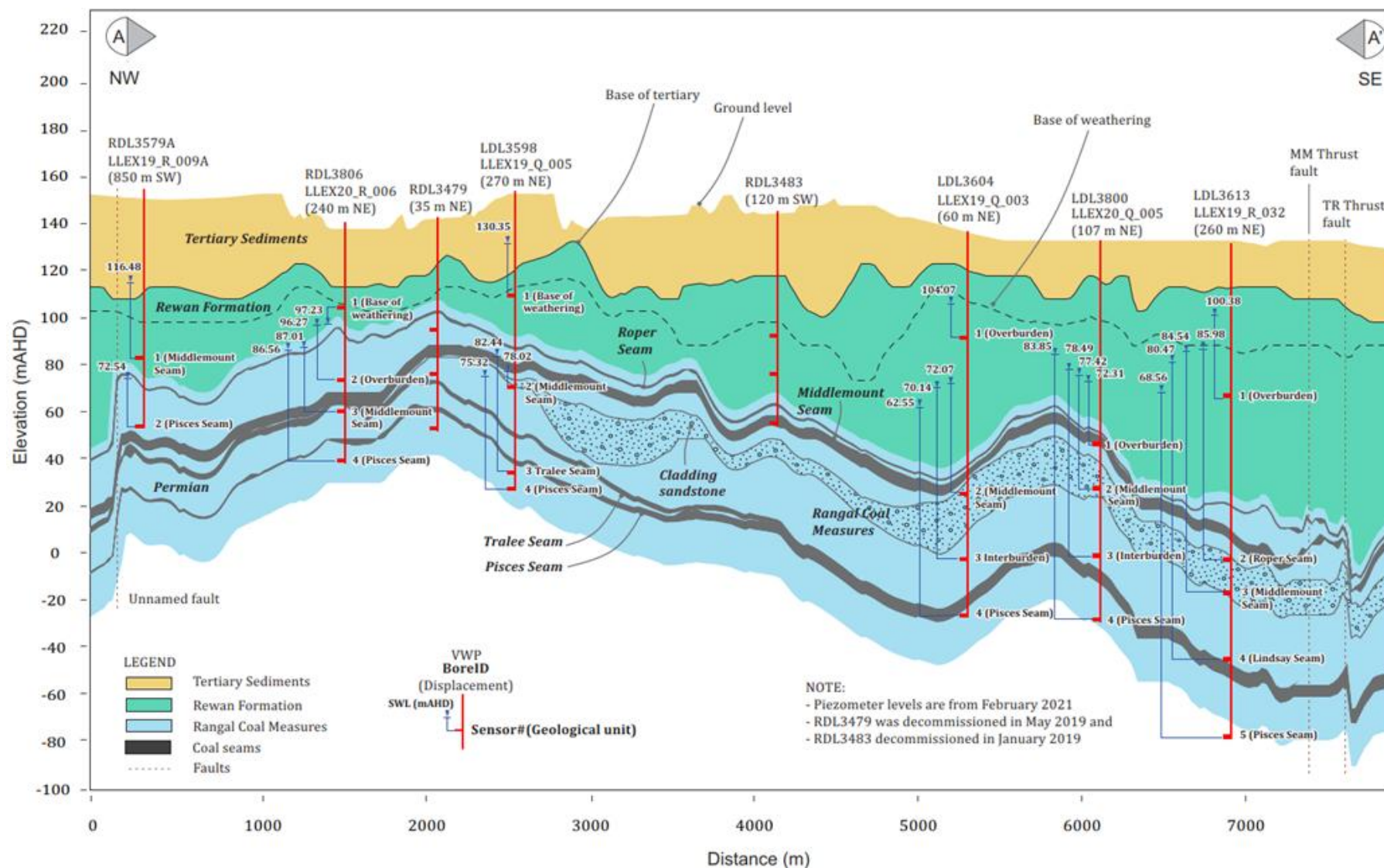


Figure 21 LLM Hydrogeological Model (Source: AGE, 2021b)

3.8.8 Ecological Characteristics

The LLM Mining Leases (MLs) are situated within the Isaac–Comet Downs subregion, one of the 13 subregions comprising the Brigalow Belt North bioregion. Large portions of the Brigalow Belt North bioregion have been historically cleared of remnant vegetation (i.e. Category B regulated vegetation as defined under the *Vegetation Management Act 1999* (VM Act)) for grazing, agricultural, and mining purposes. Remaining patches of remnant vegetation are typically confined to hilly areas, roadside verges, riparian corridors, and other small, isolated fragments. Extensive clearing over the past 150 years has resulted in a highly fragmented landscape characterised by large expanses of cleared land interspersed with relatively small remnants of native vegetation (Aurecon, 2022).

The nearest forest reserves are Bundoora State Forest, located approximately 26 km to the north-west, and Junee State Forest, situated approximately 21 km to the north-east.

The LLM areas have been subject to considerable historical disturbance, predominantly as a result of cattle grazing. Land to the north, south, and east of LLM has been largely cleared of woody vegetation, with only scattered, moderately sized patches of native vegetation remaining (Aurecon, 2022).

Two flora and fauna assessments have previously been undertaken on MDL 170 (now incorporated into the LLM MLs). These include the report *Flora and Fauna of the LLM Exploration Prospect, Central Queensland*, prepared by WBM Oceanics Australia (now BMT Commercial Australia Pty Ltd) in December 1993 (WBM Oceanics, 1993), and the *Girrah Flora and Fauna Assessment*, prepared by Environmental Resources Management Australia Pty Ltd (ERM) in April 2001 (ERM, 2001). Both assessments describe the flora and fauna species present, vegetation communities, habitat types, conservation status, and the potential impacts of proposed mining activities on species and communities within the current MLs.

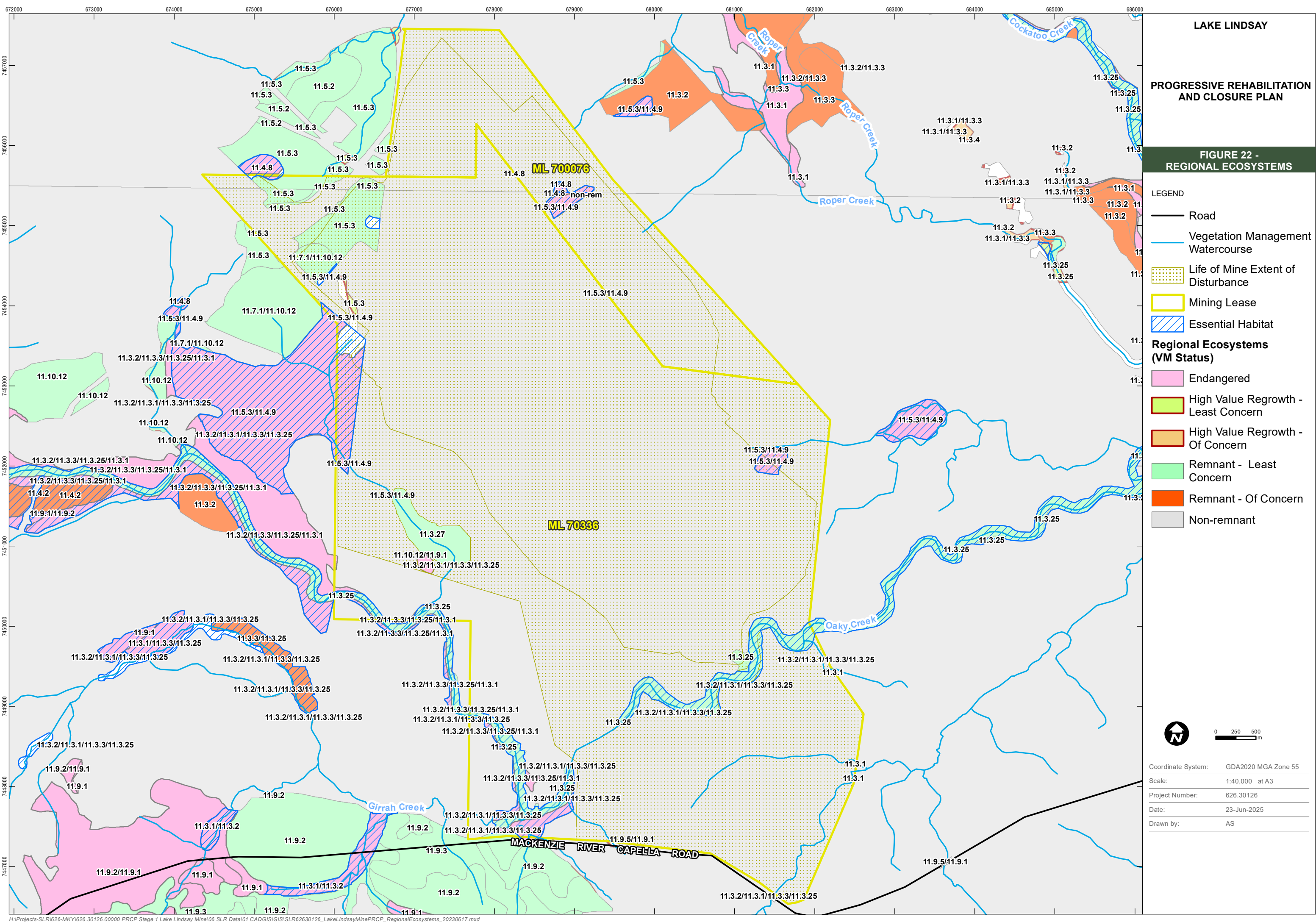
Regional Ecosystems

Regional Ecosystems (RE(s)) have been mapped to occur within the LLM MLs (Table 11 and Figure 22).

Table 11 Regional Ecosystems recorded within LLM (Source: Parsons Brinckerhoff, 2005 and Aurecon, 2022 with VM Act Status updated November 2023 (DESI database))

RE Type	Description	Status (VM Act)
11.3.1	Acacia harpophylla and/ or Casuarina cristata open forest on alluvial plains.	Endangered
11.3.2	Eucalyptus populnea woodland to open woodland with or without E. melanophloia.	Of Concern
11.3.25	Eucalyptus tereticornis or E. camaldulensis, Casuarina cunninghamiana woodland fringing drainage lines.	Least Concern
11.4.8	Eucalyptus cambageana woodland with Acacia harpophylla and/or A. argyrodendron on Cainozoic clay plains.	Endangered

RE Type	Description	Status (VM Act)
11.4.9	Acacia harpophylla shrubby woodland with Terminalia oblongata and Eremophila mitchellii. Casuarina cristata sometimes replaces Acacia harpophylla.	Endangered
11.5.18	Micromyrtus Capricornia open shrubland with overstorey trees sometimes present including Eucalyptus exserta, Corymbia trachyphloia, E. melanophloia or E. crebra.	Of Concern
11.5.2	Eucalyptus crebra ± Corymbia clarksoniana ± C. citrodora ± E. molluccana woodland with a sparse ground stratum and sparse to mid-dense shrub/ low tree stratum.	Least Concern
11.5.3a	Shrubby woodland with Eucalyptus populnea and/or E. melanophloia ± Corymbia clarksoniana ± C. dallachiana with an understorey including Eremophila mitchellii, Geijera parviflora and Ventilago viminalis.	Least Concern
11.5.9	Eucalyptus crebra and/or Corymbia citrodora woodland ± Corymbia clarksoniana or C. intermedia, C. dallachiana, C. lamprophylla, Eucalyptus tenuipes, E. exserta, E. cloeziana, E. acmenoides, Lysicarpus angustifolius and patches of Callitris glaucophylla and Acacia shirleyi.	Least Concern
11.7.1	Acacia harpophylla, Casuarina cristata woodland or low open forest.	Least Concern
11.7.2	Monospecific stands of Acacia forest/ woodland with Acacia shirleyi, A. catenulata, A. burrowii, A. sparsiflora, A. crassa, A. blakei and A. microsperma.	Least Concern
11.7.3	Eucalyptus persistens and Tiodia mitchellii low open woodland.	Least Concern
11.9.7	Eucalyptus populnea and Eremophila mitchelli woodland.	Of Concern
11.10.12	Eucalyptus populnea grassy woodland sometimes with an Eremophila mitchellii, Callitris glaucophylla understorey.	Least Concern



The Oaky Creek drainage system, including its associated riparian vegetation and ephemeral floodplain wetlands, provides important habitat features for a diverse range of fauna. Surveys conducted to date have recorded a variety of local and migratory species utilising these habitats.

- Key microhabitats present along Oaky Creek include:
- Areas of water ponding;
- Large and small hollows in mature flooded gums;
- Fallen litter and coarse woody debris; and
- Understorey and canopy vegetation that support foraging, nesting, and sheltering.

Despite these habitat values, sections of Oaky Creek within the LLM area have been subject to extensive cattle grazing. This has resulted in notable disturbance to the ground-layer vegetation, creek banks, and creek beds (Parsons Brinckerhoff, 2005).

Additionally, other woodland remnants throughout the LLM area support a variety of microhabitats. These include coarse woody debris, which provides cover for small mammals and reptiles, seed and nectar resources for birds, and tree hollows that serve as roosting and nesting sites for birds, insectivorous bats, and arboreal reptiles.

Terrestrial Flora Overview

Overview of National Significance

In total, three Regional Ecosystems (REs) representing the Brigalow ecological community (*Acacia harpophylla*-dominant and co-dominant), which is listed as a threatened ecological community under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), were recorded within the study area (Parsons Brinckerhoff, 2005; Appendix B). Of these, RE 11.3.1 is a sub-dominant community mapped as part of the Queensland blue gum riparian woodland on Oaky Creek.

A database search conducted through the Department of Environment and Heritage Protection (DEHP; now DETSI) indicated the potential presence of two additional threatened ecological communities in the study area, namely:

- Bluegrass (*Dicanthium* spp.)-dominant grasslands of the Brigalow Belt Bioregions; and
- Semi-evergreen vine thickets (SEVTs) of the Brigalow Belt and Nandewar Bioregions.

Neither of these additional communities was recorded during past or present field surveys of the study area (MDL170, now LLM area). Furthermore, the database search did not identify any threatened flora species under the EPBC Act that are known or potentially present in the vicinity of the study area (Parsons Brinckerhoff, 2005).

Overview of State Significance

Parsons Brinckerhoff (2005) documented one 'Endangered' RE (RE 11.3.1) and one 'Of Concern' RE (RE 11.3.2), as defined under the Queensland Vegetation Management Act 1999 (VM Act) and described in the Vegetation Management Regulation 2002 (VMR). Additionally, a second 'Of Concern' RE (RE 11.3.3) is mapped for the study area; however, this community was not confirmed during field investigations.

A search of the Queensland Herbarium database identified one species, *Cerbera dumicola*, listed as 'Rare' under the Queensland Nature Conservation (Wildlife) Regulation 1994. This species was not observed at the LLM during past or present surveys. No flora species listed under the EPBC Act were identified as present or potentially present in the study area (Parsons Brinckerhoff, 2005).

Overview of Regional Significance

Oaky Creek was reported to have a very high corridor rating and is classified as a bioregional wildlife corridor (Parsons Brinckerhoff, 2005). Sections of Oaky Creek are designated as a wildlife refuge, and the modified ephemeral wetlands associated with Oaky Creek are recognised as regionally significant under the Biodiversity Assessment and Mapping Methodology (BAMM).

Vegetation Communities

The field assessment undertaken by Parsons Brinckerhoff (2005) documented a total of 40 floral species across the study area, six of which were exotic species. Extensive clearing of the LLM area for cattle grazing has resulted in only scattered patches of remnant vegetation communities.

Vegetation communities present within the study area, as identified during the Parsons Brinckerhoff (2005) survey, are outlined below (**Table 12**). Beyond these remnant patches, the broader landscape consists predominantly of grassland dominated by buffel grass (*Cenchrus ciliaris*), with low-growing thickets of Brigalow (*Acacia harpophylla*) regrowth. The study area was considered to be heavily grazed by cattle, with grazing pressure significantly impacting the condition and structure of native vegetation communities (Parsons Brinckerhoff, 2005).

Table 12 Summary of Vegetation Communities and their Conservation Significance (Source: Parsons Brinckerhoff, 2005)

Vegetation Community	RE Mapping	Conservation Significance
Queensland blue gum riparian woodland (Oaky Creek)	Oaky Creek has been mapped (EPA, 2003) as being dominated by RE 11.3.2 and 11.3.1, with sub dominant RE's 11.3.3 and 11.3.25. The riparian community within the study area contains elements of both RE 11.3.2 and 11.3.25. However, REs 11.3.1 and 11.3.3 were not identified in	No rare or threatened flora species were identified in the vegetation communities during the field survey. It is considered unlikely that such species would occur in this community within the study area due to the high level of disturbance to this vegetation.

Vegetation Community	RE Mapping	Conservation Significance
	the riparian community within the study area. A number of individuals of old growth Queensland blue gum are located throughout this community along the creek and the canopy is representative of RE 11.3.25.	
Queensland Blue Gum woodland	No Queensland blue gum communities have been mapped within LLM area (EPA, 2003). The vegetation community identified during the field survey did not exhibit composition or structural characteristics of remnant vegetation.	No rare or threatened flora species were identified within this community type during the field survey. It is considered unlikely that such species would occur due to loss of habitat from past grazing activities.
Brigalow Woodland	One brigalow community RE 11.7.1 has been mapped for LLM (EPA, 2002), in the far north-western corner. This RE is listed as 'not of concern' (now 'least concern' under the VMR). This community lies just within the study area and was found to be primarily poplar box open forest with occasional small stands of brigalow. No vegetation representative of RE 11.7.1 was identified in this area during the field survey.	While the brigalow communities in the north are not representative of an RE due to their small size, degraded composition and structure, the brigalow and belah community in the south-west of the study area exhibits more intact vegetation and may be considered remnant. This remnant vegetation represents RE 11.3.1, which is listed as 'endangered' under the Vegetation Management Regulation 2000 (VMR). Vegetation communities which contain brigalow (<i>Acacia harpophylla</i>) as dominant or co-dominant are considered 'Threatened Ecological Communities' under the EPBC Act. Therefore, the brigalow communities within the study area have a Commonwealth conservation status. However, their condition is highly degraded, and their extent significantly reduced in size.

Vegetation Community	RE Mapping	Conservation Significance
Poplar box woodland	The far north-western corner of the proposed mining lease has been mapped by the EPA as RE 11.10.12, 'Eucalyptus populnea woodfiguren Cainozoic medium to coarse-grained sedimentary rocks'. A smaller remnant within this mapped unit is shown as dominated by RE 11.7.1 with 11.10.12 present to a lesser extent. Both of these RE's are listed as 'not of concern' under the VMR. It was determined from the field survey that the vegetation is representative of its mapped status as RE 11.10.12; although, this community has been highly disturbed as a result of substantial thinning and cattle grazing. Remnant vegetation corresponding to RE 11.7.1 was not identified during the field survey in the study area. The poplar box communities throughout the remainder of the study area (i.e., the isolated stands and vegetation associated with the modified wetland south of Oaky Creek), are not considered remnant and therefore not representative of an RE.	No species listed under State or Commonwealth legislation were identified in this community type during the field survey. It is unlikely that such species would occur in the study area as the only species highlighted by the Queensland Herbarium database search, <i>Cerbera dumicola</i> does not prefer this type of habitat.

Species of Conservation Significance

A search of the Queensland Herbarium database identified one flora species listed as 'Rare' under the *Queensland Nature Conservation (Wildlife) Regulation 1994* within the vicinity of the LLM area. The species, *Cerbera dumicola*, is widespread across central Queensland and is typically associated with vine thicket and lancewood (*Acacia shirleyi*) thicket habitats (DEHP, 2003).

Cerbera dumicola was not recorded within the LLM area during the field assessments conducted by Parsons Brinckerhoff (2005), nor was it observed

during earlier surveys undertaken by WBM Oceanics (1993) and ERM (2001). Furthermore, the study area was considered to provide limited suitable habitat for this species. Nevertheless, it is noted that *C. dumicola* may potentially occur elsewhere in the surrounding region, particularly along creek and drainage lines and on properties that are less intensively managed for cattle grazing.

Weed Species Overview

A number of declared weed species, listed under the *Catchment and Land Protection Act 1994* (CaLP Act), were recorded across the study area during field assessments conducted by Parsons Brinckerhoff (2005). Species observed within riparian vegetation included parthenium weed (*Parthenium hysterophorus*), parkinsonia (*Parkinsonia aculeata*), and noogoora burr (*Xanthium pungens*). Under the *Land Protection (Pest and Stock Route Management) Act 2002* (LP(PSRM) Act), parthenium weed and parkinsonia are categorised as Category P2 weeds, which must be destroyed throughout the state. Noogoora burr is a Category P3 weed, which must have its distribution reduced.

In addition, individuals of prickly pear (*Opuntia sp.*), also a Category P3 weed under the LP(PSRM) Act, were recorded both within riparian vegetation and in poplar box communities in the study area (Parsons Brinckerhoff, 2005).

Terrestrial Fauna Overview

A total of 97 fauna species were identified within the study area during the field survey conducted by Parsons Brinckerhoff (2005), consisting of 83 birds, 11 mammals, two reptiles and 1 amphibian.

Threatened Species

Threatened species identified as likely or known to be present at LLM include:

- Koala (Vulnerable, Nature Conservation Act 1992 (NC Act) and EPBC Act);
- Ornamental snake (Vulnerable, NC Act and EPBC Act);
- Squatter pigeon (southern) (Vulnerable, NC Act and EPBC Act); and
- Short-beaked echidna (Special Least Concern – NC Act).

Birds

A total of 83 bird species have been recorded in the study area. Highest avian species richness was documented in woodland remnants in the north-west of the study area (prior to mining activities) and within riparian vegetation along Oak Creek. In contrast, grassland habitats supported only a limited number of species, principally comprising raptors, grassland specialists, and owls.

Two species, the cotton pygmy-goose (*Nettapus coromandelianus*) and freckled duck (*Stictonetta naevosa*) are listed as 'Rare' under the *Queensland Nature Conservation (Wildlife) Regulation 1994*.

Database searches for the broader region also identified several species listed under state and Commonwealth legislation. For example, the square-tailed kite was recorded from WildNet data for the surrounding area. This species is typically associated with extensive woodlands and forests containing an abundance of

passerines. Given the lack of substantial woodland habitat within the LLM area, this record is most likely derived from nearby sub-coastal areas east of the study area.

Additionally, the red goshawk, squatter pigeon, and star finch were flagged as potentially occurring within the area based on searches of the EPBC protected matters database. The star finch is considered extinct from most of its former range in Queensland, including the Central Highlands. Suitable habitat for the red goshawk is also largely absent in the LLM area, as this species generally prefers coastal and subcoastal forests and woodlands. Squatter pigeons have been recorded in nearby poplar box open woodland approximately 30 km from the LLM area.

In addition, all avian species identified within the Charadriidae (plovers and dotterels), Anatidae (geese and ducks), Falconidae (falcons), and Accipitridae (eagles and kites) families are listed under the migratory provisions of the EPBC Act.

Mammals

A total of 11 mammal species have been recorded in the study area (Parsons Brinckerhoff, 2005). Among the larger mammals, the eastern grey kangaroo (*Macropus giganteus*) was observed in high abundance, particularly within open, grazed paddocks. Spotlighting surveys also recorded the rufous bettong (*Aepyprymnus rufescens*) in forested areas and the spectacled hare-wallaby (*Lagorchestes conspicillatus*) in cleared grassland habitats. Rabbits (*Oryctolagus cuniculus*) were relatively abundant across the study area. The only small mammal species detected at LLM was the house mouse (*Mus musculus*). Additionally, the greater glider (*Petauroides volans*) was previously recorded during the survey conducted by WBM Oceanics (1993).

The limited diversity of arboreal and ground-dwelling fauna observed may be attributed to factors including a high abundance of predators (e.g. raptors and snakes), a lack of arboreal hollows, and prevailing drought conditions.

Five insectivorous bat species were detected within the study area, all via call-detection techniques conducted over wetland areas south of Oaky Creek. None of these bat species are listed under state or Commonwealth legislation. However, the little pied bat (*Chalinolobus picatus*), recorded by ERM (2001), is listed as 'Rare' under the *Queensland Nature Conservation (Wildlife) Regulation 1994*. This species was detected in grassland habitat during three Anabat® passes. A further insectivorous bat, the eastern long-eared bat, was identified as potentially occurring within the area based on the EPBC protected matters database search, although the study area lies outside its known distribution range.

Reptiles

Only two reptile species were recorded during the field surveys conducted by Parsons Brinckerhoff (2005). This limited detection is likely attributable to the seasonality of the surveys, which were undertaken during winter months when reptile activity is typically reduced. Nevertheless, historical surveys suggest that reptile diversity and abundance in the study area are generally low despite the widespread availability of suitable habitat such as fallen timber across woodland and grassland areas.

The survey conducted by ERM (2001) recorded a total of eight reptile species, whereas WBM Oceanics (1993) did not record any reptiles. Among the species recorded by ERM, the ornamental snake (*Denisonia maculata*) is listed as 'Vulnerable' under both State and Commonwealth legislation. This nocturnal species was observed sheltering under a log approximately 100 metres from Oaky Creek. It prefers alluvial habitats near water, typically sheltering under leaf litter and fallen timber during the day and emerging after dark to feed primarily on frogs. However, the habitat was considered marginal for this species by ERM (2001). No subsequent surveys at LLM have recorded the ornamental snake.

Database searches of the DEHP (now DETSI) identified five reptile species with potential to occur within the study area: the Fitzroy tortoise (*Elseya sp.*), ornamental snake (*Denisonia maculata*), Dunmall's snake (*Furina dunmali*), brigalow scaly-foot (*Paradelma orientalis*), and yakka skink (*Egernia rugosa*). All five species are listed as 'Vulnerable' under the EPBC Act, with the ornamental snake and yakka skink additionally listed as 'Rare' under the NC Act.

Field assessments determined that suitable habitat is absent for the Fitzroy tortoise and yakka skink within the study area. However, the mesic habitats associated with Oaky Creek may provide suitable conditions for Dunmall's snake, while mixed Acacia and box woodlands to the north-east of the study area may support the brigalow scaly-foot. The Queensland Museum database indicates that the golden-tailed gecko (*Strophurus taenicauda*) is associated with brigalow habitats, particularly where cypress pine (*Callitris columellaris*) is present; however, these habitats are not found within the LLM area.

Amphibians

A total of eight amphibian species, including the introduced cane toad (*Rhinella marina*), have been recorded within the study area, all documented by ERM (2001). These species are generally considered common and widespread. Seasonality and prolonged dry conditions typical of central Queensland likely limited amphibian activity during the survey period.

A search of Queensland Museum records covering the broader region identified a total of 11 amphibian species. Among these, the whirring tree frog (*Litoria revelata*), listed as 'Rare' under the *Queensland Nature Conservation (Wildlife) Regulation 1994*, was recorded twice approximately 25 km southwest of the study area. However, it is considered unlikely that this species utilises the study area, as it prefers coastal swamp and montane forest habitats, which are absent locally. Furthermore, stream and wetland depressions within the study area have been significantly degraded due to cattle grazing.

Pests

7 introduced species have been identified at LLM, including the following:

- Feral cat (*Felis catus*);
- European rabbit (*Oryctolagus cuniculus*);
- Feral pig (scats) (*Sus scrofa*);
- House mouse (*Mus musculus*);

- Cane toad (*Rhinella marina*);
- Asian house gecko (*Hemidactylus frenatus*); and
- Common myna (*Acridotheres tristis*).

Of these, 3 species are considered as pest species under the Queensland's *Biosecurity Act 2014*:

- Feral cat (Category 3, 4 and 6 restricted matter);
- Feral pig (Category 3, 4, and 6 restricted matter); and
- European rabbit (Category 3, 4, 5 and 6 restricted matter).

3.8.9 Native Title and Cultural Heritage

The *Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHP Act) provides protection for Aboriginal cultural heritage at the national level. No declarations relating to Aboriginal heritage have been made under Commonwealth legislation for the LLM area, and there are no sites listed on Commonwealth heritage registers.

At the state level, the *Queensland Aboriginal Cultural Heritage Act 2003* (ACH Act) provides for the recognition, protection, and conservation of Aboriginal cultural heritage. A search conducted by Aurecon (2021) of the Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships (DSDSATSIP) Cultural Heritage Database and Register (2022) identified no recorded Aboriginal cultural heritage sites or items of significance within the LLM area.

LLM management has established procedures to identify potential areas of cultural significance, encompassing both Indigenous and non-Indigenous heritage, prior to any clearing or ground-disturbance activities. The permit-to-disturb process ensures that such areas are recognised through pre-clearance surveys to mitigate impacts on cultural heritage values.

Aboriginal Cultural Heritage

Under the ACH Act, a person conducting an activity in compliance with certain due diligence requirements or under the authority of specific agreements, such as an approved Cultural Heritage Management Plan (CHMP), is deemed to have fulfilled their cultural heritage duty of care (Section 23).

The Barada Kabalbara Yetimarala People are recognised as the Aboriginal party under the ACH Act for the LLM area.

A CHMP exists for the Capcoal Complex, established between Anglo Coal (Capcoal Management) Pty Ltd (the proponent), acting on its own behalf and as agent, and representatives of the Barada Kabalbara Yetimarala People, namely Betty Doyle, Norman Ross, Anthony Henry, Sam Dallachy, Vanessa Saunders, Margaret Hornagold, and Davina Tileroo (QUD383/2013; Register number CLH-015-012). This CHMP was executed on 14 July 2021 and applies to all mining tenements held by the proponent within the Barada Kabalbara Yetimarala People's native title claim area, including the LLM operations.

The purpose of the CHMP is to establish procedures enabling the proponent to carry out activities across the Capcoal Complex in compliance with their obligations. These obligations include conducting cultural clearance surveys, preparing reports, and monitoring activities, all while respecting the traditional laws and customs of the Barada Kabalbara Yetimarala People and protecting their Aboriginal cultural heritage. The CHMP further outlines protocols to be followed upon discovery of items potentially of Aboriginal cultural heritage significance. As such, the CHMP represents the proponent's primary method of ensuring compliance with the cultural heritage duty of care provisions under the ACH Act.

Non-Indigenous Cultural Heritage

A review conducted by Aurecon (2021) of Commonwealth, State, and Local heritage registers identified no listed or known places of non-Indigenous heritage significance within the LLM area or its immediate surroundings. The closest listed heritage site is the Tieri War Memorial (Place ID 602184), located in Tieri, approximately 43 km west of LLM. No homesteads or associated buildings exist within or adjacent to LLM.

A 'Chance Finds' Procedure is established to manage any unexpected cultural heritage discoveries that may occur during mining, rehabilitation, or related activities. This procedure is recommended to remain in place and be actively implemented throughout rehabilitation, decommissioning, and closure phases.

3.9 Design for Closure

Not required for transitional PRCs.

3.10 Rehabilitation Planning

As per the current LoAP, mining activities at LLM are currently planned to cease in 2044. Progressive rehabilitation has been undertaken since 2011 as per the mine rehabilitation schedule. Further progressive rehabilitation associated with LLM will occur over the remaining LoAP.

Major rehabilitation activities and their planned duration have been summarised below (**Table 13**).

Table 13 Rehabilitation Planning Summary

Activity	Duration	Area (ha)	Rehabilitation Methodology
Existing rehabilitation areas	2011 - 2054	432	Rehabilitation at LLM has been progressively undertaken.
Infrastructure areas, water storages (dams), laydowns, roads and access tracks	2055 - 2087	183	Infrastructure will be decommissioned and removed from LLM post completion of rehabilitation activities as these will be required to support rehabilitation activities.
Overburden dumps, reshaped highwalls, RoM pad, exploration disturbance* and all other mine affected disturbance areas#	2032 - 2085	1,451	Rehabilitation and closure of these areas will be progressively undertaken over the remaining mine life until achievement of landform design as stipulated by the EA to support PMLU of bushland.
Exploration and ancillary areas	2056 - 2085	2,261	Future exploration and ancillary activities will be rehabilitated as required in areas which are disturbed. This will include backfilling all shafts, topsoiling with soil taken from the area and rehabilitation to achieve a PMLU of grazing.
Residual voids (including highwalls, low walls and end walls inundated by water and water contained within voids) and ramps	2044 - 2054	525 (NUMA)	LLM will leave a maximum of 525 ha of mining voids and ramps as residual voids in accordance with the EA.
Total Rehabilitation Area (ha)	2,591		

Table Notes:

*An additional 1,712 hectare of undisturbed land across both MLs remains available for potential future exploration activities but this not considered disturbed currently and hence is not included as part of rehabilitation planning.

#Mine-affected disturbance consists of all the areas authorised for disturbance in the EA that currently don't fall under another rehabilitation activity.

3.11 Existing Rehabilitation

Rehabilitation at LLM has been progressively undertaken since 2011 (Table 14 and Figure 23) to the approved PMLU of bushland as required under the EA (Table G2)

Lake Lindsay Coal Mine

The progressive rehabilitation has been regularly monitored, with data being fed back into future rehabilitation processes.

As of March 2024, a total area of approximately 432 ha had been rehabilitated (Anglo American, 2024). No certification of rehabilitation areas has occurred to date, however Anglo American plans to undertake rehabilitation certification in the future.

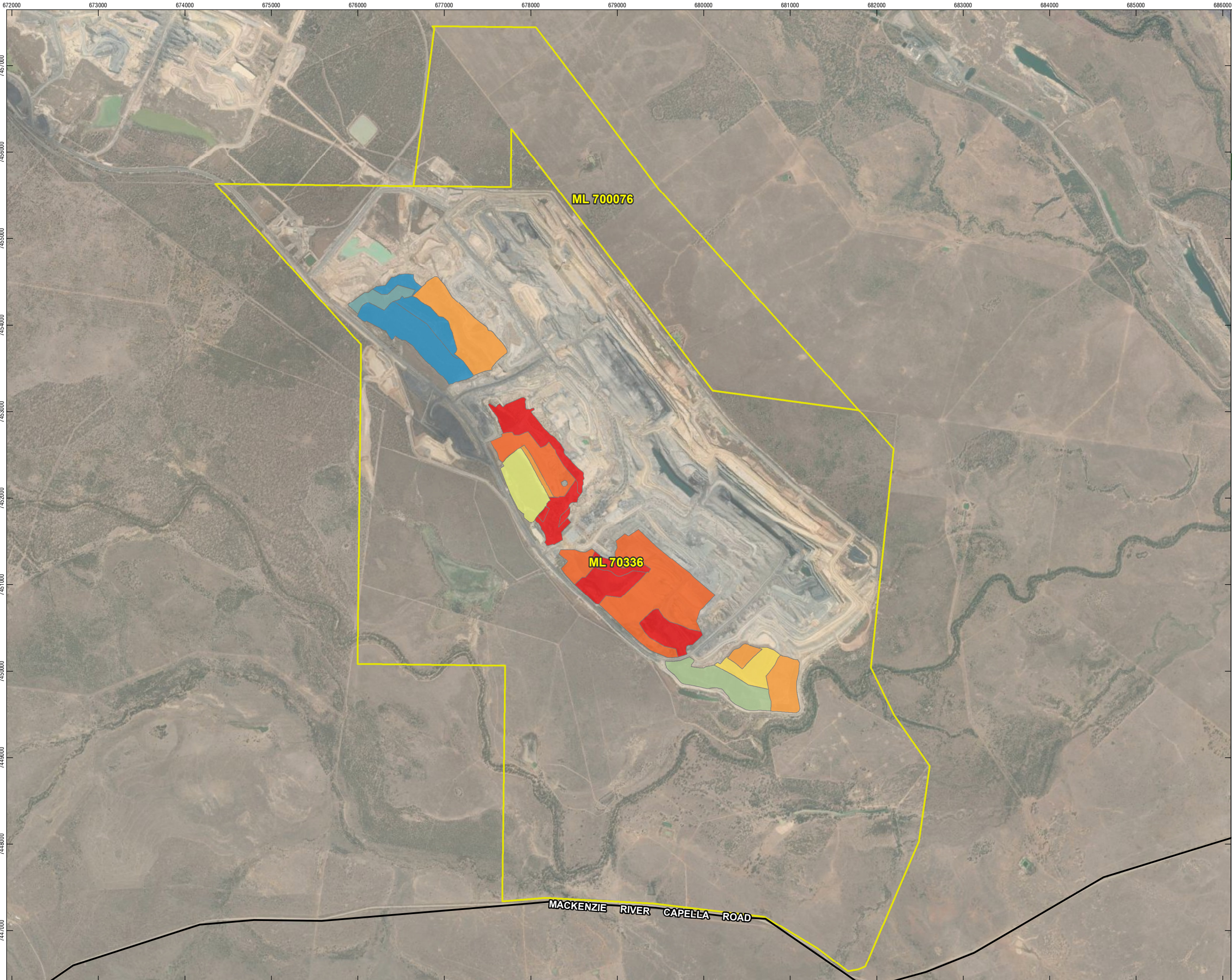
Table 14 Existing Rehabilitation undertaken at LLM (Source: Anglo American, 2024)

Rehabilitation Area Name	Total Area Rehabilitated (ha)	Year Completed	PMLU	Certified
X1	15.1	2011	Bushland	No
X1 ACARP Trials	41.4	2011	Bushland	No
X1N	6.4	2011	Bushland	No
X1S/X2SN	44.2	2022	Bushland	No
X2 South	26.6	2019	Bushland	No
X2 South	3.4	2022	Bushland	No
X2N Gypsum Trial	10.5	2012	Bushland	No
X2S	26.7	2023	Bushland	No
X2S	15.3	2024	Bushland	No
X2S	25.9	2024	Bushland	No
X2S	2.3	2024	Bushland	No
X3	11.1	2023	Bushland	No
X3	18.8	2024	Bushland	No
X3	7.5	2024	Bushland	No
X3/X4N	84.6	2023	Bushland	No
X4 South Top of Dump	16.5	2021	Bushland	No
X4S	30.7	2018	Bushland	No
X4S	5.8	2022	Bushland	No
X4S	20.3	2022	Bushland	No
X4S	18.5	2024	Bushland	No
Total	431.6 ha			

Rehabilitation methodology to date has included following:

- Externally draining overburden dumps have been reshaped to a slope of up to 33.3% in accordance with the EA;
- Rock mulch with a thickness 0.2 m – 1.0 m was then applied, with the exception of the X1 ACARP trial area;

- All spoil was ameliorated as per the recommendations of soil chemical analyses;
- Topsoil to an average depth of 150 mm was then applied and the area ripped along the contour;
- Drainage has been implemented where required; and
- Each area has then been seeded with the recommended seed mix.



LAKE LINDSAY

PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 23 - EXISTING
REHABILITATION AREAS

LEGEND

- Road
- Mining Lease
- Completed Rehabilitation**
 - 2011
 - 2012
 - 2018
 - 2019
 - 2021
 - 2022
 - 2023
 - 2024



0 250 500
m

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:40,000 at A3
Project Number:	626.30126
Date:	15-Apr-2025
Drawn by:	AS

Aerial rehabilitation monitoring surveys were conducted from 2020 to 2023 by Ecocene Pty Ltd ((Ecocene) (previously Ecoda Pty Ltd) 2024) with the results of most recent surveys presented (**Table 15**).

Table 15 Existing Rehabilitation Monitoring Results (2020 to 2023) (Source: Ecocene, 2024)

Rehabilitation Monitoring Area	Rehabilitation Area Name	Vegetation Cover (%)	Mean Gully Cover (%)
Success Criteria		>30%	0%
East Spoil TS-1	X3/X4N	64.0	0.0
East Spoil TS-2	X4S	83.7	0.0
East Spoil TS-3	X4S	84.7	12.3
East Spoil TS-5	X2 South	82.9	0.7
West Spoil TS-1	X2N Gypsum Trials	85.7	3.0
West Spoil TS-2	X1 ACARP Trials	91.0	3.4
West Spoil TS-3	X1	81.0	0.9
West Spoil TS-4	X1 ACARP Trials	89.0	3.0
West Spoil TS-5	X2S	85.0	0.5
X1S	X1S/X2SN	63.7	2.1
X2S	X2S	70.4	1.8
X4S	X4S	72.9	5.0
X4S Top of Dump	X4S	87.3	0.0

Figure 24 shows the average vegetation cover for the rehabilitation monitoring areas which have been monitored since 2020 including:

- East Spoil TS-3;
- West Spoil TS-1;
- West Spoil TS-2;
- West Spoil TS-3;
- West Spoil TS-4; and
- West Spoil TS-5.

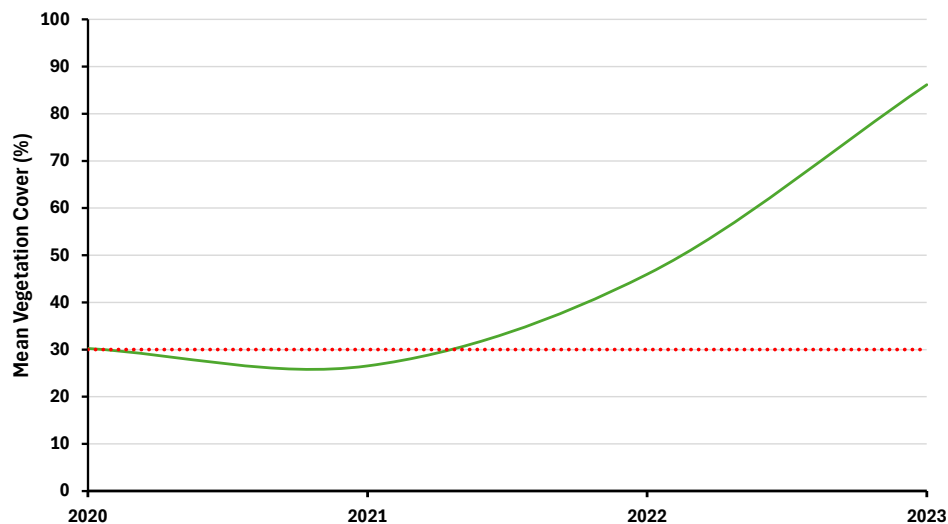


Figure 24 Average Revegetation Groundcover from 2020 to 2023

There is an upward trend in the average vegetation groundcover between 2020 and 2023 (**Figure 24**) (Ecocene, 2024). The dashed red line shows the groundcover limit for internally and externally draining spoil being ~30% (conservatively marked for 33.3%) from EA Table G1. The existing revegetation exceeded the average groundcover target by mid 2021 and achieved 86% by 2023. Actual groundcover acting as protection for erosion includes both the average vegetation groundcover and the rock mulch groundcover. Therefore, when considering the rock mulch and average vegetation groundcover, the actual groundcover on the overburden emplacement area slope would be approximately 100%.

Aerial examples of the revegetation from surveys provides aerial images of rehabilitation area X2S (**Figure 25**) and spoil rehabilitation area X3 (**Figure 26**). The images show established vegetation on the spoil slopes.



Figure 25 Aerial Image of Rehabilitation Area X2S (Source: Anglo American, 2024)



Figure 26 Aerial Image of Rehabilitation Area X3 (Source: Anglo American, 2024)

4 Post-Mining Land Uses

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 PRCP carried out on the land have ended. A PMLU must meet the definition of stable condition. Land is in a stable condition if:

- a) *"The land is safe and structurally stable, and*
- b) *There is no environmental harm being caused by anything on or in the land, and*
- c) *The land can sustain a PMLU".*

The *Environmental Protection Regulation 2019* (EP Regulation) requires that each PMLU:

- a) *"is viable, having regard to the use of land in the surrounding region, and*
- b) *satisfies at least one of the following-*
 - the use is consistent with how the land was used before a mining activity was carried out on the land;
 - the use is consistent with a development approval relating to the land;
 - the use is consistent with a use of the land, other than a use that is mining, permitted under a State or Commonwealth Act, including, for example, a planning instrument under the Planning Act; or
 - the use will deliver, or is aimed at delivering, a beneficial environmental outcome".

4.1 Pre-Approved PMLUs

Under the transitional provisions of the EP Act, existing approved PMLUs are able to be transitioned into the PRCP without further assessment or public notification. Existing approvals must be included in a land outcome document. Land outcome documents (LODs) are listed in section 750 of the EP Act and include:

- a) *'an EA for a resource activity on the land;*
- b) *a document made under a condition of an EA that:*
 - *relates to the management or rehabilitation of land (e.g., rehabilitation and closure plan or residual void management plan); and*
 - *was provided to the administering authority, and had not been superseded, before 30 November 2018; and*
 - *before 15 January 2019, the administering authority had not notified the EA holder that the document was insufficient; and*
 - *before 30 November 2018, the document had not been superseded.*
- c) *a document made under a condition of an EA that:*
 - *relates to the management or rehabilitation of land (e.g., rehabilitation and closure plan or residual void management plan); and*

- *was provided to the administering authority between 20 November 2019 and to 30 November 2021; and*
 - *within 20 business days after receiving the document, the administering authority had not notified the EA holder that the document was insufficient.*
- d) a report evaluating an EIS under section 34D of the State Development and Public Works Organisation Act 1971 (SDPWO Act) (Queensland Government, 2023, accessed on 21 August 2023);
- e) an EIS assessment report; and
- f) a written agreement between the EA holder and the State that is in force on 30 November 2018’.

LODs associated with LLM include:

- EA EPML00739113 (**Appendix A**).

The EA was amended in 2023 to include an ML700076 and specific conditions relating to landform design and final land use. The conditions of the EA relevant to land outcomes includes Conditions G1 and G2 of the EA, which state:

- Condition G1 “All areas significantly disturbed by mining activities must be rehabilitated to a safe, stable and non-polluting landform with self-sustaining vegetation”; and
- Condition G2 “All areas significantly disturbed by mining activities must be rehabilitated to meet or exceed the requirements of Table G1 - Final land use and rehabilitation approval schedule (**Table 16**) and Table G2 - Landform design” (**Table 22**).

Table 16 Table G1 of EA (Final Land Use and Rehabilitation Approval Schedule)

	Disturbance Type					
	Externally Draining Spoil	Internally Draining Spoil	Top of Dumps	Voids and Ramp s	Access Roads	Infrastruct ure
Post mine land use	Bushland [A]	Bushland [A]	Bushland [A]	Voids	Cattle Grazing	Cattle Grazing
Land suitability	NA	NA	NA	NA	Suitable (Class 3)	Suitable (Class 3)
Topsoil depth (mm)	150	150	150	150	Return stockpile reserves	Return stockpile reserves
Vegetativ e groundco ver percenta ge (%)	≥30	≥30	≥80%		≥80	≥80

	Disturbance Type					
	Externally Draining Spoil	Internally Draining Spoil	Top of Dumps	Voids and Ramp s	Access Roads	Infrastruct ure
Rock groundcover percentage (%)	50	50	NA		NA	NA
Dominant sp	Standard	Standard	Standard	NA	NA	NA
Key Species Recruitment	>10 species with viable seed	>10 species with viable seed	>10 species with viable seed		>10 species with viable seed	>10 species with viable seed
Habitat Complexity	Comparable to reference site	Comparable to reference site	Comparable to reference site	NA	Comparable to reference site	Comparable to reference site
Downstream Impacts of pH and Conductivity	Comparable to reference site	Comparable to reference site	Comparable to reference site	No ongoing impacts	Comparable to reference site	Comparable to reference site

Table G1 Notes:

[A] Mix of eucalypt, acacia and groundcover species

4.2 Proposed PMLUs

4.2.1 Rehabilitation Objectives

The overarching objectives for rehabilitation are to ensure safety hazards are not greater than those that exist in the surrounding landscape, and to establish a stable, non-polluting landscape that maximises potential for sustainable land use.

Conditions relating to rehabilitation objectives state that:

- All areas disturbed by mining activities must be rehabilitated to a safe, stable and non-polluting landform with self-sustaining vegetation (Condition G1); and
- All areas significantly disturbed by mining activities must be rehabilitated to meet or exceed the requirements of Table G1 - Final land use and rehabilitation approval schedule (Table 16) and Table G2 - Landform Design (**Table 23**).

4.2.2 Proposed PMLUs

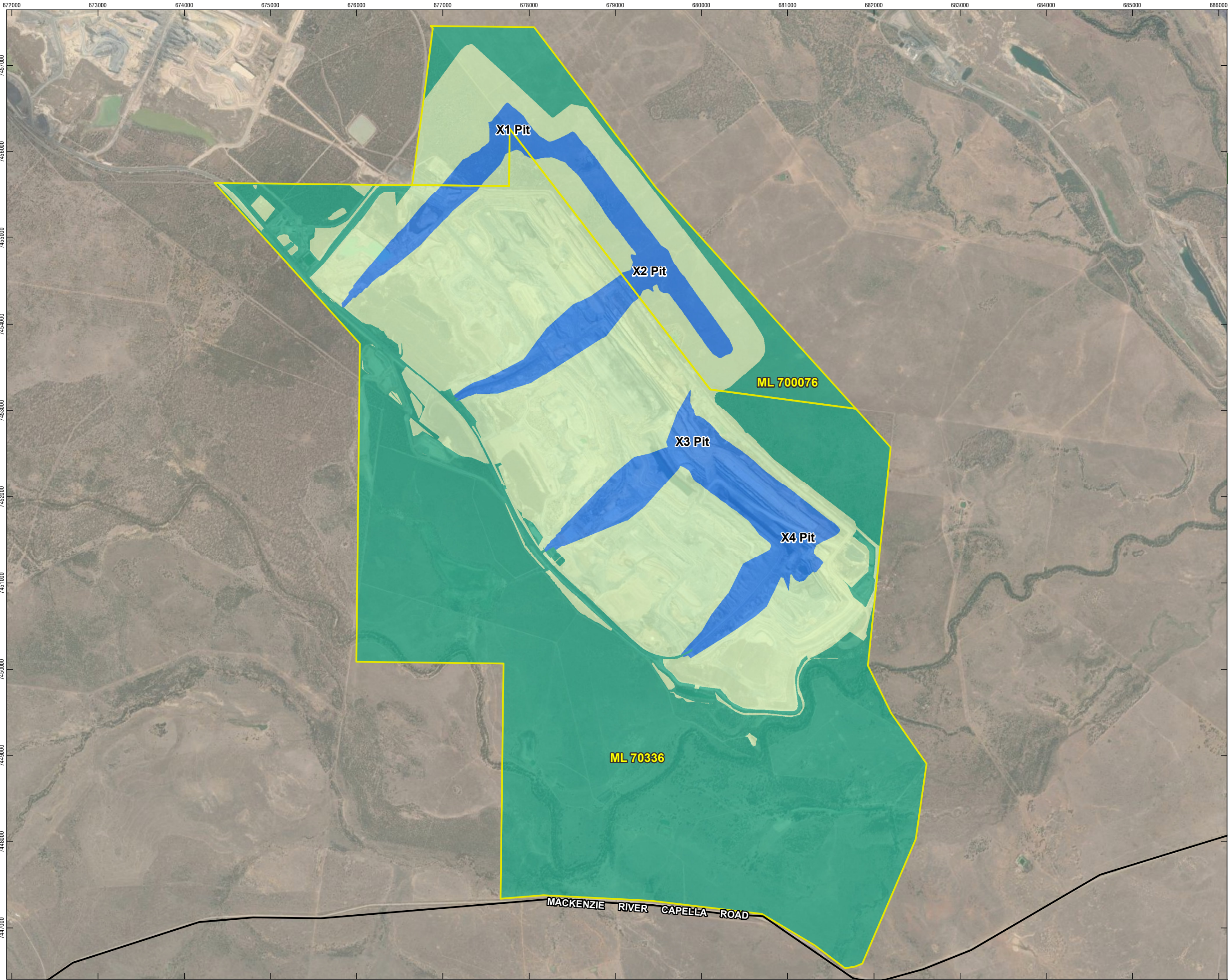
The predominant PMLUs for LLM (Table 17 and Figure 27) proposed are 'bushland' (with a mix of eucalypt, acacia and groundcover species) and 'grazing', both of which are pre-approved within the EA. As per the EP Regulation requirements, the PMLU of bushland and grazing are considered viable for the region and are consistent with Table G1 of LLM's EA.

Table 17 Proposed PMLUs for LLM

Activity	PMLU
Existing rehabilitation areas	Bushland
Infrastructure areas, water storages (dams)*, laydowns, roads and access tracks, exploration and ancillary activities	Grazing
Overburden dumps, reshaped highwalls, RoM pad, exploration disturbance and all other mine affected disturbance areas	Bushland
Exploration and ancillary activities	Grazing

Notes:

*Water storages (dams) are currently scheduled to be decommissioned, reshaped, topsoiled, and revegetated to support the PMLU of grazing. However, as closure planning progresses, the decommissioning of certain dams may be re-evaluated. Retention may be considered where dams are assessed as having potential value to future landholders, particularly as a source of livestock drinking water, contingent upon meeting WQOs as stipulated by the EA.



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FIGURE 27 -
POST MINING LAND USES

LEGEND

— Road

□ Mining Lease

Post Mining Land Use

□ Bushland

■ Grazing

■ NUMA



0 250 500
m

Coordinate System: GDA2020 MGA Zone 55

Scale: 1:40,000 at A3

Project Number: 626.30126

Date: 26-Sep-2025

Drawn by: AS

4.2.3 Community Consultation

The proposed PMLUs have been transitioned from the EA. Anglo American have and will continue to engage with stakeholders on the management and outcomes for the proposed PMLUs (Section 6.0).

Anglo American utilise Capcoal Community Reference Forum (CCRF) as an important process for engaging with communities in line with the Anglo American's 'Group Social Way Policy' on a quarterly basis. CCRF is an established forum utilised by Anglo American for engaging with communities in line with the Toolbox. The CCRF serves as a platform for ongoing dialogue between Anglo American and the local community, focusing on addressing concerns, sharing information, and collaborating on initiatives that benefit the region.

Regular stakeholder engagement and consultation to discuss closure is a requirement of the Toolbox using the CCRF process on a quarterly basis. The framework has been utilised to develop a Community Consultation Plan (CCP) to guide engagement activities relevant to mine closure (Appendix E). The CCRF meets on a quarterly basis and is comprised of key community stakeholders.

4.2.4 Relevant Plans and Strategies

Section 126C of the EP Act requires the PRCP to state the extent to which the PMLUs are consistent with any strategies or plans for the land of a local government, the State, or the Commonwealth. Relevant plans and strategies have been identified below.

Water Resources (Fitzroy Basin) Plan 2011

The Water Plan (Fitzroy Basin) 2011 (Queensland Government, 2011) provides a framework for sustainably managing water and taking water from overland flows and groundwater while considering existing water users including the environment. Mine closure planning including final landforms and drainage has considered the protection of flows (e.g., prevention of impounding waters, connection of base flows, etc.), water quality and groundwater recovery for surrounding ecosystems and users in accordance with this PRCP.

Mackay, Isaac and Whitsunday Regional Plan

The Mackay, Isaac and Whitsunday (MIW) Regional Plan (Queensland Government, 2012) has been developed as a planning instrument under the *Planning Act 2016*. The MIW Regional Plan provides regional strategies via a framework to produce the desired outcomes; it includes consideration for sustainability, climate change, regional landscapes, biodiversity, water quality and health, along with natural resource management. Bushland and grazing are identified as important economic values for the area. PMLUs of bushland and grazing are consistent with MIW's principle "*Further develop and diversify existing and potential primary production and rural industries to enhance the contribution to the regional economy and regional landscape.*"

Isaac 2035, Isaac Regional Council's Community Plan

The Isaac 2035 Community Plan (Isaac Regional Council, 2015) developed under the *Local Government Act 2009* provides a long term 'roadmap' setting out the future vision and aspirations of the community and steps for achievement. One of the opportunities identified in Isaac 2035 Community Plan includes "*increased beef, agricultural, fisheries and aquacultural opportunities due to global food shortages and changing consumption patterns*" which is consistent with the proposed PMLU of grazing.

Isaac Regional Planning Scheme

The LLM MLs are zoned as “rural” under the *Isaac Regional Planning Scheme* (Isaac Regional Council, 2021). These areas are used primarily for agriculture, grazing, complementary tourism and agribusiness activities. Other activities may be found in rural areas where they are in keeping with the character, amenity, and natural resources of the area. These areas also contain localities which provide small scale community facilities which serve as a focal point for the surrounding community. The proposed PMLUs of bushland and grazing are consistent with the current land use zoning.

4.2.5 Final Milestone Criteria

Final milestone criteria have been proposed (**Section 11.3**).

5 Non-Use Management Areas

A NUMA is defined in Section 112 of the EP Act as an area of land the subject of a PRCP that cannot be rehabilitated to a stable condition after all relevant activities for the PRCP carried out on the land have ended. A NUMA can only be proposed due to one of the following reasons:

- a) carrying out rehabilitation of the land would cause greater risk of environmental harm than not carrying out the rehabilitation; or
- b) both of the following apply -
 - The risk of environmental harm as a result of not carrying out rehabilitation of the land is confined to the area of the relevant resource tenure; and
 - The applicant considers, having regard to each public interest consideration, that it is in the public interest for the land not to be rehabilitated to a stable condition.

5.1 Pre-approved NUMAs

Under the transitional provisions of the EP Act, existing approved NUMAs are able to be transitioned into the PRCP without further assessment or public notification. Existing approvals must be included in a land outcome document.

The LOD associated with LLM includes:

- EA EPML00739113 (**Appendix A**).

In addition to Condition G1 and G4 of the EA outlined in Section 4.1, Conditions G9 and G10 relate specifically to residual voids.

Condition G9 Residual void outcome:

- *“Residual voids must comply with the following outcomes:*
 - *Residual voids must not cause any serious environmental harm to land surface waters or any recognised groundwater aquifer, other than the environmental harm constituted by the existence of the residual void itself and subject to any other condition within this environmental authority; and*
 - *Residual voids must comply with Table G3 - Residual Void Design.”*

Table G3 – Residual Void Design of EA (**Table 18**) is reproduced below.

Table 18 Environmental Authority Table G3 (Residual Void Design)

Void Identification	Void Wall - Competent Rock Max Slope (Percentage)	Void Maximum Surface area (ha)	Void Wall - Incompetent Rock Max Slope (Percentage)
Pit X	70	525	45% Highwall tertiary weathered Permian. 34% Low wall for tertiary weathered Permian.

LLM’s LODs have not stipulated the location of NUMA voids and as such, floodplain modelling was completed by SLR (2025b) (**Appendix F**) to assess NUMA void flooding risk in accordance with Sections 3.4 and 3.6.1 of the PRCP Guideline.

5.2 Proposed NUMAs

LLM’s EA has pre-approved residual voids or NUMAs.

Residual voids will be located at LLM at completion of mining in the year 2044 (**Section 7.1**). These residual voids will comprise the highwalls, low walls, end walls inundated by water and water contained within the voids to Standing Water Levels (SWL) and ramps. SWLs within the voids are determined by Void Water Balance (VWB) study conducted by SLR (**Section 7.8**).

5.2.1 Size and Location

The NUMA area including highwalls, low walls and end walls inundated by water and water contained within the voids and ramps results in a total area of 525 ha (**Table 19**). These residual voids/NUMAs will be located within ML70336 and ML700076 (**Figure 28**).

Table 19 Proposed Residual Voids or NUMAs (Source: EA EPML00739113)

Residual Void or NUMA Area	Total Area
Pit X residual voids includes highwalls, low walls and end walls inundated by water and water contained within the voids to SWLs and ramps	525 ha

Flooding (**Appendix F**) and geotechnical (**Appendix M**) assessments were conducted by SLR. These assessments are based on the final landform design prepared by Minserve (2023) and subsequently modified by SLR in 2024 to accommodate the partial backfilling of Pit X4. The flood assessment (**Section 7.3**) results confirm that the residual voids designated as NUMAs are not expected to be inundated during 0.1% Annual Exceedance Probability (AEP) or Probable Maximum Flood (PMF) events. Geotechnical stability analyses (**Section 7.9**) of selected critical sections demonstrate that the final landform slopes achieves a static Factor of Safety (FoS) > 1.5 and a seismic FoS > 1.0.



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FIGURE 28 - NON-USE
MANAGEMENT AREAS

LEGEND

- Road
- Life Of Mine Disturbance Extent
- Mining Lease
- Non-use Management Area



0 250 500 m

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:40,000 at A3
Project Number:	626.30126
Date:	18-Jun-2025
Drawn by:	AS

5.2.2 NUMA Minimisation Strategies and Landform Design Update

Anglo American have demonstrated a strong commitment to responsible mine closure, undertaking extensive efforts to significantly reduce the residual NUMA footprint at the point of relinquishment.

At closure in 2044, prior to rehabilitation, residual void footprint below ground level is projected to cover approximately 830 ha. Anglo American has implemented several measures to minimise the extent of residual voids proposed to be designated as NUMAs, including:

- Blasting and reshaping of highwalls, end walls and low walls to achieve stable slopes to support the proposed PMLU and cap and cover of all coal seams to limit water ingress and minimise spontaneous combustion risk;
- Reshaping and reprofiling of overburden dumps to reduce slope gradients and support the proposed PMLU; and
- Partial backfilling of Pit X4 to reduce the overall NUMA void footprint and manage flooding risk to below 0.1 % AEP and PMF.

These proactive interventions have resulted in a substantial reduction of the total NUMA footprint, reducing it to approximately 525 ha. Collectively, these strategies aim to maximise the land available for PMLU, while reducing the area proposed as NUMA to the extent possible, ensuring compliance with the EA, which allows for a residual void area of up to 525 ha.

According to Minserve (2023), the slope designs implemented in the NUMA areas define the minimum feasible void size while maintaining long-term stability and safety. The report also highlights that any further reduction in void size would require steeper slopes, which would not comply with the EA.

Since the final landform design presented in Minserve (2023), Anglo American has included partial backfilling of Pit X4 at the southeastern extent of the ML to remove the void from the floodplain. This modification has contributed to a further reduction in the overall surface area of the NUMA. As a result, the total NUMA area has been reduced to 525 ha, consistent with the pre-approved threshold set by the EA (**Table 19**).

Further details on the revised final landform design have been provided (**Section 7.1**).

Table 20 Residual Void or NUMA Footprint Minimisation

NUMA	Total Area
Projected potential NUMA area at completion of mining and prior to rehabilitation activities	830 ha
Proposed NUMA area post completion of rehabilitation activities	525 ha
Maximum allowed void surface area (as per EA Table G3)	525 ha

5.2.3 Minimisation of Environmental Risk

Various assessments including flooding, void water balance, groundwater impact, geotechnical stability, geochemical, soil and capping materials and erosional stability assessments have been undertaken on the proposed final landform design to assess and minimise risk to the environment (**Section 7.0**).

The flood modelling results (**Section 7.3**) show that all residual voids/NUMAs will be free from flood ingress from adjacent waterways in events up to and including the 0.1% AEP and PMF.

Void water balance modelling results (**Section 7.8**) concluded that once the final landform has been completed, four residual voids will remain capable of capturing and storing runoff water as well as infiltrating groundwater. All the voids are deemed stagnant, in that surface water will not flow through them and out via surface pathways. They have been modelled, considering long-term climate, catchments, runoff generation and groundwater interaction.

While the voids are expected to reach a hypersaline state, all voids were allocated a 'low-risk' category rating due to the low risk of discharge to the environment. None of the voids are expected to overtop offsite. The voids were also assessed under a high warming climate change scenario and the risk rating outcomes were unchanged.

Groundwater modelling results (**Section 7.4**) showed the predicted post closure groundwater elevations across LLM and its surrounds. The model predictions showed that LLM voids will function as groundwater sinks. The predicted void lake elevations would need to increase above 110 m AHD for the voids to become a source.

5.2.4 Community Consultation

American have and will continue to engage with stakeholders on the management and outcomes for the proposed NUMAs (**Section 6.0**). Consultation with stakeholders has historically been undertaken and will continue over the life of mine.

Anglo American utilise CCRF as an important process for engaging with communities in line with the Anglo American's 'Group Social Way Policy' on a quarterly basis. CCRF is an established forum utilised by Anglo American for engaging with communities in line with the Toolbox. The CCRF serves as a platform for ongoing dialogue between Anglo American and the local community, focusing on addressing concerns, sharing information, and collaborating on initiatives that benefit the region.

Regular stakeholder engagement and consultation to discuss closure is a requirement of the Toolbox using the CCRF process on a quarterly basis. The framework has been utilised to develop a CCP to guide engagement activities relevant to mine closure (**Appendix E**). The CCRF meets on a quarterly basis and is comprised of key community stakeholders.

5.2.5 Relevant Plans and Strategies

The Isaac Regional Planning Scheme identified the LLM area as 'rural.' It is acknowledged that mining and exploration activities occur within this planning zone.

Section 126C of the EP Act requires the PRCP to state the extent to which the NUMAs are consistent with any strategies or plans for the land of a local government, the State, or the Commonwealth.

The Queensland Plan

The Queensland Plan (Queensland Government, 2014) is an aspirational 30-year community vision with nine foundation areas which include the following relevant areas to mine closure planning for LLM:

- Regions - building thriving communities;
- Environment - achieving balance; and
- Infrastructure - being connected.

Mine closure planning is required to consider goals of capitalising on unique regional opportunities and assets, environmental protection, effective natural resource management, and connectivity and accessibility across the state.

5.2.6 Final Milestone Criteria

Final milestone criteria have been proposed (**Section 11.3**).

6 Community Engagement and Consultation

The DETSI have released an information sheet titled '*Community Consultation for Progressive Rehabilitation and Closure Plans (ESR/2019/5101)*' which provides guidance on the community consultation requirements for the purpose of developing a PRCP. A community consultation plan is provided as **Appendix E** (SLR, 2025a).

6.1 Key Community Stakeholders

The information sheet '*Community Consultation for Progressive Rehabilitation and Closure Plans (ESR/2019/5101)*' states that members of the community must have a genuine interest in the underlying, adjacent or surrounding land where LLM is located. This may include, but is not limited to:

- Direct impact interest (e.g., underlying and adjacent landholders);
- Cultural interest (e.g., Indigenous communities, Traditional Owners including Native Title holders);
- Heritage interest (e.g., State or Local government or relevant community groups);
- Environmental interest (e.g., State or Local government or relevant community groups);
- Recreational interest (e.g., community groups);
- Land use interest (e.g., overlapping tenure holders, agricultural entities or Local government); and
- Health interest (e.g., State or Local government, community groups).

Based on the above, the stakeholders relevant to the LLM operation have been identified. A summary of the stakeholder type, organisation name and key interests (**Table 21**) has been provided.

Table 21 Relevant Community and Stakeholder (Source, SLR, 2025a)

Type of Stakeholder	Organisation Name	Key Interests	Level of Participation
Federal Government	Commonwealth Department of Climate Change, Energy, the Environment and Water	• Matters of National Environmental Significance; • Post-mining land uses; • Compliance with approvals; and • Impacts to local industry.	Inform

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Type of Stakeholder	Organisation Name	Key Interests	Level of Participation
State Government	Department of Environment, Technology, Science and Innovation	- Environmental outcomes; and - Safe, stable, non-polluting landforms with an agreed post-mining land use.	Inform, Consult and Involve
	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development	- Maximise utilisation of the resource; and - Compliance with Mining Lease conditions.	Inform
	Department of Transport and Main Roads	Impacts on rail and road network during and following closure.	Inform
Local Government	Isaac Regional Council	- Impact on local and regional employment; - Social impacts of population change; - Future sustainability of Middlemount township and associated services; - Effective transition of workforce and economy; - Post-mining land uses; and - Consistency/ impacts on local planning schemes.	Inform
Privately owned homesteads or Private Landowners	Lake Lindsay Homestead (~5.7 km to the east)	- Impact on local community; - Condition of post mining land use; and	Inform and consult
	Mount Stuart Homestead (~10.3 km to the southwest)	Use of remaining infrastructure.	

Type of Stakeholder	Organisation Name	Key Interests	Level of Participation
	Oak Park Homestead (~10.8 km to the west)	- Impact on water resources; and - Ongoing management requirements.	
	Foxleigh Homestead (~14.8 km to the north)		
Community Groups and Non-Government Organisations	Reef Catchments	- Impact on water resources; - Net positive impact on water quality post closure; - Environmental impact; and - Post-mining land uses.	Inform
Local Indigenous Groups and Cultural Heritage Groups	Barada Kabalbara Yetimarla people	- Connection to country; - Management of cultural heritage; and - Post mining land uses.	Inform and Consult
Employees	Mine employees and nominated contractors	- Current and future employment (e.g., implementing closure); - Remaining mine life; - Redundancy and benefits; - Workforce transition; - Housing; and - Future of community services.	Inform, Consult and Involve

6.2 Community Engagement and Initiatives

Anglo American have undertaken various community consultation and engagement activities with the local community, particularly concerning the Capcoal Complex (which includes LLM).

Anglo American's broader community engagement efforts in the region include:

- Supporting Local Services - Investing in local infrastructure and services, such as a \$2.6 million upgrade of shopping centre facilities and a \$25 million investment in upgrading 100 homes in recent years;
- Community Health and Well-being - Providing critical mental health and social support services through partnerships with local organisations; and
- Educational Initiatives - Contributing to regional skills development through projects with local schools.

Some of the community focused initiatives undertaken by Anglo American are:

- Community Grants Program - Anglo American's Community Grants Program supports local community groups and not-for-profit organisations in Middlemount and surrounding areas. The program invites funding applications for local projects and events, aiming to contribute to sustainable development initiatives that benefit the community. This program reflects Anglo American's commitment to supporting community-driven projects and fostering positive relationships with local stakeholders;
- Support for Local Services and Infrastructure - Complex (including LLM) has played a significant role in supporting community services and infrastructure in Middlemount. The company has invested in local projects, including the upgrade of shopping centre facilities and the provision of housing improvements. Additionally, Capcoal Complex has been involved in supporting local health services, education initiatives, and community events, demonstrating its commitment to enhancing the quality of life for residents; and
- Partnerships with Local Organisations - Anglo American has established partnerships with local organisations to address community needs. These partnerships have focused on areas such as mental health support, social services, and skills development. By collaborating with local groups, Anglo American aims to leverage collective resources and expertise to address community challenges effectively.

These initiatives aim to foster positive relationships with the local community and address socio-economic impacts associated with the mining operations. Through these initiatives, Anglo American demonstrates its commitment to engaging with the Middlemount community, addressing socio-economic impacts, and contributing to the region's sustainable development.

6.3 Consultation

Community consultation is an important aspect of mine closure planning. Community consultation has historically been and will continue to be undertaken over the life of mine at LLM.

Anglo American utilise CCRF as an important process for engaging with communities in line with the Anglo American's 'Group Social Way Policy' on a quarterly basis. CCRF is a collaborative space to ensure community views are taken into consideration regarding planning, business management and long-term community well-being.

Prior to the use of the 'Social Way Toolkit', a Socio-Economic Assessment Toolbox (SEAT) was also used to compile a report for Capcoal Complex (including LLM) over 2019 - 2021 (Anglo American, 2018b). The SEAT process involved engaging with local stakeholders to assess the social and economic impacts of Anglo American's operations and to identify areas for improvement. The objectives of the SEAT process and report were to:

- Build a meaningful dialogue with stakeholders to gather feedback;
- Improve Anglo American's understanding of the socio-economic impacts, both positive and negative;
- Identify the key social and economic issues that need to be managed in the local community;
- Develop a plan for managing the operation's social and economic impacts, including social investment and ensure capacity; and
- Scope goals and indicators to track impact moving forward.

Discussions and outcomes of the consultation undertaken as part of the SEAT process are provided (**Section 6.4**).

Additionally, a CCP (**Appendix E**) has been prepared by Anglo American that provides framework for undertaking community consultation in relation to LLM closure. This will be utilised as a tool in combination with CCRF.

6.3.1 Mine Closure Consultation

Anglo American's approach to mine closure involves consulting with community members about potential future uses of mining infrastructure, rehabilitated areas, residual voids or NUMAs, and community infrastructure. These consultations are integral to developing draft closure plans which will be reviewed and updated as the mine approaches closure.

Anglo American utilises its Mine Closure Toolbox (MCT), a framework launched in 2007 and adopted across its operations, to guide closure planning. The MCT emphasises the importance of community relationships and engagement, aiming to ensure that closure activities leave a positive environmental and socio-economic legacy for the communities involved.

Public consultation and notification in regard to final land use outcomes as part of mine closure related consultation process was undertaken as part of the EA

amendment for the addition of ML 700076 to the LLM. The ML and EA applications were publicly notified as part of the ML application process, and no submissions or objections were received.

Additionally, some consultation activities were undertaken as part of the development of the broader Capcoal Preliminary Mine Closure Plan (PMCP) in 2022 (ERM, 2022). Consultation occurred in 2021 including Traditional Owners representatives, adjoining neighbours and internal stakeholders to inform the rehabilitation objectives and PMLU.

The Traditional Owners expressed their preference for the land to be returned to a native vegetation community with a focus on retuning species with medicinal benefits. It was stated that it is unlikely that the land can be returned to a perfect pre-mining state, but that 50% of pre-mining condition would be a good outcome and that methods such as linking vegetation areas, wildlife corridors and restoration of riparian areas are strongly endorsed. The Traditional Owners also expressed a desire to manage pest species and return traditional burning to the area (ERM, 2022).

The attendees included adjoining grazing property. The key items raised in the meeting included:

- Erosion of applied topsoil and erosion caused by cattle tracks from water sources to tops of dumps;
- Inclusion of native species in the vegetation seed list;
- Use of eucalypt trees for shade and shelter without dominating pasture species;
- Avoiding the use of wattle species such as Brigalow which can impede cattle and overshadow pasture species;
- Maintenance and management of fuel loads and fire breaks due to the risk of fire from dry lightning;
- Management of pigs which cause disease and damage;
- Providing habitat for wildlife within a grazing operation is supported;
- Wildlife corridors should not impede movement of cattle or exclude cattle through fencing; and
- Paddocks should have water access, not exceed 1,000 acres and have a stocking rate of 1 beast per 10 acres.

Further consultation will continue throughout the remainder of the life of mine as closure planning progresses, ensuring that any emerging concerns or issues are identified and managed in a timely and appropriate manner.

6.4 Community Consultation Register

A register of all community consultation (**Table 22**) is presented.

Lake Lindsay Coal Mine

Table 22 Community Consultation Register (Source: SLR, 2025a)

Date	Community Groups	Consultation Type	Information Provided	Issues Raised	How Issues have Been Considered	Outcomes of Engagement	Commitments
August to October 2018	• Employees and contractors; • Young people and students; • Vulnerable groups; • Local businesses; • Traditional owners; • Neighbours; • Regional residents; • Emergency and health services; • Education and child services; • IRC; • State or Federal Government; and • Media.	• Socio-Economic Assessment Toolbox Report 2019-2021.	• Profile of Capcoal Complex; • Existing social performance management and investment; • Impact identification and assessment; • Social Management Plan; • Contacts Details; and • Complaints and Grievance Procedure.	• Local economy; • Community engagement and communication; • Childcare; • Education; and • Health and wellbeing.	• Section 6.4 of the Report outlines the issues, risk of inaction and the existing management plan and actions to manage the issues identified.	• The Report includes the outcomes of focus groups with stakeholders.	• Section 7.2 of the Report details the management response to stakeholders and Anglo American's social commitments.

7 Rehabilitation and Management Methodology

7.1 Final Landform Design

7.1.1 Objectives

The objectives for the final landform are to achieve the following:

- Safe to humans and wildlife;
- Non-polluting;
- Stable; and
- Sustain the EA approved PMLUs.

7.1.2 Landform Design Criteria

The conceptual final landform design was developed to comply with the conditions stipulated by Table G2 of the EA (Table 23).

Table 23 Table G2 of EA (Landform Design)

Table G2 (Landform Design)		
Disturbance Type	Area (ha)	Design Criteria
Externally draining spoil slopes	343.8	Slope < 1V:3H (33.3%) Rock mulch is applied at the following rates: a) For slopes > 1V:4H (> 25%), ≥ 0.5 m depth; and b) For slopes ≤ 1V:4H and ≥ 1V:6H (≤ 25% and ≥ 16.67%), ≥ 0.2 m depth. Gypsum is applied at the following rates: c) For spoil, to a minimum treatment depth of 400 mm (± 100 mm): • ≥ 25 tonne per hectare (t/ha); or • At a rate sufficient to reduce the ESP/ EC ratio below the stability threshold of 14%; and d) For topsoil, to a minimum treatment depth of 150 mm: • ≥ 3 t/ha; or • At a rate sufficient to reduce the ESP/ EC ratio below the stability threshold of 5%.
Top of Dumps	589.2	Slope < 1V:10H (10%)
Internally draining spoil Slopes	474.2	Slope < 1V:6H (16.7%) for slope length < 30m Covered with ≥ 0.2m of rock mulch
Voids and Ramps	305	Remain 'as is' if geotechnical stable or,

Table G2 (Landform Design)

		Reshape to obtain stability or to ensure landform integrity of surrounding landforms if failure occurs or, Fill with mine waste, cover with inert material and rehabilitate.
Roads	141	Slope < 1V:10H
Infrastructure	60	Slope < 1V:10H

Where available, competent Permian material will be used to supplement quarry rock as outer batter armouring and rock mulch.

7.1.3 Final Landform Outcome

A conceptual final landform design for LLM was developed by Minserve in 2023 (**Appendix D**) and updated by SLR in 2024 to include partial backfilling of Pit X4. The conceptual final landform design (**Figure 29 – Figure 31**) has comprised the following outcomes in compliance with Table G1, G2 and G3 of the EA:

- Reshaped and reprofiled overburden dumps, RoM pads and any other mine affected disturbance to achieve slope < 33.3% to support PMLU (bushland);
- Blasted and reshaped highwalls to support PMLU (bushland);
- Decommissioned, reshaped and reprofiled infrastructure areas, water storages (dams), laydowns, roads and access tracks to achieve slope < 10% to support PMLU (grazing); and
- Four residual voids (associated with Pits X1 to X4 (un-backfilled portion) with highwalls, low walls and end walls inundated by water, water contained within the voids to SWLs and ramps. These residual voids and ramps will be left 'as is' in the final landform proposed as NUMAs as pre-approved within the EA.

Flooding (**Appendix F**) and geotechnical (**Appendix M**) assessments on the final landform have been undertaken by SLR (2025b) and (2025e). These assessments are based on the final landform design prepared by Minserve (2023) and subsequently modified by SLR in 2024 to include the backfilling of Pit X4.

The flood assessment (**Section 7.3**) results confirm that the residual voids designated as NUMAs are not expected to be inundated during 0.1% AEP or PMF events.

Geotechnical stability analyses (**Section 7.9**) of selected critical sections demonstrate that the final landform slopes achieve a static FoS > 1.5 and a seismic FoS > 1.0.



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PROGRESSIVE REHABILITATION
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FIGURE 29 - FINAL LANDFORM
DESIGN

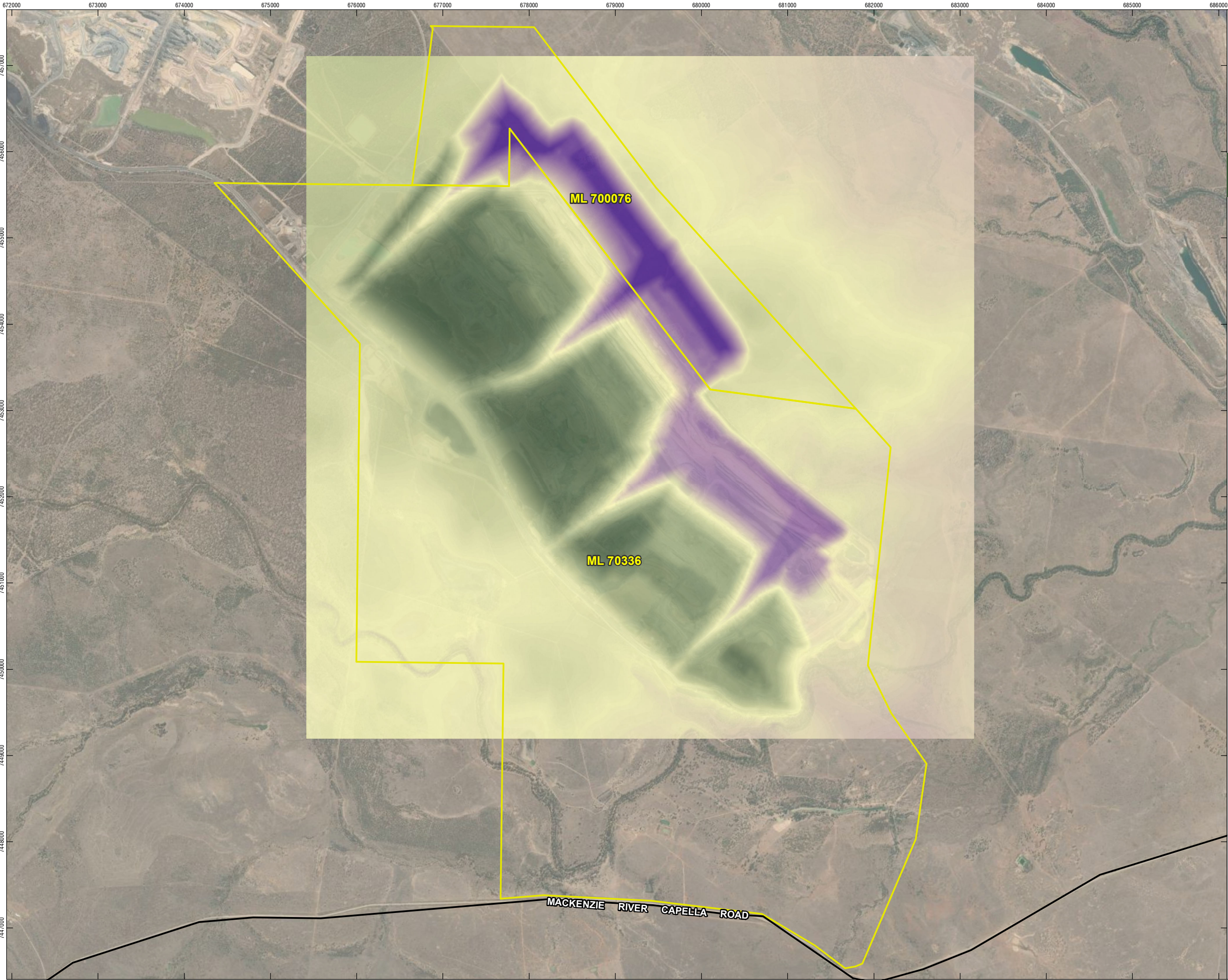
LEGEND

- Road
- Mining Lease



0 250 500
m

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:40,000 at A3
Project Number:	626.30126
Date:	15-Apr-2025
Drawn by:	AS



LAKE LINDSAY

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AND CLOSURE PLAN

FIGURE 30 - FINAL
LANDFORM DIGITAL
ELEVATION MODEL

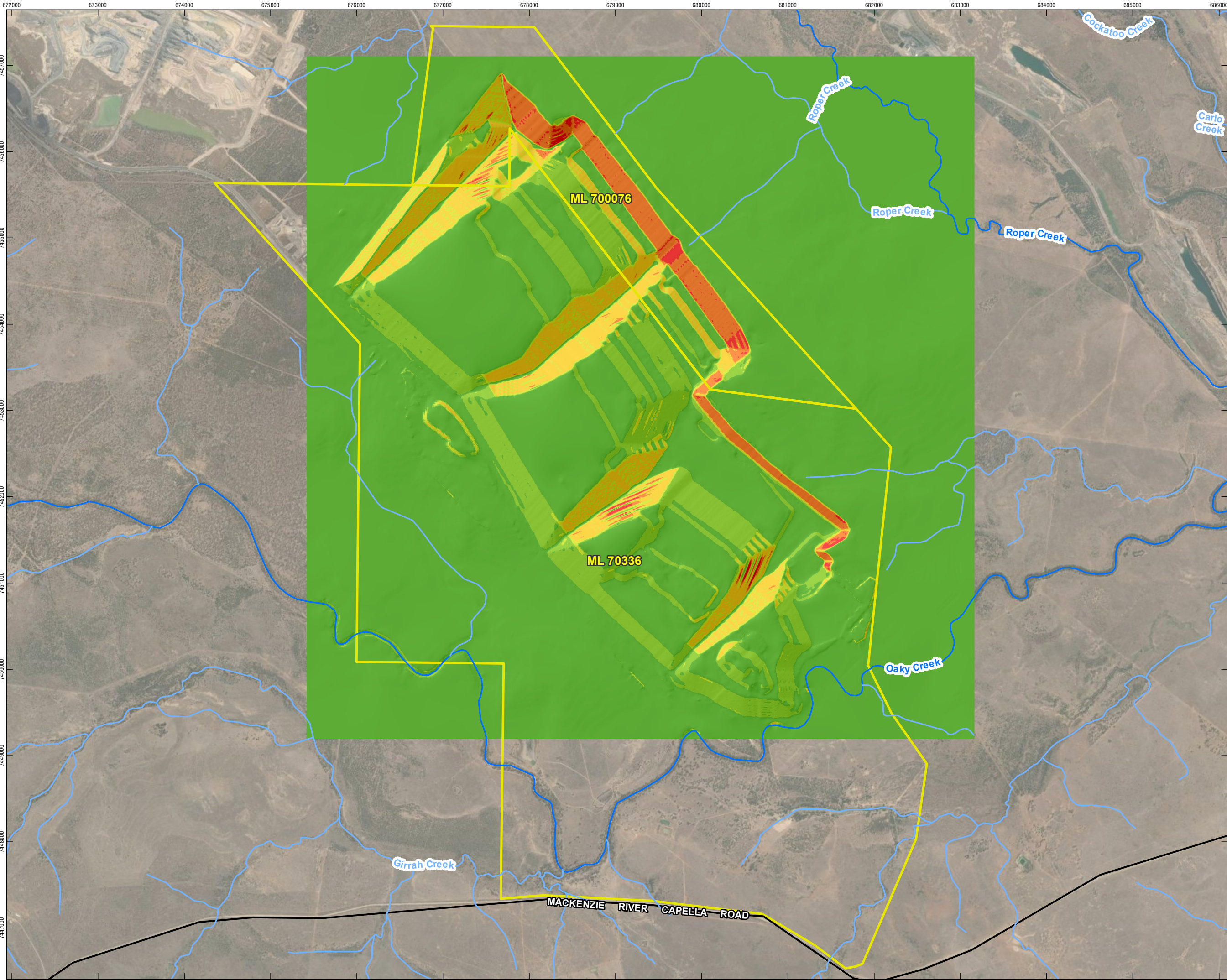
LEGEND

- Road
- Mining Lease
- Elevation (mAHD)**
 - 222
 - 25



0 250 500
m

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:40,000 at A3
Project Number:	626.30126
Date:	20-May-2025
Drawn by:	AS



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PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 31 - FINAL LANDFORM
SLOPE GRADIENTS

LEGEND

- Major Watercourse
- Minor Watercourse
- Road
- Mining Lease

Final Landform (Slope
% Rise)

- 0 - 15%
- 15 - 20%
- 20 - 25%
- 25 - 30%
- 30 - 33.3%
- 33.3% - Max



0 250 500
m

Coordinate System: GDA2020 MGA Zone 55

Scale: 1:40,000 at A3

Project Number: 626.30126

Date: 09-Apr-2025

Drawn by: AS

7.1.4 Final Landform Construction

Effective management and oversight of final landform construction are critical throughout all stages of rehabilitation at LLM to ensure that:

- Landform designs align with the approved rehabilitation objectives and criteria;
- Construction activities are executed in accordance with these designs; and
- Completed areas are formally handed over to Anglo American's environmental team to initiate ongoing monitoring and maintenance.

To ensure successful implementation, construction controls must be in place. Design personnel are responsible for clearly communicating design specifications to the implementation teams. Upon completion of construction, the implementation team must initiate a site inspection with the design team to verify that the constructed landform conforms to the approved design.

Preferred construction methodologies include:

- Highwalls - To be blasted, reshaped, and reprofiled to achieve gentler or flatter slopes in line with design specifications;
- Overburden dumps - To be reshaped and reprofiled in accordance with design criteria outlined in Table G2 of the EA;
- Infrastructure areas, water storages (dams), laydowns, roads and access tracks - To be decommissioned and infrastructure removed in accordance with EA requirements. Any contaminated land will be remediated prior to reshaping and reprofiling;
- Erosion control - All disturbance works will be conducted across the slope (i.e., along the contour) to reduce erosion risk. Where feasible, spoil surfaces will be sealed with a grader working across the slope before applying growth media;
- Final landform surface preparation - Surfaces will be trimmed to remove oversized rocks and smoothed as required;
- Growth media application - Growth media will be evenly spread at a depth of 150 mm over reshaped overburden dumps, highwalls and RoM pad in accordance with Table G1 of the EA. Reserved topsoil stockpiles will be returned to roads and infrastructure areas for surface preparation;
- Rock mulch application - To be applied to overburden dumps as required under Table G2 of the EA, using a mixture of soil and rock mulch;
- Amelioration - To be conducted on the prepared growth media surface in accordance with Section 7.6.4 of this report and the requirements of the EA;
- Ripping - The surface will be deep-ripped to a minimum depth of 300 mm, across the contour where it is safe to operate machinery, to improve infiltration, soil structure, and root penetration;
- Growth media treatment - To be worked using conventional agricultural equipment, including (but not limited to) wheel-based tractors, offset ploughs, aerial seeders, harrows, and press wheels, or suitable equivalents where feasible;

- Seeding - Seed mix appropriate to the PMLU will be applied; and
- Rehabilitation approval - All rehabilitation planning and design must receive formal sign-off prior to implementation.

7.1.5 Final Landform Drainage Considerations

Effective management of surface runoff in rehabilitated areas has been proven as essential to achieving long-term landform stability and successful revegetation outcomes.

The following considerations have been incorporated into the rehabilitation design process to manage final landform drainage and erosion as per the EA Table G2 (Table 22):

- Final slope grades of externally draining spoil slopes to 33.3%;
- Gypsum addition and incorporation to externally draining spoil slopes to reduce exchangeable sodium percentage if required;
- Final slope grades of < 16.7 % for slope lengths < 30 m on internally draining spoil slopes;
- Rock mulching at 0.2 m – 0.5 m depth for externally and internally draining overburden/spoil slopes;
- Slopes of < 10% for the top of dumps, roads and infrastructure areas; and
- Topsoiling to 150 mm.

Runoff and erosion control measures applied in rehabilitation areas include:

- Minimising the use of drainage structures by using rock mulch on spoil slopes and dispersing, rather than concentrating water;
- Minimising the volume of runoff entering recently rehabilitated surfaces;
- Establishing a rapid vegetative cover by appropriately timed growth media placement and seeding, ideally aligned with seasonal rainfall patterns;
- Cross-ripping prepared surface areas along the contour to a minimum depth of 300 mm where safe machinery operation allows;;
- Constructing benches or terraces to shorten slope lengths, thereby reducing runoff volume and velocity, while also facilitating vegetation establishment and maintenance access; and
- Ensuring all permanent drainage infrastructure is designed in accordance with engineering standards, with capacity to manage high-intensity storm events (e.g., cyclones), taking into account climate, substrate conditions, landform design, and long-term vegetation cover performance.

7.2 Cover Design

A cover system is not required for LLM as there are no tailings or rejects stored within the LLM area, and the overburden oxidation and seepage risk is considered 'low'.

7.3 Flooding

LLM's LODs have not stipulated the location of NUMA voids and as such, floodplain modelling was completed by SLR (2025b) (**Appendix F**) to assess NUMA void flooding risk in accordance with Sections 3.4 and 3.6.1 of the PRCP Guideline.

Flood plain modelling was undertaken to define the pre-mining flood inundation risk for the void locations caused by the 0.1% AEP flood event. Flood studies have previously been undertaken for the broader Capcoal Complex by Aurecon (2022) and Engeny Australia Pty Ltd (Engeny) (2018). Hydraulic models were developed for Roper Creek (Aurecon, 2022) and Oaky Creek (Engeny, 2018), respectively. These models were reviewed and updated to undertake the flood modelling assessment (SLR, 2025b).

The key tasks carried out by SLR (2025b) were:

- Review the existing hydraulic models developed for LLM;
- Consider the location of domains (including the NUMA voids) in relation to potential flood levels;
- Develop the pre-mining terrain for modelling the floodplain;
- Update the existing hydraulic models to determine the 0.1% AEP and PMF flood immunity with incorporation of final landform; and
- Develop a flooding risk profile.

Roper Creek Model Review

Hydrologic and hydraulic modelling were undertaken by Aurecon (2022) to assess Roper Creek flood conditions. The following models were developed as part of the Roper Creek flood study:

- Unified River Basin Simulator (URBS) runoff-routing hydrologic model (URBS v4.3.0) which was used to estimate flood hydrographs in Roper Creek and Cockatoo Creek. Flood estimation methods were based on Australian Rainfall and Runoff (ARR) (2019) industry standards; and
- Two-dimensional Unsteady FLOW (TUFLOW) 2-Dimensional (2D) hydraulic model (BMT WBM, version 2020-01-AB) which was used to estimate peak flood levels, extents, depths and velocities.

The outcomes of the Roper Creek hydraulic modelling undertaken by Aurecon (2022) showed that the LLM NUMA void area was immune to the from the 0.1% AEP and PMF Roper Creek flood ingress. Further flood modelling of Roper Creek was undertaken to assess the 0.1% AEP and PMF flood immunity of proposed LLM NUMA area with the final PRCP landform topography which includes the partial backfilling of the X4 Void (SLR, 2025b).

Oaky Creek Model Review

A flood assessment was undertaken by Engeny (2018) for all major waterways, including Oaky Creek, in the vicinity of the operational areas of the broader Capcoal Complex (including LLM). The following models were developed as part of the Engeny (2018):

- Runoff Routing Model – B (RORB) hydrologic model, which was developed and calibrated for 5 catchments including Oaky Creek to generate flood hydrographs;
- TUFLOW hydraulic model which was developed and calibrated for the extent of major creeks to estimate peak flood levels and depths in the creeks; and
- A Rational assessment for pre-developed catchment conditions was completed to assess for changes due to mining.

Further flood modelling of Oaky Creek was undertaken to assess the 0.1% AEP and PMF flood immunity of the LLM NUMA void area with the partial backfilling of the X4 Void (SLR, 2025b).

Roper Creek Model Updates

The considerations and updates for the Roper Creek Model are as follows:

- The Shuttle Radar Topography Mission (SRTM) data was originally used by Aurecon (2021) as the base topography in LLM Extension Project. The hydraulic modelling topography was updated in the PRCP assessment using 5 m Light Detection and Ranging (LiDAR) data (2010 – 2017) as the base topography outside of LLM, given the better resolution and vertical accuracy of LiDAR data. The 1 m LiDAR data (2020) was used and final landform Digital Elevation Model (DEM) data was adopted as the overlaid topography;
- The TUFLOW model domain, downstream boundary conditions and inflow hydrographs used in SLR (2025b) assessment were not modified from those adopted in the flood study in LLM extension project of Aurecon (2021). A Manning's coefficient 'n' of 0.015 was adopted for the residual void in the assessment. The Manning's n values for the rest of the model domain were maintained as per the values adopted in the studies associated with the LLM Extension Project; and
- Simulations were run using the Roper Creek hydraulic model for 0.1% AEP and PMF flood events for the critical storm duration of 18 hours. The critical duration adopted was based on the critical storm duration assessment undertaken as part of the LLM extension project study.

Oaky Creek Model Updates

The considerations and updates for the Oaky Creek Model are as follows:

- The model topography was updated to use the PRCP final landform DEM. The 2 m (1998 – 2006) LiDAR DEM was adopted outside the final landform coverage area and the 5 m (2010 – 2017) LiDAR data was used as the base topography outside the 2 m LiDAR coverage;
- The TUFLOW model domain of Engeny (2018) was extended to enable modelling the potential floodwater inundation in the area with low elevations, which is located on the western side of the rehabilitated overburden dumps. Therefore, the model covered Oaky Creek, up to approximately 7 km downstream of the German Creek confluence;
- Flow hydrographs extracted from the Oaky Creek RORB model were used as inflows to the TUFLOW model. Due to the model domain extension in this

assessment, the total flow hydrograph for the catchment area of Oaky Creek reporting to LLM was divided between 2 locations based on the proportion of contributing catchments out of the whole Oaky Creek catchment. 85% of the total flow hydrograph was applied to the Oaky Creek inflow location and 15% of the total flow was applied to the Girrah Creek inflow location;

- The hydraulic model was run for the 2%, 0.1% AEP and PMF flood events for the critical storm duration of 18 hours. The critical duration adopted was based on the critical storm duration assessment undertaken in Engeny (2018);
- The hydraulic roughness for the model was determined based on available ArcMap World Imagery. The Manning's n values were adopted generally based on the values used in Engeny (2018), modified where appropriate to represent the land use distribution of the fully rehabilitated site conditions;
- The downstream model boundary was applied as a stage-discharge relationship with the 1% water surface gradient as used in Engeny (2018) in the vicinity of the boundary. A sensitivity analysis was undertaken on the downstream model boundary conditions. A stage-discharge relationship was calculated based on a water surface level gradient of 0.5%. The results of the sensitivity analysis showed that peak flood levels, depths and velocities were consistent with the base model scenario in the areas of interest. The downstream model boundary conditions were therefore deemed appropriate; and
- It was found that for the majority of the model domain, there is only +/-100 mm difference between the surface water levels estimated in this assessment and Engeny (2018), so the PRCP flood assessment results are consistent with the previous flood modelling results.

7.3.1 Model Outcomes

The results of the Roper Creek and Oaky Creek hydraulic models showed the proposed final landform and residual void is not subject to inundation from either Roper Creek or Oaky Creek floodwaters in the modelled flood events for the 2%, 0.1% AEP and PMF event.

The hydraulic model results provided high level indication that the stability of the final landform will not be adversely impacted by flooding in Roper Creek or Oaky Creek.

7.3.2 Flood Ingress to Voids

Roper Creek

The Probable Maximum Precipitation (PMP) flood inundation extent was produced by the TUFLOW model for Roper Creek (**Figure 32**). The TUFLOW model results showed that residual void is free from inundation from Roper Creek in the 0.1% AEP and PMP flood events. On the eastern side of the residual void, peak flood levels simulated in the 0.1% AEP event were between 127 m AHD to 132 m AHD, which were at least 0.5 m below the elevations of the final landform between the void and the Roper Creek.

Oaky Creek

The PMP flood inundation extent was produced by the TUFLOW model for Oaky Creek (**Figure 33**). The TUFLOW model results showed that the residual void is outside the Oaky Creek flood extent due to the relatively high elevations of the final landform adjacent to the flood extent.

The TUFLOW model results showed the residual void was free from inundation in the PMF event, therefore any potential increases in peak flood levels in the 0.1% AEP event due to increases in rainfall intensity from climate change will not result in inundation of the residual void.

7.3.3 Scour and Erosion Potential

Roper Creek

According to the TUFLOW model results, there is no risk of scour or erosion at LLM from Roper Creek flooding, as it is situated more than 3 km away from the flood zone.

Oaky Creek

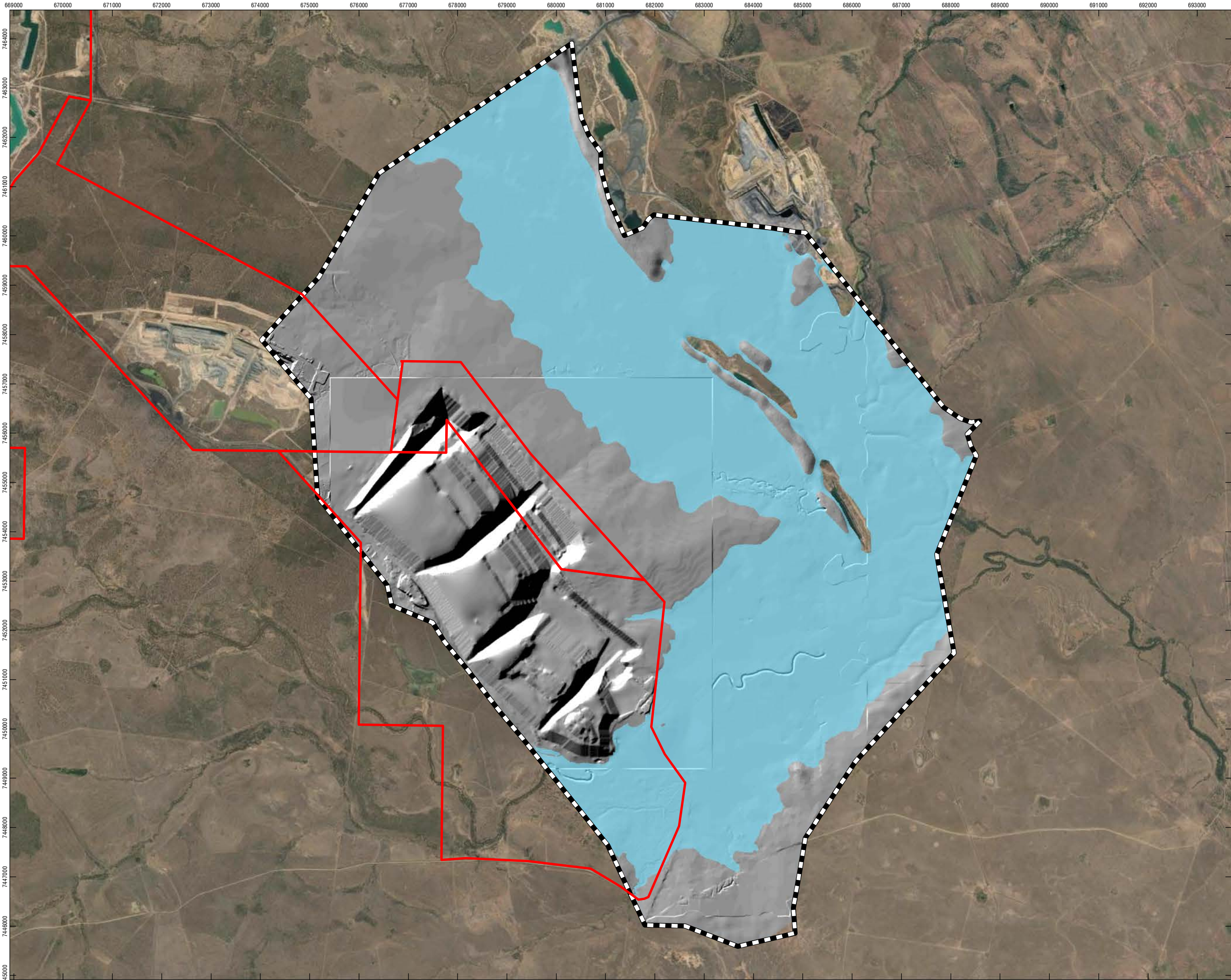
The Australian Coal Association Research Program (ACARP) (2002) guidelines provided indicative parameter thresholds for scour potential in sediment transport limited diversions in the Bowen Basin (**Table 24**).

Depth-averaged bed shear stress (BSS), stream power (SP) and velocities were extracted from the hydraulic model results for the 2% AEP event. It was noted that the hydraulic model results for velocity, BS and SP are calculated using a depth-averaged approach and were therefore used likely provided a conservative estimate of erosion/scour potential.

Table 24 ACARP Design Criteria for Bowen River Basin – Sediment Transport Limited Diversions (Source: SLR, 2025b)

Scenario/ Parameter		ACARP Criteria	Modelled Result
2% AEP event	Stream Power (W/m ²)	<150	<100
	Velocity (m/s)	<2.5	<1.5
	Bed Sheer Stress (N/m ²)	<80	<50

Based on the model results for 2% AEP event, the peak velocities were generally below the ACARP recommended value (below 1.5 m/s). The predicted BSS and SP were to generally below 50 Newton per square meter (N/m²) and 100 watts per square meter (W/m²) within the waterway. The BSS and SP exceeded the ACARP criteria (80 N/m² and 150 W/m² respectively) near the Oaky Creek bed centre. However, any potential scour is contained within the creek and will not impact the stability of the final landform.

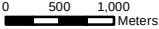


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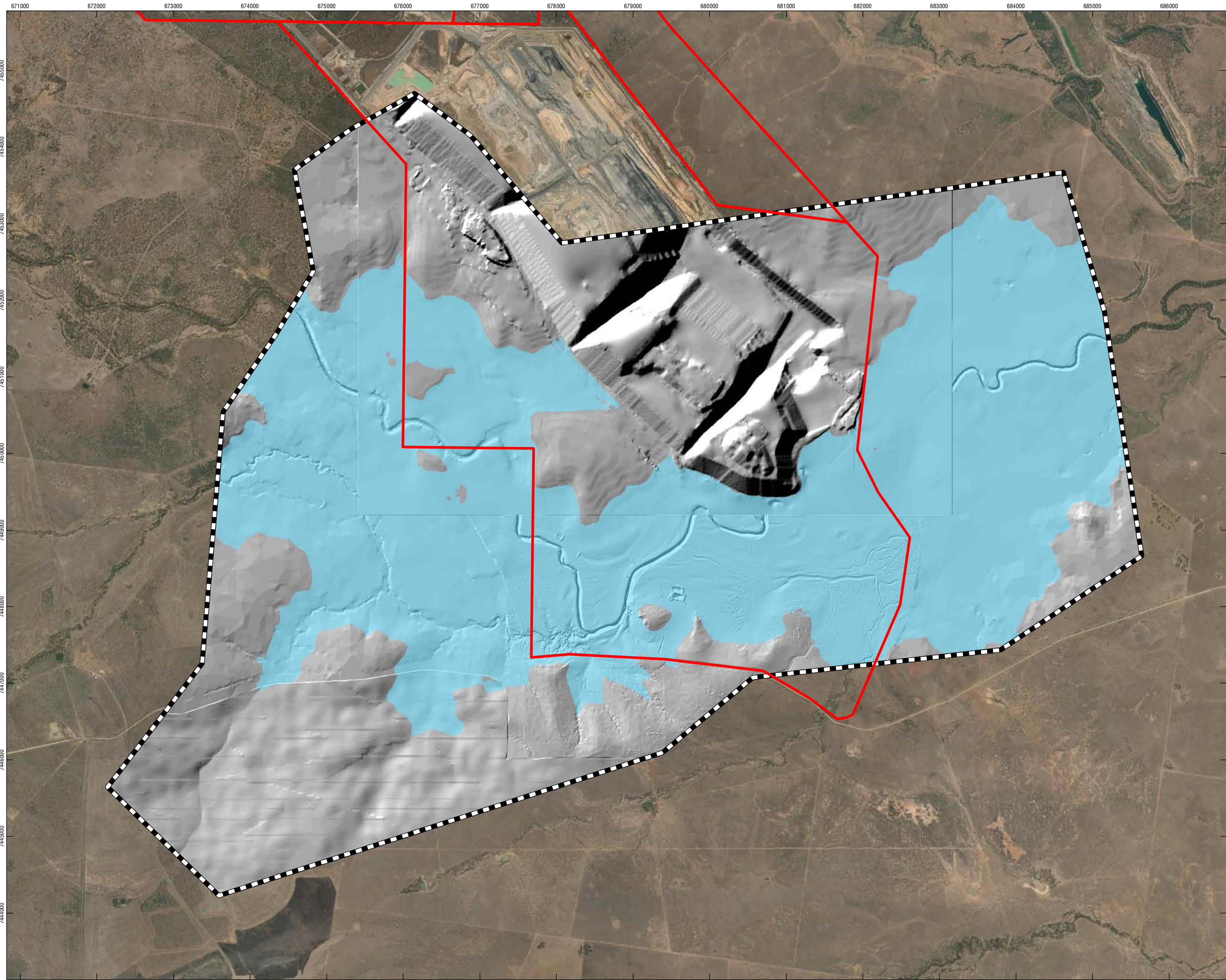
PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 32 - PMF FLOOD
INUNDATION EXTENT
FOR ROPER CREEK

- Legend
-  Mining Lease
Boundaries
 -  TUFLOW Model
Extent
 -  Inundation Extent



Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:70,000 at A3
Project Number:	626.30126
Date:	13/09/2024
Drawn by:	MS



LAKE LINDSAY

PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 33 - PMF FLOOD
INUNDATION EXTENT FOR
OAKY CREEK

- Legend
-  Mining Lease
Boundaries
 -  TUFLOW Model
Extent
 -  Inundation Extent



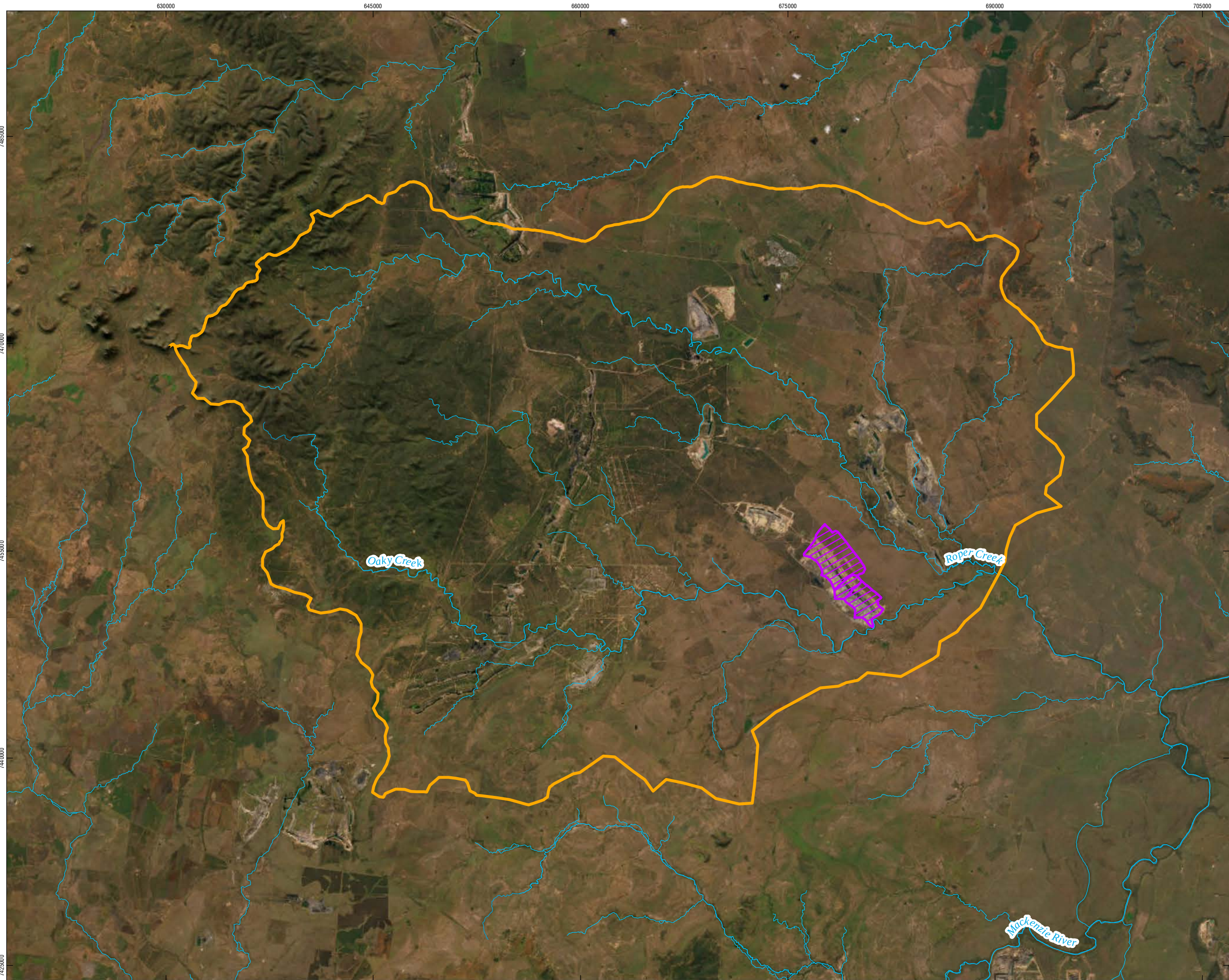
0 500 1,000
Meters

Coordinate System:	GDA 1994 MGA Zone 55
Scale:	1:45,000 at A3
Project Number:	626.30126
Date:	23/10/2023
Drawn by:	MS

7.3.4 Catchment Assessment

The alteration of flows was considered in accordance with Section 3.6.1 of the PRCP Guideline. Introduction of voids in the final landform has the potential to cause changes in catchment areas and flow regimes in comparison to pre-mining conditions. Therefore, the catchment area contributing to the junction of Oaky Creek and Roper Creek was calculated and modelled for both the pre- and post-mining conditions.

The total pre-mining catchment area upstream of the junction of the Oaky Creek and Roper Creek is 2,069 square kilometres (km²) (**Figure 34**). The catchment contributing to the residual void, which acted as a hydrologic sink, was approximately 16.5 km². Based on the above, the catchment area was reduced by 0.8% due to the final landform. Therefore, it was considered that the proposed final landform will not result in a significant change in the hydrologic regime of the Oaky Creek and Roper Creek upstream of the junction of the creeks.



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PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 34 - OAKY CREEK
CATCHMENT AND RESIDUAL
VOID CATCHMENT

- Legend
- Oaky Creek Catchment
 - Final Void Catchments Watercourse



0 2.5 5 Kilometers

Coordinate System:	GDA 1994 MGA Zone 55
Scale:	1:250,000 at A3
Project Number:	626.30126
Date:	13-Nov-2023
Drawn by:	MS

7.3.5 Void in Floodplain Assessment

As the EA does not stipulate the location of NUMA voids, pre-mining floodplain modelling was carried out in accordance with Section 3.4 of the PRCP Guideline. Modelling was undertaken to define the baseline flood inundation risk for the NUMA voids caused by the 0.1% AEP flood event, based on pre-mining topography.

Floodplain modelling was undertaken by SLR (2025b) only for relevant watercourses as defined in the Voids in Floodplain Information Sheet (i.e. watercourses with a stream order of 4 or higher under the Strahler stream order classification system). The watercourses in the vicinity of LLM which meet this classification include:

- Oaky Creek; and
- Roper Creek.

The TUFLOW model results for Roper Creek (**Figure 32**) show that the 0.1% and PMF flood extent does not encroach into the LLM ML boundaries. Therefore, the proposed Pit X4 residual void is located outside the Roper Creek floodplain extent and modelling of Roper Creek for the pre-mining conditions was not required.

Results for Oaky Creek (**Figure 33**) indicates that the proposed residual void extents of Pit X3 and Pit X4 encroached on a very small flow path of the overall flood extent for 0.1% AEP events. However, the rehabilitated overburden dump that forms the stable final landform, prevented the flow path from entering the residual void. The impact of this was considered negligible on the stability of the final landform.

Mine closure flood assessments using the Roper Creek and Oaky Creek hydraulic models showed that the residual voids within the final landform of this PRCP were not subject to inundation from Roper Creek and Oaky Creek floodwaters in the 0.1% AEP or the PMF event.

The hydraulic model result indicated that the stability of the final landform will not be adversely impacted by flooding in Roper Creek or Oaky Creek systems.

7.4 Hydrogeology

Groundwater at LLM has been modelled and addressed in multiple reports. The LLM extension project (Aurecon, 2022; **Appendix G**) provides a detailed description of the groundwater at LLM and includes a technical appendix on groundwater modelling by Hydrogeologist (2021). A groundwater conceptual model was developed by (AGE, 2021b; **Appendix C**). An update to the groundwater modelling was completed by Hydrogeologist (2023) (**Appendix H**) to address the requirements of PRCP Guideline.

7.4.1 Conceptualising the Groundwater System

In the conceptual groundwater setting, residual void lakes have been shown to behave as either:

- A 'groundwater source' - This occurs if the void lake elevation stabilises above the surrounding groundwater levels. Under these conditions, void lake water may be able to move into the surrounding groundwater regime and away from the void lake;
- A 'groundwater sink' - This occurs if the void lake elevation stabilises below the surrounding groundwater levels. Under these conditions, groundwater and any associated solutes will flow towards the void lake;
- A 'flow through system' - Under these conditions, the upgradient end of the void lake may be below the groundwater table while the downgradient end of the void lake may be above the groundwater table. Conceptually, groundwater would seep into the upgradient end of the void lake and void lake water will seep out of the downgradient end of the residual void; or
- Groundwater systems experience ephemeral recharge and have negligible influence on flooding outcomes.

7.4.2 Numerical Groundwater Model

To assess the post closure behaviour of groundwater conditions, the existing 3-Dimensional (3D) numerical groundwater flow model of LLM was updated for the PRCP groundwater assessment by Hydrogeologist (2023) (**Appendix H**).

The numerical groundwater model uses Modular fine-difference Flow Model – Unstructured Grid (MODFLOW-USG) to represent the conceptual hydrogeological model and hydrogeological regime. The Australian Groundwater Modelling Guidelines (Barnett et al., 2012) were considered throughout the modelling process.

The numerical model included 5 layers representing the key geological units and extends approximately 20 km west to east and 25 km north to south. The model domain included the historical and current mining of the Pisces and Middlemount coal seams at the existing and approved LLM.

The physical structure of the groundwater model was based on the detailed geological model developed by Aurecon/ Anglo American. Model development was supplemented by published geological maps, bore logs and data from the Queensland groundwater database.

The groundwater flow model was calibrated to groundwater levels from the Anglo geotechnical and environmental monitoring network (Hydrogeologist, 2021). The calibration achieved a scaled root mean squared (SRMS) error within acceptable limits (i.e., 10%) as recommended by Barnett et al. (2012). Furthermore, the calibrated groundwater levels, vertical gradients, flow patterns and mine inflows were comparable to measured data and groundwater trends. The model calibration was therefore considered robust. The model calibration has not been updated for the purposes of the PRCP.

A post-closure scenario was then modelled to predict the behaviour of groundwater levels in response to the development of void lakes. The void lake elevations (as predicted by SLR, 2025d) were simulated using general head boundaries, with the post-closure predictions occurring over a nominal 1000-year modelling timeframe.

The numerical modelling approach considered the Office of the Queensland Mine Rehabilitation Commissioner's recent technical guidance paper 'Approaches for leading practice modelling of residual mine voids for rehabilitation planning', which outlined leading practice methodology for modelling of residual voids.

Model Calibration

Model calibration included adjusting model parameters (hydraulic properties and boundary conditions such as recharge rates or cross-boundary flow rates) so that the model replicated the behaviour of the physical groundwater system. The quality of this replication was assessed by comparing model outputs (modelled heads and flows) with calibration targets - observed behaviour of the actual groundwater flow system (observed heads and flows). The transient calibration covered the period from the start of 2004 to the end of 2021. This covered the period of historical development at LLM.

Groundwater measurements at LLM were used as calibration targets including a total of 41 sites including 6 monitoring bores and 8 VWP gauges. A full list of the calibration targets has been shown in Aurecon (2022) and Hydrogeologist (2021).

An overall transient calibration (across all observations and time steps) achieved an unweighted root mean square (RMS) error of 11.3 m and an unweighted SRMS error (SRMS) of 18.1%. A weighted RMS of 4.5 m and an unweighted SRMS error of 7.1% was also achieved. The weighted SRMS value of 7.1% indicated a good fit between measured and modelled data and is within the acceptable limits (i.e., 10%) as recommended by Barnett et al. (2012). The weighted calibration statistics were considered appropriate to use in this instance as the weightings allow for the number of observations per site, and for the weighting of data points not considered representative.

The calibration was highly influenced by the historical mine development at LLM. In general, the calibration hydrographs showed a reasonable match between the observed data and the modelled response. Further detail on the model calibration results and calibration hydrographs have been provided (Appendix A1 of Hydrogeologist (2023) (**Appendix H**)).

The calibrated numerical model produced a good correlation between measured and modelled hydrographs and contour maps. The model calibration was therefore considered valid.

Groundwater – Surface Interactions

Locally, LLM lies within the Roper Creek catchment, a tributary of Oaky Creek. Roper Creek flows in a south-east direction between LLM and Foxleigh mine. Oaky Creek flows along the southern boundary of the existing LLM mining area. Oaky Creek and Roper Creek have been considered ephemeral systems with highly seasonal flows and high degree of flow variability.

The ephemeral nature of flows in Oaky Creek and Roper Creek indicated that groundwater does not contribute to baseline flows within these waterways.

An assessment of groundwater monitoring data for the Oaky Creek (RDL3307) found groundwater levels ranged between ~12 m and ~13 m bgl within the Oaky Creek alluvium where the alluvium was 18 to 20 m deep. As such, it was observed that the Quaternary Alluvium along Oaky Creek was partially saturated.

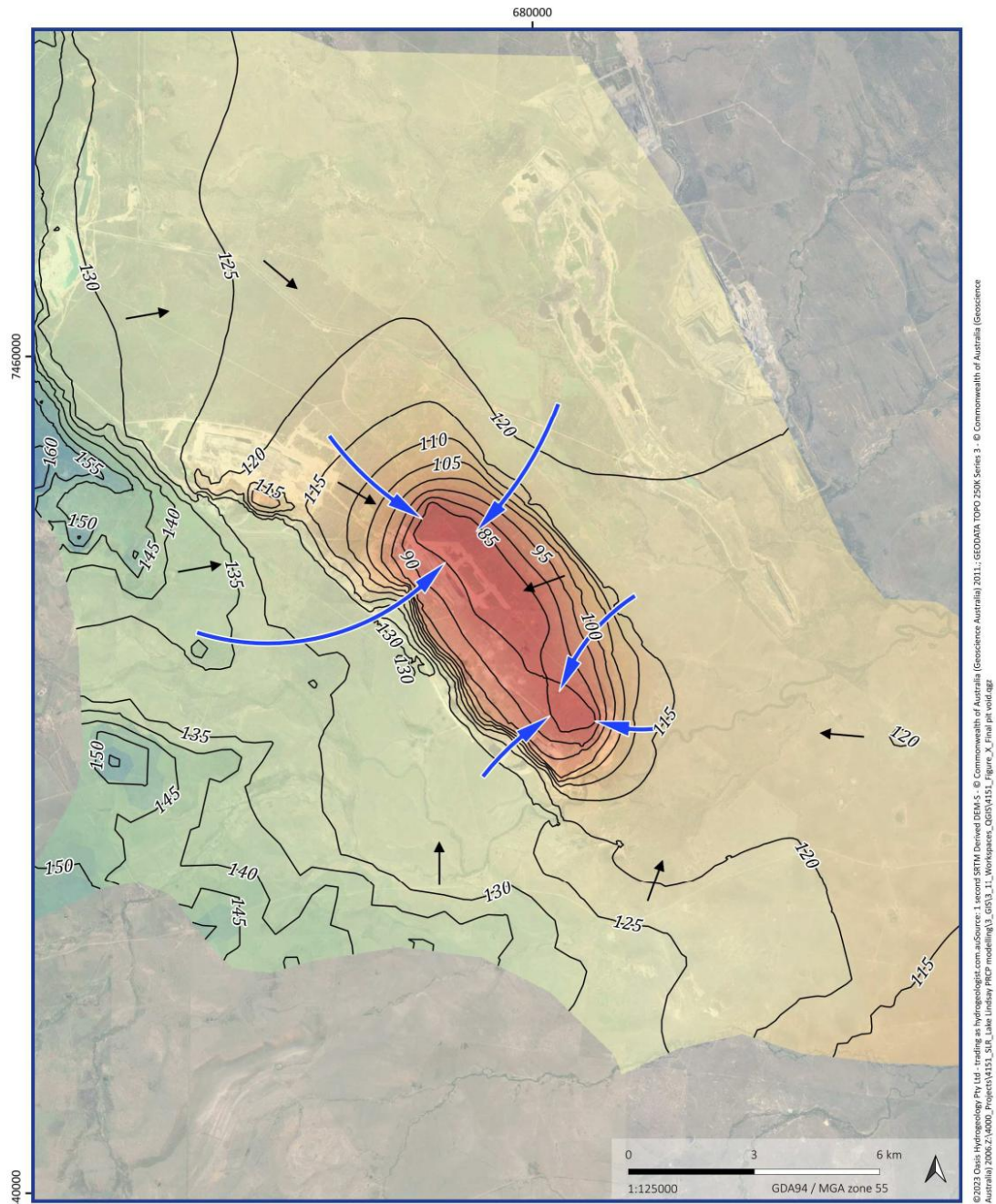
Accordingly, a review of the environmental setting and monitoring data indicated there is limited contribution of groundwater to surface water flows in Oaky Creek and Roper Creek. Both the Oaky Creek and Roper Creek alluvium likely receive recharge through both direct rainfall and transmission inflows from ephemeral flow events. Occasional contributions of alluvial groundwater to baseflow may occur where prolonged high rainfall events occur.

Model Results

The predicted post closure groundwater elevations across LLM (**Figure 35**) show that:

- LLM voids will function as a groundwater sink; and
- Groundwater flow through systems is not predicted to occur. The predicted void lake elevations would need to increase above 110 m AHD for flow through conditions to occur.

Lake Lindsay Coal Mine



Legend

Post-closure groundwater elevation and flow - Lake Lindsay Mine

(4151) SLR Lake Lindsay PRCP modelling

Figure 6

26/10/2023

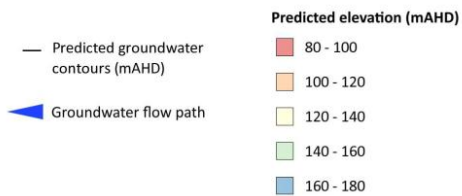


Figure 35 Post Closure Groundwater Elevation and Flow (Source: Hydrogeologist 2023)

7.5 Waste Characterisation

A field investigation was undertaken by Parsons Brinckerhoff (2005) (**Appendix B**) which involved the excavation and sampling of 27 test pits and sampling of rock cores from two previously drilled test bores at LLM. Exploration and geotechnical drilling generally encountered the following lithological sequence:

- Tertiary–Quaternary sediments of clay and sand, extending from near surface to depths between approximately 9 m -39 m. These deposits included unconsolidated, reworked laterites and residual basal lateritic clays;
- Permian strata comprising mudstone, siltstone, and sandstone present as distinct layers or interbedded sequences beneath the Tertiary sediments, extending to depths between approximately 41 m and 80 m; and
- Interburden (material between coal seams), comprising similar lithologies to the overburden with the addition of claystone and carbonaceous mudstone.

Laboratory analyses indicated that all overburden samples had a negative net acid-producing potential (NAPP), demonstrating that the acid neutralising capacity exceeded the potential for acid generation. However, carbonaceous mudstone and coal-adjacent strata were observed to contain pyritic material that could generate acid if concentrated at the surface of the spoil. It was therefore recommended that roof and floor materials containing visible pyrite, as well as coal-adjacent strata, not be placed at or near the surface of spoil stockpiles. This risk has been managed at LLM by emplacing any carbonatous material deep within the overburden stockpiles or transporting them with RoM coal to the German Creek Coal Preparation and Handling Plant for processing.

The Tertiary–Quaternary overburden exhibited a pH range from slightly acidic) to highly alkaline (pH 5 - >9), with electrical conductivities varying from approximately 200 $\mu\text{S}/\text{cm}$ to 2,400 $\mu\text{S}/\text{cm}$. These materials were dispersive or displayed a high potential for dispersivity.

Weathered Permian sandstones, siltstones, and mudstones were moderately saline, moderately dispersive and highly sodic. Exposure of these materials on spoil surfaces would lead to further breakdown, resulting in a saline, sodic, and dispersive substrate with high erosion potential and limited capacity to support vegetation. Consequently, these weathered materials are unsuitable for use as stockpile capping or cladding.

Fresh, strong quartz and quartz-lithic sandstone units (e.g. C791 sandstone) were identified as a potential source of durable cladding. Quartz-lithic sandstones with low porosity and minimal feldspathic content are preferred for this purpose as these were resistant to weathering. Geological and geotechnical interpretations indicated that approximately $8.4 \times 10^6 \text{ m}^3$ of C791 sandstone is present in the central portion of the LLM tenement, with the material below 30 m depth considered suitable for spoil capping.

Tertiary alluvial soils present to approximately 10 m depth, including sands, silty and clayey sands, sandy clays, and silty clays, were also assessed. Observations suggested that sandy and silty clays were potentially appropriate for dam and

levee embankment construction, although physical, mineralogical, and geochemical properties must be verified on a case-by-case basis. Tertiary clayey sands and sandy clays have been utilised as general bulk fill for roads.

Fresh, strong quartz and quartz-lithic sandstone has been deemed suitable for pavement sub-base materials.

7.5.1 LLM Extension Waste Characterisation 2022

A waste rock assessment was completed by Aurecon (2022) (**Appendix G**) for the LLM extension project. The key objectives of this assessment were to:

- Evaluate the geochemical characteristics of waste rock anticipated to be produced from the proposed extension area and identify any associated environmental risks; and
- Determine whether the waste rock material from the extension area is geochemically comparable to material from the existing mine, thereby confirming whether the current mine waste management practices could be applied to the extension area to maintain compliance with EA conditions.

Samples were collected from two boreholes (**Table 25**) drilled adjacent to the then proposed extension area (LLM Extension Project) between December 2020 and January 2021. Selected geochemical parameters were subsequently analysed under laboratory conditions. The results indicated that the waste rock material from the extension area is unlikely to produce acid.

Comparisons with data from the existing mine area show that both the existing mine and the then proposed extension are exhibited geochemical variability across lithological units, reflecting the heterogeneity of the materials sampled. The extent of geochemical variability was similar between the two areas, and the data ranges for the existing mine and the proposed extension generally overlapped. This indicates that the geochemical character of the then proposed extension was consistent with that of the then existing mine area.

Table 25 Details of Waste Characterisation Boreholes (Source: Aurecon, 2022)

ID	VWP2	MB4
Alternative names	RDL3809	LDL3810
Dates drilled	8 - 9 December 2020	13 – 15 December 2020
Depth	Total depth: 92 m Chipped 0 – 48 m, cored 48 – 92 m	Total depth: 171 m Chipped 0 – 70 m, cored 70 – 171 m
Sample collection date	8 - 9 December 2020	25 January 2021
Distance from mine extension footprint boundary	Approximately 50 m	Approximately 200 m
Coordinates	679,016.83 7,455,719.68	680,417.1 7,454,017.22

Static Testing

Static geochemical testing, including acid–base accounting and multi-element analysis, has been deemed critical for assessing the potential environmental impacts of waste materials. These tests allowed determination of a material’s acid-generation potential, acid-neutralising capacity (ANC), and heavy metal content, which together enable robust predictions and management of acid rock drainage (ARD) risks.

Key findings for the LLM area, based on Aurecon (2022), have been summarised:

- The potential overburden dumps at LLM were alkaline, with pH (1:5 water extracts) ranging from 7.4 to 10.2 across 20 samples, with an average pH of 8.69;
- The potential overburden materials were generally non-saline, with electrical conductivity (1:5 water extracts at 25°C) between 300 and 1,400 µS/cm, and a median EC of 620 µS/cm;
- Total sulfur concentrations were very low, with 75% of the potential spoil samples containing <0.1% total sulfur and 95% containing < 0.2%. These low sulfur levels indicate that the spoil is essentially barren with respect to sulfur;
- Maximum potential acidity (MPA) was similarly very low across most samples, with a median MPA of < 1 kg H₂SO₄/t and a maximum of 27 kg H₂SO₄/t. Only two samples yielded MPA values exceeding 5 kg H₂SO₄/t;
- ANC values, by contrast, were considerably higher, ranging from 7.4 to 110 kg H₂SO₄/t, with a median ANC of 54 kg H₂SO₄/t; and
- Given the low MPA and high ANC across all tested samples, calculated NAPP values were negative for all 20 samples, with NAPP values ranging from -7 to -110 kg H₂SO₄/t. This indicated a substantial excess of ANC relative to MPA and supported the geochemical classification of all samples as non-acid-forming (NAF).

Multi-element testing provided the average concentration and measured range for selected metals (

Table 26). There are no guidelines or regulatory criteria in Australia specifically related to total metal and metalloid concentrations in mineral waste materials. To provide context, the total concentrations for each element were compared to the average background concentration (mean crustal concentration).

Except for one sample for arsenic, all results showed less than a threefold enrichment and therefore received a “null geochemical abundance index (GAI)” score. The noted arsenic sample exhibited a threefold enrichment ratio corresponding to a GAI of 1. While this indicates slight enrichment, it is not sufficient to warrant further investigation.

Table 26 Multi-Element Results Summary (Source: Aurecon, 2022)

Analyte	Results (mg/Kg)	Mean crustal concentration (mg/Kg)	Enrichment factor	Maximum GIA Score
Arsenic	Average: 7.05 Range: 1.9 - 15	5	Average: 1.15 Range: 0.4 - 3	1
Cadmium	Average: 0.63 Range: 0.3 - 1	0.5	Average: 1.3 Range: 0.6 - 2	-
Chromium	Average: 15.44 Range: 5.6 - 38	200	Average: 0.1 Range: 0 - 0.2	-
Copper	Average: 40.6 Range: 16 - 52	20	Average: 2.25 Range: 0.8 - 2.6	-
Iron	Average: 37330 Range: 8300 - 60000	N/A	N/A	-
Nickel	Average: 26 Range: 11 - 39	40	Average: 0.7 Range: 0.3 - 1	-
Lead	Average: 16.71 Range: 9.1 - 24	10	Average: 1.85 Range: 0.9 - 2.4	-
Zinc	Average: 79.6 Range: 70 - 92	50	Average: 1.5 Range: 1.4 - 1.8	-
Mercury	Average: 0.054 Range: 0.02 - 0.1	0.03	Average: 1.5 Range: 0.7 - 3.3	-

The conclusion of the static testing is as follows:

- Based on the sample results, waste rock generated from the LLM extension project area was expected to be relatively benign, producing moderately alkaline runoff upon exposure at surface. These findings were consistent with existing data from LLM and associated sediment runoff monitoring;

- The majority of tested samples from both the existing mine and the proposed extension had low sulfur concentrations (< 0.1%) and were therefore be classified as barren with respect to sulfur. This outcome was also consistent with historical LLM data;
- Given the high ANC measured in these materials, the potential for acid generation was considered negligible. This conclusion aligned with existing geochemical data for the LLM operation;
- Samples sourced from the existing Pit X2 area displayed elevated sodicity. Given the lithological similarities, comparable sodicity levels were likely be present in materials from the extension project area;
- Concentrations of metals in the tested samples were generally not elevated relative to typical soil and rock background levels;
- Overall, geochemical characterisation indicates that the waste rock from the LLM extension project area is comparable to that at the existing LLM; and
- Given that current waste management practices at the LLM successfully manage the geochemical characteristics of the existing waste rock, it is expected that these measures will remain adequate for the management of waste material from the proposed extension area and will continue to support compliance with EA conditions.

Kinetic Testing

The results of the static waste characterisation testing at LLM indicated that the material was generally non-acid-forming, with high ANC, low sulfur content, and low levels of metal enrichment. In addition, kinetic testing seepage monitoring undertaken by monitoring water quality from the LLM voids, has shown the void water has been neutral to alkaline which supported the validity of the very clear static testing results. As such it was determined that acid mine drainage was not considered a risk at LLM during operations or closure.

7.6 Materials Assessment

SLR (2025c) (**Appendix I**) conducted a soil and capping material assessment for. A summary of the findings and proposed management measures has been presented.

Section 3.6.1 of the PRCP guideline outlines the key requirements for a soil and capping material assessment. Prior to the commencement of mining operations, a soil assessment must be conducted that addresses the following elements:

- The quantity and quality of available soil and cover materials (e.g. topsoil, clay, competent rock) required to achieve the target rehabilitation objectives;
- The spatial distribution and accessibility of cover material, including haul distances and any approvals that may be required for off-tenure material;
- An evaluation of the need for soil ameliorants and fertilisers to support rehabilitation outcomes;

- The ecological relationship between soil properties and target vegetation ecosystems, as well as the desired PMLU and rehabilitation strategy;
- Identification of suitable growth media to support the PMLU and confirmation of its availability at the LLM site; and
- Determination of topsoil depth requirements to enable successful revegetation and sustainable post-mining land use.

Previous soil and land capability assessments undertaken at LLM include the Parsons Brinckerhoff (2005) pre-mining overburden, soils, and land capability assessment report for ML70336 (**Appendix B**), which incorporated a soil survey. Additionally, prior to the commencement of mining within ML700076, Aurecon (2022) prepared a soil characterisation report to support the Environmental Assessment Report (EAR).

7.6.1 Topsoil Management

Stockpiling, Planning and Placement

The Environmental Management Plan (EMP) Topsoil Management Plan (CAP_EMP_064) (Anglo American, 2019a) outlined the process by which Anglo American manages and preserves topsoil across LLM. The plan provided guidance on topsoil stripping, placement, stockpiling, stockpile preservation and final application.

Topsoil has been and will continue to be routinely stripped in advance of mining and spread directly in progressive rehabilitation works or stockpiled for future use. Anglo American maintains a dedicated topsoil resource register for LLM, which tracks information such as stockpile identification numbers, volumes, age, management actions and locations. Stockpile identifiers have been assigned sequentially, with lower stockpile numbers indicating older stockpiles. Where historical topsoil stockpiles required relocation, the register has been updated accordingly with notes indicating whether the topsoil was moved and retained under its original identification number or assigned a new one.

Stripping depths for topsoil have been specified prior to stripping each soil management unit (SMU) (**Table 27**).

Table 27 Recommended Topsoil Stripping Depths (Source: SLR, 2025c)

SMU	Surface Soil Composition	Suggested Stripping Depth (m)
Foxleigh	Sandy, sandy loam	0.15
Foxleigh clay loamy phase	Sandy loam, clay loam	0.20
Racetrack	Sandy clay loam	0.15
Warwick	Sandy clay loam	0.10
Parrot	Sandy loam	0.15
Thirteenmile	Clayey silt/silty clay	0.10

When rehabilitation areas have become available, recently stripped or direct return topsoil is preferred over stockpiled material to maximise soil quality, the viability of seeds, microorganisms and nutrients. Topsoil management practices include:

- A Permit to Disturb Process;
- Soil surveys to identify topsoil stripping depths ahead of stripping;
- Direct return of topsoil to prepared progressive rehabilitation blocks where possible;
- Stockpiling of topsoil at a maximum depth of 3 m;
- Implementation of erosion and sediment control measures to minimise degradation;
- Involvement of Anglo American's Environment Department in the permitting process for any movement or removal of topsoil stockpiles;
- Monitoring for contamination resulting from mining activities;
- Separate stockpiling by soil type when significant property differences are identified;
- Surveying and recording stockpile locations along with associated soil types and volumes in the topsoil stockpile register; and
- Seeding of stockpile surfaces where natural revegetation is insufficient to provide adequate cover.

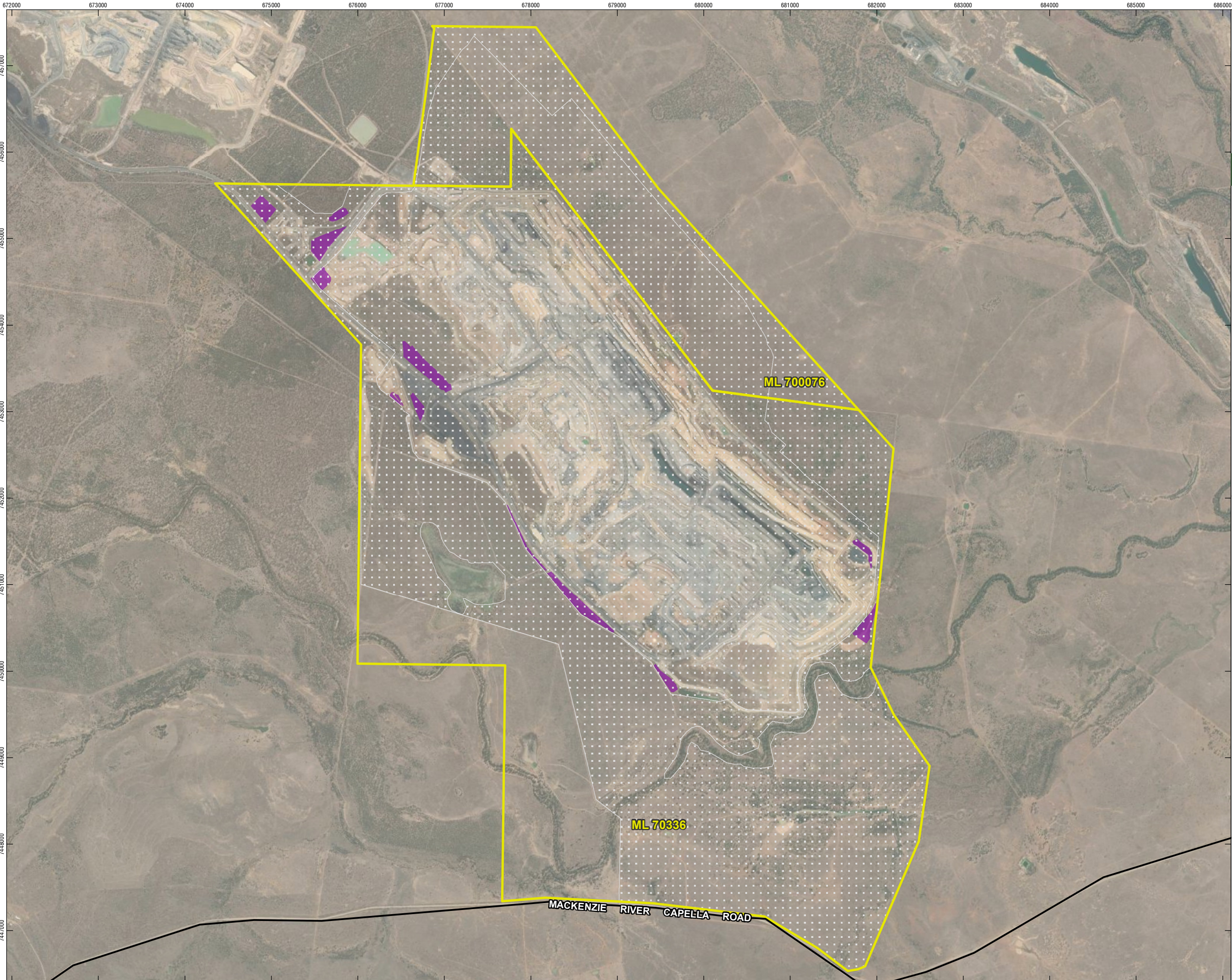
Topsoil stripping requirements are considered for all ground disturbance activities associated with mining operations, ensuring appropriate identification and management of topsoil during clearing. The Topsoil Management Plan (TMP) stipulates that topsoil stripping and application will be conducted progressively and utilised in rehabilitation areas in a manner that minimises the need for handling and stockpiling. Where stockpiling is necessary, amelioration measures will be implemented to preserve and enhance topsoil quality.

Location and Quantity

The locations of stockpiled topsoil materials at LLM (**Figure 36**) have been maintained in the topsoil register. Topsoil stockpiles have been distributed across the site and vary in size. Using the updated register, Anglo American determines the optimal source of topsoil to support ongoing rehabilitation activities, whether from direct stripping or existing stockpiles. Preferred stockpile locations and haulage routes are identified accordingly, with provisions for additional stockpile sites if surplus material has been identified during stripping operations.

Estimated topsoil stockpile locations and inventory have been documented in the topsoil register (Appendix A of SLR (2025c) (**Appendix I**)).

Based on the topsoil inventory, there is approximately 3,149,305 m³ topsoil available. If topsoil is spread at 150 mm, LLM will have a **topsoil surplus** of approximately **698,305 m³** (**Section 7.6.6**).



LAKE LINDSAY

PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 36 -
TOPSOIL STOCKPILES

LEGEND

- Road
- Mining Lease
- Life Of Mine Disturbance
Extent
- Topsoil Stockpile



0 250 500
m

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:40,000 at A3
Project Number:	626.30126
Date:	23-Jun-2025
Drawn by:	AS

Quality

Topsoil stockpile quality at LLM was evaluated through two key investigations the 2018 ACARP trial (Verterra Ecological Engineering Pty Ltd, 2018) and the 2021 soil amelioration study (Verterra, 2021).

During the ACARP trial, six topsoil samples were collected and analysed. In 2021, Verterra conducted further sampling of four topsoil stockpiles to assess amelioration requirements and to provide supporting data for the Estimated Rehabilitation Cost (ERC) decision, specifically regarding topsoil amelioration costs. These samples were taken from the surface and approximately 1 m depth within each stockpile, representing two historic stockpiles (approximately 12 years old) and two more recent stockpiles (approximately 12 months old). All samples were submitted to a National Association of Testing Authorities (NATA) accredited laboratory for comprehensive agronomic analysis.

The conclusions from both assessments indicated that topsoil materials stockpiled at LLM were consistent with the characteristics of their native in-situ SMUs and exhibited the following characteristics:

- Alkaline pH levels;
- Elevated exchangeable sodium percentage (ESP), indicative of sodicity;
- Deficiencies in key nutrients, including nitrogen, phosphorus, potassium, boron, and zinc; and
- Low organic carbon content.

Based on these findings, it was recommended that LLM topsoil resources undergo amelioration using a combination of gypsum, mineral fertilisers and organic matter. The stockpiles showed varying degrees of nutrient and organic matter deficiencies and physico-chemical limitations, with no clear correlation to stockpile age or sampling depth, aside from higher organic matter levels in surface samples. Gypsum application to mitigate sodicity (high ESP) was recommended on slopes > 16.7% to improving soil structural stability, reducing erosion risk and facilitate plant establishment. Mineral fertiliser application was also recommended to correct deficiencies in nitrogen, phosphorus, potassium, boron, and zinc, supporting healthy plant growth relative to standard agronomic recommendations.

The addition of organic matter was deemed desirable to stimulate soil microbial activity and enhance plant establishment, though limited availability and higher costs make this a supplementary, rather than primary, amelioration measure.

In accordance with rehabilitation requirements outlined in the Rehabilitation Management Plan (Anglo American, 2022a), topsoil stockpiles intended for use in rehabilitation undergo sampling and analysis prior to application, preferably concurrent with spoil and capping material assessment. Amelioration prescriptions should be based on analytical results benchmarked against standard agronomic guidelines, and amendments should be incorporated during soil application in rehabilitation areas (**Section 7.6.4**) in order to achieve the required soil quality criteria (**Table 28**). Limits are subject to change with PRCP condition PRCP17.

Table 28 Soil Quality Criteria

Parameter	Criteria
pH	6–9
EC _{1:5} (μS/cm)	≤1,500
Exchangeable Sodium Percentage [ESP] (%)	<6.0
Total Organic Carbon (%)	>1.0
Plant Available Water Capacity [PAWC] (mm/m)	>75
Emerson aggregate class	≥4

7.6.2 Overburden Management

Overburden quality at LLM has been evaluated through multiple studies. The key findings from the following investigations are summarised below:

- Applying Risk-based principles of dispersive mine spoil behaviour to facilitate development of cost-effective best management practices (ACARP C24033) (Verterra, 2018);
- LLM Pit D spoil amelioration design (ANG-2015) (Verterra, 2019); and
- Reviewing rock mulch construction and performance at Capcoal operations and guidelines for future construction (Landloch, 2017).

As part of the rock mulch performance study (Landloch, 2017), three spoil samples were collected from LLM, alongside samples from the GCM site. Analytical results indicated that waste rock properties were consistent across both sites, confirming the applicability of historic rock mulch trials from GCM to LLM. Specific characteristics of spoil samples from LLM included:

- Very strongly alkaline pH levels;
- High sodicity, as indicated by elevated exchangeable sodium percentage (ESP);
- High to extremely high salinity; and
- Low calcium concentrations.

Additionally, 24 spoil samples were collected across LLM and GCM for the 2018 ACARP trial to inform pre-topsoil placement analyses (Verterra, 2018). These samples exhibited:

- Very strongly alkaline pH levels;
- Elevated ESP indicative of strong sodicity;
- High to extreme salinity; and
- Low organic carbon content.

Detailed guidelines for spoil amelioration are provided in **Section 7.6.4**.

7.6.3 Rock Mulch Application

Using rock to stabilise batter slopes has been used previously at mine sites, however, its use has been often limited by the availability of suitable material. Landloch (2017) evaluated existing rock mulch trial slopes at the broader Capcoal Complex as part of a rock mulch performance investigation. Analytical data confirmed that the waste materials placed on previous trial slopes were reasonably similar to those expected to require rock mulch coverage in rehabilitation works planned for LLM. Consequently, observations from these trial slopes were considered applicable to future rehabilitation works at LLM.

Verterra was consulted to review the target rock mulch depths specified in Table G2, specifically to assess whether the prescribed rock mulch and topsoil thicknesses could be reduced while still supporting the nominated PMLUs. Findings from the trials (Verterra, 2020) showed that rock mulch alone exhibited the highest rates of erosion. Consequently, it was concluded that rock mulch should be applied strategically, and that dispersive soils should be ameliorated with gypsum.

As a result, amendments to the landform design criteria and rehabilitation outcomes were proposed and approved in the 2025 LLM EA Amendment Application to optimise rock mulch thicknesses and usage locations (Table 23).

7.6.4 Amelioration and Fertiliser Assessment

Soil and spoil chemical characterisation testing shall be completed prior to the commencement of rehabilitation.

Following characterisation, spoil and capping material shall be treated with appropriate ameliorants as required (e.g. gypsum, lime, fertiliser and/or organic material), as determined by the results of the chemical characterisation testing.

Based on the available topsoil quality from samples to date, it is recommended that topsoil resources at LLM will likely require amelioration with a combination of gypsum, mineral fertiliser and potentially organic matter.

Based on findings from trials assessed in support of the 2025 EA Amendment Application (Verterra, 2020), the proposed amelioration requirements have been outlined (Table 29).

Table 29 Amelioration Requirements for Spoil and Topsoil on Externally Draining Spoil Slopes (Source: Verterra, 2020 and EA Table G2)

Amelioration requirements	Externally Draining Spoil Slopes	Topsoil on Externally Draining Spoil Slopes
Minimum amelioration depth	400 mm ($\pm$ 100 mm)	150 mm
ESP treatment in the absence of testing	25 t/ha of gypsum incorporated pre-topsoil placement	3 t/ha of gypsum incorporated pre-stripping or post-topsoil and rock mulch placement
ESP treatment with testing	Gypsum application sufficient to target a residual ESP of 14% or residual ESP below the	Gypsum application sufficient to target a residual ESP of 5% or residual ESP below the

Amelioration requirements	Externally Draining Spoil Slopes	Topsoil on Externally Draining Spoil Slopes
	ESP/EC stability threshold* throughout the minimum treatment depth (plus an allowance for a 50% efficiency factor, incorporated pre-topsoil placement. These requirements may be modified as required to assist with water retention.	ESP/EC stability threshold* throughout a minimum treatment depth of 200 mm (plus an allowance for a 50% efficiency factor), incorporated pre-stripping or post-topsoil and rock mulch placement. These requirements may be modified as required to assist with water retention.
Nutrient amendment in the absence of testing	Application of 400 kg/ha of an NPKS + trace fertiliser + 15 t/ha organic matter (minimum equivalent analysis of NPKS = 14-12-12-5)	
Nutrient amendment with testing	Site specific fertiliser application to adjust pH and remove deficiencies in macro nutrients (N, P, K and S), exchangeable cations (Mg and Ca), trace elements (B, Cu, Zn and Mn) and organic matter throughout a minimum treatment depth of 200 mm.	

Gypsum Amendment for Dispersivity

Dispersive spoils and topsoils should be ameliorated by incorporating gypsum into the upper 35–50 cm of the final landform profile at a rate sufficient to achieve an ESP below the generic soil stability thresholds (nominally 5% for topsoil and 14% for spoil) (Verterra, 2020).

As part of the ACARP investigation (2018), Verterra developed a risk relationship matrix (**Table 30**) which evaluates the relationship between ESP and EC to determine whether gypsum application is warranted.

Soil and spoil chemical characterisation testing shall be completed prior to the commencement of rehabilitation.

Table 30 Risk Relationship – Gypsum and ESP (%) / EC (dS/m) (Source: Verterra, 2020)

ESP/EC	Low 0-5	Medium 5-12	High >12
Gypsum Treatment			
Nil	Gypsum unnecessary for ESP correction	Failure possible	Failure highly likely
1x requirement	Gypsum unnecessary for ESP correction	Treatment critical	Failure possible
2x requirement	Gypsum unnecessary for ESP correction	Acceptable but may be excessive	Treatment critical

ESP/EC	Low 0-5	Medium 5-12	High >12
Gypsum Treatment			
Legend	Low risk of failure	Failure possible	Failure highly likely

Organic Matter

The addition of organic matter as an ameliorant for sodic soils has been proven to improve soil structure by binding soil particles into stable aggregates. Organic matter also provides a slow-release source of nutrients and supplies carbon to support soil microorganisms. This promotes soil biological activity, which further enhances soil structure. Verterra has developed a risk relationship matrix to assess the impact of organic matter on soil erodibility (**Table 31**).

Soil and spoil chemical characterisation testing shall be completed prior to the commencement of rehabilitation.

Table 31 Risk Relationship – Soil Erodibility – Organic Matter and ESP/EC (Source: Verterra, 2020)

ESP/EC Org. Matter (%)	Low 0-5	Medium 5-12	High >12
<1	Low risk of failure	Failure highly likely	Failure highly likely
1-2	Low risk of failure	Failure possible	Failure highly likely
2-3	Low risk of failure	Low risk of failure	Failure possible
3-5	Low risk of failure	Low risk of failure	Failure possible
>5	Low risk of failure	Low risk of failure	Low risk of failure
Legend	Low risk of failure	Failure possible	Failure highly likely

Organic matter requirements are based on a minimum adequate level of 1.7% within the assumed treated mass of soil. Potential sources of organic matter may include inert cover crops, manures, compost, biosolids and mill mud. The indicative carbon content for different sources of organic matter is provided (**Table 32**).

Table 32 Potential Sources of Organic Matter (Source: Verterra, 2020)

Carbon Source	Carbon %	C:N ratio
Cattle/pig manure	5-15%	15-20%
Chicken/sheep manure	15-20%	20-25%
Compost	20-30%	10-20%
Biosolids	20-25%	<5%
Mill mud	10-15%	15-20%

In the absence of soil testing, the recommended fertiliser application includes application of 400 kg/ha of macro nutrients N, P, K and S (NPKS) + trace fertiliser + 15 t/ha organic matter (minimum equivalent analysis of NPKS = 14-12-12-5).

Amendments of pH

Although pH has been considered less significant than other factors in soil dispersity, it may influence the solubility of salts, electrolyte balance and net charge of ions in the soil solution. A risk relationship matrix for pH and ESP/EC is provided (Table 33). To meet the calcium and magnesium needs of the acid spoils (as found at Pit D for example in rehabilitation trials), it is recommended that calcitic lime be applied with 30% Ca and 5% Mg content.

Soil and spoil chemical characterisation testing shall be completed prior to the commencement of rehabilitation.

Table 33 Risk Relationship – Soil Erodibility – pH and ESP/EC (Source: Verterra, 2020)

ESP/EC pH	Low 0-5	Medium 5-12	High >12
Acid treatment to pH 4.5 to 5.5	Failure highly likely	Low risk of failure	Failure possible
Nil (pH 5.5-8.5)	Low risk of failure	Failure possible	Failure highly likely
Lime treatment to pH>8.5	Failure highly likely	Failure highly likely	Failure highly likely
Legend	Low risk of failure	Failure possible	Failure highly likely

Fertiliser

Site specific fertiliser application can be used to adjust pH and remove deficiencies in macro nutrients (N, P, K and S), exchangeable cations (Mg and Ca), trace elements (B, Cu, Zn and Mn) and organic matter. Application of fertiliser will be site specific and will be determined by soil testing.

7.6.5 Suitability of Materials to Support PMLU

The rehabilitation outcomes for the LLM have been outlined in Section 3.0 of SLR (2025c). The PMLUs for the LLM have been identified as bushland and grazing. Pre-mining soil resources at the LLM were classified as generally unsuitable for cultivation and only marginally arable at best. These classifications are deemed to support a pastoral land use under appropriate management.

Erosion and sedimentation controls should be implemented so that reclaimed soils from the LLM area can support the final landform design. Prior to the use of any soils, soil testing is required to inform the accurate prescription of amelioration methods and rates to achieve soil quality that supports the PMLU.

7.6.6 Rehabilitation Materials Balance

Topsoil depth is typically 150 mm. The seeding mix varies depending on the PMLU for the rehabilitation area but typically includes a mixture of pasture grasses and native trees and shrubs. Topsoil volumes required for rehabilitation of the disturbance areas (Table 34) were calculated.

The topsoil required was based on the following assumptions:

- Topsoil placed at a depth of 150 mm on future rehabilitation; and
- No topsoil required for residual voids including highwalls, low walls and end walls inundated by water and water contained within the voids and ramps.

Table 34 Topsoil Required for Rehabilitation (Source: SLR, 2025c)

Rehabilitation Area/Improvement Area	Description	Area (ha)	Post-Mining Land Use	Area (m2)	Volume Required when 0.15 m Topsoil is Placed (m3)
RA1	Existing rehabilitation areas	432	Bushland	4,320,000	N/A
RA2	Infrastructure areas, water storages (dams), laydowns, roads and access tracks	183	Grazing	1,830,000	274,500
RA3	Overburden dumps, reshaped highwalls, RoM pad, exploration disturbance, all other mine affected disturbance areas#	1451	Bushland	14,510,000	2,176,500
RA4	Exploration and ancillary activities	2261	Grazing	22,610,000	Additional exploration or ancillary activities will have stripped topsoil stored and reused for rehabilitation. No volume is required.

Rehabilitation Area/ Improvement Area	Description	Area (ha)	Post-Mining Land Use	Area (m ²)	Volume Required when 0.15 m Topsoil is Placed (m ³)
IA1	Residual voids including highwalls, low walls and end walls inundated by water and water contained within the voids and ramps	525	NUMA	5,250,000	N/A
Total		4852	-	48,520,000	2,451,000

Table notes:

#Mine-affected disturbance consists of all the areas authorised for disturbance in the EA that currently don't fall under another rehabilitation activity.

Based on the topsoil inventory (**Table 35**), there is approximately 3,149,305 m³ of topsoil available. If topsoil is spread at 150 mm, LLM will have a topsoil surplus of approximately 698,305 m³.

Table 35 Topsoil Balance (Source: SLR, 2025c)

Topsoil	Volume (m ³)
Topsoil Available	3,149,305
Topsoil Required	2,451,000
Topsoil Balance	698,305

7.7 Erosion Assessment

7.7.1 Verterra Studies

Erosion assessments are important for determining and identifying erosion risks and appropriate control measures to achieve a stable landform and successful rehabilitation.

The Verterra (2020) study (**Appendix J**) investigated the effect of different soil conditioners on the quality of the soil in a plot experiment. These showed that an agricultural gypsum treatment not only improved soil quality and promoted plant growth but also enhanced the soil's ability to resist erosion by reducing the value of

rill erodibility factor. The rehabilitation trials have been assessed, and the recommendations have been recently included in the EA through an amendment application. The criteria for optimal treatment have been transitioned into the PRCP schedule.

Verterra also recommended “*natural landform design to control overland flow (including run-on) to a maximum slope length of 80 m outside rock armoured drainage lines.*”

Furthermore, samples taken from stockpiles, namely TS LL & TS TAJ Stockpiles and TS137C and TSX2 Stockpiles (Verterra, 2021), exhibited good resistance to soil erosion when there was a vegetation cover exceeding 40%. It is worth noting that the results of the TS LL & TS TAJ Stockpiles (Verterra, 2021) samples were noticeably better than those of the TS137C and TSX2 Stockpiles (Verterra, 2021), which may be attributed to the extended storage duration of these samples in stockpiles.

In lieu of site-specific soil loss risk classes, the Houghton and Charman (1986) risk classes detailed in Bergma et. al. (1996) *Terminology for Soil Erosion and Conservation: Concepts, Definitions and Multilingual List of Terms for Soil Erosion and Conservation* were considered appropriate to use for the assessment of erosion risk of the designed landforms, since the planned end land use for LLM is a mix of native bushland and cattle grazing land. The risk classes are shown (**Table 36**).

Table 36 Soil Loss Risk Categories (Source: Verterra, 2020)

Soil Loss (t/ha/yr)	Class
< 5	Very Low
5 – 12	Low
12 – 25	Moderate
25 – 60	High
60 – 150	Very High
> 150	Extremely High

7.7.2 Water Erosion Prediction Program (WEPP) Modelling

In 2019, Landloch (**Appendix K**) undertook erosion modelling for Permian rock and topsoil to simulate runoff/erosion rates predicted using the WEPP erosion model.

The results of the WEPP modelling for a range of heights, material conditions, surface conditions and slopes are presented in **Table 37**. As expected, the WEPP modelling shows that bare surfaces experienced significantly worse erosion compared to ground with established vegetation. The data also shows that, irrespective of the rock sizes placed, vegetation establishment has a major impact on erosion potential of the slopes considered. However, there is also a large impact of rock size and critical shear on erosion risk (**Table 37**).

Table 37 WEPP Modelling Results (Source: Landloch, 2019)

Material	Surface Condition	Slope %	Average Erosion (t/ha/yr)	Peak Erosion (t/ha/yr)
Permian Rock and Topsoil Mixture				
Permian waste and topsoil	40% Cover	33.3	7.8	16.9
		16.66	2.4	6.6
Permian waste and topsoil – reduced fines	40% Cover	33.3	1.3	4.2
		16.66	0.44	0.44
Increased D50 and critical shear	40% Cover	33.3	0.61	0.61
		16.66	0.44	0.44
Permian Rock and Topsoil Mixture and 65 m High Landform				
Permian Rock Mix and Critical Shear of 47 Pa	40% Cover	33.3	2.9	10.6
		16.66	0.9	3.8
	60% Cover	33.3	0.6	2.2
		16.66	0.2	0.8
Permian Rock Mix and Critical Shear of 4 Pa	40% Cover	33.3	0.4	1.7
		16.66	0.15	0.2
	60% Cover	33.3	0.1	0.3
		16.66	0.03	0.04

For 40% grass cover, the simulations indicate that the current Permian rock size distribution if its fine component can be reduced, will be stable to erosion if placed on a 65 m high landform at 16.66% gradient, and is likely to be stable if placed at a gradient of 33.3%. If the rock size becomes coarser (and critical shear increases to 74 Pa) because of changed handling practices, then the data show that both slope gradients will be extremely stable for this cover level.

For 60% grass cover, the simulations indicate slopes of either gradient, placed on a 65 m high landform, will be extremely stable. This highlights the importance, for this landform, of achieving vegetation cover targets and establishment of sustainable and vigorous vegetation cover. Rehabilitation monitoring indicated that groundcover of > 80% was being achieved in the field within LLM progressive rehabilitation areas (**Table 24**) and as such the 40% and 60% simulations (**Table 35**) were likely overestimating actual in field erosion rate results.

A coarse rock mulch (ie higher critical shear strength) than Permian has been identified and sourced from an onsite quarry for rehabilitation purposes at LLM. This courser and more competent material was deemed capable of producing average and peak erosion rates of significantly < 5 t/ha/yr and 10 t/ha/yr, respectively, even at the steepest slopes in the final landform (33.3%). This quarried rock mulch also had the added advantage of being a competent material which is resistant to

weathering over time thus providing ongoing erosion protection over time where the landform was steeper and higher risk (ie. long slopes at 33%). As such the quarried rock mulch provides a very low risk erosion cover even at the longest and steepest (33.3%) landform slopes. Permian material appears suitable for all slopes but the longest and steepest landform slopes (**Table 35**), particularly considering vegetation cover of > 80% is being achieved (**Table 24**).

Given WEPP erosion modelling is more appropriate for landform design (i.e. to examine and determine key slope grade, length and cover requirements for given material types and the landform at LLM does not contain any high risk materials such as PAF, tailings or rejects, Landscape Evolution Modelling (LEM) analysis was not deemed necessary as per the advice of the Office of the Queensland Mine Rehabilitation Commissioner within the paper *"Applying erosion and Landscape Evolution Models to assess post-mining landform stability: Technical Paper"* (Hancock et al, 2025).

7.8 Surface Water Residual Void Water Balance

SLR (2025c) (**Appendix L**) developed a surface water void model based on the final landform (Minserve, 2023) in accordance with Section 3.2 and Section 3.6.3 of the PRCP Guideline.

The scope of work included the development of a surface water residual void model based on the design landform. The model accounts for all expected surface water sources, storage and discharge, as well as the modelled groundwater interactions derived from the groundwater model ((Hydrogeologist (2023) (**Appendix H**)). The residual void model then provides long-term estimates of water level and salt concentration for the void stored water.

7.8.1 Water Balance Model Void Arrangement

There will be 4 pits at LLM, namely Pits X1, X2, X3 and X4, which are expected to remain with a residual void or depression (**Figure 28**), capable of storing water i.e., a void lake. The arrangement of these voids for the purpose of the Water Balance Model (WBM) is presented (**Table 38**).

Table 38 Residual Void Configuration (Source: SLR, 2025d)

Void	PRCP Void Type	WBM Arrangement
X1	Pit Lake	Treated as one void, labelled X2
X2	Pit Lake	
X3	Pit Lake	X3 and X4 merge above 99.6 mAHD
X4	Pit Lake	Overtops to X2 above 107.6 mAHD

While X1 and X2 are defined as separate voids, an examination of the landform concluded they would behave as a single water storage. Therefore, they were combined in the WBM and named X2. On average, the floor level of X2 was approximately 60 mAHD, however, there was a depression in the centre of the void which reaches a minimum elevation of approximately 25 mAHD.

X3 and X4 were significantly smaller and shallower than X2. X3 and X4 have minimum elevations of approximately 92 and 86 mAHD, respectively. There was a pit end wall between X3 and X4 at roughly 99.6 mAHD. Another end wall separates these two voids from X2 at an approximate elevation of 107.6 mAHD.

7.8.2 Water Balance Modelling

A residual void WBM was developed to predict the accumulated volumes and water quality of void waterbodies after mining ceases at LLM. The aim of the WBM was to represent the surface water system at LLM and to characterise the long-term water levels and water quality within the residual voids. The WBM incorporated all anticipated projected inflows and outflows and tracks the water volumes in each storage element.

Conceptual Model

A conceptual model of a typical residual void directly after reshaping and rehabilitation of the backfill material has been developed (**Figure 37**).

The diagram shows the varying sources of water which may contribute to the void water body. These include:

- Direct rainfall on the waterbody (once established);
- Runoff from pit walls;
- Runoff from the rehabilitated catchment draining towards the void;
- Runoff from any natural catchment draining towards the void;
- Recharge through the backfilled material which progressively saturates the material and in time seeps into the void water body; and
- Groundwater inflow while the water levels in the void and spoils is lower than the surrounding water table.

Potential losses from the water accumulating in the void include:

- Evaporation, if an open water surface has established;
- Seepage to the underlying backfill material, until this is fully saturated;
- If the water level in the void exceeds that of the surrounding water table, water can seep out from the void to the surrounding aquifer systems; and
- Overtopping or spilling if the accumulated volume exceeds the storage capacity.

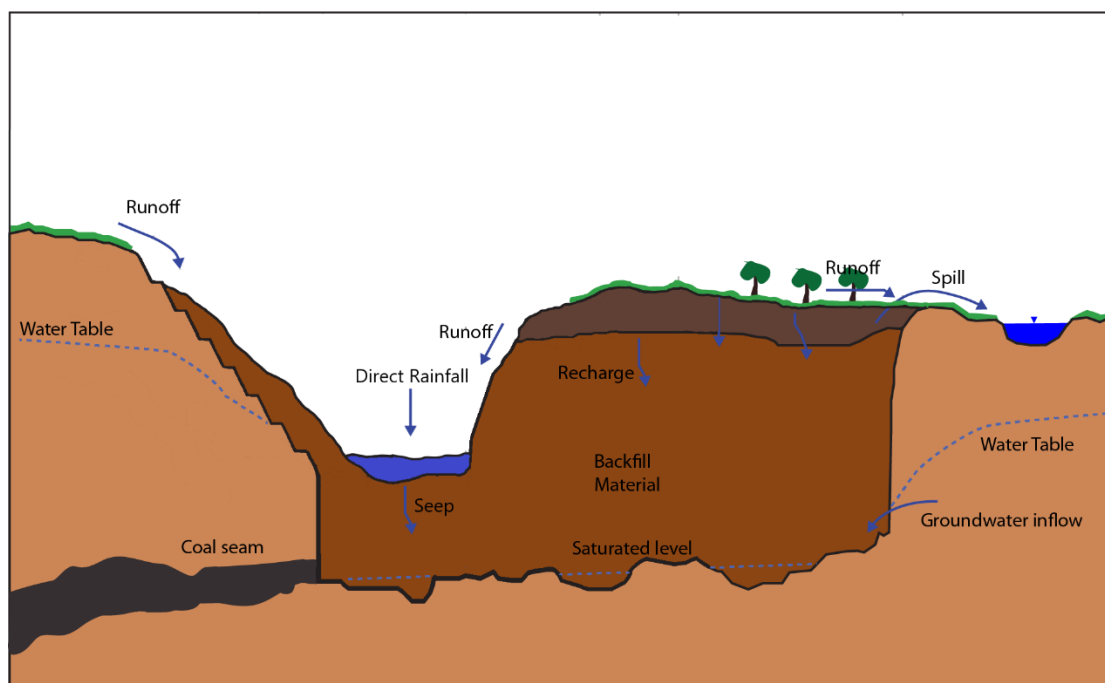


Figure 37 Conceptual Model of Typical Residual Void (Source: SLR, 2025d)

The WBM was simulated with a range of rainfall conditions, statistically equivalent to the historic records, to allow for the calculation of percentiles of key model outputs. These percentiles represent the results range due to the variability in the climate. These percentiles can be interpreted as the chance of the statistic being exceeded. The results of the WBM focus on the 5th (dry), 50th (median) and 95th percentile (wet) conditions.

The residual void WBM was simulated for two different time periods. Water levels within the voids were predicted over a 100 year-period (2023 – 2123) under 500 varying climatic sequences. However, the salinity within the void required a longer period to reach a steady state, and as such the water quality component of the model was run for 500 years to achieve this (2023 – 2523) under 100 varying climatic sequences. This allowed assessment of long-term water levels, quality, and probable risk of overflow for each void.

Catchment Areas

A summary of the catchment breakdown (Table 39 and Figure 38) is provided. The footprint associated with each void was determined using the current available pit outlines, the current surface contours and the proposed final landform contours.

Table 39 Catchment Summary (Source: SLR, 2025d)

Residual Void	Rehabilitated Catchment Area (ha)
X2	536
X3	108
X4	231



LAKE LINDSAY

PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 38 - VOID CATCHMENT
AREAS

- Legend
- Mining Lease Boundary
 - Void Footprint
 - Catchment Area
 - Watercourse



0 250 500 1,000
Metres

Coordinate System:	GDA 1994 MGA Zone 55
Scale:	1:40,000 at A3
Project Number:	626.30126
Date:	3/09/2024
Drawn by:	SM

Residual Void Waterbodies

The simulations for 5th percentile, median and 95th percentile water levels and water volumes in each of the water storing residual voids after 100 years were undertaken (Table 40) with the daily median water surface level over this period (Figure 39 and Figure 40). As voids X3 and X4 are merged in the 95th percentile wet climate scenario, results under this scenario are also combined.

Table 40 Simulated Water Levels and Water Volumes in Residual Voids (Source: SLR, 2025d)

Residual Void	Water Level (mAHD)			Volume (ML)		
	5%	50%	95%	5%	50%	95%
X2	71	75	81	13,700	18,700	25,800
X3	99	99	101	220	220	5,900
X4	96	98		1,700	3,200	

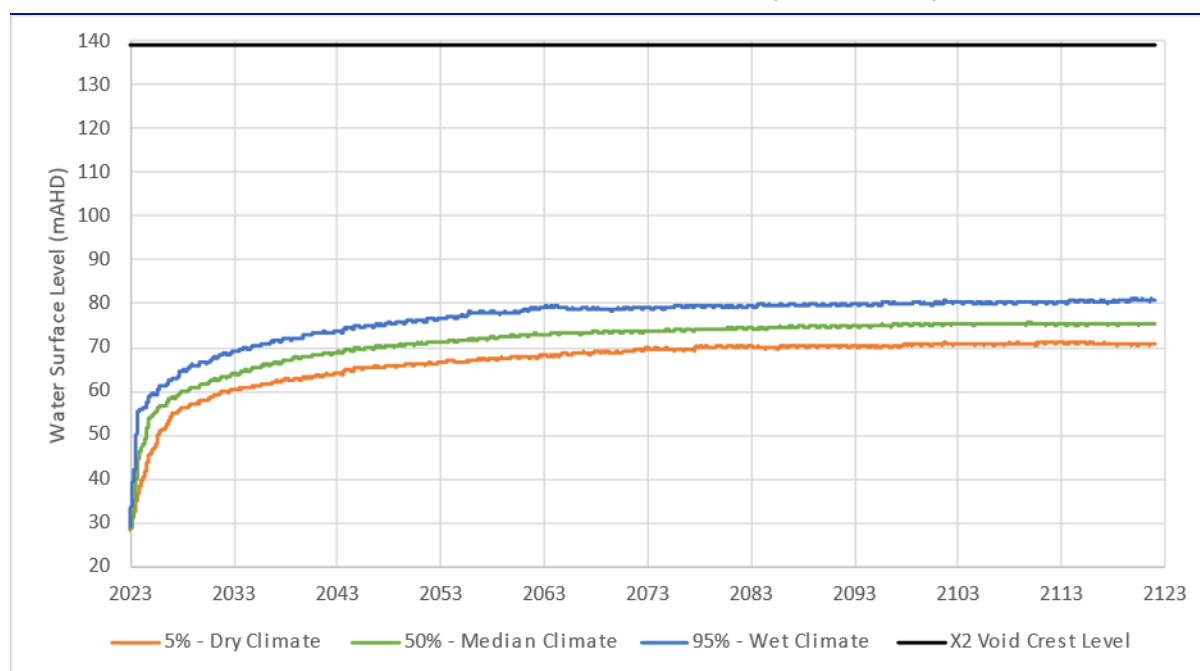


Figure 39 X2 Void Simulated Water Level (Source: SLR, 2025d)

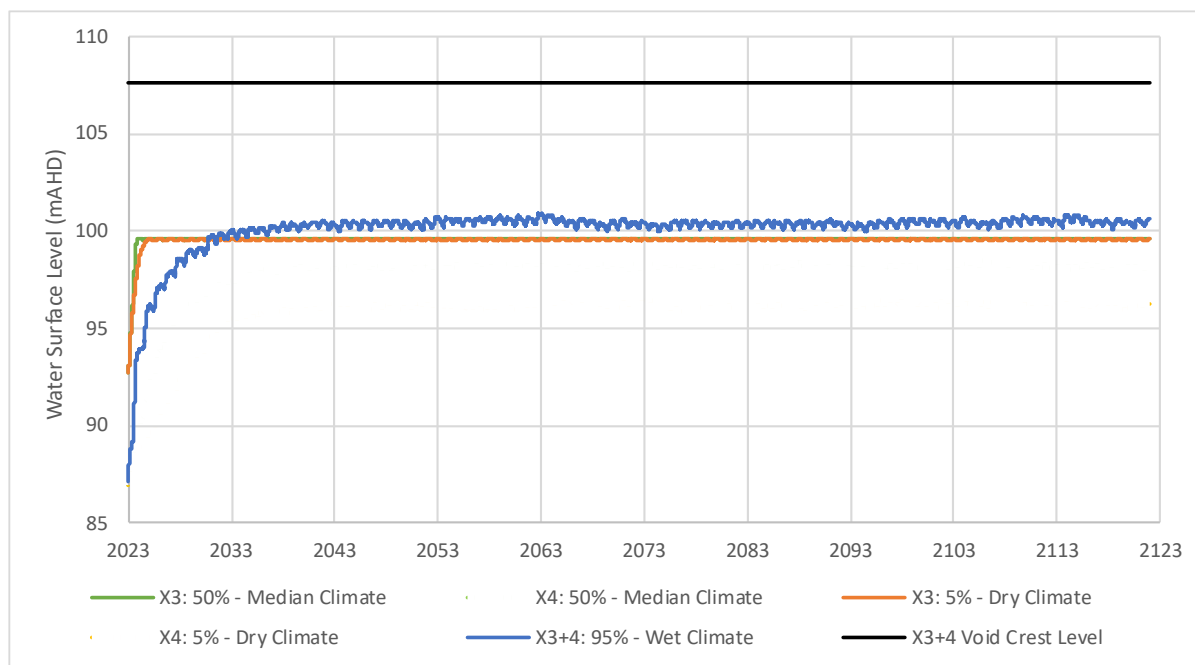


Figure 40 X3 & X4 Voids Simulated Water Level (Source: SLR, 2025d)

The results indicate that, as an integrated system, the voids are collectively expected to contain water under all climate conditions. X3 is predicted to reach capacity (99.6 m AHD) within the first two years and consistently overtop into X4 under all climate scenarios, while it is expected that the water level within X4 will reach steady state within 20 years and maintain around 96 and 98 mAHD under the 5th percentile dry climate conditions. Under the 95th percentile wet conditions, the water level for these voids was above the elevation of the end wall which separates them. Therefore, they were combined under these scenarios. This combined storage does not overtop into void X2.

Results for void X2 indicated a longer period of approximately 80 years before reaching steady state. While there was expected to be a large volume of water within X2 at steady state, the remaining capacity within the void is significantly greater at approximately 172 Gegalitre (GL) in the 95th percentile wet climate scenario. The capacities of the voids below spill level at steady state were predicted (Table 41).

Table 41 Simulated Void Remaining Capacities Below Spill Level (Source: SLR, 2025d)

Residual Void	Steady State Remaining Capacity Below Spill Level (Megalitre)		
	5%	50%	95%
X2	183,900	178,900	171,800
X3	01	01	17,100
X4	15,400	13,900	

Notes:¹ X3 overtops to void X4 and volume is accounted for in X4 results

¹ X3 overtops to void X4 and volume is accounted for in X4 results

Spill/ Overtopping Probability

No spill events from the void system were recorded. Voids X3 and X4 do not overtop into X2 throughout the simulation and X2 was not found to overtop.

The predicted containment of runoff resulting from a single extreme event has also been assessed. The following conservative assumptions were made:

- The water volume in the void, at the time when the storm occurs, is equal to the 95th percentile wet conditions (25,800 ML (**Table 40**)); and
- Runoff losses are negligible, and thus the runoff depth has been assumed equal to the full rainfall depth for the 1 in 2,000-year 24-hour event (403 mm).

The runoff volume reporting to the voids during the 1 in 2,000-year 24-hour event was estimated at 5,290 ML. As the remaining capacity in X2 under 95th percentile wet conditions was approximately 171,800 ML, there was sufficient capacity to contain all runoff generated during this event. Therefore, was determined that void water would not spill from the system.

7.8.3 Water Quality Modelling

The WBM was developed to include a high-level salt balance to track both the quantity and quality of water at LLM. The salt balance tracks the water quality or salinity (total dissolved solids (TDS) in mg/L) for the inflows into the voids and subsequent effects from evaporation and releases on the storage water quality. This also included modelling of salt to represent the general salt in the residual voids.

Each land use type was allocated a specific EC (in $\mu\text{S}/\text{cm}$) value which was then applied to the runoff for each land use type that reports to the void. In addition to runoff, the groundwater inflow to the voids also contributed to TDS levels. The salt loading parameters for LLM were adopted from the existing operational WBM.

Adopted water quality (salinity) parameters are:

- Runoff:
 - Natural: 600 $\mu\text{S}/\text{cm}$; and
 - Pit: 13,400 $\mu\text{S}/\text{cm}$.
- Infiltration/ Seepage via spoils: 5,000 $\mu\text{S}/\text{cm}$; and
- Groundwater: 5,000 $\mu\text{S}/\text{cm}$.

The TDS concentrations in the voids were limited to 357,000 mg/L (532,800 $\mu\text{S}/\text{cm}$), as this is the solubility limit of salt in water. Importantly it has been noted that while reported concentrations were limited, mass of salt in the model is preserved.

Water Quality

Water quality results were produced from the system response over a period of 500 years and with 100 different sequences of rainfall. The results of the residual void salinity modelling have been provided (Table 42 and

Figure 41). As shown, the salinity levels within voids X3 and X4 were expected to increase very quickly post mining, with salt concentrations within both X3 and X4 approaching the solubility limit (approximately 357,000 mg/L at 25°C) at steady state.

Water within void X2 was also expected to reach the solubility limit within 500 years. Although the results indicated that the increase in salinity will be more gradual than the other voids, the EC of water within the void after 100 years was approximately 70,000 $\mu\text{S}/\text{cm}$. The water quality limits the uses for the land below the water line, however above the SWL, the voids were suited for PMLU such as bushland.

Void X3 reached a steady state EC of approximately 29,000 $\mu\text{S}/\text{cm}$ very quickly post mining. This lower EC value was due to the constant overtopping from void X3 to X4, which allows for the transfer of salt out of void X3.

Table 42 Simulated Long-Term Mean Electrical Conductivity (Source: SLR, 2025d)

Residual Void	Mean Electrical Conductivity ($\mu\text{S}/\text{cm}$)		
	100 years Post Mining	200 years Post Mining	500 years Post Mining
X2	66,000	130,000	310,000
X3	29,000	29,000	29,000
X4	420,000	480,000	490,000

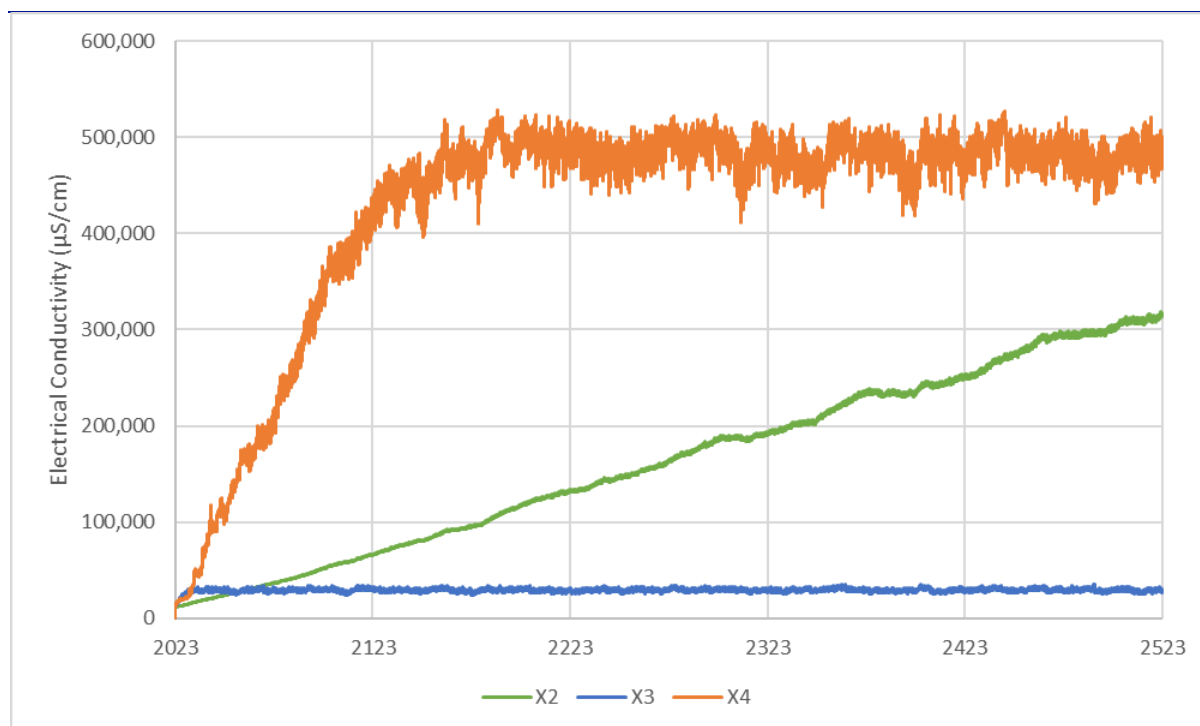


Figure 41 Voids Simulated Mean Electrical Conductivity (Source: SLR, 2025d)

Stratification Potential

The formation of physical and chemical differences in water properties with depth, within the void water bodies, is known as stratification. Stratification can vary in strength and is typically observed most strongly in water bodies greater than 10 m depth. It is possible that a layer of relatively clear, low-salinity water will develop over cooler, more turbid water of higher salinity. However, the tendency of pit lakes to permanently stratify is favoured by systems that have groundwater inflow with moderately high TDS and a positive environmental water balance (precipitation – evaporation + runoff) (Jewell, 2009).

Void X2 was expected to exceed 40 m in depth and become hypersaline shortly after mine closure. Therefore, there was high potential for stratification to occur. The modelling conducted assumes fully mixed lake conditions and does not consider stratification. However, the occurrence of stratification was deemed not likely to impact the outcomes of this assessment as the voids will have limited land use options for areas below SWL due to the water quality assessment results, indicating high salinity levels.

7.8.4 Residual Void Risk Assessment

A residual void risk assessment was undertaken and has been summarised (**Table 43**). The expected size, permanency, overtopping probability, and long-term water quality of each void has been considered when allocating an overall surface water risk rating. Each aspect of the void risk has been coloured as follows:

- Green = Low Risk;
- Yellow = Medium Risk; and
- Red = High Risk.

Table 43 Residual Void Risk Assessment Summary (Source: SLR, 2025d)

Residual Void	Water Quality	Overtopping Probability	Groundwater Contamination	Surface Water Risk
X2	Gradually rising salinity trend, expected to reach 100,000 $\mu\text{S}/\text{cm}$ after approximately 160 years and approach solubility limit	None	Void acts as a groundwater sink (groundwater flows into the void at steady state)	Low: Highly saline in the long-term but not expected to spill or contaminate groundwater (void is a groundwater sink)
X3	Fast rising salinity trend, expected to reach 100,000 $\mu\text{S}/\text{cm}$	None ¹	Void acts as a groundwater sink (groundwater flows into the	Low: Highly saline in the long-term but not expected to spill or

Residual Void	Water Quality	Overtopping Probability	Groundwater Contamination	Surface Water Risk
	after approximately 63 years and fluctuate around 200,000 $\mu\text{S}/\text{cm}$		void at steady state)	contaminate groundwater (void is a groundwater sink)
X4	Fast rising salinity trend, expected to reach 100,000 $\mu\text{S}/\text{cm}$ after approximately 25 years and approach solubility limit	None ¹	Void acts as a groundwater sink (groundwater flows into the void at steady state)	Low: Highly saline in the long-term but not expected to spill or contaminate groundwater (void is a groundwater sink)

¹ Ultimately overtops to void X2

7.8.5 Conclusions

SLR (2025c) concluded that once the final landform has been completed, four residual voids will remain capable of capturing and storing runoff water as well as infiltrating groundwater. All the voids were deemed stagnant, in that surface water will not flow through them and out via surface pathways and they were groundwater sinks. They have been modelled, considering long-term climate, catchments, runoff generation and groundwater interaction.

While the voids were expected to reach a hypersaline state, all voids were allocated a 'low-risk' rating due to the low risk of discharge to the environment. Under wet climate scenarios, voids X3 and X4 were likely to merge thus the high EC attributed to X3 (Table 4 1) versus that modelled for the void alone (Table 40). However, none of the voids were expected to overtop to the environment and remain as groundwater sinks. The voids were also assessed under a high warming climate change scenario and the risk rating outcomes were unchanged.

Several assumptions regarding the hydrology and groundwater interactions of LLM were made while developing the current understanding and the model. It was recommended that ongoing monitoring of the water levels and water quality be maintained, and that the assessment revisited at least every 5 years to improve the confidence in the long-term forecasting.

7.9 Geotechnical Stability

SLR (2025e) (Appendix M) undertook a slope stability analysis to assess the geotechnical stability of the proposed final landform as per the requirements of the PRCP Guideline.

Following tasks were undertaken by SLR (2025e):

- A desktop review of selected geological and geotechnical information for each of the four voids including:
 - Relevant publicly available geological and geotechnical information;
 - Previous geotechnical reports provided for LLM; and
 - Highwall and low wall sections.
- Development of a geotechnical model for the most geotechnically at-risk portion (i.e., highest and steepest slopes) of each void highwall and low wall section; and
- Slope stability analysis using the GeoStudio Slope/W software program using the limit equilibrium analysis method and seismic stability to assess the FoS of critical slopes.

The report presented the findings of the slope stability analysis and a one-page design document for each pit, detailing final highwall and low wall geometry for each strip.

For the purpose of the assessment, the most critical sections of the highwall slopes were selected for stability analysis as they represent the least stable sections (critical sections). The low walls consisting of spoil inside the voids were also analysed to account for any undesirable geotechnical parameters in this material. The voids that were selected for slope stability were X1 and X2 as these were identified as the critical voids. These voids are considered as suitable representative section for stability analysis due to:

- Presence of two pit wall orientations (facing southeast and southwest) which will likely represent two different geotechnical models due to difference in the bedding and discontinuity orientations relative to the highwall slope;
- Provides the highest and steepest highwall sections; and
- Presence of standing water in the base of the pit.

SLR (2025e) also undertook stability analysis on various materials and provided the following key statement:

- Recent experience with the X1S north pre-strip end wall failure suggests that the Tertiary clays in the area contain a substantially lower cohesion in comparison to the rest of the mining area. A back analysis of the pre-strip end wall failure indicates that a maximum overall slope angle of 22° is required to stabilise pit slopes where long-term exposure occurs.

7.9.1 Summary of Geotechnical Conditions

The primary in-situ geological units characterising the four voids were (from youngest to oldest):

- Tertiary sediments comprising either surficial alluvium or residual soils derived from the weathering of the underlying rock;

- Weathered Permian rock present within the upper pit slopes, directly underlying the sediments; and
- Fresh, unweathered Permian rock present at the base of the pit slopes.

Slope instability within the overlying soils and highly weathered rock was expected to be governed by rock mass or rotational style slope failures, with some residual influence from relict structures within the weathered rock.

SLR (2025e) considered that deeper-seated, global failure within slightly weathered and fresh, unweathered Permian rock exposed in highwall slopes was unlikely under similar long-term conditions. Rather, slope instability was more likely to be structurally controlled, where unfavourable intersections of major joint sets and/or faults may control highwall stability.

7.9.2 Geotechnical Model

To assess the stability of the highwall slopes, a geotechnical model was developed based on the available information, including the conceptual final landform report (Minserve, 2023) (**Appendix D**). This geotechnical model forms the basis for the stability analyses. Two sections running perpendicular to the highwall (Section 1 and Section 3) were selected for analysis, as they are considered representative of areas with lower stability. The geotechnical models of the LLM void were used for the stability analyses (**Figure 42**, **Figure 43** and **Figure 44**).

The geotechnical models included the existing upper portion of the highwall configuration, which was assigned a design slope of 1V:3H. The in-pit low wall model utilised a design slope of 1V:6H (Minserve, 2023). It is noted that Table G2 within the EA permits the voids to:

- Remain 'as is' if geotechnically stable; or
- Reshape to obtain stability or to ensure landform integrity of surrounding landforms if failure occurs; or
- Fill with mine waste, cover with inert material and rehabilitate.

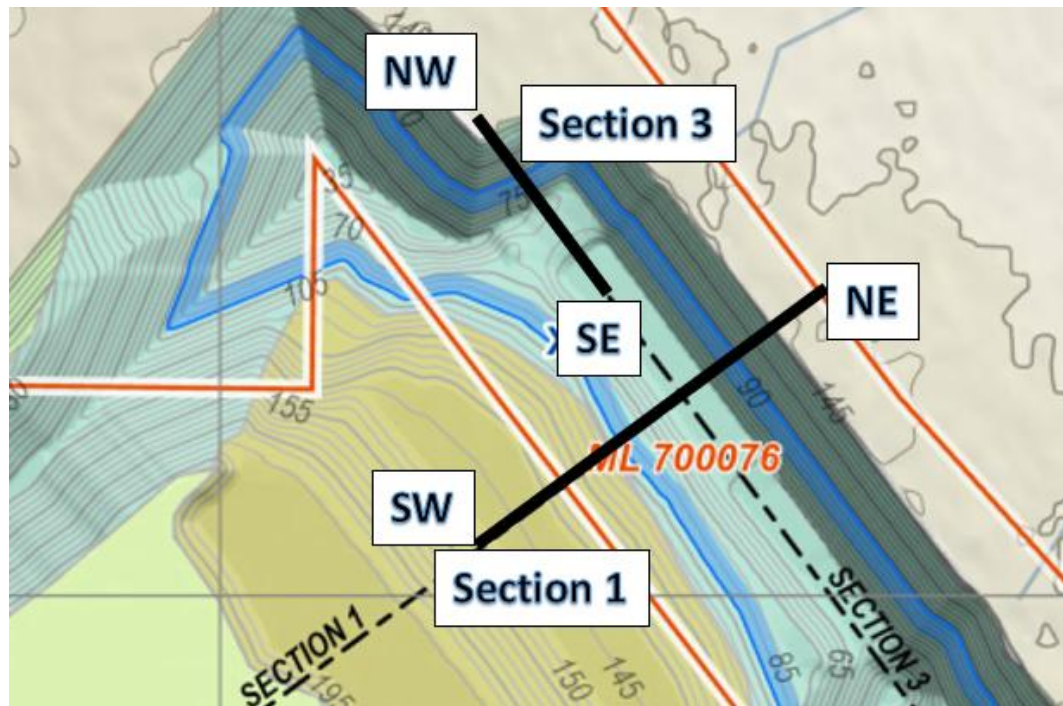


Figure 42 Geotechnical Critical Section Plan (Source: Minserve, 2023 (edited))

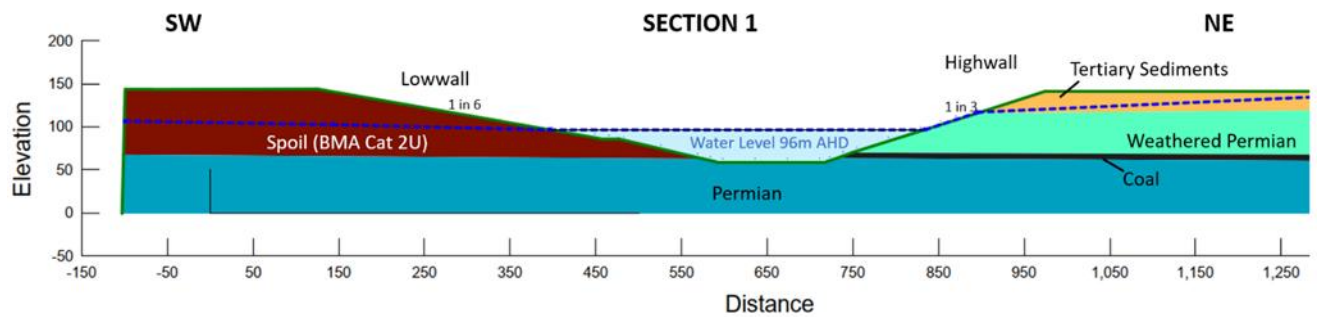


Figure 43 Section 1 Geotechnical Model (Source: Minserve, 2023)

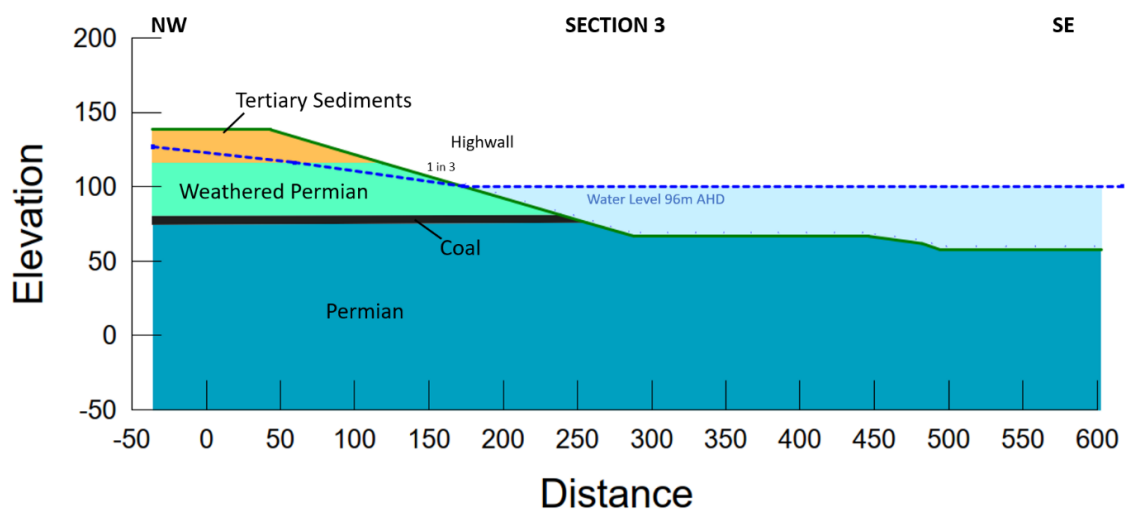


Figure 44 Section 3 Geotechnical Model (Source: Minserve, 2023)

The model considered:

- Groundwater data from Hydrogeologist (2023) (**Appendix H**);
- Final landform design from Minserve (2023) (**Appendix D**); and
- Void water levels from SLR (2025d) (**Appendix L**).

7.9.3 Static Slope Stability Assessment Results

For the purposes of this report, the following highly conservative minimum FoS criteria as recommended by DETSI have been adopted:

- Permanent slopes and static analyses: ≥ 1.5 ; and
- Seismic analyses: ≥ 1.0 .

The results of the stability analysis for the critical sections long-term static (normal) scenarios and seismic scenarios (**Table 44**) and the Slope/W output plots (**Appendix M**) are provided.

Table 44 Summary of Stability Analysis for Long-Term Static Conditions (SLR, 2025e)

Section	Scenario	Approximate Overall Design Slope Angle	Factor of Safety	Comparison with Adopted Performance Criteria*
Section 1, Highwall	Normal RL 96m AHD	1 in 3	2.3	Acceptable >1.5
Section 1, Highwall	Seismic	1 in 3	1.3	Acceptable >1.0
Section 1, Low wall	Normal RL 96m AHD	1 in 6	3.0	Acceptable >1.5
Section 1, Low wall	Seismic	1 in 6	1.9	Acceptable >1.0
Section 3, Highwall	Normal RL 96m AHD	1 in 3	2.1	Acceptable >1.5
Section 3, Highwall	Seismic	1 in 3	1.5	Acceptable >1.0

Table Notes: *It should be noted that there is currently no unified standard specifying the minimum factor of safety (FoS) for the long-term slope stability of residual mine voids. In the absence of a formal standard, the designer has adopted a FoS of 1.5..

The results of the analysis indicated that the upper highwall slopes in their existing configuration provide a FoS > 1.5 against rock-mass or rotational slope failure under long-term, normal conditions. Where upper highwall slopes were flattened as part of the final landform design, an increase in the FoS against rock-mass or rotational slope failure resulted.

Similarly, the results indicate that the proposed low-wall slopes provide a FoS > 1.5 against rotational slope failure under long-term, normal conditions. This FoS can also be applied to spoil-dump slopes of the same or shallower angle where the material composition is equivalent to that of the low wall.

In summary, the analysis indicated that the final landform slopes achieve a FoS > 1.5 for all critical sections under both circular and non-circular failure analyses. Where the upper highwall slopes were re-graded to shallower angles, this further improved the FoS and reduce the long-term risk of slope instability. The seismic stability analyses also indicated a FoS > 1.0 for the critical sections.

Based on a desktop review of the likely soil and rock materials comprising the final landform highwall slopes, the key slope instability mechanisms under the existing configuration were expected to be governed by structurally controlled instability rather than deep-seated, global rotational-style failures.

Modelling of the Minserve final landform design indicated that no highwall or low-wall failures are predicted at LLM due to the highwalls being battered back to slopes of 1V:3H and the low walls to 1V:6H. The 1.5 FoS for both the highwall and low-wall slopes did not present beyond the top batter slopes.

7.10 Tailings/Rejects Management

There are no coal tailings or course rejects stored or planned to be stored within LLM MLs over the LoAP. Tailings/rejects management has hence not been presented within PRCP.

7.11 Underground

No underground operations have been undertaken or are currently planned at LLM.

7.12 Water Management

7.12.1 Potential Contaminants, Sources, Pathways and Receptors

Potential sources of surface water contamination post-closure include:

- Mine-affected runoff and its conveyance via surface water systems; and
- Previously contaminated areas that have not been adequately rehabilitated and revegetated, which may become a source of surface water contamination. These areas may include:
 - Laydown yards and workshops;
 - Exposed metals and minerals in the remaining highwalls;
 - Toe seeps from surface waste storage;
 - Infiltration and subsurface seepage to the residual voids via backfilled material in the pits; and
 - Dispersion or conveyance of subsurface mine-affected water into local groundwater resources.

A geochemical analysis (**Section 7.5** and **Section 7.6**) outlines the methodology used to identify contaminants of concern in waste rock and topsoil from mining activities. The identified contaminants of concern included:

- pH (hydrogen ions);
- salts;
- MPA;
- Sulfates; and
- Metals.

Based on these analyses, a direct source and pathway for contamination from residual mineral waste was considered unlikely but could potentially occur through surface water runoff. Waste characterisation showed that most materials were classified as NAF, with low sulfate and metal concentrations. Consequently, contaminant pathways from rehabilitated areas to surface water are not anticipated. Operational surface water quality monitoring has demonstrated that downstream concentrations have been comparable to those at upstream reference sites. Therefore, no contaminant pathways currently exist during operations, and none are expected during or after closure.

As demonstrated in the residual voids act as a groundwater sinks (**Section 7.8**), preventing contaminants from reaching groundwater aquifers. These residual voids have also been demonstrated to not overtop (**Section 7.9**). Thus, contamination sources have not been predicted in relation to the residual voids.

Additionally, Anglo American maintains a Contaminated Sites Register to record and manage potentially contaminated sites. Remediation activities will be conducted in accordance with the EA. A Preliminary Site Investigation (PSI), and if required a Detailed Site Investigation (DSI), will be completed to further delineate contamination if identified during decommissioning and thereafter. Any remediation works arising from the PSI or DSI will continue until contamination is removed and the site is no longer required to be listed on the contaminated sites register or equivalent.

7.12.2 Dams, Diversions and Drains

LLM has no regulated dams, diversions or drains constructed on-site. As part of planned rehabilitation at LLM, all water storages (dams) will be decommissioned and rehabilitated to support the PMLU of grazing. Mine affected water (if any) will be managed in accordance with the conditions of the EA.

7.12.3 Oaky Creek Levee Decommissioning

The Oaky Creek Levee has been designed to run along the southern extent of LLM to prevent flood ingress into the mining voids during mining operations. The levee is buttressed with haul road fill and spoil stockpiles and is categorised as a 'regulated structure' with a 'significant' consequence category under the DETSI publication '*Manual for assessing consequence categories and hydraulic performance of structures* (Queensland Government, 2024b)'.

Under Condition D34 of the EA, *"structures must not be abandoned and must be either:*

a) Decommissioned and rehabilitated in compliance with Condition H; or

b) Be left in situ for a beneficial use provided that:

- It no longer contains contaminants that will migrate into the environment;*
- It contains water of a quality that is demonstrated to be suitable for its intended beneficial uses; and*
- The administering authority, the holder of the EA and the landholder agree in writing that the dam will be used by the landholder following the cessation of the environmentally relevant activities."*

Oaky Creek Levee will be decommissioned and rehabilitated as per Section a) of Condition D34.

As part of LLM closure, X4 Pit will be partially backfilled and the operational levee consumed and within the final landform. Two cross-sections (**Figure 45**) have been analysed across the landform to compare the operational and final rehabilitated slopes.

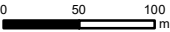
LAKE LINDSAY

PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 45 - OAKY CREEK LEVEE
DECOMMISSIONING AND REHAB-
ILITATION - FINAL LANDFORM
CROSS SECTIONS

LEGEND

- Cross Section
- Mining Lease

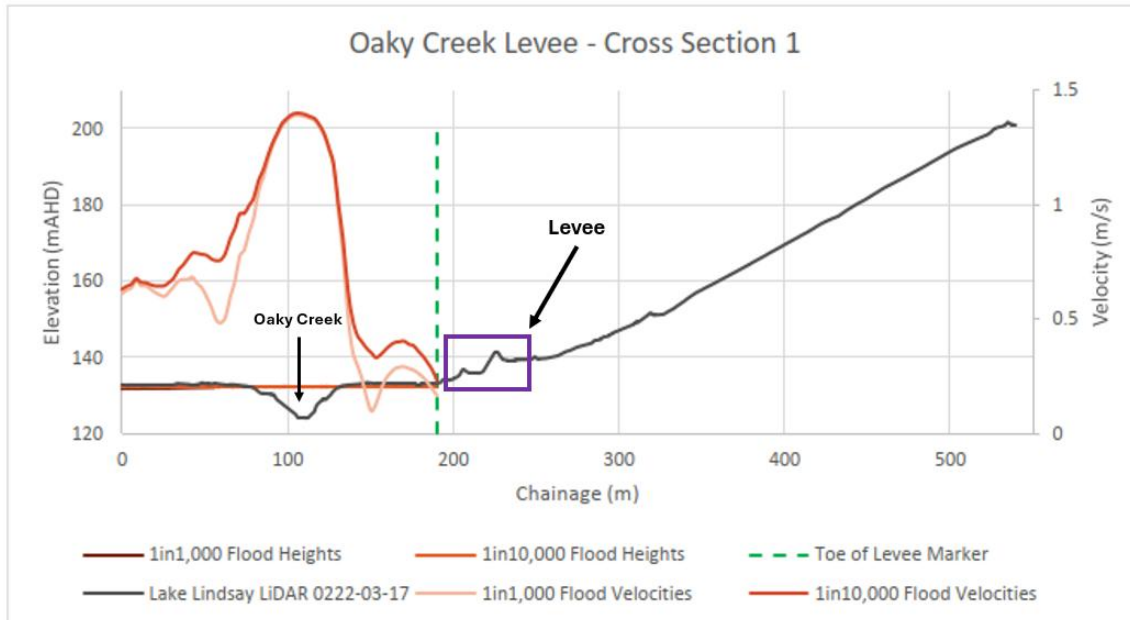


Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:5,000 at A3
Project Number:	626.30126
Date:	04-Mar-2025
Drawn by:	AS

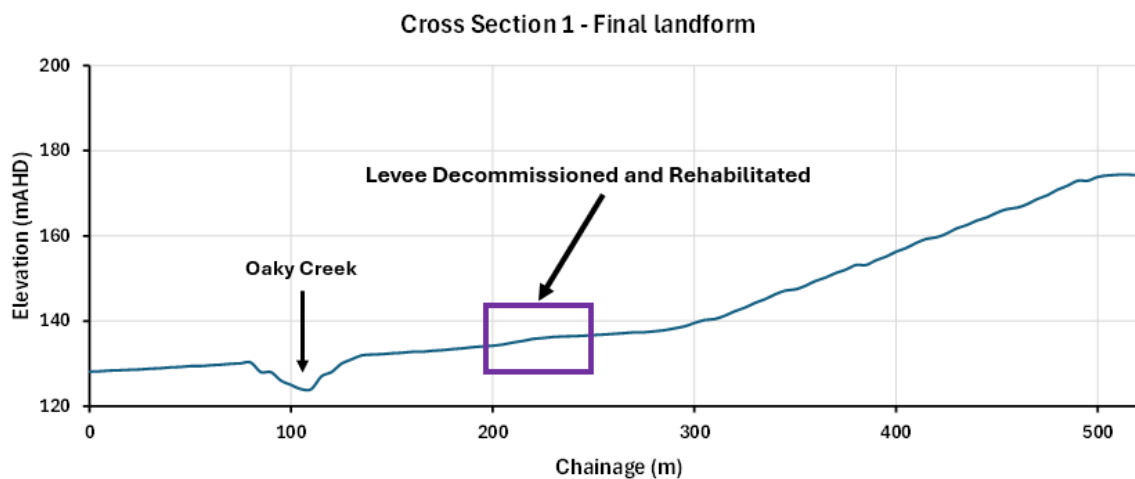


Lake Lindsay Coal Mine

Cross-section 1 includes flood height and velocity results which runs across Oaky Creek and up onto the spoil slope in operational phase (**Figure 46**). The operational levee is depicted within the purple box and consists of two berms with a drainage channel in between. The same cross section profile for the final landform shows that the operational has been consumed and merged into the surrounding final landform (**Figure 47**).

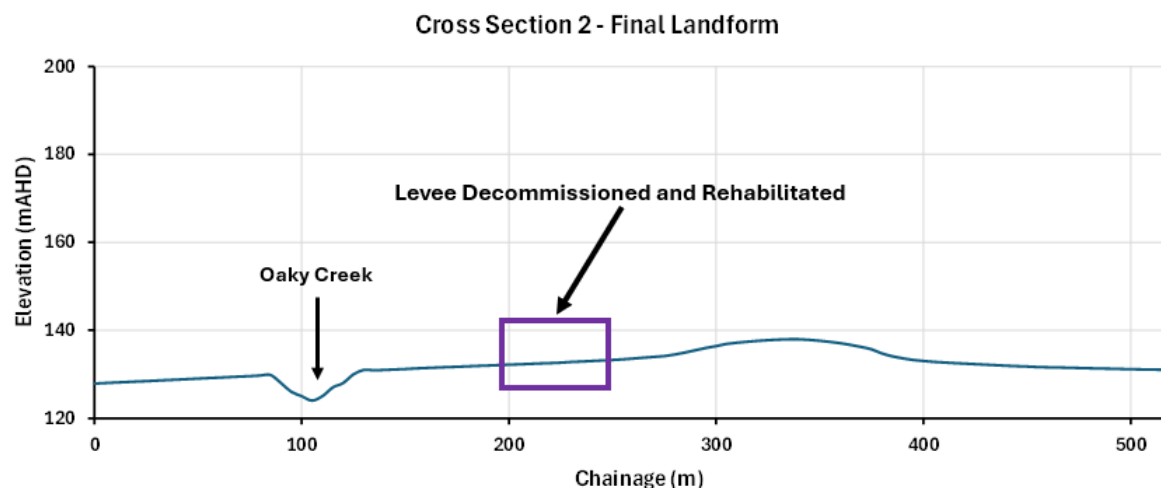


*Figure 46 Oaky Creek Levee in Operational Phase - Cross Section 1
(Source: Red Earth Engineering, 2022)*



*Figure 47 Decommissioned and Rehabilitated Oaky Creek Levee – Cross Section 1
(Data Source: Minserve, 2023)*

A second cross-section (cross-section 2) (**Figure 48**) through the operational levee also shows that it has been decommissioned and integrated into the final landform.



*Figure 48 Decommissioned and Rehabilitated Oaky Creek Levee - Cross Section 2
(Data from Final Landform by Minserve, 2023)*

7.13 Revegetation

7.13.1 Seed Mixture Specification

ERM (2021) prepared a seed mix and recommended sowing rates for the LLM bushland PMLU. These species selections were derived from a combination of species identified during the annual rehabilitation monitoring program, local knowledge of suitable species for the Bowen Basin, and species observed on rocky slopes with similar properties to the proposed landform. Verterra (2020) also prepared a recommended list of species suitable for LLM's soil types and quality under a bushland PMLU.

In addition, a grass species list for grazing PMLUs has been developed using species suitable for grazing that have been used in other PRCPs across the region. Seed mixes will be sourced locally where available, and it is recommended that seed be ordered well in advance of any rehabilitation program and stored in temperature-controlled conditions on-site.

Seed stocks should be selected from local provenance collections if possible and sown as soon as practical after receipt. Prior to delivery, it is recommended that seed mixes be tested for purity/kg (husk and chaff contamination), contamination and viability. Records of seed testing and procurement will be maintained by LLM.

If seed must be stored, it should be kept in a dry environment (~15% humidity is optimal), at a controlled temperature (~15°C is optimal), and under clean (pest-free) conditions. Seeds should be stored in insect- and rodent-proof containers, with baits in place to protect seed quality. Air-conditioned containers may also be considered as an option for medium-term temperature management. Following storage viability should be re-tested prior to sowing and seeding rates compensated for purity and viability results.

The recommended seed list for a PMLU of grazing (**Table 45**) and the recommended species list for a PMLU of bushland (**Table 46**) are presented below. Species for seeding will be selected from these lists based on seed availability with local provenance seed being preferred if available.

Table 45 Recommended Species for Vegetation Establishment to Support PMLU of Grazing

Scientific Name	Common Name	Recommended Sowing Rate (kg/ha)
Chloris ventricose	Tall Chloris	3–6 species from the list with a bulked seed weight of 3 kg/ha
Cymbopogon refractus	Barbed wire grass	
Paspalidium jubiflorum	Warrego grass	
Enteropogon acicularis	Curly windmill grass	
Bothriochloa decipiens	Pitted Bluegrass	
Panicum decompositum	Native millet	
Chloris divaricata	Slender chloris	
Panicum effusum	Hairy panic	
Digitaria spp.	Summer grass	
Eragrostis sp.	Lovegrass	
Rytidosperma sp.	Wallaby Grass	
Melinis repens	Red Natal Grass	
Chloris gayana	Rhodes Grass	
Cynodon dactylon	Bermuda/Couch Grass	
Rhynchosia minima var. minima	Rhyncho (legume)	
Glycine tabacina	Glycine Pea (legume)	
Panicum decompositum	Native Millet (cover crop)	
Lolium multiflorum	Annual Rye (sterile cover crop)	
Echinochloa utilis	Shirohie Millet (sterile cover crop)	
Echinochloa esculenta	Japanese Millet (sterile cover crop)	
3P Species		
Themeda triandra	Kangaroo Grass	
Bothriochloa bladhii	Forest Bluegrass	
Heteropogon contortus	Black Speargrass	

Scientific Name	Common Name	Recommended Sowing Rate (kg/ha)
Dicanthium sericeum	Queensland Bluegrass	
Bothriochloa ewartiana	Desert Bluegrass	
Digitaria brownii	Cotton Panic Grass	
Panicum decompositum	Native Millet	
Capillipedium spicigerum	Scented Top	

Table 46 Recommended Species for Vegetation Establishment to Support PMLU of Bushland (ERM, 2021)

Scientific Name	Common Name	Steep-Rocky Slopes	Flat-Loamy Surfaces	Seeding Rate
Trees				
Allocasuarina luehmannii	Bull-oak/ buloke		X	Between 4–8 species from the list with bulk seed at 3 kg/ha (assuming some chaff and impurities in seed lots). Use 1.5 kg/ha if using pure seed.
Corymbia clarksoniana	Clarkson's Bloodwood	X	X	
Corymbia erythrophloia	Red bloodwood	X	X	
Eucalyptus cambageana	Dawson River blackbutt/ Dawson gum/ Coowarra box		X	
Eucalyptus citriodora	Lemon-scented gum	X	X	
Eucalyptus crebra	Narrow-leaved ironbark	X	X	
Eucalyptus melanophloia	Silver-leaved ironbark		X	
Corymbia dallachiana	Dallachy's Gum		X	
Eucalyptus populnea	Poplar box	X	X	
Eucalyptus thozetiana	Mountain Yapunyah	X	X	
Eucalyptus brownii	Reid River Box	X		

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Scientific Name	Common Name	Steep-Rocky Slopes	Flat-Loamy Surfaces	Seeding Rate
Tall Shrubs/ Small Trees				
Acacia bancroftiorum	Bancroft’s wattle		X	Between 4–8 species from the list with bulk seed at 8 kg/ha, subject to availability of seed stock.
Acacia catenulata	Bendee		X	
Acacia crassa	Curracabah	X	X	
Acacia cretata	Chalky wattle		X	
Acacia decora	Pretty Wattle		X	
Acacia rhodoxylon	Ringy rosewood/ Rosewood	X	X	
Acacia shirleyi	Lancewood		X	
Acacia oswaldii	Umbrella Wattle		X	
Cassia brewsteri	Brewster’s Cassia	X	X	
Eremophila mitchellii	False sandalwood		X	
Low Shrubs				
Clerodendrum floribundum	Lolly bush		X	2–3 species from the list with a bulked seed at 1 kg/ha, subject to availability of seed stock.
Corchorus trilocularis	Wild jute		X	
Dodonaea viscosa	Hopbush	X	X	
Eremophila bignoniflora	Bignonia emu-bush		X	
Senna artemisioides	Silver Cassia	X	X	
Grasses and Cover Crop Species				
Aristida latifolia	Feathertop wiregrass	X	X	3-6 species from the list with a bulked seed at 3 kg/ha.
Bothriochloa bladhii	Forest Bluegrass		X	
Bothriochloa decipiens	Red grass	X	X	

Scientific Name	Common Name	Steep-Rocky Slopes	Flat-Loamy Surfaces	Seeding Rate
Chrysopogon fallax	Golden beard grass ribbon grass	X	X	
Cymbopogon bombycinus	Citronella Grass		X	
Entolasia stricta	Wiry panic		X	
Echinochloa utilis	Shirohie Millet (cover crop)		X	
Heteropogon contortus	Black speargrass/ tanglehead	X	X	
Panicum queenslandicum	Yadbila grass/ Coolabah grass		X	
Themeda triandra	Kangaroo Grass	X	X	
Forbs				
Dichanthium sericeum (G)	Queensland Bluegrass		X	2–3 species from the list with a bulked seed at 1 kg/ha, subject to availability of seed stock.
Lolium multiflorum	Annual Rye		X	
Atriplex muelleri	Muellers saltbush		X	
Einadia nutans	Climbing saltbush		X	
Enchylaena tomentosa	Ruby saltbush		X	
Atriplex nummularia	Old Man Saltbush	X	X	

7.13.2 Timing

Revegetation success can be significantly influenced by climatic conditions. To achieve successful revegetation, both the appropriate wet and dry cycle, season and timing of germination should be considered. Direct seeding will generally be conducted between October and February and ideally between October and December, to take advantage of the wet season. Seeding will occur as soon as possible after topsoil application and immediately following ripping to ensure a friable seedbed.

7.14 Rehabilitation Methodology

Anglo American maintains a rolling Five-Year Rehabilitation Plan to guide rehabilitation efforts over that period. The objective of rehabilitation is to create areas that are self-sustaining, resilient, and require no greater management than surrounding undisturbed areas. The plan outlines key requirements and best practices for rehabilitation on site, in alignment with Anglo American's Rehabilitation Strategy Guidelines and the final landform criteria that must be achieved before rehabilitation can be signed off for relinquishment. This five-year plan is updated annually to incorporate changes in the mine plan and other factors that may influence the current five-year rehabilitation forecast (Anglo American, 2018a).

7.14.1 Design

Following commitments have been made by Anglo American in relation to LLM rehabilitation design requirements:

- Rehabilitation design and execution scheduling will be undertaken using the Five-Year Rehabilitation Plan;
- Design of rehabilitation will, at a minimum, meet the design and final landform requirements of the applicable LLM EA, ensuring it is safe, stable, self-sustaining, and non-polluting (**Section 7.1, Table 22 and EA Table G2**);
- Landform design works will be integrated with mining operations to allow for less erosive Permian material to be placed on external batters rather than Tertiary material. Where available, competent Permian material will be used to supplement quarry rock as outer batter armouring and rock mulch; and
- The total area rehabilitated each year will be undertaken in accordance with the PRCP Schedule (**Appendix P**).

7.14.2 Reshaping

Anglo American has indicated that the following principles may be applied during rehabilitation:

- Reshaping will be completed to the design slope (**Section 7.1, Table 22 and EA Table G2**) or to the slopes specified within the EA;
- The toe of all external slopes will be merged into the surrounding surface profile; and
- Upon completion of reshaping, a survey will be undertaken to capture the final landform.

7.14.3 Overburden or Spoil Amelioration

Following commitments are made by Anglo American in relation to LLM spoil amelioration requirements:

- Spoil material will undergo chemical characterisation testing, as required, prior to the commencement of rock mulching or topsoiling and/or ripping and seeding;

- Gypsum should be applied in accordance with Table G2 – Landform Design of the EA applicable on externally draining soil slopes at the following rates:
 - For spoil, to a minimum treatment depth of 400 mm (± 100 mm):
 - i. ≥ 25 tonnes per hectare (t/ha); or
 - ii. At a rate sufficient to reduce the ESP/ EC ratio below the stability threshold of 14%; and
 - For topsoil, to a minimum treatment depth of 150 mm:
 - i. ≥ 3 t/ha; or
 - ii. At a rate sufficient to reduce the ESP/ EC ratio below the stability threshold of 5%.
- Treatment options should be applied after the completion of reshaping and prior to topsoil application.

7.14.4 Rock Mulching

The following commitments have been made by Anglo American in relation to LLM rock mulching requirements:

- Rock mulch must be applied to the depth specified in Table G2 – Landform Design of the EA (**Table 22**) for externally draining soil slopes as follows:
 - For externally draining spoil slopes:
 - i. For slopes $> 1V:4H$ ($> 25\%$), ≥ 0.5 m depth; and
 - ii. For slopes $\leq 1V:4H$ and $\geq 1V:6H$ ($\leq 25\%$ and $\geq 16.67\%$), ≥ 0.2 m depth.
 - For internally draining spoil slopes:
 - i. Covered with ≥ 0.2 m of rock mulch.
- Following completion of rock mulching and topsoil application, a survey will be undertaken to confirm that the material has been placed to the required depth; and
- Where available, competent Permian material will be used to supplement quarry rock as outer batter armouring and rock mulch.

7.14.5 Topsoil Application

The following commitments have been made by Anglo American regarding LLM topsoil application requirements:

- Topsoil stockpiles designated for use in rehabilitation will be sampled prior to use, ideally at the same time as spoil material. Topsoil sampling will be undertaken in accordance with the following procedure:
 - Select representative sampling locations, depending on the size of the topsoil stockpile;
 - Collect samples at a depth of at least 150 mm;
 - Store and dispatch samples to the laboratory in accordance with laboratory guidelines;

- Maintain Chain of Custody (CoC) and request soil and agronomic analyses;
- Review laboratory results and determine ameliorant requirements; and
- Order additives (e.g. fertilisers, gypsum or organics) as required.
- Additives will be mixed into the topsoil after placement by contour ripping to a minimum depth of 150 mm;
- Appropriate equipment such as a dozer or grader will be used for topsoil placement to minimise soil compaction and structural loss; and
- The topsoil will typically be placed to a depth of 150 mm.

7.14.6 Ripping and Seeding

Following commitments are made by Anglo American in relation to LLM ripping and seeding requirements:

- Ripping will be undertaken on the contour to a minimum depth of 300 mm using a D10/D11 Dozer or equivalent with a maximum tyne spacing of 1.5 m; and
- Seed mixes will applied immediately after ripping and prior to any rain to ensure a friable seed bed;
- Seed mixes will be sourced, stored and prepared in accordance with Section 7.13.1; and
- Seed spread by a mechanical spreader, hand or aerial seeding depending on the scale of the area to be seeded, equipment availability and safe operating procedures.

7.14.7 Residual voids

Four residual voids will remain in the final landform after reshaping is completed to reduce highwall slopes. These residual voids will act as NUMAs and will gradually fill with stormwater, creating water bodies referred to as “void lakes.” LLM will leave a maximum of 525 ha of mining voids and ramps as residual voids or NUMAs, in accordance with the EA.

The proposed residual void walls have been geotechnically assessed and determined to be safe and stable, with no water ingress from flood events up to a 0.1% AEP or PMF.

The residual voids will contain water sourced from runoff and have been modelled as groundwater sinks, indicating that they will not discharge water to surrounding groundwater systems or overtop into the surrounding environment.

7.14.8 Built Infrastructure

The rehabilitation of infrastructure will involve demolishing and removing all buildings and infrastructure, followed by land contamination assessments and remediation where required. Any hardstand areas will be ripped, contoured, and revegetated in accordance with the final land use specified in the proposed PRCP schedule. Water storages (dams) will also be decommissioned, with any mine-affected water dewatered and transferred to GCM for management under GCM’s EA. These areas will then be reshaped, topsoiled, and seeded. The PMLU for these

infrastructure areas has been designed as grazing in accordance with Table G1 of the EA.

Liberty Industrial (2018) undertook a decommissioning study on the Capcoal Complex to assess fixed plant and infrastructure decommissioning. The scope of this study included all fixed plant, workshops, administration buildings, and concrete hardstand areas. The findings informed the estimated quantities of waste generated from decommissioning and provided a disposal plan for each waste category. The scope of work conducted as part of the study included (Liberty Industrial, 2018):

- Removal of all demountable and moveable buildings off-site;
- Demolition and removal of fixed plant and infrastructure;
- Removal of concrete hardstand areas;
- Removal of footings to 1.5 m below ground level;
- Disposal of all general waste, brick, and concrete in a designated on-site area; and
- Recognition that waste from LLM infrastructure decommissioning and closure will consist primarily of general waste, concrete/masonry, and steel.

All waste disposal will be carried out in accordance with the requirements of the EA.

7.14.9 Exploration and Ancillary Activities

Exploration and ancillary activities include the following activities:

- Exploration; and
- Ancillary activities such as roads, fences, underground services, telecommunications facilities, pipelines, electrical infrastructure, storage depots, laydown or shutdown pads and monitoring stations and bores.

Rehabilitation for areas listed as exploration or ancillary activities in the Final Site Design (**Figure 51**) under RA4 will be rehabilitated in accordance with *Eligibility criteria and standard conditions for exploration and mineral development projects* or its successor. Works could include area-specific rehabilitation methods based on disturbance type such as:

- Boreholes will be backfilled and sealed;
- Ancillary activity infrastructure will be decommissioned and removed;
- Disturbed areas will be topsoiled with stockpiled soil, ripped as required and seeded; and
- Areas will achieve a PMLU of grazing.

7.14.10 Tailings and Rejects Storage Facilities

There are no coal tailings or rejects storage facilities at LLM.

7.14.11 Fauna Establishment

For areas with a PMLU of bushland, the following methods will help support the establishment of native fauna:

- Logs from trees cleared in advance of mining will be stockpiled and later distributed across rehabilitated areas designated as bushland to provide habitat for native fauna; and
- Large inert boulders of competent rock may be placed on the surface of overburden dumps to create fauna habitat and perching sites for raptors.

8 Mine Closure Risk Assessment

A Closure and Rehabilitation Risk Assessment was undertaken by Anglo American between 19 and 20 October 2021 as part of preparing the Draft Closure Plan for the broader Capcoal Complex, to meet the requirements of the Anglo American Mine Closure (v3) Toolkit. This information has been provided to support the risk assessment.

8.1 Principles and Methodology

Anglo American conducts risk assessments in accordance with AS/NZS ISO 31000:2018 – Risk Management – Guidelines (Standards Australia, 2018).

The key steps in the risk assessment process are:

- **Establish the Context:** Consideration is given to both the internal and external environments, the limits within which the risk assessment is valid, the activity being assessed, and the cross-section of people contributing to the risk management process;
- **Identification of Hazards:** This involves identifying risks against a predefined set of business objectives, taking into account the context, previous risk assessments, incidents, and findings from onsite audits;
- **Risk Analysis:** Each potential consequence is analysed separately, with existing controls identified and their effectiveness and efficiency evaluated;
- **Risk Evaluation:** This assists in decision-making by defining which risks require treatment and prioritising implementation; and
- **Risk Treatment:** This involves selecting and implementing control options to reduce residual risks to a level that is As Low As Reasonably Achievable (ALARA). The costs and benefits of controls are reviewed, with risk reduction guided by the hierarchy of controls:
 - Elimination;
 - Substitution;
 - Engineering controls;
 - Administrative controls; and
 - Personal protective equipment.

The Mine Closure Risk Assessment (Anglo American, 2021) considered and documented:

- The risk or opportunity event;

- Causes and potential consequences/ impacts;
- Existing preventative and/or mitigative controls;
- Whether the item is classified as a risk or opportunity;
- The effectiveness or adequacy of existing controls;
- The consequence category (e.g., Health and Safety, Environment, Social/ Community, Legal & Regulatory, Damage, Reputation);
- The consequence considering existing controls;
- The potential maximum consequence (worst case if existing controls fail);
- The likelihood of the event occurring with existing controls and their effectiveness;
- Any additional controls required, included in a forward work plan; and
- The consequence and likelihood of the event occurring after closure criteria are implemented.

8.2 Risk Assessment Process

8.2.1 Objective

The closure and rehabilitation risk assessment was conducted with the following objectives:

- Identify existing and potential key closure and rehabilitation-related risks and opportunities, and confirm existing or current control measures (closure criteria);
- Identify additional risk mitigations required for LLM, including agreed actions; and
- Focus on future rehabilitation work (agreed actions) to address significant risks and knowledge gaps.

8.2.2 Scope of Closure and Rehabilitation Risk Assessment

The scope of the Closure and Rehabilitation Risks and Opportunities Workshop (Anglo American, 2021b) encompassed all landforms, infrastructure, surface features, and potential interactions or impacts on the MLs associated with LLM, as part of the broader Capcoal Complex.

Risks and opportunities were identified for all decommissioning, demolition, and rehabilitation activities occurring progressively throughout the LLM lifecycle, as well as at the cessation of mining and processing. The post-closure monitoring period was also considered, including any potential legacy issues that may not be rehabilitated or remediated.

Key risk areas considered included:

- Health and safety;
- Environmental impact;
- Material losses, damage, or business interruption;

- Legal and regulatory compliance; and
- Reputation, social, and community impact.

8.3 Risk Matrix ---

Anglo American's standard risk matrix was used in the PRCP risk assessment. The risk matrix, along with the consequence and likelihood categories, is provided in (Table 47 to Table 49).

The risk matrix assesses the level of risk associated with specific events by considering both the consequence and likelihood of each event. The consequence and likelihood categories have been developed based on the criteria outlined in the *Integrated Mine Closure Good Practice Guide*, 2nd Edition (International Council on Mining & Metals (ICMM), 2019), with an additional consequence category included to address impacts on the PRCP schedule.

8.4 Closure Risk Assessment ---

Closure risk assessment was conducted by Anglo American as part of the Capcoal Complex Risk Assessment (Anglo American, 2021b).

SLR modified this risk assessment to include a risk treatment plan for each risk applicable to mine closure specifically associated with LLM. The methodology for the risk assessment is presented below by providing the consequence table (Table 47), likelihood table (Table 48) and risk matrix (Table 49). The full and updated risk assessment is attached (Appendix N).

Table 47 Anglo American Operational Risk Management (ORM) Risk Matrix – Consequence Level

Anglo American ORMP RISK MATRIX	CONSEQUENCE LEVEL (Consider the maximum reasonable potential consequence of the event)				
	1 - Insignificant	2 - Minor	3 - Moderate	4 - High	5 - Major
Consequence Type (Additional "Impact Types" may exist for an event, identify & rate accordingly)					
(S) Harm to People - Safety	First aid case	Medical treatment case	Lost time injury	Permanent disability or single fatality	Numerous permanent disabilities or multiple fatalities
(H) Harm to People - Occupational Health	Exposure to health hazard resulting in temporary discomfort	Exposure to health hazard resulting in symptoms requiring medical intervention and full recovery (no lost time)	Exposure to health hazards/ agents (over the OEL) resulting in reversible impact on health (with lost time) or permanent change with no disability or loss of quality of life	Exposure to health hazards/ agents (significantly over the OEL) resulting in irreversible impact on health with loss of quality of life or single fatality	Exposure to health hazards/ agents (significantly over the OEL) resulting in irreversible impact on health with loss of quality of life of a numerous group/ population or multiple fatalities
(E) Environmental Impact	Lasting days or less; limited to small area (metres); receptor of low significance/ sensitivity (industrial area)	Lasting weeks; reduced area (hundreds of metres); no environmentally sensitive species/ habitat)	Lasting months; impact on an extended area (kilometres); area with some environmental sensitivity (scarce/ valuable environment).	Lasting years; impact on sub-basin; environmentally sensitive environment/ receptor (endangered species/ habitats)	Permanent impact; affects a whole basin or region; highly sensitive environment (endangered species, wetlands, protected habitats)
(S) Social / Community Impact	Insignificant impact on external stakeholders regarding their health and safety, and/ or insignificant impact on external stakeholder / contractor worker economic welfare, personal and political security, and/ or cultural heritage.	Minor impact on external stakeholders regarding their health and safety, and/ or minor impact on external stakeholder / contractor worker economic welfare, personal and political security, and / or cultural heritage	Medium impact on external stakeholders regarding their health and safety, and/ or medium impact on external stakeholder/ contractor worker economic welfare, personal and political security, and/ or cultural heritage	High impact on external stakeholders regarding their health and safety, and/ or high impact on external stakeholder/ contractor worker economic welfare, personal and political security, and/ or cultural heritage	Major impact on external stakeholders regarding their health and safety, and/ or major impact on external stakeholder/ contractor worker economic welfare, personal and political security, and/ or cultural heritage
(L&R) Legal & Regulatory	Technical non-compliance. No warning received; no regulatory reporting required	Breach of regulatory requirements; report/ involvement of authority. Attracts administrative fine	Minor breach of law; report/investigation by authority. Attracts compensation/ penalties/ enforcement action	Breach of the law; may attract criminal prosecution, penalties/ enforcement action. Individual licence temporarily revoked	Significant breach of the law. Individual or company lawsuits; permit to operate substantially modified or withdrawn

Anglo American ORMP RISK MATRIX	CONSEQUENCE LEVEL (Consider the maximum reasonable potential consequence of the event)				
(M) Material Losses/ Damage/ Business Interruption	<0.01 % of Annual Revenue/ Total Assets	0.01 - 0.1 % of Annual Revenue / Total Assets	0.1 - 1.0 % of Annual Revenue/ Total Assets	1 - 5 % of Annual Revenue/ Total Assets	> 5 % of Annual Revenue/ Total Assets
(R) Reputation	Minor impact; awareness/ concern from specific individuals	Limited impact; concern/ complaints from certain groups/ organizations (e.g. NGOs) period	Local impact; public concern/ adverse publicity localised within neighbouring communities	Suspected reputational damage; local/ regional public concern and reactions	Noticeable reputational damage; national/ international public attention and repercussions

Table 48 Anglo American Operational Risk Management (ORM) Risk Matrix – Consequence Type

Consequence Type		1 - Insignificant	2 - Minor	3 - Moderate	4 - High	5 - Major
LIKELIHOOD Considering the presence and magnitude of the hazard and the exposure to that hazard (number of people and frequency of the tasks exposing those people), as also the status of existing controls		RISK RATING				
5 - Almost Certain	The unwanted event is almost certain to happen within the LOAP (Life of Asset Plan). In the case of repetitive/ frequent tasks the unwanted event has or will occur in order of one or more times per year. In terms of major events, as also in the case of long-term health, environmental or social impacts, it may happen only once in the LOAP.	11 (Medium)	16 (Significant)	20 (Significant)	23 (High)	25 (High)
4 - Likely	There is a high probability that the unwanted event will occur within the LOAP. In the case of repetitive/ frequent tasks the unwanted event has occurred or is likely to occur in order of less than once per year. In terms of major events, as also in the case of long-term health, environmental or social impacts, it might happen once in the LOAP.	7 (Medium)	12 (Medium)	17 (Significant)	21 (High)	24 (High)
3 - Possible	It is possible that the unwanted event can occur within the LOAP. In the case of repetitive/ frequent tasks, the unwanted event has occurred or is likely to occur in order of once every 5-10 years. In terms of major events, as also in the case of long-term health, environmental or social impacts, there is a low probability for the event to happen in the LOAP.	4 (Low)	8 (Medium)	13 (Significant)	18 (Significant)	22 (High)
2 - Unlikely	There is a low probability for the unwanted event to occur within the LOAP. In the case of repetitive/ frequent tasks, the unwanted event has occurred sometime or is likely to occur not more than once every 10-20 years. In terms of major events, as also in the case of long-term health, environmental or social impacts, there is a low probability for the event to happen in the LOAP.	2 (Low)	5 (Low)	9 (Medium)	14 (Significant)	19 (Significant)
1 - Rare	There is a very low probability for the unwanted event to occur within the LOAP. In the case of repetitive/ frequent tasks there are no records of the event occurring or it is highly unlikely that it will occur within the next 20 years. In terms of major events, as also the case of long-term health, environmental or social impacts, there is a very low probability for the event to ever happen.	1 (Low)	3 (Low)	6 (Medium)	10 (Medium)	15 (Significant)

Table 49 Anglo American Operational Risk Management (ORM) Risk Matrix – Risk Rating and Risk Level

Risk Rating	Risk Level	Guidelines for Risk Matrix
21 to 25	High	A high risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised immediately.
13 to 20	Significant	A significant risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised as soon as possible.
6 to 12	Medium	A moderate risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised as part of the normal management process.
1 to 5	Low	A low risk exists that management's objectives may not be achieved. Monitor risk, no further mitigation required.

9 Rehabilitation Trials

Rehabilitation trials were established at GCM in September 2014 and at LLM in March 2018 as part of the broader Australian Coal Association Research Project (ACARP) C24033, titled “Applying risk-based principles of dispersive mine spoil behaviour to facilitate development of cost-effective best management practices.” Details of these trials are documented in Verterra (2020) (**Appendix J**).

The objective of the trials was to assess different surface treatment options with the aim of achieving a stable landform capable of supporting the desired post-mining land use while remaining cost-effective.

At LLM, the trial treatments (**Table 50**) were established (**Figure 49**). The results of these trials are documented in **Appendix J**.

Table 50 LLM Trial Treatments (Source: Verterra, 2020)

Treatment	Treatment Name	Spoil Gypsum Treatment	Spoil Ripping Depth	Topsoil Depth (cm)	Topsoil Gypsum Treatment	Organic Matter (t/ha)	Fertiliser	Topsoil Cultivation Depth (cm)	Irrigation	Seed mix (kg/ha)	Seed Harrow Depth (mm)
1	No treatment (Control 1)	Nil	20 cm	15	Nil	52t	Blend	15	No	42	50
2	Dry gypsum (1x) in spoil and topsoil	1x	20 cm	15	1x	52t	Blend	15	No	42	50
3	Gypsum (1x) in spoil and topsoil with controlled irrigation	1x	20 cm	15	1x	52t	Blend	15	Yes	42	50
4	Dry gypsum (2x) in spoil and topsoil	2x	20 cm	15	2x	52t	Blend	15	No	42	50
5	Gypsum (2x) in spoil and topsoil with controlled irrigation	2x	20 cm	15	2x	52t	Blend	15	Yes	42	50
6	Rock mulch – 0.5 to 1 m (Control 2 / standard practice)	Nil	N/A	30 equiv	Nil	Nil	DAP	N/A	No	70a	N/A

Lake Lindsay Coal Mine



Figure 49 LLM Trial Design and Sampling Points (Verterra, 2020)

The 1x and 2x irrigated gypsum treatments exhibited the least erosion, with 0.1% and 0% gully erosion as a proportion of total area, respectively. This was followed by the Control, 1x, and 2x unirrigated gypsum treatments, which recorded erosion rates of 0.9%, 2.8%, and 0.9%, respectively. The rock mulch treatment showed significantly greater erosion again, at 12.8%.

Despite the superior performance of the gypsum amelioration treatments in reducing the dispersive behaviour and vulnerability to erosion of spoil and soil at LLM, transport and erosion still occurred. This is evident in the 1x dry gypsum treatment of replicate 2, where water from a catchment area of 4,176 m² above the trial was preferentially channelled onto the trial area. The soil below this point was exposed to higher erosive energy than the majority of the trial, whose catchment started at the top of the treated plots. In such cases, where flow velocity exceeds the cohesion between soil particles - leading to detachment, entrainment, and transport - additional energy dissipation provided by rock armouring is required.

The conclusions of the rehabilitation trials are as follows:

- ESP, slope, and contributing catchment are important factors driving erosion;
- Vegetation cover and rock are important factors in preventing erosion;
- Landform design that allows uncontrolled development of overland flow will likely result in random formation of concentrated flow paths and associated erosion;
- Lines of flow-path concentration and their contributing catchment should be designed to identify where soil amelioration alone cannot resist concentrated flow energy, and the effective use of rock (at least 100 mm cover) should be considered;
- Gypsum amelioration can effectively reduce ESP to target levels of around 5%, thereby reducing soil and spoil vulnerability to erosion;
- Site-specific topsoil amelioration can effectively address nutritional (chemical), physical, and biological limitations to plant establishment and growth. This allows establishment of high vegetation cover, contributes to reduced erosion through increased surface roughness, slows overland flow, protects soil from raindrop impact, supports root development that provides shear stress, and enhances soil particle aggregation through root exudates and humates;
- Despite significantly greater erosion and less vegetation cover on rock mulch treatments, rock contributes to increased surface roughness and armouring, reducing erosion below levels expected with no treatment, especially when combined with amelioration treatments; and
- Rock cover should be used in a targeted manner to achieve the most effective outcomes, with dispersive soils ameliorated by incorporating gypsum.

The trial informed the 2025 EA Amendment Application to revise the requirements for rock mulching to:

- For slopes > 1V:4H (> 25%), ≥ 0.5 m depth; and
- For slopes ≤ 1V:4H and ≥ 1V:6H (≤ 25% and ≥ 16.67%), ≥ 0.2 m depth.

10 Monitoring and Maintenance

10.1 Overview

Monitoring of rehabilitated areas is critical to demonstrate whether defined completion criteria are being met. It is also important for the early identification of issues – such as erosion or weed invasion – so they can be addressed before worsening.

Rehabilitation monitoring is a requirement under Condition G5 of LLM's EA, which states:

“Monitoring rehabilitation must be undertaken for the purpose of reviewing the rehabilitation process undertaken with the intent to improve rehabilitation practices and validating the proposed post mining land use. The rehabilitation monitoring must at a minimum include:

- a) Species diversity;*
- b) Vegetative ground cover;*
- c) Tree density and stem thickness;*
- d) Visible indicators of erosion; and*
- e) Foliage projective cover.”*

LLM's rehabilitation monitoring and maintenance will be undertaken in accordance with the conditions of the EA and guided by the Rehabilitation Specification (Anglo American, 2023) or any subsequent revisions or documents that may supersede it.

In accordance with the Rehabilitation Specification (Anglo American, 2023), Anglo American will develop a standardised rehabilitation monitoring program that incorporates all requirements of the defined completion criteria. The rehabilitation monitoring program should adhere to the following principles:

- Collate and review existing monitoring data to identify common elements across programs;
- Select a single monitoring methodology that incorporates all required elements from the completion criteria and consistently apply it;
- Conduct a gap analysis of existing monitoring and repeat the chosen standardised method in previously rehabilitated areas as necessary;
- Include a monitoring component after the first wet season following rehabilitation, involving transects to identify issues such as erosion, weed invasion, and framework species establishment;
- Include additional monitoring at various stages of successional development to demonstrate self-sustainability and resilience;
- Recognise that some monitoring will be one-off while others will be repeated and should be permanently marked;

- Ensure monitoring sites are appropriately replicated and employ scientifically rigorous techniques;
- Focus primarily on vegetation monitoring, with selective monitoring of some fauna groups as indicators of ecosystem function;
- Develop an annual rehabilitation monitoring program based on a comprehensive matrix of individual site requirements to demonstrate compliance with completion criteria; and
- Store monitoring data in the environmental database, linking it to ArcGIS Pro spatial data where possible.

Each rehabilitated area will be classified into one of four categories:

- Meets all completion criteria - prepare submission for sign-off;
- Meets the majority of completion criteria with minor issues - schedule remedial works;
- Meets some completion criteria with major issues - re-rehabilitate the area; and
- Area too young to assess - continue monitoring.

10.2 Monitoring Methodology

As of 2020, the broader Capcoal Complex has 58 monitoring sites established across rehabilitation areas, with rehabilitation ages ranging from 36 years to the present (ERM, 2021). Existing rehabilitation at LLM has not yet had sufficient time to establish a baseline dataset to inform ideal values for future rehabilitation success. Ideal values have been developed using limited existing monitoring data as well as knowledge from similar sites.

ERM (2022c) summarised the Rehabilitation Monitoring Program undertaken at the Capcoal Complex and proposed revisions. A pilot campaign was conducted in 2022 to trial these updated rehabilitation monitoring practices.

The recommended monitoring program for Anglo American (**Table 53**) is discussed below.

10.2.1 Surface Water Quality Criteria

Table 51 provides recommended guideline limits, derived from several sources, to establish criteria for surface water. Water quality at the Oaky Creek Upstream location (background) has been monitored at intervals since 2012. Limits are subject to change with PRCP condition PRCP17.

Table 51 Recommended Post Closure Water Quality Limits

Parameter	Site Specific Limit	Comment
pH	6.5–8.5	Mackenzie River Sub-basin WQO
Electrical Conductivity (µS/cm)	670	80th Percentile of Historical Reference Site Water-Quality Data

Parameter	Site Specific Limit	Comment
Turbidity (NTU)	50	Mackenzie River Sub-basin WQO
Sulphate (mg/L)	79	80th Percentile of Historical Reference Site Water-Quality Data
Fluoride (mg/L)	0.2	Site-specific
Aluminium – dissolved (µg/L)	55	ANZG 2018
Arsenic – dissolved (µg/L)	13	ANZG 2018
Boron – dissolved (µg/L)	40	Site-specific
Chromium – dissolved (µg/L)	1.0	ANZG 2018
Cobalt – dissolved (µg/L)	1.4	ANZG 2018
Copper – dissolved (µg/L)	3	Site-specific
Manganese – dissolved (µg/L)	1,000	Site-specific
Molybdenum – dissolved (µg/L)	34	ANZG 2018
Nickel – dissolved (µg/L)	11	ANZG 2018
Zinc – dissolved (µg/L)	8	ANZG 2018
Total recoverable hydrocarbons (C6–C9) (µg/L)	20	
Total recoverable hydrocarbons (C10–C36) (µg/L)	100	
Major ions (mg/L)	For interpretation purposes	
Hardness (mg/L)	For 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; and
- ANZG (2018) Aquatic ecosystem protection for moderately disturbed system (95% protection).

10.2.2 Groundwater Quality Criteria

Quality limits for the main hydrogeological units are derived using existing groundwater data at LLM and existing limits (**Table 52**). Limits are subject to change with PRCP condition PRCP17.

Table 52 *Derived Groundwater Quality Limits*

Hydrogeological Unit	Monitoring Bore	Limit	Comment
pH (pH units)	All bores	6–9	Range
Electrical Conductivity (µS/cm)	Lake Lindsay Bore (Alluvium)	13,400	95th Percentile of bore data
Electrical Conductivity (µS/cm)	MB1, MB2, MB4, MB5 (Late Permian)	33,205	95th Percentile of bore data
Electrical Conductivity (µS/cm)	MB3 and MB6 (Tertiary)	33,825	95th Percentile of bore data
Sulphate (mg/L)	Lake Lindsay Bore (Alluvium)	142	95th Percentile of bore data
Sulphate (mg/L)	MB1, MB2, MB4, MB5 (Late Permian)	153	95th Percentile of bore data
Sulphate (mg/L)	MB3 and MB6 (Tertiary)	165	95th Percentile of bore data
Fluoride (mg/L)	All bores	0.6	Site-specific
Aluminium – dissolved (µg/L)	All bores, except MB1	55	ANZG 2018
Aluminium – dissolved (µg/L)	MB1	85	95th Percentile of MB1 data
Arsenic – dissolved (µg/L)	All bores	13	ANZG 2018
Arsenic – dissolved (µg/L)	Lake Lindsay Bore (Alluvium)	700	95th Percentile of all bore data
Boron – dissolved (µg/L)	MB1 and MB2	900	95th Percentile of all bore data
Boron – dissolved (µg/L)	MB4 and MB5	300	95th Percentile of all bore data
Boron – dissolved (µg/L)	MB3	2,270	95th Percentile of all bore data

Lake Lindsay Coal Mine

Hydrogeological Unit	Monitoring Bore	Limit	Comment
Boron – dissolved (µg/L)	MB6	3,000	95th Percentile of all bore data
Chromium – dissolved (µg/L)	All bores, except MB1 and MB5	1	ANZG 2018
Chromium – dissolved (µg/L)	MB1 and MB5	20	95th Percentile of MB1 and MB5 data
Cobalt – dissolved (µg/L)	All bores, except MB3 and MB6	1.4	ANZG 2018
Cobalt – dissolved (µg/L)	MB3 and MB6	10	95th Percentile of MB3 and MB6 data
Copper – dissolved (µg/L)	All bores	10	95th Percentile of all bore data
Manganese – dissolved (µg/L)	All bores	1,900	ANZG 2018
Molybdenum – dissolved (µg/L)	All bores, except MB1	34	ANZG 2018
Molybdenum – dissolved (µg/L)	MB1	225	95th Percentile of MB1 data
Nickel – dissolved (µg/L)	All bores, except MB3	11	ANZG 2018
Nickel – dissolved (µg/L)	MB3	25	95th Percentile of MB3 data
Zinc – dissolved (µg/L)	All bores, except MB3	130	95th Percentile of all bore data
Zinc – dissolved (µg/L)	MB3	520	95th Percentile of MB3 data
Major ions (mg/L) – calcium, chloride, potassium,	All bores	For interpretation purposes	

Hydrogeological Unit	Monitoring Bore	Limit	Comment
magnesium, sodium, bicarbonate, carbonate			
Hardness (mg/L)	All bores	For 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; and
- ANZG (2018) Aquatic ecosystem protection for moderately disturbed system (95% protection).

10.2.3 PMLU Monitoring

PMLU monitoring methodology will generally be applied as follows:

- The primary assessment is based on transect sampling. GPS coordinates for the start and end of each transect will be recorded, with photo monitoring points established. Site descriptions (location, orientation, gradient) and condition (visible indicators of erosion and disturbance) will also be documented and compared annually;
- Within a 10 m × 10 m plot along each transect, trees and shrubs will be identified and counted, with species richness, canopy height, canopy cover and basal thickness measured. Groundcover, biomass, and species composition will be assessed using a 1 m² quadrat placed at 10 m intervals along the transect (10, 20, 30, 40, and 50 m). Photographs taken along each transect will provide a visual record that, over time, will contribute to long-term tracking of vegetation performance;
- Tree basal area will be measured at a trunk height of 0.5 m;
- Erosion will be estimated at 10 m intervals along each transect;
- Ground monitoring will be conducted at regular intervals from the year of rehabilitation. The monitoring schedule will aim to achieve a safe, stable, and non-polluting landform;
- Reference sites will be monitored at scheduled intervals (refer to Section 10.3);
- Continued groundwater aquifer monitoring will occur on a quarterly basis;
- Field surveys and flyover surveys will be completed as part of the annual monitoring program and included in the annual monitoring report;
- Monitoring will also be conducted as part of the annual REMP; and
- The program will be further developed as per condition PRCP14.

10.2.4 Residual Voids and Ramps Monitoring

Condition G10 of the EA for the geotechnical stability of residual voids requires:

- *“Monitoring of residual void slope is to be undertaken every four (4) years to validate the predictive model of the long-term geotechnical behaviour of the voids as outlined in the Slope Design for Longterm Geotechnical Stability at German Creek Mine by Geotechnical Consulting Service Pty Ltd, report 109.”*

Table 53 Rehabilitation Monitoring

Monitoring Area	Aspect	Methodology	Corresponding Residual Risk	Frequency	Completion Criteria
All LLM disturbance	Weed and pest monitoring	- Ground survey and remote sensing to; - Identify weeds and weed species; and - Identify feral pest activity.	Proliferation of weed species in rehabilitated areas and surrounding vegetation.	- Post rehabilitation: - monthly for 12 months, then annually thereafter.	Pest management plan actions completed for weeds and vermin.
	Erosion	Remote sensing survey of landform condition.	- Geotechnical instability of final landforms; - Stockpile, rejects and WRD seepage results in groundwater contamination; - Stockpile safety is inadequate for closure; and - Void water quality does not meet Identified Regulatory Requirements.	Years 1, 2, 5, 10 & 15	- Rill depth (< 300 mm) and/or not increasing over time. If deeper, trigger rock armouring; and - No gully erosion present.

Monitoring Area	Aspect	Methodology	Corresponding Residual Risk	Frequency	Completion Criteria
	Landform geometry and slopes	Remote sensing survey and post processing of data to compare landform against design and slope criteria.	- Final landform instability (highwall and low wall); - Post mining land uses cannot be achieved; and - Geotechnical instability of final landforms.	Years 1 & 3	Slopes as per landform design.
Overburden dumps, reshaped highwalls, RoM pad, exploration disturbance, all other mine affected disturbance areas*	Rehabilitation (Bushland)	- On ground survey using transects for: - Species diversity; - Vegetative ground cover; - density and stem thickness; - Visible indicators of erosion; - Foliage projective cover; - Receiving water quality monitoring; and	- Post mining land uses cannot be achieved; - Geotechnical instability of final landforms; - WRD seepage or runoff results in water contamination; - Rehabilitation failure on WRDs; - Inadequate surface water management on and around WRDs;	Years 1, 2, 5, 10 & 15	- There is a mix of Eucalypt, Acacia and groundcover species with > 10 key species recruitment over a representative climatic period; - Proportion of Category 3 restricted invasive plant species and Weeds of National Significance are not > 10% of total vegetative groundcover; >15% slopes must achieve $\geq 70\%$

Monitoring Area	Aspect	Methodology	Corresponding Residual Risk	Frequency	Completion Criteria
		○ Oaky Creek Downstream water quality.	• Rejects seepage or runoff results in water contamination; • Rehabilitation failure on rejects (cover erosion); and • Inadequate surface water management on and around rejects areas.		- groundcover (rock mulch, leaf litter, vegetation etc), consisting of at least 25% vegetation groundcover; and • ≤15% slopes must achieve ≥50% groundcover (rocks, leaf litter, vegetation etc), consisting of at least 25% vegetation groundcover. • Stem thickness >100 mm; • With respect to erosion: ○ No evidence of erosion classified as 'moderate' or 'severe' as defined in the erosion classification framework; ○ Any erosion present will not compromise the achievement of a

Monitoring Area	Aspect	Methodology	Corresponding Residual Risk	Frequency	Completion Criteria
					PMLU to a stable condition; and ○ No evidence of scouring, gullying, or drilling in or adjacent to water management drainage infrastructure retained on the landform (including spine drains, contour drains and chutes). • Foliage cover within 50% of established reference site; • Habitat complexity is within 30% of established reference sites; • Downstream surface water quality within limits; and • Groundwater quality within limits.

Monitoring Area	Aspect	Methodology	Corresponding Residual Risk	Frequency	Completion Criteria
Infrastructure areas, water storages (dams), laydowns, roads and access tracks	Rehabilitation (Grazing)	- On ground or aerial survey for: - Grass cover over a five-year period average; and - Biomass and species diversity. - Receiving water quality monitoring: - Oaky Creek Downstream water quality	- Post mining land uses cannot be achieved; - Geotechnical instability of final landforms; and - Unidentified hazardous materials or contamination in LLM assets.	Years 2, 5 & 10	≥80% established and self-sustaining vegetative groundcover of species as listed in species list and seeding rates for grazing PMLU. - Proportion of Category 3 restricted invasive plant species and Weeds of National Significance are not > 10% of total vegetative groundcover; - Minimum vegetation composition of: - three species of 3P native pasture species; and - two legumes. - Key species recruitment is >10; - Habitat complexity is within 30% of

Monitoring Area	Aspect	Methodology	Corresponding Residual Risk	Frequency	Completion Criteria
					established reference sites; and • Downstream surface water quality within limits; and • Groundwater quality within limits.

10.3 Reference Site Monitoring

Reference sites must be representative of the agreed PMLU. Reference sites at LLM are critical to provide baseline data for evaluating whether rehabilitation, and the methods employed, are trending toward the goal of safe, stable, non-polluting, and self-sustaining ecosystems for each PMLU. A set of reference sites (**Table 54**) has been developed which cover all of the relevant RAs.

By 10 December 2027 a full methodology for assessing rehabilitation against the reference sites must be developed and an AQP must review the adequacy of the identified monitoring sites. The revised methodology will replace the standard BioCondition method. Locations are subject to change with PRCP condition PRCP14.

Table 54 Reference Site Monitoring Locations

Site	Latitude	Longitude	RA
Bush_05b	-22.935199	148.613769	RA1, RA3
RW_03	-22.958608	148.650724	RA1, RA3
RW_02	-22.921937	148.659585	RA1, RA3
Bush_06	-23.011397	148.709504	RA1, RA3
Past_01	-23.047313	148.746144	RA2, RA4
Past_02	-23.071869	148.757163	RA2, RA4
Bush_05	-22.910501	148.617644	RA1, RA3
Bush_03	-22.96729	148.631382	RA1, RA3
RW_01	-23.009258	148.619665	RA1, RA3
Bush_01	-22.976601	148.686063	RA1, RA3
Bush_02	-22.892635	148.55914	RA1, RA3
Bush_04	-22.889978	148.66011	RA1, RA3
Past_04	-23.043985	148.742946	RA2, RA4

Unlike rehabilitated areas, vegetation in reference sites is mature and not expected to show significant changes year to year. It is recommended that monitoring at reference sites be undertaken biennially for the first five years to establish an average set of reference values. Following this period, the frequency of monitoring can be reduced to every five years.

10.3.1 Existing Grazing Leases

Anglo American holds several grazing leases, including nature conservation areas surrounding LLM. These non-mined areas require ongoing management to prevent overgrazing, erosion, and infestation with declared weed species.

Since 2006, a land condition assessment has been undertaken using visual evaluation techniques to determine the condition of these areas. The location of the LLM grazing lease (**Table 55**) should be considered to assess its suitability for use as a reference site for the PMLU of grazing.

Table 55 *Grazing Lease Site at Lake Lindsay (Source: Anglo American, 2019c)*

Site Name	Easting	Northing	Monitoring years	Vegetation Type
LL3	0675609	7447259	2006 - 2013	Silver-leaved ironbark/ bloodwood.

At LLM, the ground cover consisted of around 5% basal grass cover, 61% litter cover and 34% bare soil. The pasture condition was around 4000 kilograms per hectare (kg/ha) as the area is currently ungrazed.

Overall, the area was given a land condition score of 'A' (good condition) with a management recommendation of a growing season rest every 3 to 4 years to maintain pasture condition.

10.4 Environmental Monitoring Databases

Rehabilitation monitoring data for LLM will be collected on a regular basis and compared against LLM's rehabilitation objectives, indicators, and completion criteria (Section 10.2 and Table 53). Anglo American currently utilises online rehabilitation monitoring tools and databases - including *Ecoda* (a spatial database) and *EnviroSys* - to manage its environmental data.

10.5 Rehabilitation Records

Condition A2 – Monitoring and Records of LLM's EA requires:

"The environmental authority holder must keep records of monitoring results required by this environmental authority for a minimum of five (5) years".

Up to date records must be kept on:

- Achievement and maintenance of each rehabilitation or management milestone criteria of this schedule;
- Rehabilitation activities and the results of those activities (including but not limited to, actions taken, date, location, methods, data collected, QA/QC, photos, waste tracking and disposal records, appropriately qualified person details and assumptions);
- Maintenance of rehabilitation and the results of maintenance activities;
- Monitoring of rehabilitation and the results of monitoring;
- Details and results of rehabilitation trials;
- Designs, drawings, specifications and any similar documents developed in accordance with good professional practice in relation to rehabilitation milestones or milestone criteria;
- All documents in relation to the requirements of this schedule, including reports (e.g. site investigation report), statements (e.g. site suitability statement), certifications, assessments, investigations, inspections, audits or any similar

documents developed in relation to rehabilitation milestones or milestone criteria;

- Landholder agreements; and
- Details of community consultation in the community consultation register relating to rehabilitation and closure activities.

10.6 Review of Monitoring Programs and Methodology

There should be continuous improvement to strengthen the link between rehabilitation techniques, completion criteria, and management and monitoring.

Reviews of monitoring programs and methodologies should be conducted to assess the effectiveness of procedures against the objectives of the EA. The monitoring methodology should be reviewed - and, if necessary, revised - within three months of submission of any of the following:

An annual review undertaken as per the requirements of the EA;

- An incident report undertaken as per the requirements of the EA;
- An audit undertaken as per the requirements of the EA; or
- Any modification to the conditions of the EA.

The monitoring methodology may also be revised if:

- Deficiencies are identified;
- Results from the monitoring and review program require it;
- Recommendations arise from the monitoring and review program;
- There are changes in environmental requirements and/or legislation;
- Advances in knowledge or technology become available; or
- A risk assessment identifies a need to alter the methodology.

10.7 Rehabilitation Certification

All rehabilitated areas that achieve their associated PMLU will require Rehabilitation Certification and a Rehabilitation Report by a suitably qualified person to support EA surrender.

10.8 Rehabilitation Maintenance Plan

A range of maintenance and management activities will be required in rehabilitated areas to support the achievement of defined success criteria. Rehabilitated areas will be monitored at an early stage, and the results compared against the success criteria. Areas that do not meet the defined success criteria will have appropriate maintenance or management activities completed to facilitate their achievement.

Areas requiring maintenance should be addressed as soon as possible, as delays can lead to more costly and complex repairs. Maintenance activities may include:

- Re-Seeding or Re-Planting;
- Weed Control;
- Feral Animal Control;
- Maintenance of Fire Breaks;
- Erosion Mitigation;
- Sediment Management;
- Application of Additional Growth Medium;
- Compaction Alleviation;
- Maintenance of Erosion and Sediment Control Structures;
- Fertiliser Application; and
- Addition of Fauna Habitat.

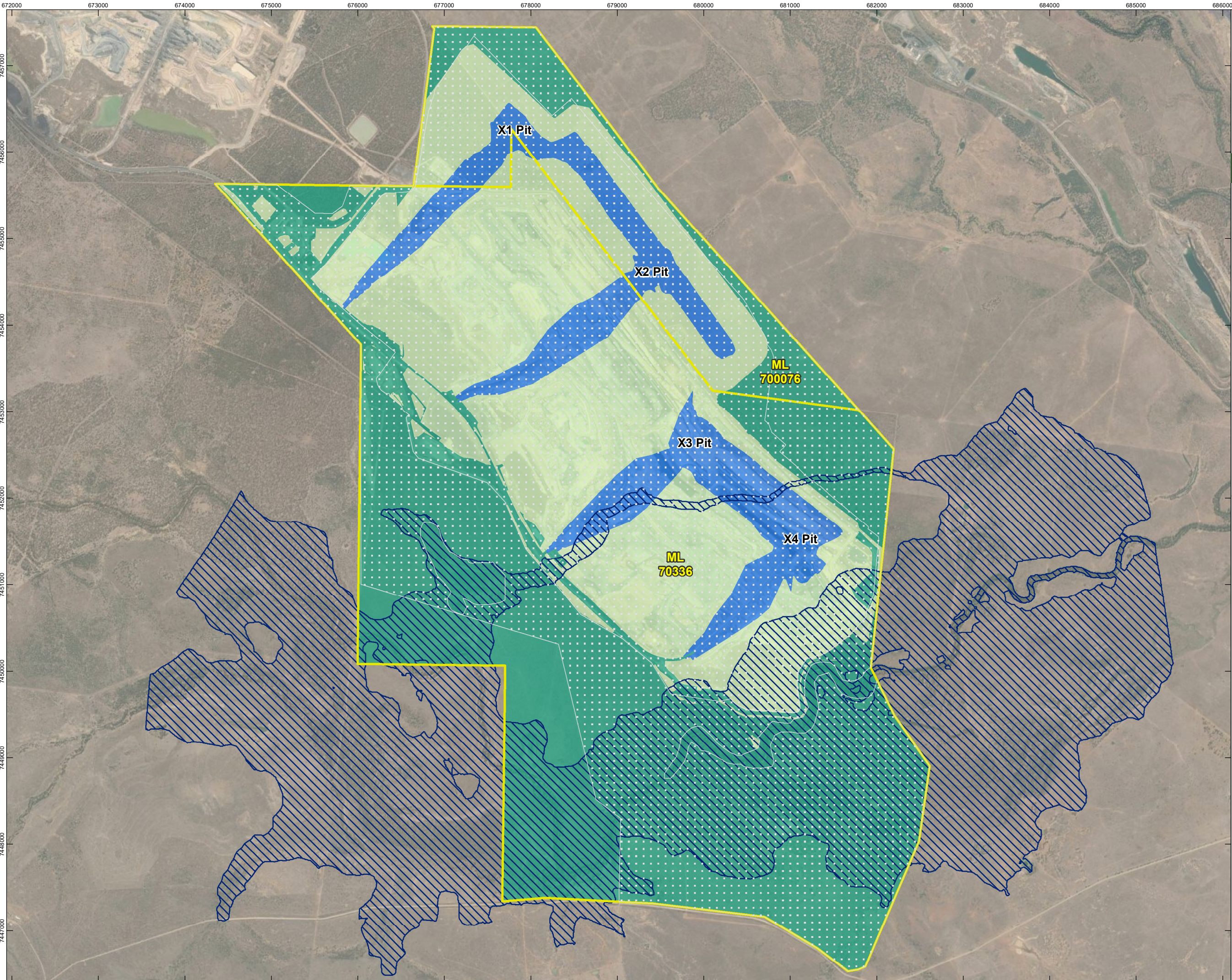
Costs for monitoring and maintenance activities shall be budgeted for within the annual budgets and outlined in the rolling five-year rehabilitation plan.

11 PRCP Schedule

The PRCP schedule (**Appendix O**) will become a statutory instrument once approved by the administering authority. The purpose of the PRCP schedule is to set timeframes for completing rehabilitation over LLM's life. The breakdown of how the proposed PRCP schedule has been developed is outlined below.

The final site design (**Figure 50**) delineates the following:

- The maximum disturbance footprint;
- ML boundaries;
- The PMLUs and NUMAs for the area;
- 0.1% AEP flood extent; and
- 0.1% AEP pre-mining (floodplain) extent.



LAKE LINDSAY

PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 50 -
FINAL SITE DESIGN

LEGEND

- Anglo American Mining Lease
- Life Of Mine Disturbance Extent
- 0.1% AEP Pre-mining Inundation Extent
- Post Mining Land Use**
 - Bushland
 - Grazing
 - NUMA



0 250 500 m

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:40,000 at A3
Project Number:	626.30126
Date:	01-Aug-2025
Drawn by:	AS

11.1 Rehabilitation/ Improvement Areas

A Rehabilitation Area (RA) is defined in the EP Regulation as an area of land in the PMLU to which a rehabilitation milestone for the PMLU relates. LLM has PMLUs of bushland and grazing. Residual voids including highwalls, low walls and end walls inundated by water and water contained within voids to SWL and ramps unable to support a PMLU are proposed as NUMAs (Improvement Area (IA)). The void lakes will form as residual voids will subsequently fill with stormwater and runoff from the respective catchments to SWLs modelled at 0.1% AEP. Areas above the SWLs will subsequently be vegetated to support PMLU of bushland.

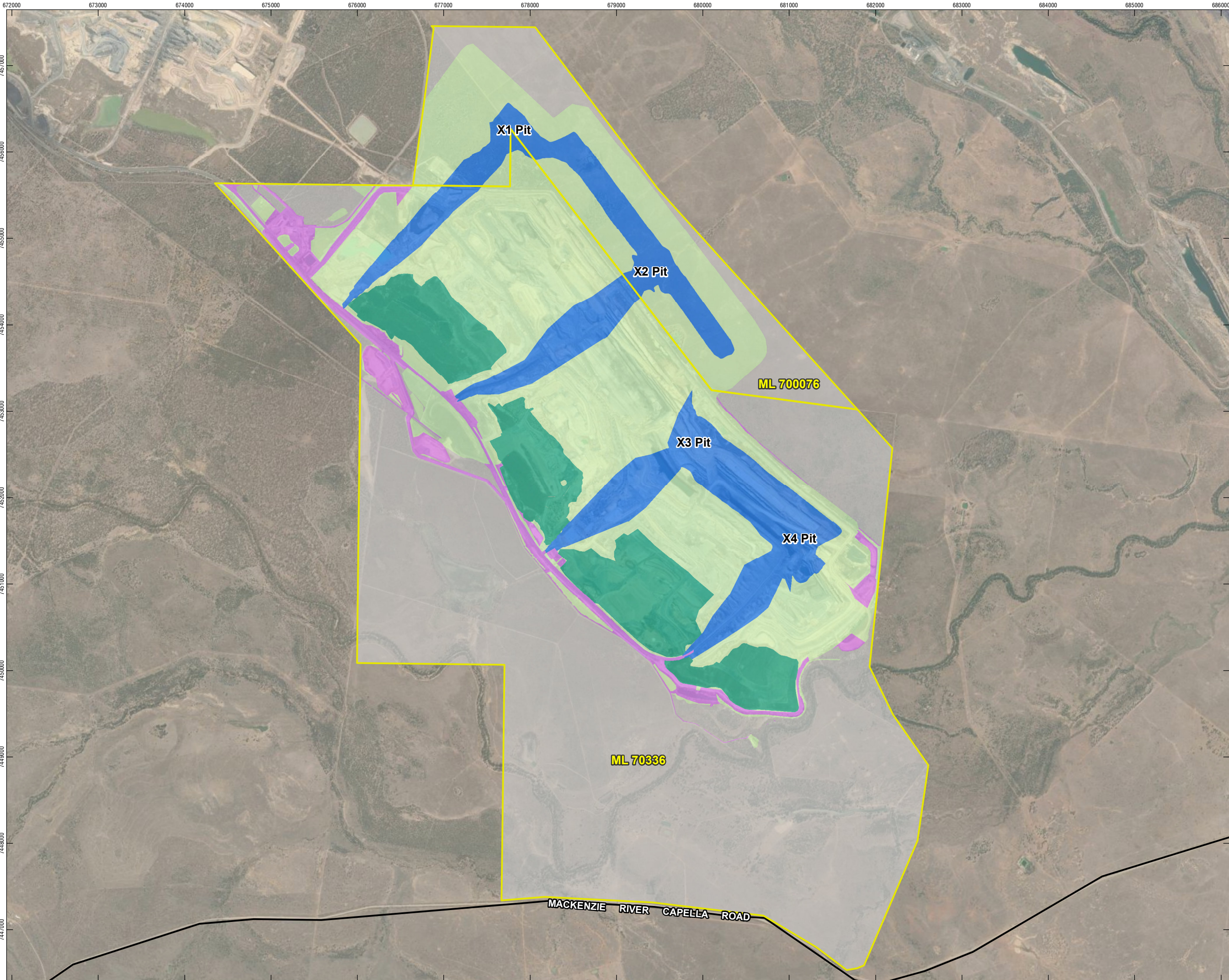
The applicable rehabilitation methodology/ milestones (**Table 56** and **Figure 51**) have been used to identify different rehabilitation and improvement areas.

Table 56 Rehabilitation/ Improvement Areas

Rehabilitation Area/ Improvement Area	Description	Area (ha)	PMLU	Applicable Milestone
RA1	Existing rehabilitation areas	432	Bushland	• RM6 - Achievement of surface requirement: ○ Bushland PMLU. • RM7 - Achievement of post-mining land use to a stable condition: ○ Bushland PMLU. • RM8 - Achievement of post-mining land use water quality.
RA2	Infrastructure areas, water storages (dams), laydowns, roads and access tracks	183	Grazing	• RM1 - Infrastructure decommissioning and removal; • RM2 - Contaminated land assessment and remediation; • RM3 - Landform development,

Rehabilitation Area/ Improvement Area	Description	Area (ha)	PMLU	Applicable Milestone
				- reshaping and reprofiling; • RM4 - Surface preparation; • RM5 - Revegetation; • RM6 - Achievement of surface requirement: ◦ Grazing PMLU. • RM7 - Achievement of post-mining land use to a stable condition: ◦ Grazing PMLU. • RM8 - Achievement of post-mining land use water quality.
RA3	Overburden dumps, reshaped highwalls, RoM pad, exploration disturbance, all other mine affected disturbance areas	1,451	Bushland	• RM1 - Infrastructure decommissioning and removal; • RM3 - Landform development, reshaping and reprofiling; • RM4 - Surface preparation; • RM5 - Revegetation; • RM6 - Achievement of surface requirement: ◦ Bushland PMLU. • RM7 - Achievement of

Rehabilitation Area/ Improvement Area	Description	Area (ha)	PMLU	Applicable Milestone
				post-mining land use to a stable condition: ○ Bushland PMLU. • RM8 - Achievement of post-mining land use water quality.
RA4	Exploration and ancillary activities	2,261	Grazing	• RM1 – Infrastructure; • RM5 – Revegetation; • RM6 – Achievement of surface requirement: ○ Grazing PMLU. • RM7 – Achievement of post-mining land use to a stable condition: ○ Grazing PMLU. • RM8 – Achievement of post-mining land use water quality.
IA1	Residual voids including highwalls, low walls and end walls inundated by water and water contained within the voids to SWL and ramps	525	NUMA	• MM1 – Achievement of final landform design; • MM2 – Achievement of safety requirements; and • MM3 – Achievement of Sufficient Improvement.



LAKE LINDSAY

PROGRESSIVE REHABILITATION
AND CLOSURE PLAN

FIGURE 51 -
REHABILITATION AND
IMPROVEMENT AREAS

LEGEND

- Road
- Mining Lease
- Rehabilitation and Improvement Areas**
- IA1
 - RA1
 - RA2
 - RA3
 - RA4



0 250 500
m

Coordinate System: GDA2020 MGA Zone 55

Scale: 1:40,000 at A3

Project Number: 626.30126

Date: 26-Sep-2025

Drawn by: AS

11.2 Available for Rehabilitation

Available for rehabilitation is defined in section 126D of the EP Act as land that is no longer being mined, unless:

- The land is being used for operating infrastructure or machinery for mining, including, for example, a dam or water storage facility;
- The land is identified in the proposed PRCP schedule as containing a resource to be mined within 10 years after the land would otherwise have become available for rehabilitation;
- The land is required for the mining of a probable or proved ore reserve mentioned in paragraph (b); or
- The land contains permanent infrastructure identified in the proposed PRCP schedule as remaining on the land for a PMLU.

Rehabilitation areas at LLM will progressively become available throughout the life of LLM and once mining at LLM has ceased. The general timing of rehabilitation has been based on the LOAP) and has been undertaken by Deswik Mining Consultants (Australia) Pty Ltd (Deswik) in 2023, modified by SLR to accommodate contingencies.

Some rehabilitation areas will not be able to commence rehabilitation until after mining has ceased. Infrastructure areas, water storages and ancillary disturbance areas are included in the PRCP Schedule as commencing once mining has ceased. Some of this disturbance/ infrastructure will need to be used to support the rehabilitation activities for the overburden dumps and pits and therefore cannot be rehabilitated until those activities have ceased.

11.3 Milestones and Milestone Criteria

Rehabilitation milestones and the associated criteria have been developed using the information presented in Deswik (2023). These milestones have been reflected in the proposed PRCP schedule (and **Table 57**).

The milestone criteria have been transitioned from multiple existing locations as well as developed from technical studies undertaken for the PRCP. It should be noted that not all of the current criteria from the EA have been transitioned into the proposed PRCP Schedule. This is due to the criteria not meeting Specific, Measurable, Achievable, Relevant, Timely (SMART) principles or having the intent of the criteria better addressed in another format.

Table 57 Proposed Milestones, Milestone Criteria and Timing

Milestone Reference	Rehabilitation Milestone	Numbering	Milestone Criteria	Justification and Notes
RM1	Infrastructure decommissioning and removal All RAs	1.1	With the exception of any infrastructure to remain as part of the post mining land use or where infrastructure is agreed to be retained by the landholder as evidenced by a signed landholder agreement, the following are complete: a) All buried services are decommissioned; b) All surface services are removed (e.g. Polypipe water lines); c) All buildings and associated infrastructure removed offsite; d) All hardstand, concrete areas and roads (bitumen, etc.) removed; e) All fencing and associated foundations removed; f) All waste that is not authorised to be disposed of on-site under Environmental Authority EPML00739113 is removed; g) All drillholes, bores, sediment ponds and sumps decommissioned; h) All machinery and equipment, not required for rehabilitation works, removed from site; i) All dams dewatered and desilted; and	Criteria used in other PRCPs in the area.

Milestone Reference	Rehabilitation Milestone	Numbering	Milestone Criteria	Justification and Notes
			j) Watercourse crossings and culverts removed.	
RM2	Contaminated land assessment and remediation All RAs	2.1	Contaminated Land Investigation Document completed in accordance with the Environmental Protection Act 1994, including a site investigation report, and, where required, a Validation Report and/or a draft Site Management Plan.	Criteria used in other PRCPs in the area.
		2.2	Contaminated water and contaminated sediment removed from dams.	
		2.3	Contaminated and hazardous material either remediated in-situ or removed/transported to facility lawfully able to accept the material.	
		2.4	Suitably Qualified Person (SQP) certifies that that no contamination unsuitable for the PMLU remains or is occurring.	
RM3	Landform development, reshaping and reprofiling All RAs	3.1	All major earthworks (including reshaping, pushing/trimming) are completed in accordance with the design specification provided by an AQP.	Criteria transitioned from the EA
		3.2	Constructed landform achieves geotechnical stability with a Factor of Safety (FOS) ≥ 1.5 , which includes consideration of flood stress.	
		3.3	The landform achieves the following slopes:	

Milestone Reference	Rehabilitation Milestone	Numbering	Milestone Criteria	Justification and Notes
			a) Externally draining spoil slopes: sloped to less than 1V:3H (i.e., < 33.3); b) Internally draining spoil slopes: slope gradient of less than 1V:6H (i.e., < 16.7%); c) Top of dumps: slope gradient of less than 1V:10H (i.e., < 10%); and d) Infrastructure areas, access tracks and roads: sloped to less than 1V:10H (i.e., < 10%).	
		3.4	Disturbed natural watercourse bed and banks returned to a natural condition with profile similar to the pre-disturbance condition.	
		3.5	All landforms are designed to be water shedding where practicable.	
		3.6	Environmentally problematic materials specifically potentially acid forming (PAF) and self-combusting materials are appropriately placed and located within the final landform or capped so as not to be exposed to the final landform surface.	
RM4	Surface Preparation	4.1	Assessment of growth media characteristics and the development of an amelioration and physical treatment plan to achieve the soil quality criteria is completed by an AQP.	Criteria transitioned from the EA and expanded based on geochemical and geotechnical investigations. Criteria provided in Table 28.
	All RAs	4.2	Where the growth media (topsoil, rock mulch and subsoil) physical, chemical and biological	

Milestone Reference	Rehabilitation Milestone	Numbering	Milestone Criteria	Justification and Notes
			properties tested under RM4.1 does not meet the soil quality criteria soil ameliorants such as fertiliser, gypsum and/or organic matter are applied at rates determined by an AQP and documented.	
		4.3	Growth media is applied in areas where topsoil has previously been removed at: a) minimum depth of 150mm for topsoil; or b) at a rate/hectare for manufactured growth media as recommended by an AQP.	
		4.4	Deep ripping to a minimum depth of 300mm into soil/spoil along contour of slopes.	
		4.5	Rock mulch is applied as per below: a) Externally draining spoil slopes: (i) For slopes >1V:4H (i.e., >25%): a) ≥0.5m depth; and b) minimum 75% surface rock (>20mm) cover. (ii) For slopes ≤1V:4H (i.e., ≤25% and ≥16.67%): a) ≥0.2m depth; and b) minimum 50% surface rock (>20mm) cover. b) Internally draining slopes: (i) Cover with depth ≥0.2m.	

Milestone Reference	Rehabilitation Milestone	Numbering	Milestone Criteria	Justification and Notes
		4.6	Gypsum, or a suitable alternative ameliorant, is applied to externally draining spoil slopes, to a minimum treatment depth of 400 mm ($\pm$ 100 mm): (a) $\geq$ 25 tonnes per hectare (t/ha); and/or (b) At a rate sufficient to reduce the ESP below 14%.	
RM5	Revegetation	5.1	With the exception of non-persistent cover crop species, the seed mix contains only those species listed in Attachment 2 – Seed mix species list and seeding rates for the relevant PMLU.	A seed mix has been included in Section 7.13.1.
	All RAs	5.2	Seed mix applied at the recommended rate for the relevant PMLU as detailed in Tables 43 and 44 of Section 7.13.1.	Seeding rates for grazing species listed in Table 43. Seeding rates for bushland listed in Table 44.
RM6	Achievement of surface requirements	6.1	No evidence of erosion classified as ‘moderate’ or ‘severe’ as defined by the Erosion classification framework.	Criteria from the EA and developed based on other PRCs in the area and internal rehabilitation monitoring reports.
	All RAs	6.2	Despite RM6.1 erosion is acceptable in the achievement of surface requirements provided an AQP certifies that all active erosion has been identified, and remediation activities have been completed.	

Milestone Reference	Rehabilitation Milestone	Numbering	Milestone Criteria	Justification and Notes
		6.3	No prohibited invasive plants present, and proportion of weed cover is <10% of total vegetative cover.	
		6.4	The landform is free draining¹, with exception of retained water management infrastructure, and there is no evidence of any of the following: a) Vegetation die-back localised in low points on the landform surface; or b) Salt rise as evidenced by salt deposition at the landform surface.	
		6.5	Vegetative groundcover is: a) Bushland PMLU: (i) >15% slopes must achieve ≥70% groundcover (rock mulch, leaf litter, vegetation etc), consisting of at least 25% vegetative groundcover; and (ii) ≤15% slopes must achieve ≥50% groundcover (rocks, leaf litter, vegetation etc), consisting of at least 25% vegetative groundcover. b) ≥50% established and self-sustaining vegetation groundcover for grazing PMLU, of which at least 50% of dry matter yield is 3P pasture species as listed in Section 7.13.1.	
RM7		7.1	Hazard assessment completed by an AQP to confirm safety hazards in the rehabilitation area	Criteria transitioned from the EA and developed

Milestone Reference	Rehabilitation Milestone	Numbering	Milestone Criteria	Justification and Notes
	Achievement of post-mining land use to a stable condition		are not significantly different to surrounding unmined landscapes subject to the same land use.	based on other PRCPs in the area and internal rehabilitation monitoring reports.
	All RAs with additional criteria where specified	7.2	Weed presence is a maximum of 10% of total vegetative cover confirmed by an AQP in annual monitoring. Less than 5% of total vegetative groundcover is declared weeds (as defined in the Biosecurity Act 2014).	
		7.3	No evidence of erosion classified as 'moderate' or 'severe' as defined by the Erosion classification framework.	
		7.4	No evidence of scouring, gullyng, or drilling in or adjacent to water management drainage infrastructure retained on the landform (including spine drains, contour drains and chutes).	
		7.5	Surface water runoff to the receiving environment complies with surface water quality limits.	
	Bushland PMLU			
	RA1, RA3	7.6	Recruitment of >10 native species, including mix of eucalypt, acacia and native groundcover species.	
		7.7	Groundcover:	

Milestone Reference	Rehabilitation Milestone	Numbering	Milestone Criteria	Justification and Notes
			(a) >15% slopes must achieve $\geq 70\%$ groundcover (rock mulch, leaf litter, vegetation etc), consisting of at least 25% vegetation groundcover; and (b) $\leq 15\%$ slopes must achieve $\geq 50\%$ groundcover (rocks, leaf litter, vegetation etc), consisting of at least 25% vegetation groundcover.	
		7.8	A BioCondition assessment is completed by an AQP using the methodology outlined in the latest version of the Queensland Herbarium's 'BioCondition Assessment Manual'.	
		7.9	The BioCondition assessment completed under RM7.7 complies with the >20/60 PRCP Benchmark for the PMLU.	
		7.10	Where RM7.7 is not achieved, an AQP has confirmed that the ecosystem is on a trajectory to achieving the BioCondition benchmarks 10-15 years.	
		Grazing PMLU		
	RA2, RA4	7.11	$\geq 80\%$ established and self-sustaining vegetative groundcover of species as listed in species list and seeding rates for grazing PMLU.	
			Minimum vegetation composition of:	

Milestone Reference	Rehabilitation Milestone	Numbering	Milestone Criteria	Justification and Notes
			(a) three species of 3P native pasture species; and (b) two legumes.	
		7.12	Land suitability class assessed by an AQP that the land has achieved a post-mining land suitability class of ≥ 3 for cattle grazing, or not different from pre-mining class if it is class 4.	
RM8	Achievement of post-mining land use water quality	8.1	Surface water quality results monitored monthly during flow at, but not limited to, downstream locations specified in surface water monitoring locations, must not exceed the surface water quality limits, for a minimum of five (5) consecutive years.	Surface water limits derived from 80th percentile values of historical monitoring provided in Section 10.2.1.
	All RAs	8.2	If (A) the surface water quality results exceed the criteria in RM8.1; and (B) if there is flow at both the upstream and downstream monitoring location for each watercourse; then, each year by 1 November, an AQP must complete and provide to the administering authority an assessment of the cause of the exceedance and risk of rehabilitation not achieving a stable condition. Where the assessment concludes: (a) That there is a low risk to achieving a stable condition, then no further action is to be taken; and (b) That there is a risk greater than low to achieving a stable condition, then an	Groundwater limits derived from 95th percentile values of historical monitoring provided in Section 10.2.2.

Milestone Reference	Rehabilitation Milestone	Numbering	Milestone Criteria	Justification and Notes
			assessment of potential environmental harm and any changes or rectification actions to rehabilitation activities must be determined and implemented.	
		8.3	If RM8.2(b) is triggered, then the five (5) year timeframe under RM8.1 is reset	
		8.4	For a minimum of five (5) consecutive years groundwater quality must be monitored quarterly at, but not limited to, compliance bores/locations specified in Section 3.8.7.6, for all quality characteristics listed in Section 10.2.2.	
		8.5	Groundwater quality results must not exceed the limits in Section 10.2.2, for three (3) consecutive results.	
		8.6	Groundwater level is monitored quarterly and for a minimum of five (5) consecutive years.	
MM1	Achievement of final landform design IA1	1.1	Pit walls achieve a Static Factor of Safety > 1.5 and Seismic Factor of Safety > 1.0.	Standard industry practice.
		1.2	Pit walls and voids assessed as geotechnically stable.	
		1.3	Pit walls achieve a maximum slope of $\leq 1V:3H$ (33.3%).	
		1.4	Pit wall landforms must:	

Milestone Reference	Rehabilitation Milestone	Numbering	Milestone Criteria	Justification and Notes
			(a) Prevent surface or seepage flow of floodwaters up to and including the 0.1% AEP into the void; and (b) Not be constructed with dispersive material.	
		1.5	Residual voids must not overtop.	
		1.6	The location of the voids and associated safety bunds does not cause instability or degradation to the land outside the NUMA.	
MM2	Achievement of safety requirements IA1	2.1	Safety bunds are constructed in accordance with the Department of Industry and Resources (1997) Guideline Safety Bund Walls Around Abandoned Open Pit Mines or as recommended by an AQP.	
		2.2	Competent safety bunds or equivalent landform in place to prevent access to the residual void constructed in accordance with engineering requirements, including: (a) Constructed from non-weathered, non-dispersive rockfill; (b) A minimum of 2 m in height; (c) A minimum of 5 m base width; and (d) At the geotechnical setback distance of a minimum of 15 m.	

Milestone Reference	Rehabilitation Milestone	Numbering	Milestone Criteria	Justification and Notes
		2.3	Safety signage (design in accordance with Australian standard) is erected at 100 m intervals.	
MM3	Achievement of sufficient improvement IA1	3.1	Groundwater and void lake water level and quality monitoring confirms that the void acts as a groundwater sink in the long-term.	Standard industry practice.
		3.2	The water level and quality in the void do not and will not cause environmental harm to the receiving environment, as demonstrated by groundwater level, surface water and groundwater quality monitoring and modelling.	
		3.3	The pit wall landform has been constructed in accordance with the final design.	
		3.4	Appropriate safety infrastructure at the geotechnical set-back distance has been installed to prevent access to the NUMA.	
		3.5	The residual voids are safe to humans and livestock.	
		3.6	Voids retain flood immunity, supported by flood modelling re-run at end of life and calibrated against the final landform.	
		3.7	Erosion of the landform within the NUMA area will not negatively impact on the stability of the safety bund and any adjacent rehabilitation areas, or their ability to sustain their PMLU.	

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Appendix A: Environmental Authority (EPML00739113)

Appendix B: Environmental Impact Statement (Parsons Brinckerhoff, 2005)

Appendix C: LLM Hydrogeological Conceptual Model Update (AGE, 2021b)

Appendix D: Conceptual Final Landform Report (Minserve, 2023)

Appendix E: Community Consultation (SLR, 2025a)

Appendix F: Flooding Report (SLR, 2024b)

Appendix G: Lake Lindsay Extension Project - Environmental Assessment Report (Aurecon, 2022)

Appendix H: Hydrogeological Assessment Report (Hydrogeologist.com.au, 2023)

Appendix I: Soils Assessment Report (SLR, 2025c)

Appendix J: Application for Amendment of Capcoal EA (LLM and GCM) (Verterra, 2020)

Appendix K: Preliminary Data – Erosion Stability of Permian Waste Mixed with Topsoil (Landloch, 2019)

Appendix L: Residual Voids Surface Water Assessment (SLR, 2024d)

Appendix M: Void Geotechnical Stability Assessment (SLR, 2023e)

Appendix N: Closure Risk Assessment

Appendix O: PRCP Schedule

