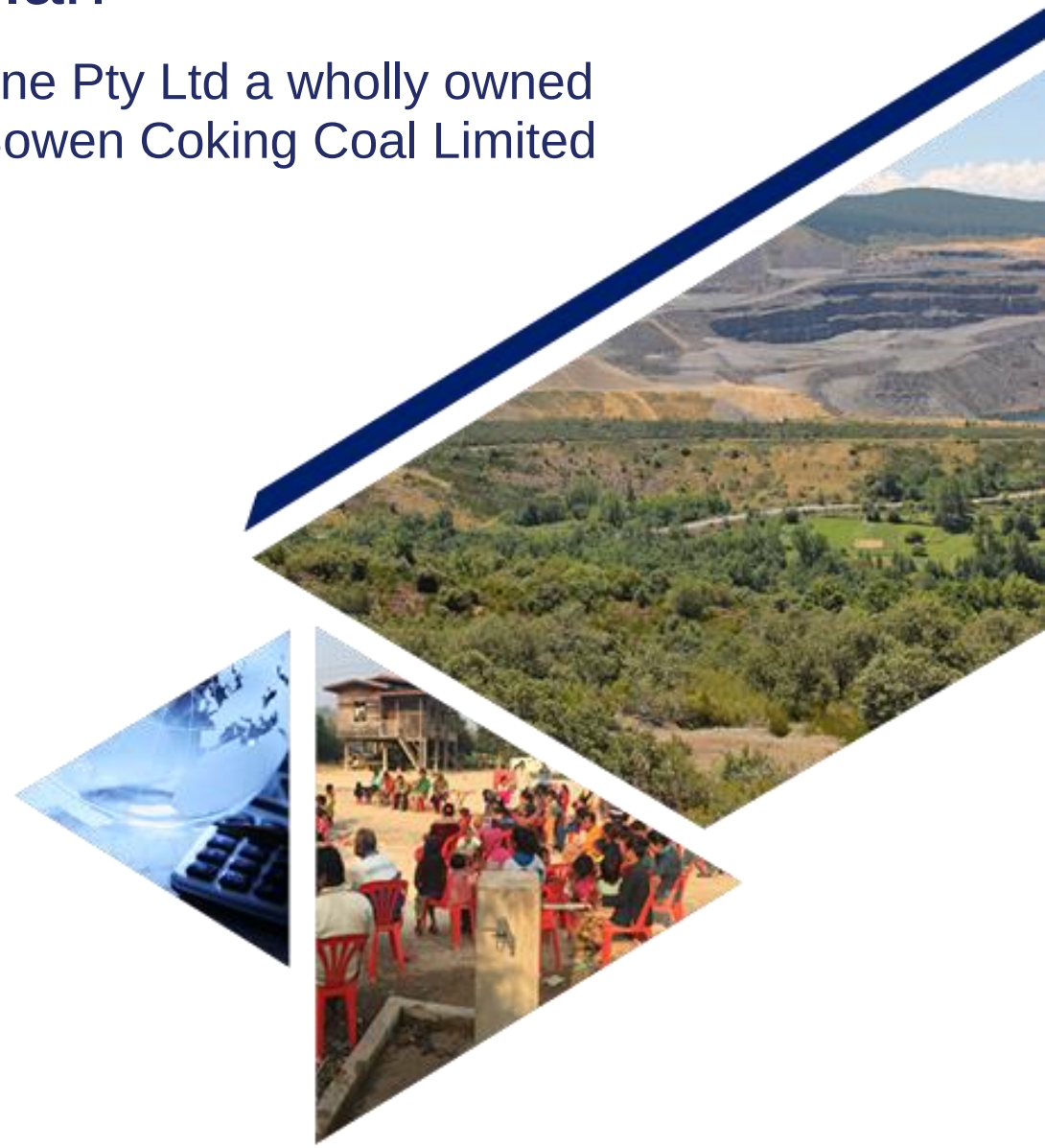
Broadmeadow East Mine - Progressive Rehabilitation and Closure Plan

Coking Coal One Pty Ltd a wholly owned subsidiary of Bowen Coking Coal Limited



Job Number: ADV-AU-00217
Date: 29 September 2023

1 Cover Page

Environmental Authority Holder Name	
Coking Coal One Pty Ltd a wholly owned subsidiary of Bowen Coking Coal Limited	
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Attachment B: PRCP Schedule
Attachment C: Spatial Information Submission
Attachment D: PRCP Hydrogeological Assessment
Attachment E: Final Landform Flood Assessment

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Table 2-1 Definitions

Terminology	Definition
Available for improvement	In relation to land in an improvement area for a non-use management area, means land in the improvement area that is not being mined, other than land to which any of the following applies– (a) the land is being used for operating infrastructure or machinery for mining, including, for example, a dam or water storage facility; (b) the land is identified in the PRCP schedule or the application for an environmental authority relating to the schedule as containing a probable or proved ore reserve that is to be mined within 10 years after the land would otherwise have become available for improvement; or (c) the land is required for the mining of a probable or proved reserve mentioned in paragraph (b).
Available for rehabilitation	For a rehabilitation area, means land in the area is not being mined, unless– (a) the land is being used for operating infrastructure or machinery for mining, including, for example, a dam or water storage facility; or (b) the land is identified in the PRCP schedule or the application for an environmental authority relating to the schedule as containing a probable or proved ore reserve, under section 126D(6) of the EP Act, that is to be mined within 10 years after the land would otherwise have become available for rehabilitation; or (ba) the land is required for the mining of a probable or proved reserve mentioned in paragraph (b); or (c) the land contains permanent infrastructure identified in the proposed PRCP schedule as remaining on the land for a PMLU.
Land outcome document	For land, means the following documents relating to the land– (a) an environmental authority for a resource activity on the land; (b) a document made under a condition of an environmental authority mentioned in paragraph (a), if– (i) the document relates to the management of a void within the meaning of section 126D of the EP Act on the land, or the rehabilitation of the land; and (ii) the document was received by the administering authority before the assent date; and (iii) the administering authority has not, within 20 business days after the assent date, given notice to the environmental authority holder that the document is insufficient in a material particular relevant to a matter mentioned in subparagraph (i); and (iv) before the assent date, the document has not been superseded;

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Terminology	Definition
	(c) a document made under a condition of an environmental authority mentioned in paragraph (a), if– (i) the document relates to the management of a void within the meaning of section 126D of the EP Act on the land, or the rehabilitation of the land; and (ii) the environmental authority requires the document to be given to the administering authority on a stated day that is on or after the assent date, or does not state a day when the document must be given; and (iii) the document is received by the administering authority within three years after the assent date; and (iv) the administering authority does not, within 20 business days after receiving the document, give the environmental authority holder a notice that the document is insufficient in a material particular relevant to a matter in subparagraph (i); (d) a report evaluating an EIS under the *State Development and Public Works Organisation Act 1971*, section 34D; (e) an EIS assessment report; or (f) a written agreement between the holder of an environmental authority mentioned in paragraph (a) and the State that is in force on the assent date.
Improvement area	For a non-use management area, means an area of land in the non-use management area to which a management milestone relates.
Management milestone	For a non-use management area, means each significant event or step necessary to– (a) achieve best practice management of the area; and (b) minimise risks to the environment.
Non-use management area	Means an area of land the subject of a PRC plan that cannot be rehabilitated to a stable condition after all relevant activities for the PRC plan carried out on the land have ended.
Post-mining land use (PMLU)	For land the subject of a PRC plan, means the purpose for which the land will be used after all relevant activities for the PRC plan carried out on the land have ended.
PRC plan	For land the subject of a mining lease, means a progressive rehabilitation and closure plan for the land that consists of– (a) the rehabilitation planning part of the PRC plan; and (b) the PRCP schedule for the PRC plan, including any conditions imposed on the schedule.
PRCP schedule	For a PRC plan, means a schedule of the plan that– (a) complies with section 126D of the EP Act; and (b) is approved under chapter 5, part 5, division 2 of the EP Act, with or without conditions.
Proposed PRC plan	For an application, a proposed PRC plan means a PRC plan proposed for land the subject of a mining lease that– (a) complies with Chapter 5, part 2, division 3; and (b) either – accompanies the application; or is submitted for the application after the application is made
Relevant activity	The EP Act defines relevant activities as those to be carried out on land the PRC Plan is subject to.
Rehabilitation area	For land the subject of a PMLU, means an area of the land to which a rehabilitation milestone for the PMLU relates.
Rehabilitation milestone	For the rehabilitation of land, means each significant event or step necessary to rehabilitate the land to a stable condition.

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3 Rehabilitation Planning Part

Introduction

RPM Advisory Services Pty Ltd ("RPM") has been engaged by Coking Coal One Pty Ltd (a wholly owned subsidiary of Bowen Coking Coal Limited) (“CCO”, or the "Proponent") to complete a Progressive Rehabilitation and Closure Plan (hereafter referred to as the "PRCP" or "PRC Plan”) for the Broadmeadow East Mine (“BME”, the “Project”, or the “Mine”). This Plan has been prepared in compliance with the *Environmental Protection Act 1994* (Queensland) (EP Act) and the prescribed Guideline ‘Progressive rehabilitation and closure plans (PRC Plans)’ (PRCP Guideline) (ESR/2019/4964). The BME PRCP comprises the rehabilitation planning part (this document) and the schedule (**Attachment B**).

On 19 August 2021, the Proponent received a Notice (‘*Progressive rehabilitation and closure plan transition notice*’ (ESR/2019/4953)) from the Department of Environment and Science (DES, hereafter referred to as the “administering authority”) that requires the Mine, subject to Environmental Authority (EA)0002465 (**Attachment A**), to transition to the PRCP legislative framework and submit a PRCP by 29 September 2023. This Plan has been developed to adhere to this Notice and legislative requirement.

Proponent Details

The Proponent is Coking Coal One Pty Ltd, a wholly-owned subsidiary of Bowen Coking Coal Limited. The registered address for the Proponent is:

Level 4, 167 Eagle Street
Brisbane City, QLD 4000
ABN: 89 615 317 907

Bowen Coking Coal is an independent coal producer trading on the Australian Securities Exchange (ASX) as ‘BCB’.

Further information regarding Bowen Coking Coal can be obtained from:

https://www.bowencokingcoal.com.au/.

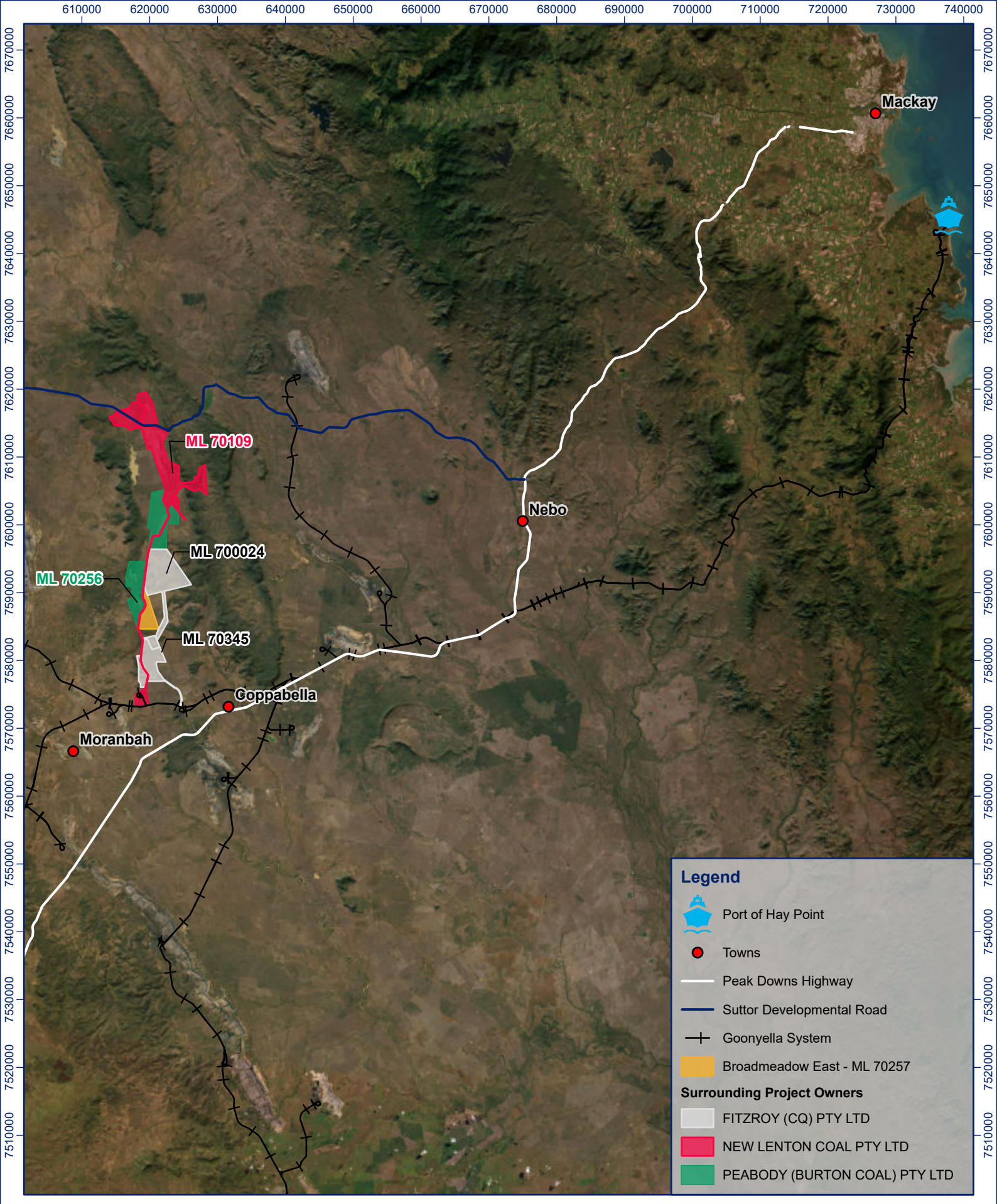
Project Location and Access

The Broadmeadow East Mine is entirely within Mining Lease (ML) 70257, located 22 km north-east of Moranbah township and 120 km southwest of Mackay in the Queensland Bowen Basin (**Figure 3-1**). The Peak Downs Highway links the coastal city of Mackay to the Mine via the Suttor Development Road.

The western boundary of ML 70257 is adjacent to the Mallawa Haul Road (ML 70109) owned and operated by a separate subsidiary of BCC, which provides the only access to the Mine via the Burton Mine administration office located 26 kilometres north. The haul road concludes at the Mallawa Train Load Out facility (TLO) that connects to the Aurizon Goonyella Rail System south of the Mine. Mining activities commenced in May 2022.

Further information on the Project as required by sections 126C(1)(b) and (c)(ii) of the EP Act, is in **Section 3.1.2**.

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RPMGLOBAL

PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Regional Mine Location	
Figure 3-1 | ADV-AU-00217 | September 2023	

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3.1 Project Planning

Legislative Requirements

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

a) Each resource tenure, including the area of each tenure
b) The relevant activities to which the application relates
c) The likely duration of the relevant activities
d) How and where the relevant activities are to be carried out, including maps.

This Section includes baseline information, site location details, a description of the Project and information on rehabilitation planning as required by section 126C(1)(b) and (c)(ii) of the EP Act.

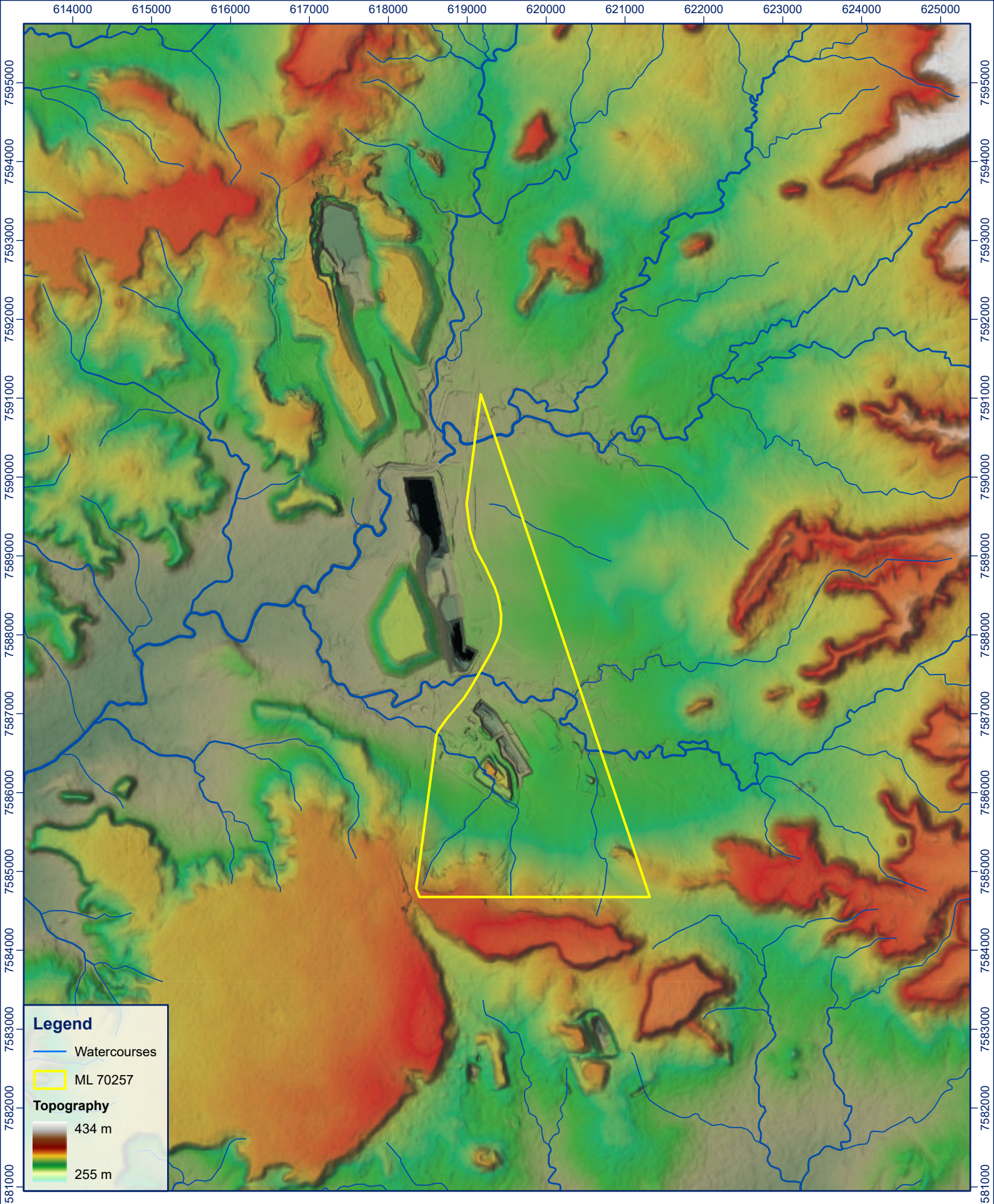
3.1.1 Baseline Information

3.1.1.1 Site Topography

On a regional scale, the Mine is situated within the Kerlong Valley, which is approximately 6 – 8 km wide and 26 km long. The region is reasonably flat and bounded by the Kerlong Range to the east and the Burton Range to the west. The ranges extend to a maximum height of 210 – 220 m above the valley floor.

On a local scale, the topography across the Mine is relatively flat, with slight undulations ranging from 275 m to 280 m in the north-west and gradually increasing to 295 m to 300 m to the southeast (**Figure 3-2**). The south-western portion of the ML has a residual Tertiary laterite hill that rises about 40 m above the surface.

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0 500 1,000 2,000 m

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RPMGLOBAL

PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Regional Topography	
Figure 3-2 | ADV-AU-00217 | September 2023	

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3.1.1.2 Climate

The climate of the region is classified as BSh (hot semi-arid climate) under the Köppen climate classification. These climates tend to have hot summers and warm to cool winters with some to minimal rainfall. There is high variability in rainfall, temperature, and evaporation. The region experiences a predominance of southerly to south-easterly winds of low velocity (less than 10 km/hour).

The local rainfall, evaporation, and temperature data summarised below has been sourced from the following Bureau of Meteorology (BOM) weather stations:

- Moranbah Airport (station 34035) — operational from March 2012. This station is located approximately 49 km south-east of the Mine (Bureau of Meteorology (BoM), no date a).
- Moranbah Water Treatment Plant (station 34028) — operated from 1972 to March 2012. This station is located approximately 43 km south-east of the Mine (BOM, no date b).

Temperature

The mean daily summer temperature in the region ranges between 33.8 °C and 35 °C, while the mean winter temperature ranges from 24.1°C to 26.7°C (**Figure 3-3**). On average, there are 73.6 days per annum with temperatures above 35 ºC. December has the highest mean number of days per month above 35 ºC, at 16.4 days above 35 ºC (BOM, no date a). Heat waves can occasionally be expected between October and March, and frosts between May and August.

Evaporation

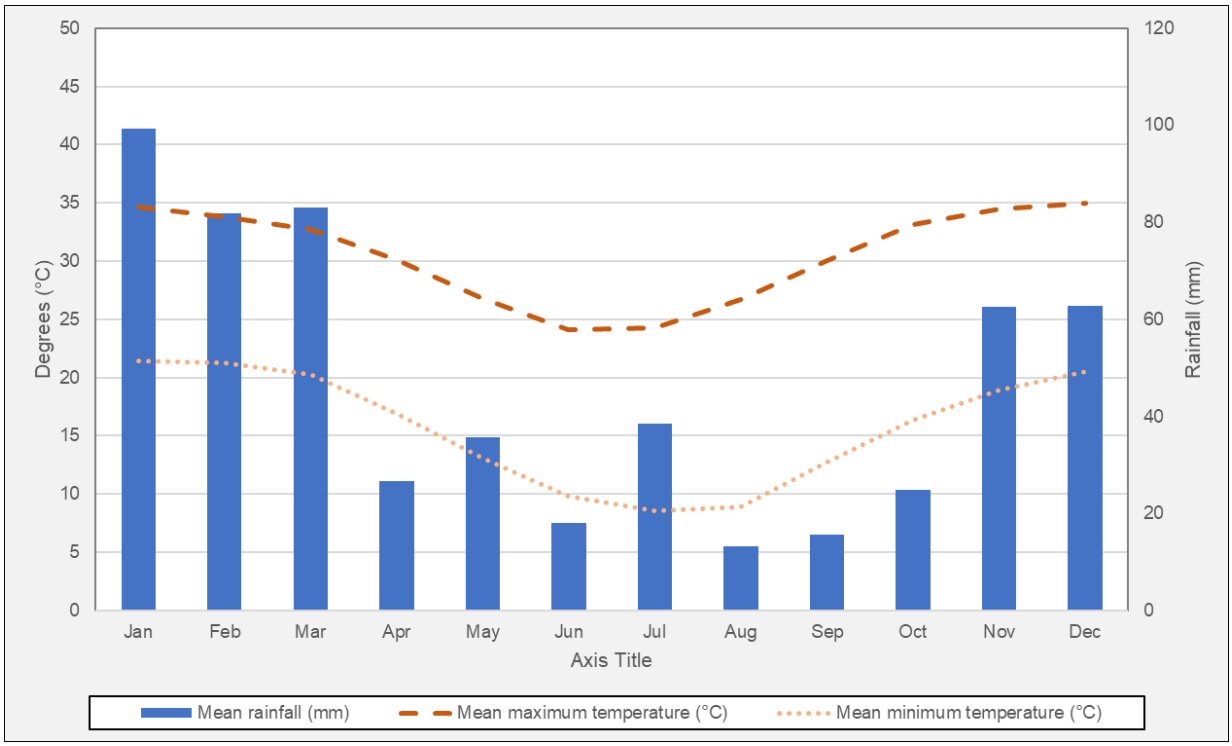
The mean annual potential evaporation is estimated to be approximately 2,300 mm, which is approximately four times higher than the region's annual rainfall, indicating a high annual net evaporative loss (BOM, no date b). The evaporation rate varies seasonally, with October to March having the highest evaporation rates (BOM, no date b). Evaporation data were taken only from the Moranbah Water Treatment Plant weather station as data for the Moranbah Airport weather station are not available.

Rainfall

Historically, the Moranbah Water Treatment Plant (1972-2012) recorded an average annual rainfall of 614 mm (BOM, no date b). Recently, the mean annual rainfall recorded at Moranbah Airport (2012-2023) recorded an average annual rainfall of 562.8 mm, a decrease of 51.2 mm (BOM, no date a). The Mine area has a summer-dominant rainfall pattern, with the highest rainfall typically occurring in January (99.3 mm) and the lowest rainfall occurring in August (13.3 mm) (**Figure 3-3**).

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Figure 3-3 Moranbah Airport Station Climate Data



Long-Range Climate Prediction

Climate change is a factor that is contributing to the way that all new projects are planned, especially regarding closure and rehabilitation requirements. These unknown climate variances can impact the Mine if not considered in the planning, operation, and post-mining stages. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) and BOM have collaboratively formed climatic projections for Australia based on climate research, observations, and detailed analysis (CSIRO, 2022).

The State of the Climate Report released by BOM and CSIRO (2022) outlines Australia's climate and, importantly, the future projected climate. The models predict the following over the coming decades:

- The fire season is going to increase with added dangerous fire days for the south and east of Australia.
- The rainfall events are going to be higher intensity for a shorter duration and there will be fewer occurrences but increased intensity of tropical cyclones.
- A further decrease in cool season rainfall across many regions of the south and east of Australia.
- Increase in extremely hot days and a decrease in extremely cold days from the continued warming.
- Longer periods of drought on average in the south and east of Australia.
- Fewer east coast lows on average, particularly during the cooler months of the year.
- Eastern and southern Australia will experience less rainfall in the cooler months.
- The sea level will continue to rise through this century and beyond.
- More frequent extreme sea levels are linked to coastal inundation and coastal erosion, coupled with increased ocean acidification.
- Increased and longer-lasting marine heatwaves, which will further stress marine environments and increase the likelihood of more frequent and severe bleaching events in coral reefs around Australia.
- An increase in the risk of natural disasters from extreme weather, including 'compound extremes', where multiple extreme events occur together or in sequence, thus compounding their impacts.

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More specifically, the Mine is within the East Coast North sub-cluster as defined by Climate Change in Australia climate prediction tool (CSIRO and BoM 2015). The sub-cluster comprises natural resource management (NRM) regions in the central part of the eastern seaboard of Australia. The tool predicts with very high confidence that:

- Average temperatures will continue to increase in all seasons; and
- More hot days and warm spells are projected.

Other regional specific climate change risks related to rehabilitation and closure outcomes include:

- Changes to rainfall are possible but unclear. There is no long-term trend in annual rainfall for the sub-cluster during the available record. Natural variability will either mask or enhance any long-term human induced trend, particularly in the next 20 years.
- Fewer frosts are projected with high confidence.
- Despite uncertainty in future projections of total rainfall for the East Coast North sub-cluster, increased intensity of extreme rainfall events is projected based on an understanding of the physical processes that cause extreme rainfall, coupled with modelled projections.
- Time spent in drought is expected to increase over the course of the century with medium confidence.
- There is high confidence that the region will have harsher fire weather, however the magnitude of that change is uncertain due to the uncertainty about rainfall projections.
- Potential evapotranspiration is projected to increase in all seasons as warming progresses.

There is evidence of these predictions occurring already, with 2019 being the hottest and driest year on record (CSIRO, 2022). Climatic variability is part of the ongoing land management strategy of this Mine to ensure there will be processes in place to reduce the likelihood of additional environmental impacts.

3.1.1.3 Geological Setting

Regional Geology

The Bowen Basin is the northernmost part of the 1,800 km-long Bowen-Gunnedah-Sydney Basin in eastern Queensland and New South Wales. The Mine is in the western part of the central Bowen Basin. The Bowen Basin comprises an accumulation of Permian and Triassic sediments, with the economic coal seams in the Bowen Basin lying within the Permian Blackwater and Back Creek Groups. The Moranbah Coal Measures are within the Back Creek Group, while the Fort Cooper and Rangal Coal Measures exist within the Blackwater group. All are late Permian coal-bearing sequences deposited in terrestrial (Blackwater Group) and marine (Back Creek Group) environments. These Permian coal strata are overlain by the Triassic, Rewan, and Clematis Groups. The economic coal seam deposits specific to the Mine occur within the Rangal Coal Measures (**Figure 3-4**).

The Bowen Basin is divided into broad morphotectonic zones that indicate maximum sediment accumulation and adjacent shelf areas. Major faults often bound the subdivision of these areas. The Mine occurs within a structurally complex zone on the eastern side of the Collinsville Shelf, which was formed in the early Permian. The structure of the Bowen Basin sequence is characterised by compressional tectonics with a direction of transport to the west and southwest of the basin. A mid-Triassic thrust fault to the west of the Mine has upthrown and subsequently eroded the overlying Triassic strata to expose the Rangal Coal Measures.

Local Geology

Quaternary soils and alluvium cover the entire Hat Creek area, which runs westerly across the centre of the ML. The soils comprise sands, silts, and clays that have formed from the underlying Triassic and Permian sequences. The alluvium sequences discovered in this area vary from 0.3 to 8.0 m, with a 2.8 m average of clayey sand and gravel (Klohn Cripper Berger Ltd (KCB), 2020).

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Tertiary sediments are also present south of Hat Creek, typically consisting of sandstone, siltstone, mudstone, and conglomerate. Tertiary basalt has a heterogeneous profile of vesicular and massive basaltic lavas with minor tuff and ash. While not confirmed within the ML, previous investigations nearby have identified a Tertiary alluvium underlying the basalt within the paleochannel (KBC, 2020). Where present, this unit is often referred to as basal sand.

There are two groups of Triassic strata found within the Mine. Only the Sagittarius Sandstone was confirmed from the two sequences found within the Rewan Group strata. This group of strata typically have very little carbonaceous material, which indicates an arid depositional environment. The Clematis Group strata overlay the Rewan group throughout this area, forming resistant cliffs on both sides of the region.

Past exploration campaigns within and surrounding the Mine indicate that only the Rangal and Fort Cooper Coal Measures from the Blackwater Group are reasonably accessible through open-cut methods. The economic Moranbah Coal Measures from the Back Creek Group mined at nearby mines are located at uneconomic depths in this area (KCB, 2020).

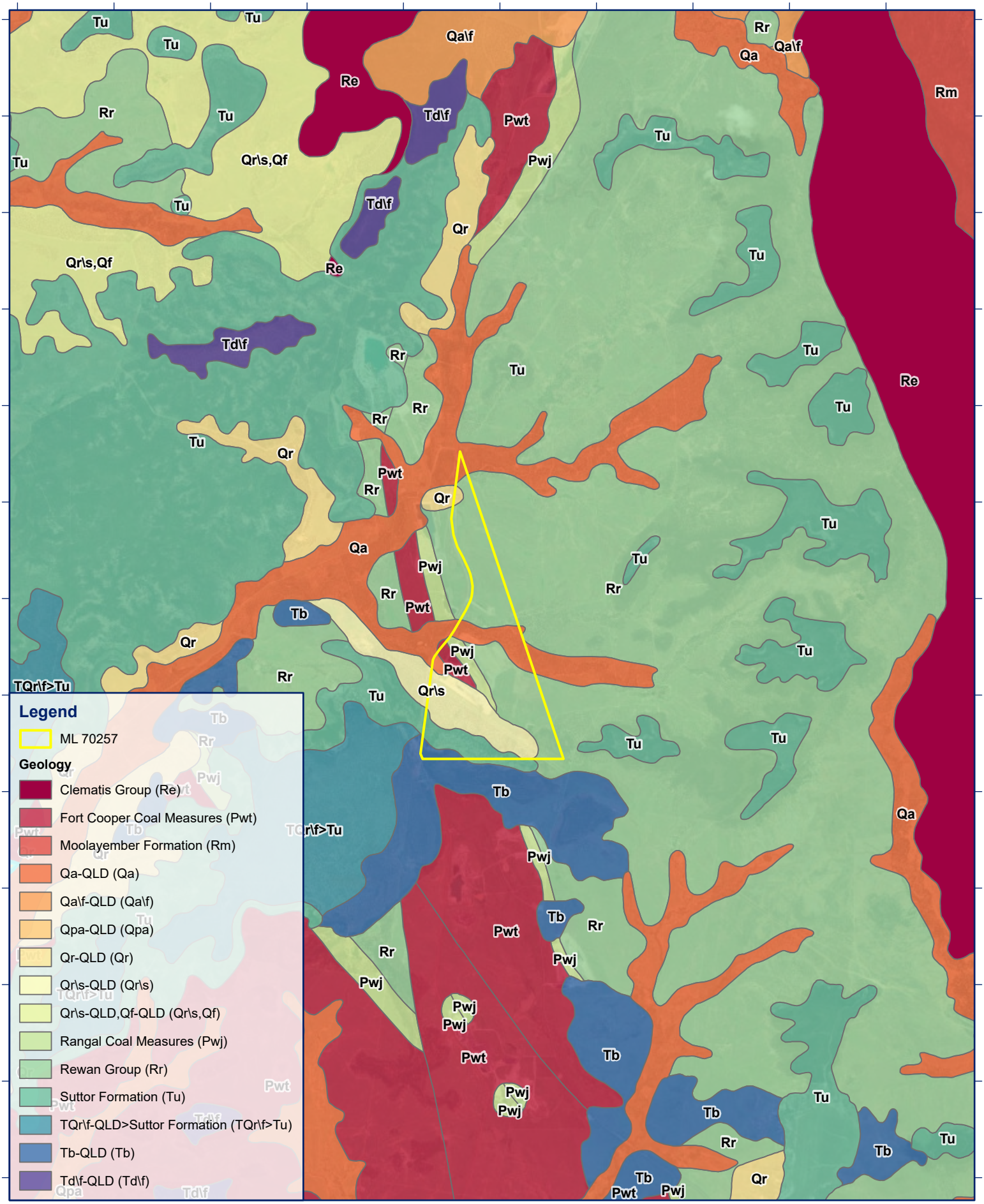
The Rangal and underlying Fort Cooper Coal measures comprise a sedimentary sequence with interbedded coal seams, including the target Leichhardt seam. The Rangal Coal Measures comprise interbedded fine to medium-grained lithic sandstone, siltstone, mudstone, and coal. The upper profile of these Permian sediments has formed into clay from extensive weathering. These weathered sediments outcrop in the central region of the Mine, with the remainder sub-cropping under the Quaternary alluvium and Tertiary sediments towards the east. As they dip towards the east, the depth of cover above the coal seam increases from approximately 15 m in the west to 120 m in the east. The stratigraphic column of the resource within the Mine is detailed in **Table 3-1** and shown in **Figure 3-5**.

Table 3-1 Summary of the Mine stratigraphy

Age	Group	Unit	Lithology
Quaternary (Qa)	-	Recent alluvium	Soil, clay, silt, sand, gravel
Tertiary (Qr\s) (Tu)	-	Sediments (Suttor Formation and Duaringa Formation)	Sandstone, mudstone, conglomerate, siltstone
	-	Basalt	Olivine basalt of Clermont Springsure Basalt Province
Triassic	Clematis Group		Sandstone, siltstone, mudstone, and granule-to-pebble conglomerate
	Rewan Group (Rw)		Red and green mudstone, green lithic sandstone (Sagittarius Sandstone), occasional pebble conglomerate
Upper Permian	Blackwater Group	Rangal Coal Measures (Pwj)	Carbonaceous mudstone, siltstone, sandstone. Coal seams: ▪ Burton Seam (splitting to the Leichhardt and Vermont Seam) ▪ Girrah Seam
		Fair Hill Formation	Sandstone and mudstone with interbedded coal, tuffaceous claystone
		Fort Cooper Formation	Coal seams, carbonaceous shale, mudstone, sandstone, siltstone, conglomerate

Source: (KCB, 2020)

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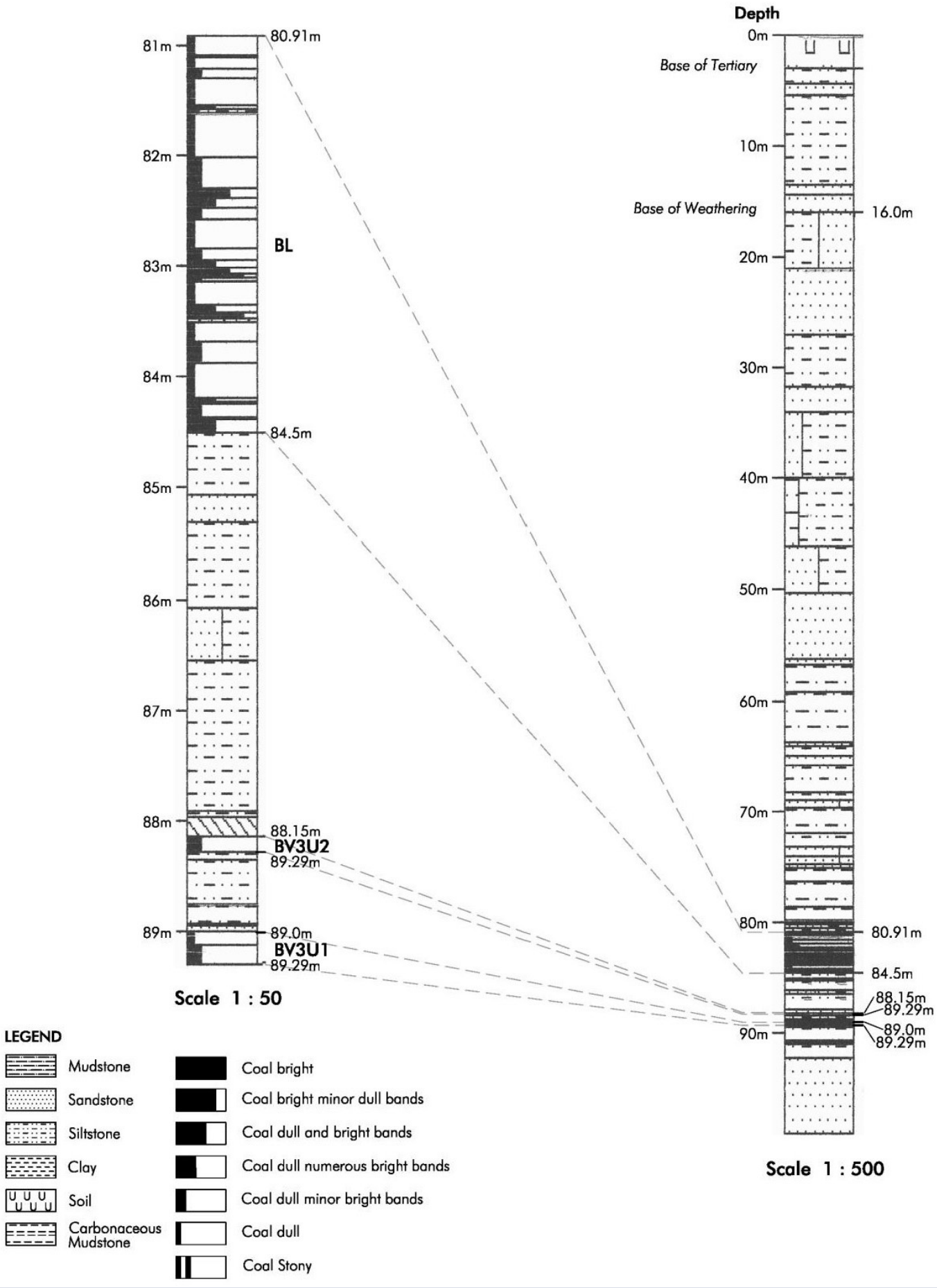
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PROJECT	CLIENT
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Regional Geology	
Figure 3-4 | ADV-AU-00217 | September 2023	

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BME Mine - PRCP

Stratigraphic Column

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Figure 3-5	ADV-AU-00217	September 2023

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3.1.1.4 Site Hydrology and Fluvial Networks

Regional Hydrology

The Mine is located in Central Queensland within the Isaac River sub-basin, which is a sub-basin of the greater Fitzroy Basin. The Fitzroy Basin has a total catchment of 142,900 km^2 with four main rivers:

- Isaac River;
- Don River;
- Mackenzie River; and
- Fitzroy River, which discharges into the Coral Sea southeast of Rockhampton.

Local hydrology and fluvial networks

The three ephemeral creek systems that flow through the ML are Hat Creek in the central portion, Teviot Brook in the northern tip, and an unnamed watercourse that feeds the large onsite dam just south of Teviot Brook (**Figure 3-6**). Stream flow in the rivers and tributaries of the Isaac River are highly dependent upon the frequency and intensity of rainfall events within the catchment area. Flows are known to recede quickly with extended periods in between events where flows are very low or non-existent. Flows within the ephemeral creek systems located within the ML predominantly occur from January to March during and after significant rainfall events.

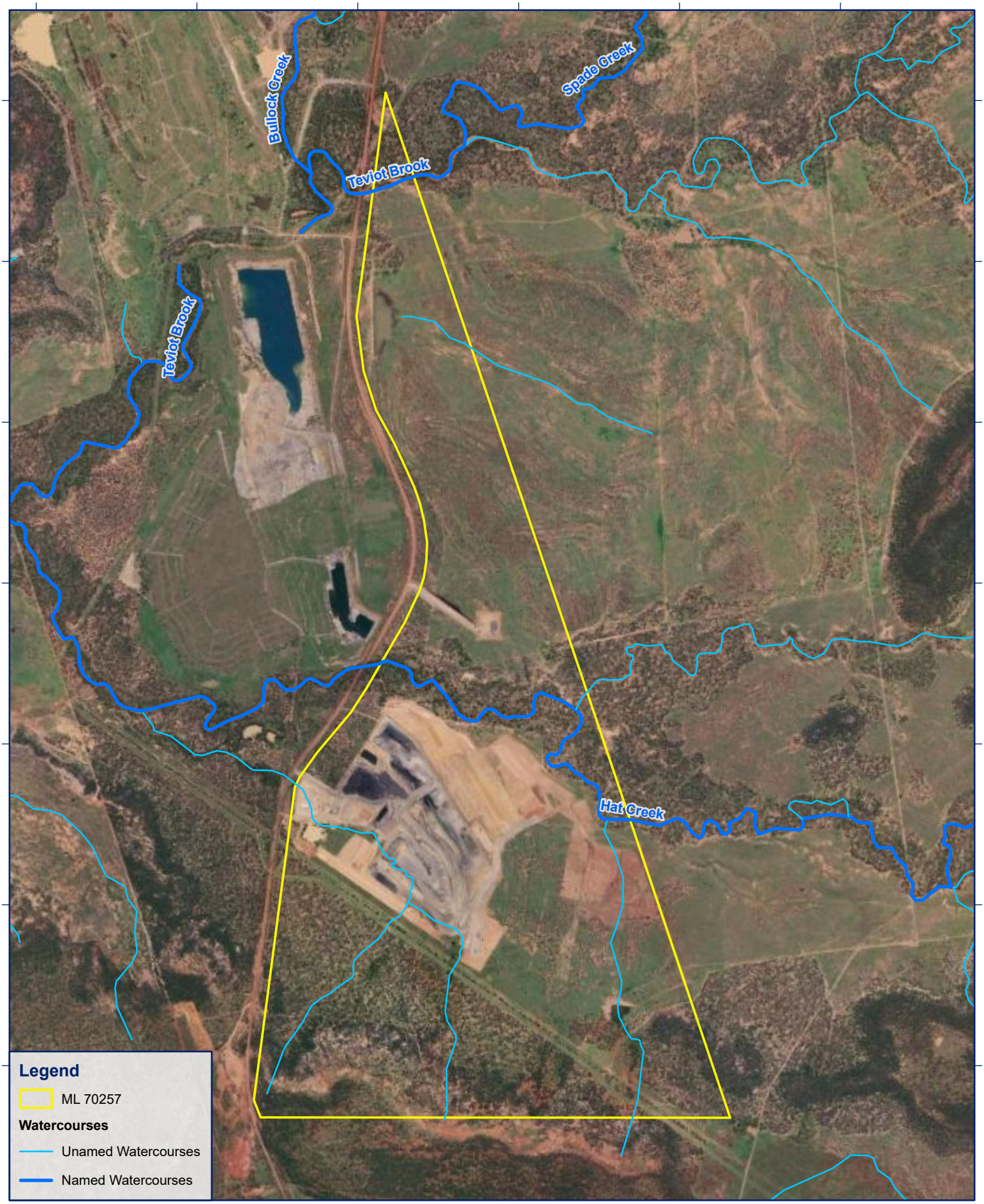
Hat Creek is the predominant waterway system flowing through the ML in a westerly direction, with its primary trunk defined as a stream order 3 watercourse under the *Vegetation Management Act 1999* (VM Act). Several stream order 1 and 2 tributaries feed into the Hat Creek system from a southerly and easterly direction. There are no diversions, crossings or any other direct impacts to Hat Creek as a result of mining at BME. Upstream and downstream gauging stations that monitor stream level water height (m) and discharge volume (m^3/s) are installed in Hat Creek per EA requirements.

A 300 m section of Teviot Brook flows through the northern-most portion of the ML in a westerly direction before turning south-west. Hat Creek connects with Teviot Brook approximately 2.5 km to the north-west of the Mine. Another unnamed watercourse flows in a westerly direction and feeds directly into a large dam in the northern portion of the ML. Mining activities do not impact Teviot Brook or the unnamed watercourse, as operational activities predominantly occur to the south of Hat Creek, except for a small explosives compound between the large dam and Hat Creek.

A watercourse determination from the Department of Regional Development, Manufacturing and Water (DRDMW) received on 17 June 2021 provided several updates to the Watercourse Identification Mapping (WIM) across the ML. This determination clarified which tributaries will be classified as watercourses and drainage features under the *Water Act 2000* (Water Act) (Queensland Government, 2023). The primary Hat Creek watercourse and the branch to the north were defined as watercourses, whereas all the tributaries feeding into it from the south and south-east were classified as drainage features. One tributary was also determined to be neither a watercourse nor a drainage feature and has subsequently been removed from the watercourse mapping across the ML.

No strategic environmental areas (SEAs) regulated by the *Regional Planning Interests Act 2014* are located within the ML.

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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Watercourse mapped across the Mine	
Figure 3-6 | ADV-AU-00217 | September 2023	

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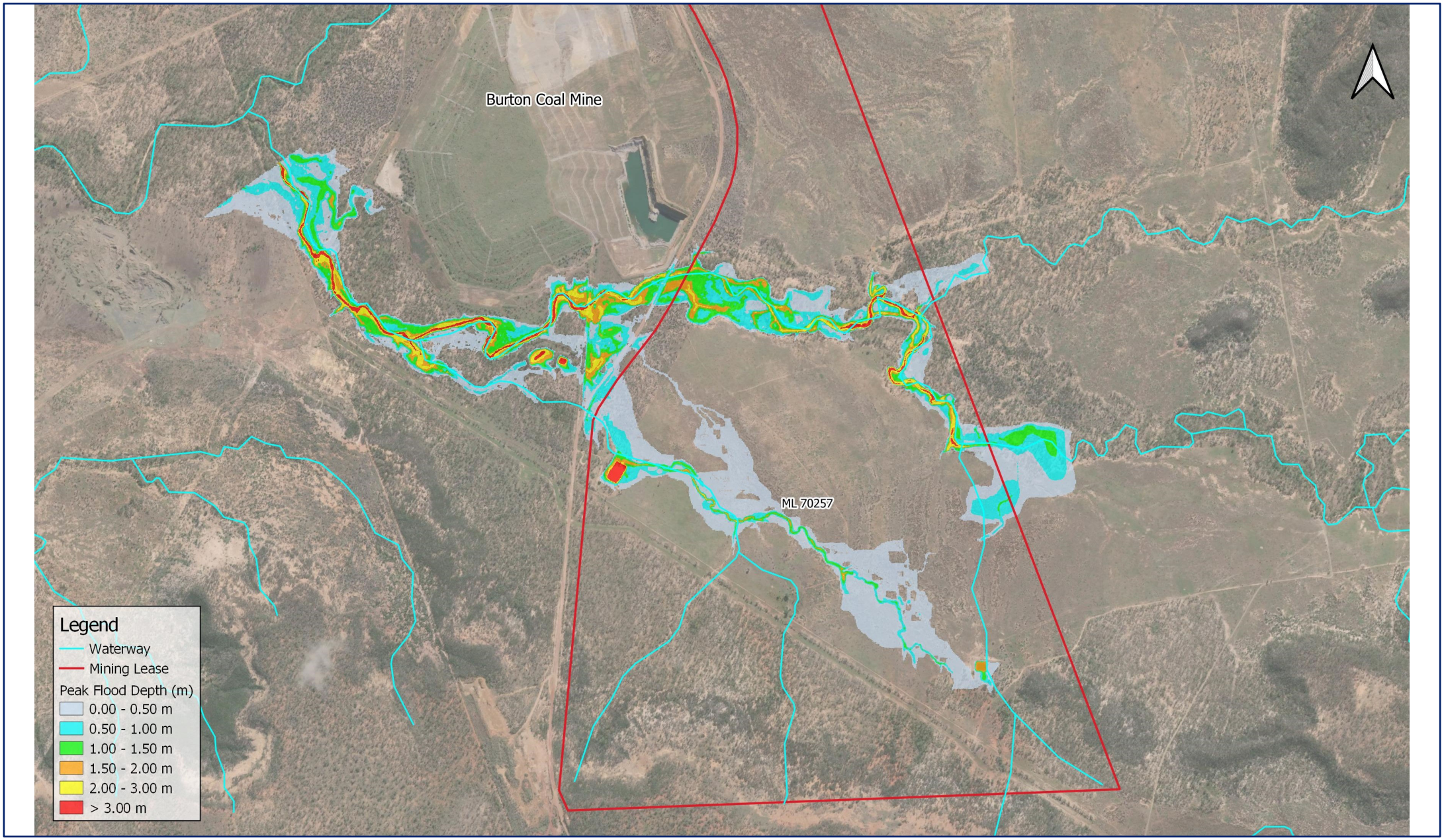
Hydraulic Modelling

Hydrologic and hydraulic modelling was undertaken as part of the Surface Water Impact Assessment (SWIA) across the pre-mining landscape to confirm the baseline flooding extents within the ML in 2021 (Engeny Water Management (Engeny), 2021). XPRAFTS, an interactive hydrologic analysis software, was used to simulate runoff hydrographs at defined points throughout a watershed. The model was developed based on Australian Rainfall and Runoff (Ball *et al.*, 2019) and PRCP guideline requirements. The 1:100 (1%) Annual Exceedance Probability (AEP), 1:1000 (0.1%) AEP, as well as Probable Maximum Precipitation (PMP) design rainfall estimates were calculated for the hydrologic modelling. Two-dimensional hydraulic models were then developed to predict hydraulic flow behaviour within the local and regional waterway surrounding the Mine. The BMT-WBM TUFLOW software was adopted for this component of the assessment.

This modelling confirmed that ML 70257 would be impacted by local and regional flooding at designed flood peak flows with an AEP of 1% and 0.1% (**Figure 3-7** and **Figure 3-8**), up to the PMP. It was also noted that the existing levee for the Broadmeadow West Pit, north of Hat Creek, is modelled as providing flood protection up to the 0.1% AEP. Additionally, the Mallawa haul road, immediately downstream of the western ML, is seen to be inundated by flooding in all modelled events.

These model observations have informed the development of an operational water management plan that includes pit flood protection on the southern side of Hat Creek and drainage to divert minor flows from the southern tributaries around the Mine extent. Climate change impacts on rainfall intensity for the Mine have also been reviewed, predicting rainfall increases of up to 5.3% to 6.8% by 2040. This increase is expected to result in a corresponding increase in flood levels. However, the engineering design of the water management infrastructure within the Mine includes sufficient freeboard to manage this risk.

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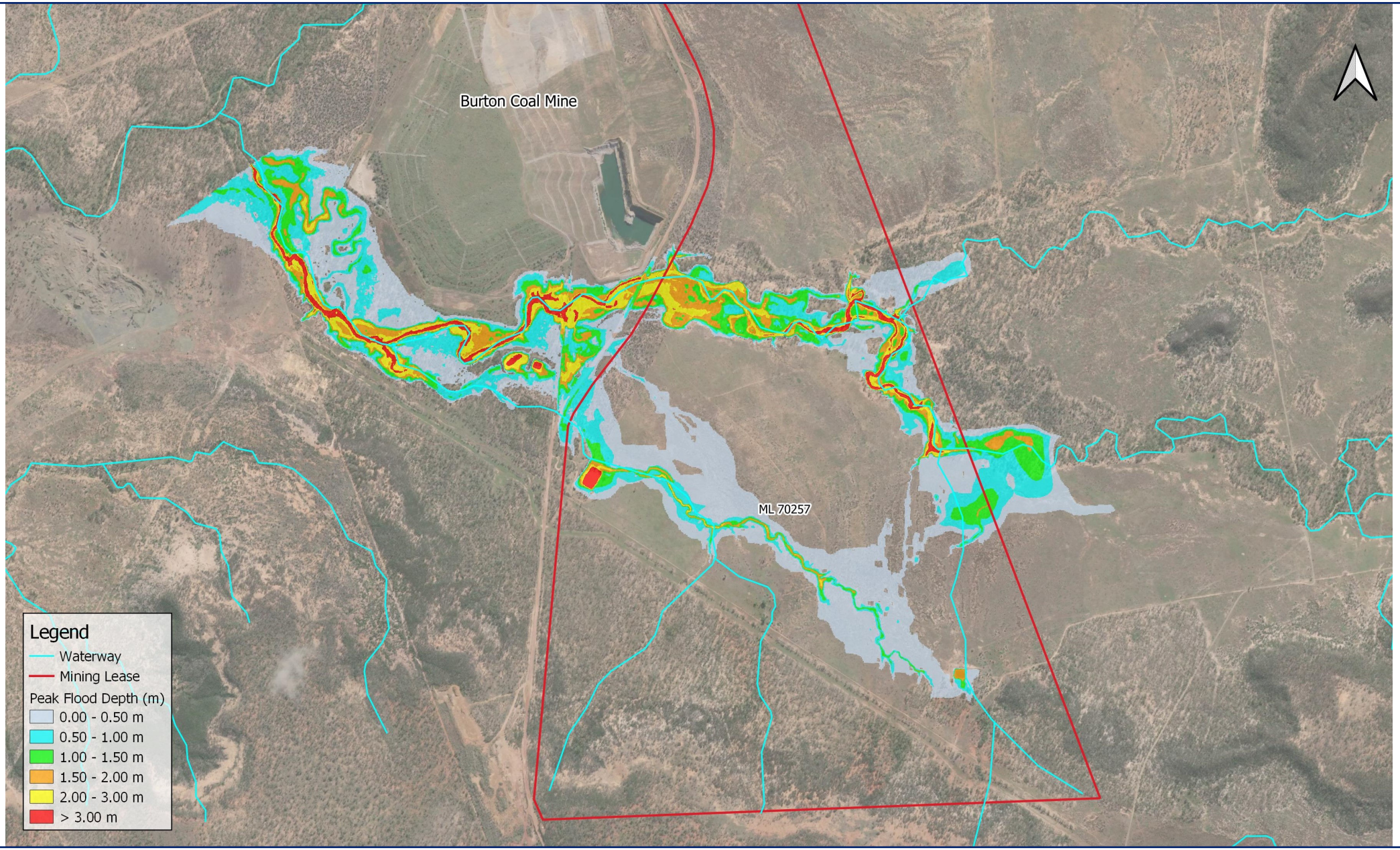
Source: Engeny

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PROJECT		CLIENT
September 2023	BME Mine - PRCP	BOWEN COKING COAL LIMITED
Figure 3-7		
ADV-AU-00217	1% AEP Flood Depth - Base Case	

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Source: Engeny

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PROJECT		CLIENT
September 2023	**BME Mine - PRCP**	BOWEN COKING COAL LIMITED
Figure 3-8		
ADV-AU-00217	**0.1% AEP Maximum Flood Depth - Base Case**	

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Environmental Values and Water Quality Objectives

Environmental Values (EVs) are defined as the qualities of water that make it suitable for supporting aquatic ecosystems and various human water uses. The EVs relevant to the region surrounding the Mine have been identified using the *Environmental Protection (water) Policy 2009 Isaac River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Isaac River Sub-basin (including Connors River)* (Department of Environment and Heritage Protection (DEHP) 2013) ("the Guideline") and associated *Sub-basin Map Series (WQ1301)*.

The waters of the Mine fall within the Isaac Northern Tributaries catchment, specifically Teviot Brook. The EVs relevant to the Mine have been sourced from the Guideline (DEHP, 2013) and further refined based upon regional knowledge to identify EVs likely to be present within the ML (**Table 3-2**).

Table 3-2 Environmental Values of Teviot Brook

The Guideline EVs (DEHP, 2013)	**Applicable to Isaac Northern Tributaries**	**Applicable to the waters of Teviot Brook**
Aquatic Ecosystems	✓	✓
Irrigation	✓	×
Farm Supply / Use	✓	×
Stock Water	✓	✓
Aquaculture	×	×
Human Consumer	✓	×
Primary Recreation	✓	×
Secondary Recreation	✓	×
Visual Recreation	✓	×
Drinking Water	✓	×
Industrial Use	✓	×
Cultural and Spiritual Values	✓	✓

There are no known users of local surface water sources for drinking water, irrigation, industrial use, or the production of aquatic foods for human consumption in the local region surrounding the Mine. There are no registered water licences within 50 km downstream of the Mine. These watercourses are ephemeral which may account for this lack of water usage and reduce the likelihood that these watercourses systems are utilised for primary or secondary recreational activities.

Based upon these observations, and the known land uses surrounding the Mine, the relevant EVs for the receiving environment are:

- Aquatic ecosystems (slightly to moderately disturbed);
- Stock water; and
- Cultural and Spiritual Values.

Surface Water Quality

The Mine does not have historical water quality data for the waterways within or surrounding the ML, apart from the data collected during the SWIA in 2021 and the first Receiving Environment Monitoring Program (REMP) undertaken in early 2023.

In the absence of historical water quality data, suitable water quality objectives have been developed for the Mine in accordance with the objectives outlined in the Guideline (DEHP, 2013). This has been incorporated into the REMP design document (RPM, 2021).

The Guideline (DEHP, 2013) outlines Water Quality Objectives (WQOs) to protect different EVs located within the Isaac River Sub-basin, which are divided into two main categories:

- WQOs to protect aquatic ecosystem which do not relate to human use; and

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- WQOs to protect EVs, other than aquatic ecosystems, being those relating to human use.

The relevant EVs have informed available release limits and trigger levels listed in EA0002465. The Mine has not experienced any planned discharges into Hat Creek to date.

Sediment sampling undertaken from an upstream location of Hat Creek adjacent to the Mine haul road returned concentrations of Al and Cu that exceed WQOs by 265 µg/L and 0.6 µg/L respectively. All other water quality parameters are within WQOs for the receiving environment.

Sediment quality results were consistent across the sampling area, and showed the riparian soils as having low moisture content which suggests a low rate of water retention. In addition, downstream locations exhibited high levels of turbidity and suspended solids which exceed the WQOs (SGM, 2023).

Wetlands

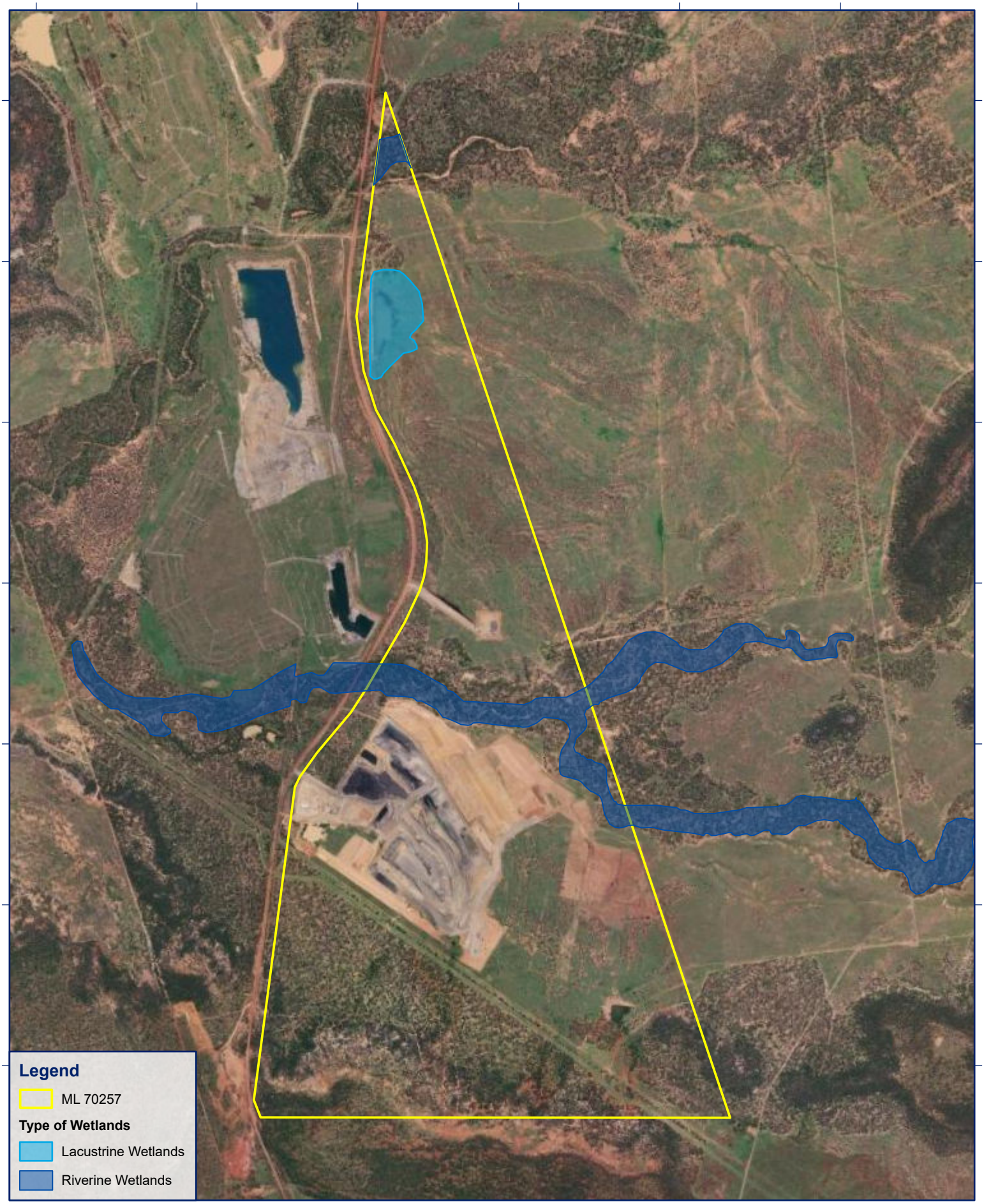
Two types of wetlands listed under the Queensland Wetland Mapping were mapped across the ML and have been shown in **Figure 3-9**. These wetlands include:

- Lacustrine wetlands: These wetlands are typically associated with open water (i.e., lakes and dams) and may not have fringing vegetation. These ecosystems are highly variable in Queensland, especially in arid and semi-arid areas. This wetland is mapped around a large man-made dam towards the north of the ML.
- Riverine wetlands: These wetlands are contained within channels (i.e., rivers, creeks, and waterways), and the water levels within these systems can be highly variable. They may also contain water permanently or intermittently. Within the ML, this wetland was co-located with the mapped areas of Regional Ecosystem (RE) 11.3.25 along Hat Creek and Teviot Brook.

The riverine wetland is not classed as a Matter of State Environmental Significance (MSES), such as Wetland Protection Areas (WPAs) or High Ecological Significance (HES), under the Queensland Wetland Mapping.

The approved disturbance area has avoided all impacts to wetlands areas; therefore this rehabilitation is not required post-closure.

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Wetlands across the Mine	
Figure 3-9 | ADV-AU-00217 | September 2023	

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3.1.1.5 Groundwater Levels and Properties

Regional Hydrogeology

The aquifers within the ML and 5 km radius are associated with the Isaac Connors Groundwater Management Area (GMA). This GMA is managed under the Fitzroy Basin Water Plan and comprises of two groundwater units. Groundwater unit 1 refers to shallow aquifers, which, for this Mine, includes the Quaternary alluvium, Tertiary sediments, and Tertiary basalt. Groundwater unit 2 includes all other sub-artesian aquifers, which, in the case of the Mine, includes the Rewan Group and the Permian Coal Measures (i.e., Rangal Coal Measures, Fort Cooper Coal Measures).

Geological mapping has identified a north-south striking regional fault structure west of the Mine. Movement along this fault has caused uplift and erosion of outcrops and sub-crops of the Permian strata (containing coal). Similar faulting elsewhere in the Bowen Basin has previously demonstrated that this hydraulic characteristic restricts groundwater flow horizontally. This characteristic, combined with mineralised fractures, high clay content, thin coal seams, and prior coal mining in the region further indicates this fault is a barrier to groundwater flow.

The movement along the regional north-south striking fault structure has caused uplift and erosion outcrops and sub-crops of the Permian strata. Similar faulting in the Bowen Basin demonstrated restrictions on groundwater flow in a horizontal direction. In conjunction with the features listed below, this characteristic indicates this fault to be a groundwater flow barrier. The additional reasons this fault is considered a barrier to flow include the following:

- Fractures are typically sealed by mineralisation and precipitation.
- High clay content within the coal measures will likely reduce the fault hydraulic conductivity by several orders of magnitude compared to the un-faulted areas.
- Thin coal seams (up to approximately 3 m) demonstrate a high probability that fault displacement has resulted in them juxtaposing with less permeable interburden or sediments on the other side of the fault.
- Prior coal mining in the region indicates that faulting typically highly compartmentalises coal seams, thereby restricting groundwater flow.

Local Hydrogeology

Details of the hydrostratigraphic unit encountered within and surrounding the Mine are summarised in **Table 3-3**. Of the five units confirmed within the Mine, only the deeper units (Rewan Group and Rangal Coal Measures) are known to contain permanent groundwater. The shallower units may experience ephemeral flows from rainfall infiltration and/or seepage.

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Table 3-3 Hydrogeological Features of the Mine

Hydrostratigraphic Unit	Soil/Rock Types	Conductivity
Quaternary alluvium	Gravel, sand, silt, and clay.	Highly variable, but higher permeability confined to smaller creek channels.
Tertiary sediments	Semi-consolidated quartz sandstone, clayey sandstone, mudstone and conglomerate, fluvial-lacustrine sediments, and minor interbedded basalt.	Permeable.
Tertiary basalt	Massive and vesicular lava, tuff, and ash flows.	Highly variable but lower permeability within the Mine.
Rewan Group	Interbedded sequence of siltstone, claystone, and minor fine-grained sandstone.	Lower conductivity due to localised fracturing being intersected.
Rangal Coal Measures	Alternating layers of fine to medium-grained sandstone, siltstone, and coal.	Varies between saturated and unsaturated depending on the location of faulting.

Groundwater Levels and Properties

The movement of groundwater to and from affected or potentially affected aquifers, or the perceived confinement of the underground water was conceptually and numerically modelled in 2021 (KCB, 2021). The inputs, connectivity, and preferential flow paths are discussed for each hydrostratigraphic unit. There are no springs within or near the Mine.

Groundwater monitoring of the Rewan Group (BDW172 (32)) and Rangal Coal Measures (BDW172 (54), BDW8C, and BDW5C) has occurred on the ML since 2009. As these will be mined out during operations, new monitoring bores targeting these aquifers have been or will be established to ensure continual monitoring of impacted hydrostratigraphic units. In 2021, five additional monitoring bores were installed and monitored for the following hydrostratigraphic units:

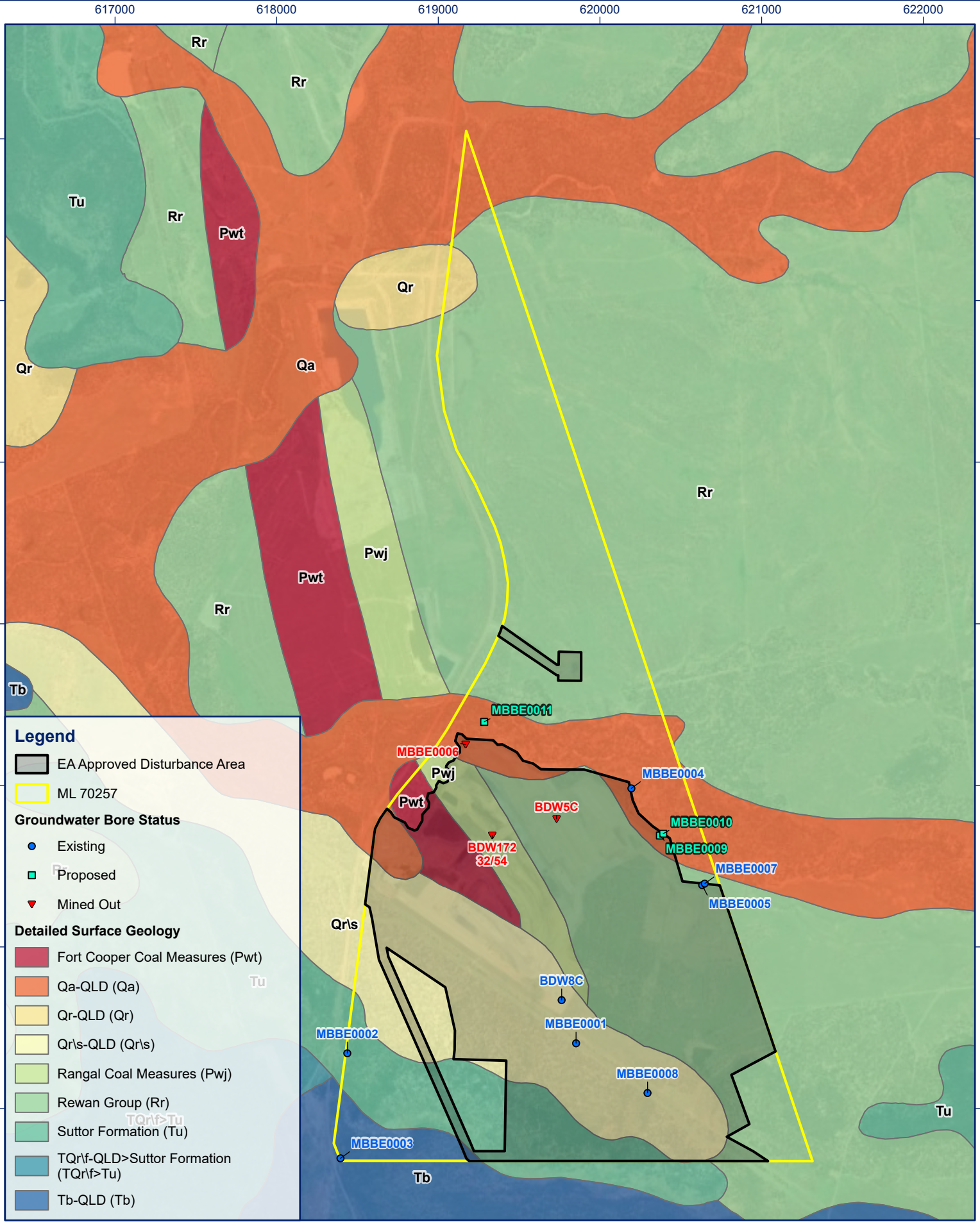
- Alluvium (MBBE0004 and MBBE0006);
- Tertiary Sediments (MBBE0002b);
- Basalt (MBBE0003); and
- Rangal Coal Measure (MBBE0008).

Two compliance bores were also established and monitored in 2021 for the aquifers that were modelled to experience groundwater drawdown as a result of mining activities. These include:

- Rangal Coal Measures (MBBE0001); and
- Rewan Group (MBBE0007).

The location of groundwater monitoring bores is presented in **Figure 3-10**, while the modelled baseline regional water levels are displayed in **Figure 3-11**.

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Groundwater Monitoring Locations

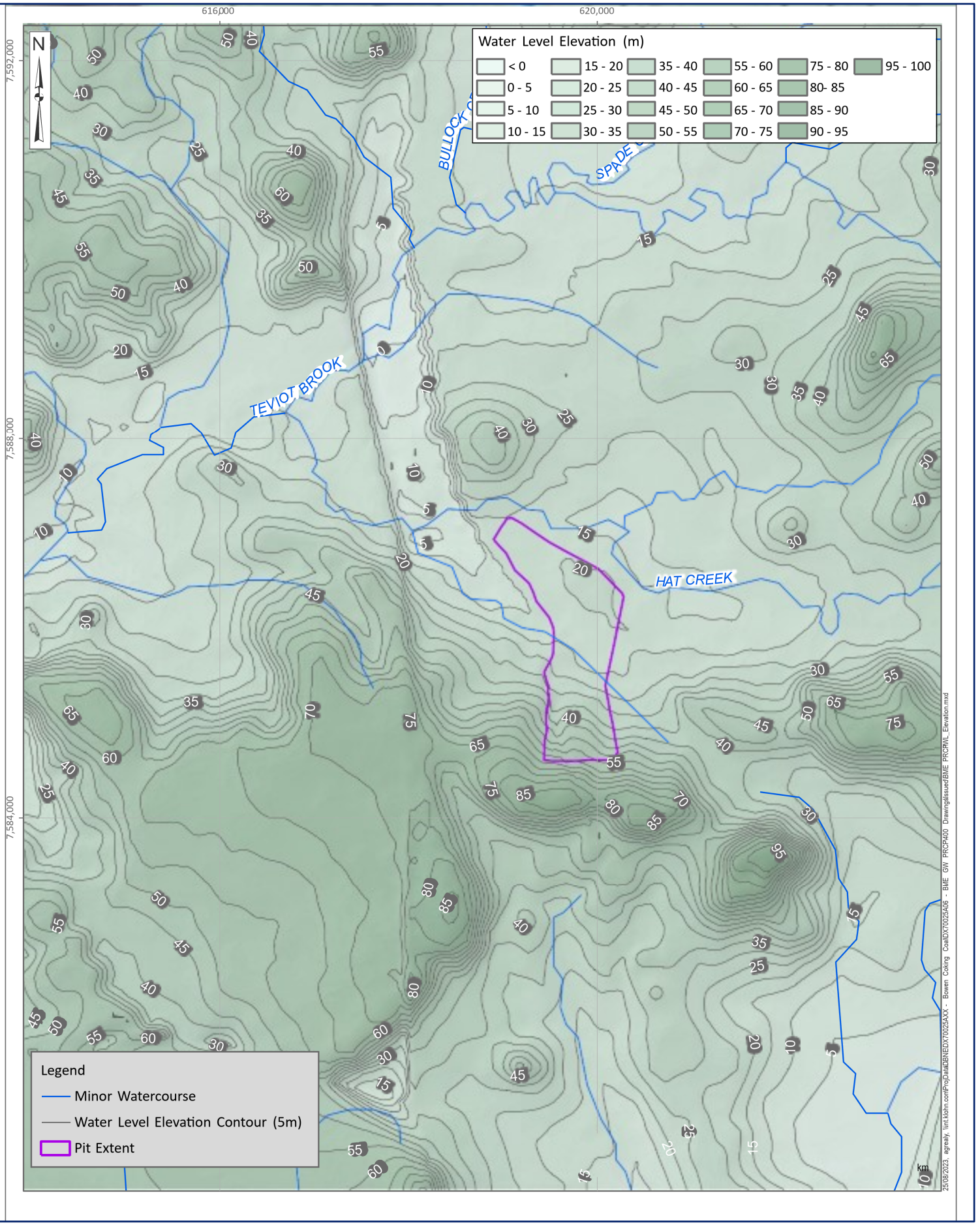
Figure 3-10 | ADV-AU-00217 | September 2023

CLIENT

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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Baseline Water Levels	

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Figure 3-11	ADV-AU-00217	September 2023

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A Groundwater Impact Assessment (GIA) that included a field investigation across the ML by a qualified hydrogeologist was conducted in 2021 prior to the commencement of current mining activities. The main component of this investigation was the development and technical analysis of seven new groundwater monitoring bores targeting each of the identified hydrostratigraphic units (KCB, 2021), that now form a part of the ongoing operational groundwater sampling program. The information gathered from the two separate bore drilling/installation campaigns attended by a hydrogeologist has been utilised to determine:

- Hydrogeological observations to identify the hydrogeological characteristics of each hydrostratigraphic unit (changes to the drilling penetration rate, water / air return, moisture / water presence, water inflow rates, water quality and weathering characteristics).
- Confirm drilling depth and select depth of the screened intervals.
- Groundwater levels following bore establishment.
- Hydraulic (slug) testing of the installed monitoring bores to estimate hydraulic conductivity of the screened hydrostratigraphic unit.
- Water quality of the screened hydrostratigraphic unit.

Numerical modelling supported by groundwater level sampling conducted prior to the development of the Mine in 2021 and ongoing sampling conducted upon recent commencement of mining activities has indicated:

- **Alluvium** (MBBE0004 and MBBE0006) - These bores were dry when first drilled in January 2021 and subsequent sampling has only encountered water within MBBE0006 during the wet season from January to March coinciding with flow events. As the monitoring bores within this unit were found to be dry during sampling events, the water level associated with seasonal events was difficult to establish.

  The alluvium associated with Hat Creek experiences ephemeral flows through infiltration and seepage from surface water that may remain in the creek bed following significant rainfall events. Given the recharge association with the surface water flow, the alluvium is a compartmentalised reflection of these short-duration events. The Hat Creek alluvium has been assumed to have less capacity for groundwater storage after these events when compared to accumulation observed in the nearby Teviot Brook alluvium.
- **Tertiary Sediments** (MBBE0002b) - Tertiary sediments are predominately located within the southwestern portion of the ML and sporadically through the surrounding region. Tertiary sediments are not considered a significant aquifer as they do not store a large amount of groundwater due to their limited thickness, typically less than 15 m. This stratum is similar to the alluvium, often encountered above the regional groundwater table, making it unsaturated. The water levels in the bores remained constant throughout the 2021 baseline sampling events.

  The Tertiary sediments encountered in the ML are considered unsaturated, as the known groundwater is below this unit. The groundwater recharge for this unit is via surface water flow seepage from the alluvium (if present) following rainfall events or direct infiltration of rainfall at outcrop areas. The residence time for water encountered within this unit is often low as infiltration of that water into the hydrostratigraphic units below often occurs.
- **Basalt** (MBBE0003) - The Tertiary basalt is below the Tertiary sediments and above the Rewan Group or Permian Coal Measures. Given this basalt is shallow and highly weathered due to the breakdown of clay, it does not contain significant groundwater and can even act as a barrier to flow. Given the characteristics of this aquifer within the ML, the bore was often dry during the 2021 baseline sampling events. This has continued to be the case during monitoring events conducted during operations.

  There is a limited extent of this hydrostratigraphic unit located within the southwestern corner of the ML. This unit also has limited thickness in the ML, which is the likely cause of its limited groundwater storage capacity identified in the field investigation. The basalt is considered unsaturated as it is located above the interpreted regional groundwater level within the Rewan Group.
- **Rewan Group** (BDW172 (32) and MBBE0007) - The Rewan Group is recognised as a regional aquitard and acts as a confining unit overlying the Permian Coal Measures. This group is typically characterised by low primary porosity. However, the Rewan Group within the Mine has low hydraulic conductivity due to localised fracturing being intersected. Both the monitoring and compliance bore maintained their water levels during the 2021 baseline sampling events.

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As the baseline groundwater levels showed little seasonal change variability, it is believed this group has limited connectivity to any overlying strata or the surface water system. The Rewan Group are considered the highest strata that contain regional groundwater, at a depth that ranges between 18 to 27 meters below ground level (mbgl).

- **Rangal Coal Measures** (BDW172 (54), BDW8C, BDW5C, and MBBE0001) - The targeted Leichhardt and Upper Vermont coal seams are within the Rangal Coal Measures and, therefore, will be affected by mining activities. Individual coal seams primarily contain groundwater and, therefore, are typically saturated throughout their full thickness but may become unsaturated where they outcrop or subcrop above the regional groundwater table. Seasonal changes in water levels were also not observed, indicating limited connectivity with the overlying strata and the surface water system.

  Recharge is considered low for this stratum as it depends on infiltration on localised outcrops of the Permian Coal Measures located within the ML. The flow direction conceptually interpreted for this stratum is west-southwest, which reflects the surface water flows. However, historical coal mining in the region has resulted in zones of depressurisation in the vicinity of residual voids where pit lakes are connected to the groundwater system. These nearby pit lakes have reduced the potentiometric surface, creating a hydraulic gradient towards the pit lakes. Rather than flowing in the conceptual west-southwest direction, the current groundwater flow follows the gradient towards the pit lakes to the northwest of the ML.

Table 3-4 shows the water levels measured in monitoring bores within the Project area that contained water since their establishment in the first quarter of 2021 and includes data from the original groundwater bores during this period. This information was used the original numerical model (2021). The location of the groundwater monitoring bores is presented in **Figure 3-10** while the regional water levels are displayed in **Figure 3-11**.

Table 3-4 Baseline Groundwater levels within the ML

Monitoring bore	Water Level - Metres from Top of Case (mTOC)					Screened Stratigraphy
	24/02/21	13/04/21	1/06/21	04/08/21	10/02/22	
MBBE0001	17.22	17.04	17.21	17.23	17.40	Rangal Coal Measures
MBBE0002	Dry	12.51	12.52	12.54	12.60	Tertiary sediments
MBBE0003	Dry	Dry	Dry	Dry	Dry	Basalt
MBBE0004	Dry	Dry	Dry	Dry	Dry	Alluvium
MBBE0006	3.42	Dry	Dry	Dry	2.76	Alluvium
MBBE0007	*	18.22	18.27	18.24	18.25	Rewan Group
MBBE0008	*	18.64	18.57	18.55	18.37	Rangal Coal Measures
BDW172 (32)	13.05	13.10	13.32	13.35	13.48	Rewan Group
BDW172 (54)	13.08	13.13	13.15	13.17	13.51	Rangal Coal Measures
BDW5C	12.46	12.47	12.50	12.58	12.58	Rangal Coal Measures
BDW8C	17.84	17.81	17.84	17.84	17.60	Rangal Coal Measures

** Not yet established*

The following subsections describe the hydrostratigraphic units encountered within and surrounding the Project area. Of the five units confirmed within the Project area, only the deeper units (Rewan Group and Rangal Coal Measures) are known to contain groundwater. The shallower units may experience ephemeral flows from rainfall infiltration and/or seepage.

3.1.1.6 Soil Types, Properties, and Productivity

A soil survey was conducted across the ML in February 2021 by appropriately qualified persons (AQPs) (SGM Environmental Pty Ltd (SGM), 2021). Across the entire ML, 48 separate locations were logged, with a representative subset (approximately 50% of the total samples) analysed at the laboratory. The survey aimed to confirm soil types; assess physical and chemical soil characteristics, erosion potential, and the need for ameliorants and fertilisers; and confirm the presence or absence of Acid Sulphate Soils (ASS). This information was used to identify the associated impacts and control measures specific to topsoil and

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subsoil handling. The data collected from these soil surveys were also used to determine the land's suitability for agriculture, cattle grazing, and broadacre cropping, as per the relevant guidelines.

Acid Sulphate Soils

The survey considered ASS not to be a risk as the Mine is not located on low-lying coastal lands below 5 metres Australian Height Datum (mAHD), as confirmed through Australian Soil Resource Information System (ASRIS) mapping (ASRIS, 2013).

Regional Soil types

Australian Soil Classification (ASC) mapping was conducted to understand soil types that are commonly found in the region. Sodosol was mapped across a 10 km buffer zone from the Mine. Soils of this soil order show a strong texture contrast between the topsoil and subsoil. While these soils are generally not strongly acid (pH > 5.5) the subsoils are highly sodic (exchangeable sodium percentage (ESP) > 6). The parent materials range from highly siliceous to intermediate in composition. Sodosols generally have low-nutrient availability and are very vulnerable to erosion and increased salinity when vegetation is removed. The high sodicity of the subsoil also causes poor structure and low permeability.

Local soil types

Sodosol was not observed in the ML. Five predominate soil types were identified, with most being texture-contrast Chromosol or high clay Vertosol and Dermosol. The details of the soils encountered throughout the ML are noted in **Table 3-5** and displayed in **Figure 3-12**.

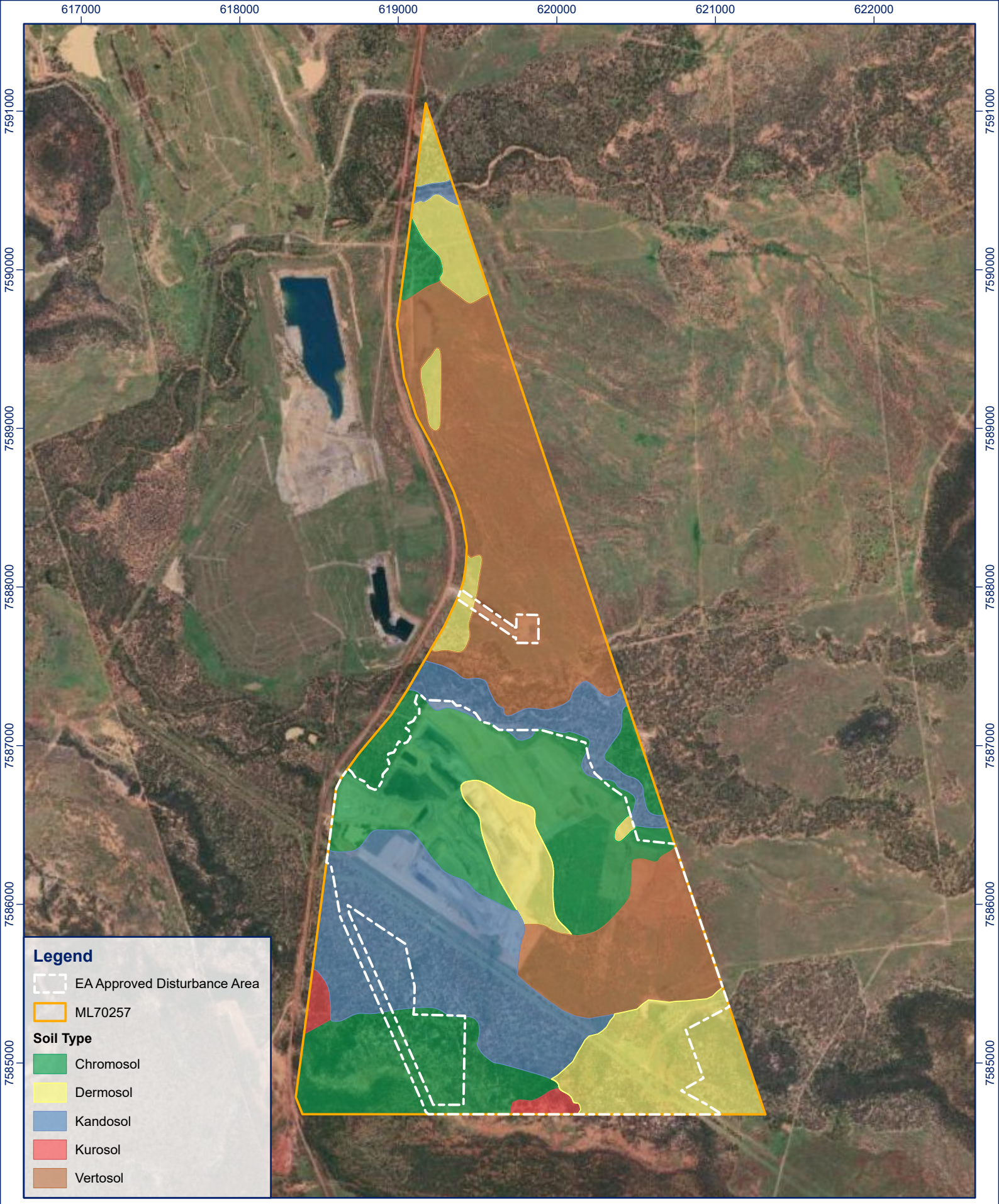
Table 3-5 Types and characteristics of soil encountered across the ML

Soil Orders	Description	Survey results
Chromosol	Chromosol often shows strong texture contrast between surface and subsoil horizons. They are generally non-sodic and not strongly acidic, with moderate agricultural potential, fertility, and water-holding capacity.	Chromosol was the soil found to occur most across the ML. It was generally located in the southern and central portions of the ML. The Chromosol variations within the ML have been described as Haplic, Mesotrophic, Brown Chromosol and Mottled, Mesotrophic and Red Chromosol. In summary, this soil was found to be: ▪ Slightly acidic pH that could still be suitable for cultivation and grazing, ▪ Poor fertility, ▪ Non-sodic subsoil (unlikely to be dispersive); and ▪ Moderate potential for dispersion if soil is reworked.
Dermosol	Dermosol includes moderately deep, well-drained, clay soils that have a more developed subsoil structure and do not have a strong texture contrast between horizons. This soil can support various land uses such as native pastures, forestry, and cropping.	The Dermosol variations within the ML have been described as Acidic, Dystrophic, Red Dermosol, Haplic, Eutrophic, Brown Dermosol and Haplic to Sodic, Mesotrophic, and Grey Dermosol. In summary, the soil was found to be: ▪ Either strongly acidic/neutral, strongly alkaline, ▪ Low salinity topsoil, ▪ Poor soil fertility, ▪ Varies between sodic or sodic subsoil; and ▪ Moderate to strong potential for dispersion if soil is reworked.

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Soil Orders	Description	Survey results
Kandosol	Kandosol lacks a strong texture contrast between the surface soil and subsoil, with a weakly structured but generally well-developed subsoil that is not calcareous. Kandosol has low to moderate agriculture potential with moderate fertility and water-holding capacity.	The Kandosol found within the ML has been described as Haplic, Eutrophic, and Brown Kandosol. In summary, the soil was found to be: ▪ Slightly acid to slightly alkaline. ▪ Low salinity topsoil, ▪ Poor soil fertility, ▪ Non-sodic subsoil (unlikely to be dispersive); and ▪ Moderate potential for dispersion if soil is reworked.
Kurosol	Kurosol has a strong texture contrast between loamy surface soil and clayey subsoil. The upper 0.2 m of the subsoil is strongly acid. This soil type has low agricultural potential due to the poor water-holding capacity.	The Kurosol found within the ML has been described as Mottled, Magnesic, and Red Kurosol. It was the least commonly encountered soil, occurring in the southern portion of the ML, which will not be disturbed. In summary, the soil was found to be: ▪ Strongly acidic, ▪ Slightly elevated salinity in the topsoil, ▪ Moderate to sufficient fertility that is susceptible to acidification; and ▪ Non-sodic subsoil (unlikely to be dispersive).
Vertosol	Vertosol is clay-rich, exhibits strong cracking when dry (shrink-swell) and is often associated with surface microrelief or gilgai found in conjunction with Brigalow (*Acacia harpophylla*). This soil has high agricultural potential with high fertility and water-holding capacity. However, it cannot provide water to plants without significant rainfall. Additionally, this soil can be difficult to cultivate due to its poor structure, which can be improved with gypsum or lime.	The Vertosol found within the ML has been described as Epihypersodic, Crusty, Brown Vertosol. It is the second most found soil within the ML. In summary, the soil was found to be: ▪ Neutral to moderately alkaline, ▪ Moderately saline topsoil, ▪ Highly saline subsoil, ▪ Poor fertility, ▪ Subsoil sodic and likely to be dispersive; and ▪ Moderate potential for dispersion if the soil is reworked.

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Locations of Soil Types encountered across the ML

Figure 3-12 | ADV-AU-00217 | September 2023

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Land Suitability

The pre-mining land suitability has been assessed in depth by an AQP by comparing site specific survey results against the relevant guidelines as outlined in Section 5 of the Soil Survey report (SGM, 2021). The assessment of land suitability for beef cattle and broadacre cropping was undertaken AQPs in accordance with the *Guidelines for Agriculture Land Evaluation in Queensland* (Department of Science Information Technology and Innovation (DSITI) and Department of Natural Resources and Mines (DNRM), 2015) and *Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland – Land Suitability Assessment Techniques* (Department of Minerals and Energy (DME), 1995). This assessment considered water availability, nutrient deficiency, soil physical factors, salinity, rockiness, microrelief, pH, ESP, wetness, water erosion, flooding, and vegetation regrowth. The results of this assessment are summarised in **Table 3-6**, and shown in **Figure 3-13** and **Figure 3-14**.

Approximately 91.1% of the ML is classed as Class 4 land, with nutrient deficiency as the limiting factor. Class 4 land is categorised as marginal for grazing improved pastures, although it is largely considered suitable for grazing native pastures of variable quality. The remaining 8.9% was classified as Class 5 land, with salinity as the limiting factor (**Table 3-6** and **Figure 3-13**). Class 5 land is unsuitable for any form of pasture improvement and is limited to low productivity grazing of native pastures. Class 5 land may require destocking in poor seasons.

Although not proposed as a post-mining land use (PMLU), the land's suitability potential for rain-fed broadacre cropping was assessed. This revealed that 71.8% of the ML has a land suitability class of 4 (unsuitable for rain-fed broadacre cropping with severe limitations) (**Table 3-6** and **Figure 3-14**).

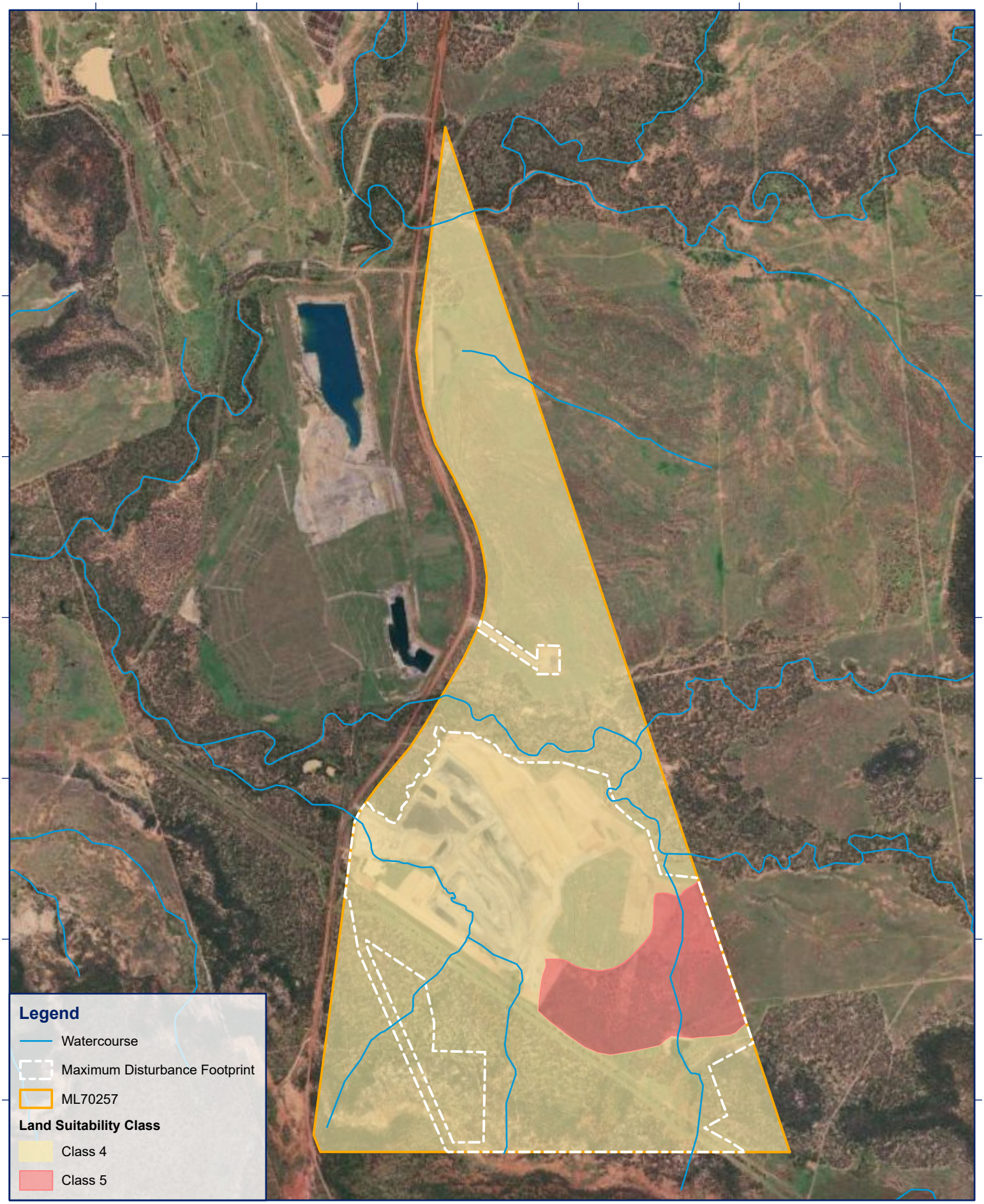
Approximately 46.9% of the land within the area covered by the MLs has not been disturbed by mining activities and will therefore maintain the pre-mining land capability/suitability classifications. Based on the land suitability assessments summarised above, the ASC units present on site have been assigned the agricultural land classifications listed in **Table 3-6** for beef cattle grazing.

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Table 3-6 Land Suitability Comparison

ASC	Beef Cattle Land Suitability				Broadacre Cropping Land Suitability			
	Land Suitability Rating	**Limiting factors**	**Area (ha)**	**% of total area**	**Land suitability Rating**	**Limiting factors**	**Area (ha)**	**% of total area**
Chromosol	Class 4	Nutrient Deficiency	252.0	29.8	Class 4	Nutrient Deficiency	171.1	20.2
					Class 5	Water Erosion	80.9	9.6
Dermosol	Class 4	Nutrient Deficiency	139.8	16.5	Class 4	Nutrient Deficiency Soil Physical Factors Water Erosion Plant available water content (PAWC)	66.6	7.9
					Class 5	Nutrient Deficiency Soil Rockiness Water Erosion	73.2	8.7
Kandosol	Class 4	Nutrient Deficiency	185.6	21.9	Class 4	Nutrient Deficiency PAWC Flooding	185.3	21.9
Kurosol	Class 4	Nutrient Deficiency	9.1	1.1	Class 5	Nutrient Deficiency Water Erosion	9.1	1.1
Vertosol	Class 4	Nutrient Deficiency	183.5	21.8	Class 4	Salinity	183.5	21.8
	Class 5	Salinity	75.5	8.9	Class 5	Nutrient Deficiency Soil Physical Factors	75.6	8.8
		Total	**845.5**	**100**		**Total**	**845**	**100**

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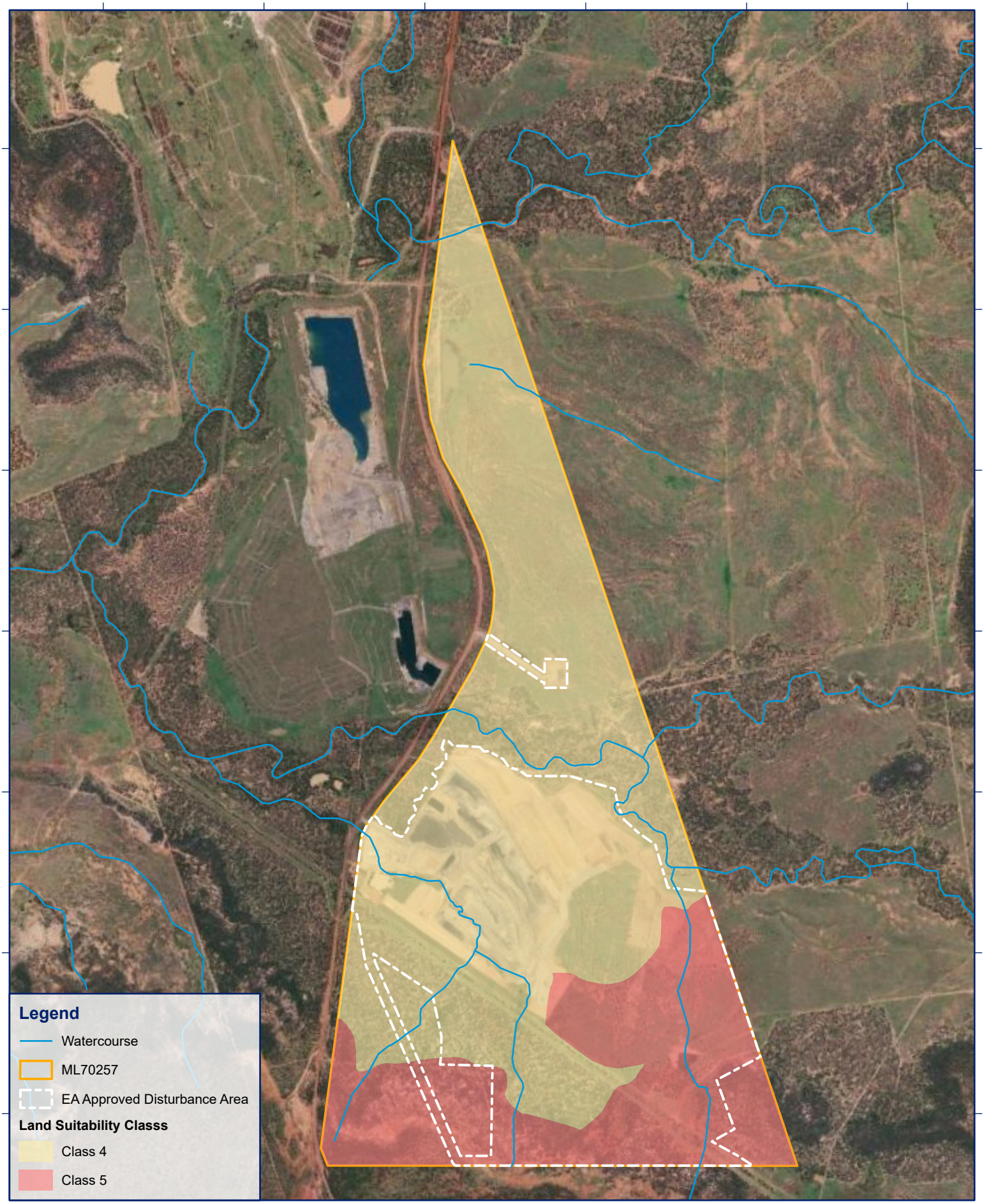
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Land Suitability Class for Cattle Grazing	
Figure 3-13 | ADV-AU-00217 | September 2023	

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Source: SGM 2021

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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Land Suitability Class for Broadacre Cropping	
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3.1.1.7 Land Stability

The ML is relatively flat, with slight undulations in the north-west and gradually increasing gradient to the southeast. A soil and land resources assessment (SLRS) (SGM 2021) was conducted for the Mine in 2021. The SLRS calculated low pre-mining erosion rates based on 48 samples using the Revised Universal Soil Loss Equation (RUSLE). The indicative erosion rates, estimated for the post-mining of the ML was calculated by using the Water Erosion Prediction Project (WEPP) runoff/erosion model (the Model). The Model integrated hydrology, vegetation, hydraulics, and erosion mechanics to predict erosion at the hillslope and watershed scale. The Model was used to simulate final landform stability parameters for a 100-year period including data for rainfall, runoff, and sediment loss for the final landform of the Mine. The Model also calculates the reduction in erosion rates with increasing groundcover. The results of the Model concluded the following:

- Moderate to high erosion rates will occur with a groundcover of 30% or less.
- Excessive rilling is unlikely.
- Stability with a groundcover of at least 60% (i.e., average erosion rate of < 5 t/ha/y).
- Vulnerability to high erosion rates in the event of extreme rainfall with vegetation ranging from 0% to 30% groundcover.
- Stability once groundcover reaches 60%, where all slopes have an acceptable maximum annual erosion rate (< 10 t/h/y).

Revised WEPP outputs for the final landform design are discussed in **Section 3.5.1.5**.

Landform evolution and stability was assessed as a part of the 2022 geochemical assessment (RGS, 2022) conducted prior to the commencement of mining. In this report, landform stability has been evaluated in terms of:

- Geotechnical stability and the potential for slips, slumps, or major slope failure.
- Geochemical stability and the rate at which major ions (salts), metals (such as aluminium, copper, and zinc) and metal(loids) (such as arsenic, molybdenum, or selenium) may be leached from or sorbed to geological materials (this report).
- Surface stability that determines if the soil profile is likely to aggrade or erode and whether the soil profile can retain its ability to support vegetation.
- Hydraulic stability that might consider if the soil: water balance within the strata is in equilibrium with the vegetation or the way water moves through the strata.
- Ecological stability and post mine land use to determine whether the vegetation on rehabilitated land will be stable or change over time due to processes such as successional development.

The physical attributes of the basement material have been quantified and found to range from low to high rock strength using point load and uniaxial analytical methods (GTS, 2021). It has been recommended to identify and segregate competent durable strata for specific applications such as armouring temporary end tipped stockpiles faces. Wherever possible, the soil profile be reconstructed using regolith material, subsoil and topsoil on top of the basement material e.g. emplaced overburden and interburden where possible during the construction of the final landform.

3.1.1.8 Vegetation Communities and Ecological Data

The ML is dominated by sparse open vegetation communities, which have been historically cleared and predominantly utilised as pastoral land. Despite this history of disturbance there are still several patches of remnant vegetation remaining within the ML including a prominent riparian corridor (associated with Hat Creek) that runs east-west and a large undisturbed area situated on a jump-up towards the south of the ML. Baseline ecological surveys were undertaken within the ML between November-December 2020 to verify the Regional Ecosystem (RE) mapping and to identify any flora or fauna species of conservation significance.

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Regional Ecosystems

The Queensland statewide RE mapping across the ML was verified as part of the field surveys conducted for the baseline ecology report (Nitro Solutions Pty Ltd (Nitro Solutions), 2021) (**Figure 3-15**). Several inaccuracies and inconsistencies were identified and have been corrected as part of the field verified RE mapping shown in **Figure 3-16**. The key changes to the state RE mapping include:

- Removal of single mapped patch of RE 11.9.5. The structural and floristic composition of this patch was observed to resemble RE 11.5.3, which does not include Brigalow (*Acacia harpophylla*) as a dominate species in the canopy layer. RE 11.5.3 is listed as Least Concern, whereas RE 11.9.5 is listed as Endangered.
- Inclusion of two previously unmapped patches of RE 11.9.5 (0.56 ha and 3.3 ha respectively) along the riparian corridor of Hat Creek.
- Inclusion of a single patch of previously un-mapped RE 11.9.5 along the haul road, which covers approximately 8.81 ha.
- Inclusion of a single patch of previously un-mapped RE 11.5.3 around the south-eastern dam, which is approximately 7.7 ha.

The resultant REs verified as being present within the ML have been outlined in **Table 3-7** and shown in **Figure 3-16**.

Table 3-7 Regional Ecosystems identified within the ML

Regional Ecosystem	Biodiversity Status	Vegetation Management Act (VMA)Status	Short Description
RE 11.3.25	Of Concern	Least Concern	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines
RE 11.5.9c*	No concern at present	Least Concern	*Eucalyptus crebra* +/- *Corymbia intermedia* +/- *E. moluccana* +/- *C. dallachiana* woodland.
RE 11.5.3*	No concern at present	Least Concern	*Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces
RE 11.7.2*	No concern at present	Least Concern	*Acacia spp*. woodland on Cainozoic lateritic duricrust. Scarp retreat zone
RE 11.7.3*	No concern at present	Least Concern	*Eucalyptus persistens*, *Triodia mitchellii* open woodland on stripped margins of Cainozoic lateritic duricrust
RE 11.7.5	No concern at present	Least Concern	Shrubland on natural scalds on deeply weathered coarse-grained sedimentary rocks
RE 11.9.5	Endangered	Endangered	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks

** Some of these Regional Ecosystems occur only as part of mixed polygons*

The remaining non-remnant areas found within the ML were also assessed and categorised into two distinct community types (**Figure 3-16**) including:

1. Non-remnant areas with Brigalow < 0.5m (57.43 ha): There is a large patch of Brigalow (*Acacia harpophylla*) non-remnant scrub located within the ML between Teviot Brook and Hat Creek. A portion

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of this area was already mapped as RE 11.9.5 under the available state mapping. The Brigalow in this patch was only 0.5 m high indicating that it was still very young and not yet definable as regrowth vegetation. This community was located on gilgai soils with some areas showing heavy scaring, indicating that water flows through this area periodically. This patch contained the only gilgais found within the ML.

2. Non-remnant mixed areas (448.74 ha): The remaining non-remnant areas within the ML can be broadly grouped together as belonging to the same community. These areas consist of an open scrubland with some sparse to dense ground cover and sporadic shrubs and/or young saplings. Numerous species were identified in these areas including Currant Bush (*Carrisa ovata*), White Wood (*Atalaya hemiglauca*), Buffel Grass (*Cenchrus ciliaris*), and Many-headed Wiregrass (*Aristida caput-medusae*).

Threatened Ecological Communities

One Threatened Ecological Community (TEC) was confirmed to be present within the ML, namely Brigalow *(Acacia harpophylla dominant and co-dominant)* herein referred to as the Brigalow TEC (Nitro Solutions, 2021). Field verification surveys confirmed the presence of three distinct patches of this community including two remnant RE 11.9.5 patches (0.56 ha and 3.3 ha respectively) and one patch of RE 11.9.5 (8.8 ha), which are shown in **Figure 3-16**. It was determined that each of these patches met the minimum conditions needed to qualify as Brigalow TEC vegetation in accordance with the Approved Conservation Advice (DoE, 2013) for this community.

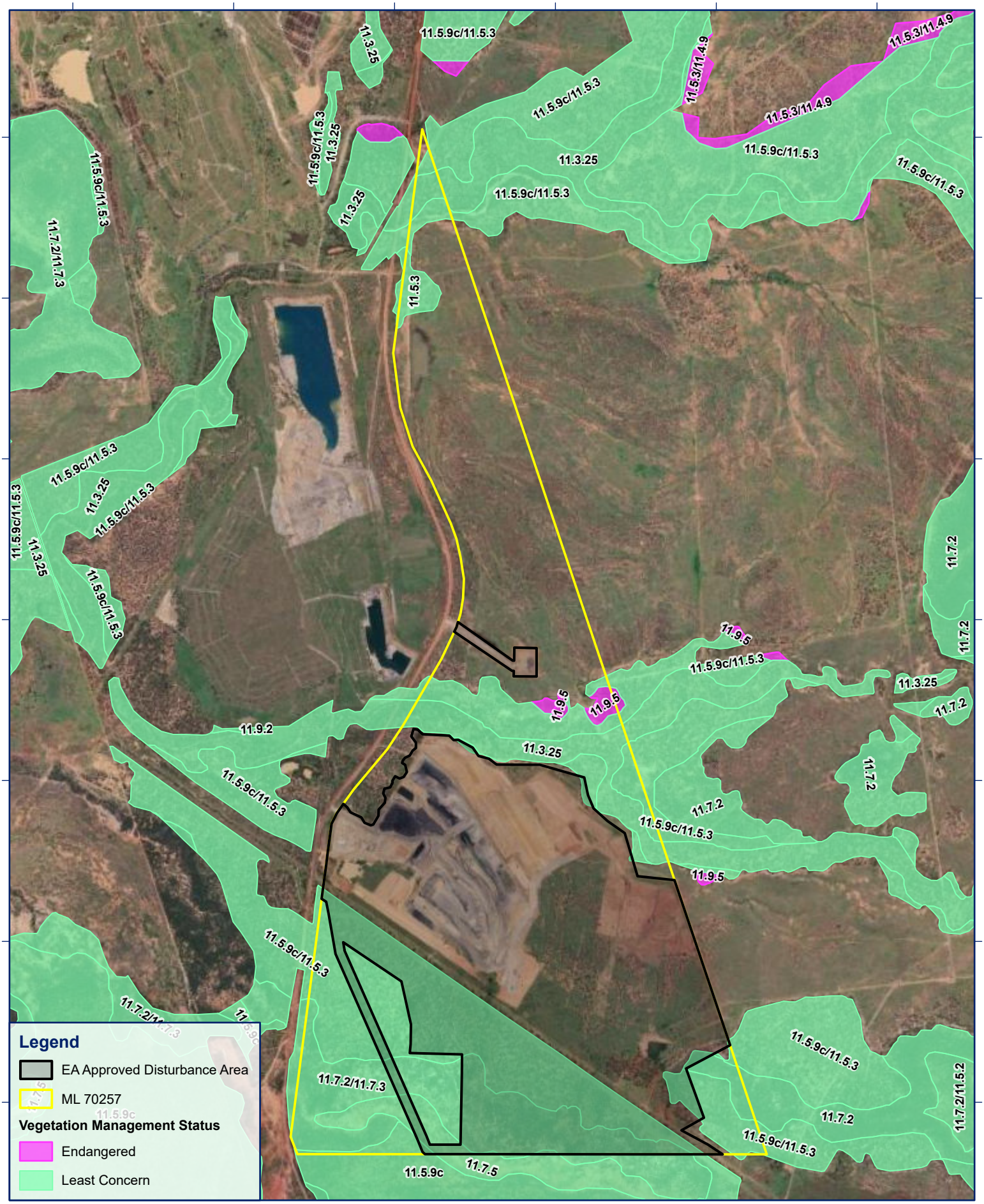
Flora of Conservation Significance

Field surveys of the ML identified one flora species of conservation significance: Native Frangipani (*Cerbera dumicola*). Specimens were collected and sent to the Queensland Herbarium for confirmation. The Queensland Herbarium confirmed, on 17 December 2020, that the specimens collected within the ML were Native Frangipani (ID number 734/20) (Nitro Solutions, 2021). This species is listed as Near Threatened under the *Nature Conservation Act 1999* (NC Act) and has been recorded locally. The distribution of this species is located throughout the RE 11.7.2/11.7.3 on the mid slope and throughout the RE 11.5.9c, on the crest of the hill in the southwest corner of the ML. The Proponent is exempt from requiring a clearing permit to clear *Cerbera dumicola*, as the ML was first granted in 2004 and is therefore subject to exemption for taking and using protected plants under particular authority or lease (NC Act, ss89 and 90 Section 57).

Weeds of Management Concern

During the various flora and fauna surveys undertaken across the ML, two weed species of management concern were identified: Harrisia cactus *(Harrisia martinii*) and the velvety tree pear (*Opuntia tomentosa*). This species was observed to occur sporadically throughout the entire ML, including within the disturbance footprint.

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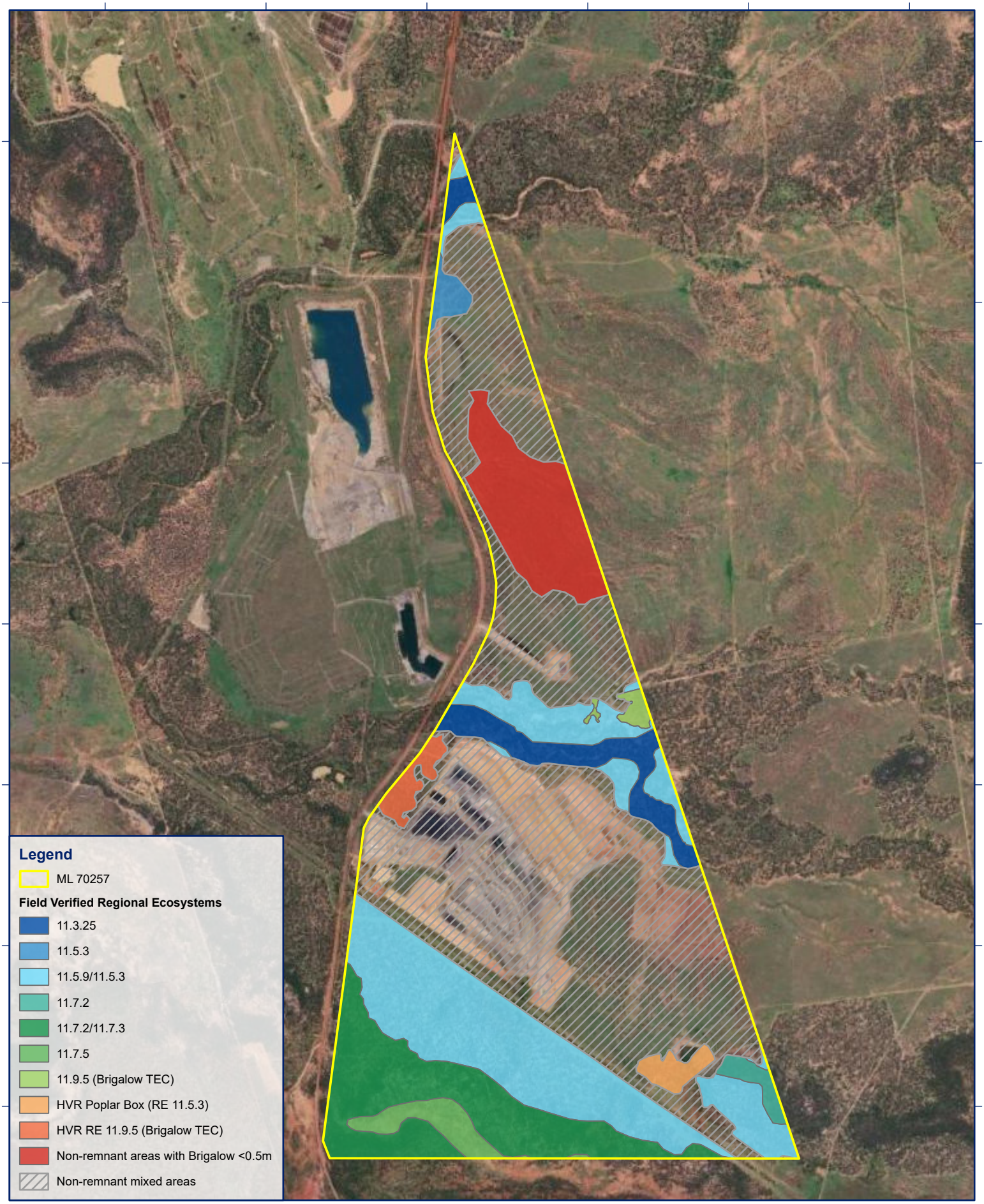
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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Administering authority RE mapping across the ML	
Figure 3-15 | ADV-AU-00217 | September 2023	

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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Field Verified RE Mapping across the ML	
Figure 3-16 | ADV-AU-00217 | September 2023	

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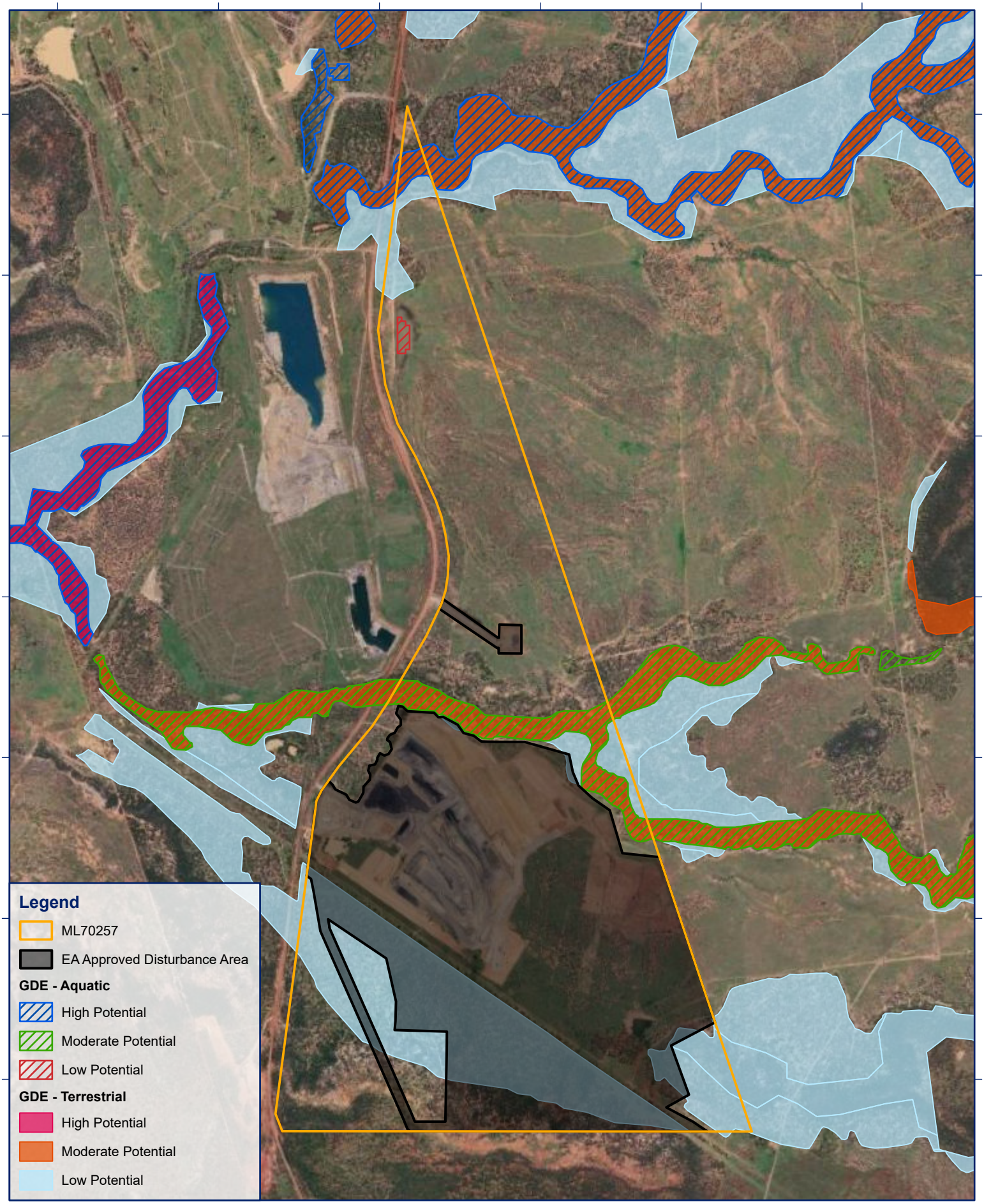
Groundwater dependent ecosystems

An assessment of the likely occurrence of Groundwater Dependant Ecosystems (GDEs) was undertaken as part of both the baseline ecology assessment (Nitro Solutions, 2021) and the GIA (KCB, 2021). Desktop analyses in both assessments identified the occurrence of several vegetation communities that had a low or moderate potential to be reliant upon groundwater resources. These communities were predominantly located along the riparian corridors of Hat Creek and Teviot Brook in addition to the lower slopes of the ridgeline along the southwestern corner of the ML (**Figure 3-17**). These potential GDE communities were field verified as part of the baseline ecology assessment to confirm their accuracy.

Based on the field assessment, the areas of low GDE potential in the southwestern corner of the ML (predominantly RE 11.5.9c/11.5.3 communities) were considered unlikely to constitute a GDE, based upon the dominant species observed within these areas (i.e., *Eucalyptus cerebra* and *Eucalyptus populnea*), neither of which are known to rely upon groundwater resources.

Areas of moderate aquatic and terrestrial GDE potential were mapped along the Hat Creek corridor (exclusively RE 11.3.25 communities) as the dominant species (*Eucalyptus tereticornis*) has been known to draw water from groundwater tables. The presence of these vegetation communities was confirmed and assessed during the baseline ecology assessment. However, based upon an analysis of local groundwater levels within the ML determined in the GIA, it appears that this community is not likely to be consistently dependent on groundwater due to the observed depth of the permanent groundwater source (Rewan Group). Groundwater depths were identified to be somewhere between 12 m to 27 m from the surface (**Figure 3-11**), which is outside the maximum root depth documented for *E. tereticornis* of 9.3 m (Kallarackal and Somen, 1998). It is believed this community accesses opportunistic water from ephemeral flow events during the wet season and any temporary water storage in the alluvium that may result from these flow events, prior to drainage into underlying units or further downstream. The root depth compared to the aquifer depth in the dry and wet seasons is illustrated in **Figure 3-18** and **Figure 3-19**. Vegetation associated with aquatic GDEs was not observed within the Hat Creek corridor during the baseline ecology assessment. Based on these observations, no GDEs were confirmed to be present within the ML. The revised GDE potential for the ML based on field verification discussed above and shown in **Figure 3-20**.

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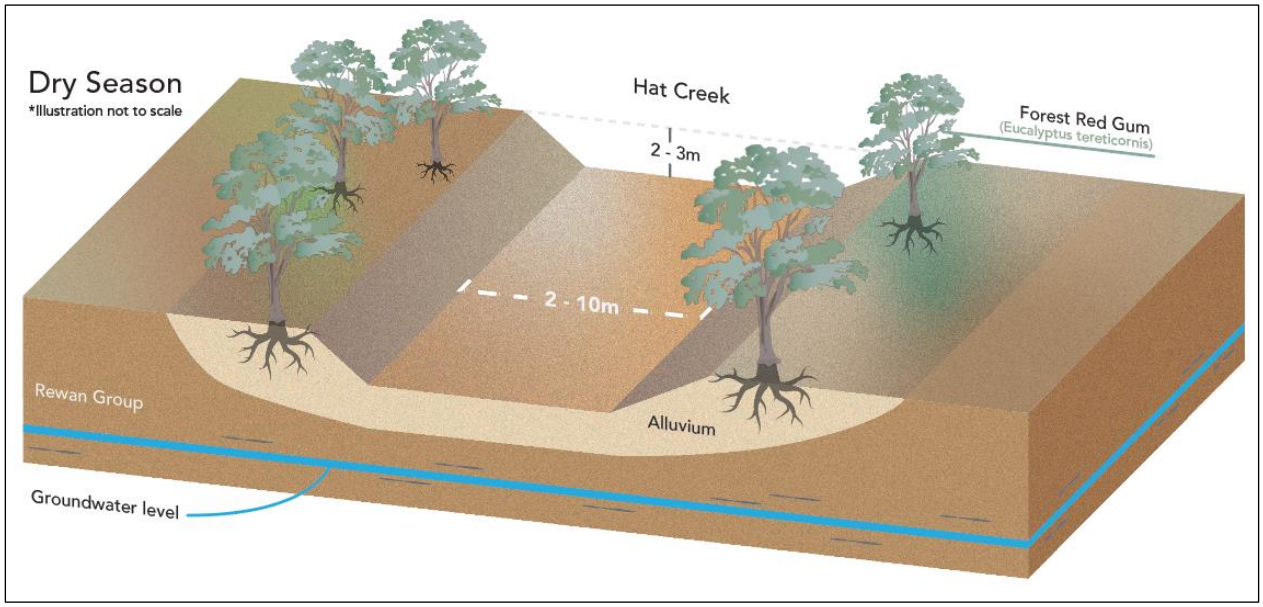
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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Mapped GDEs Across the ML	
Figure 3-17 | ADV-AU-00217 | September 2023	

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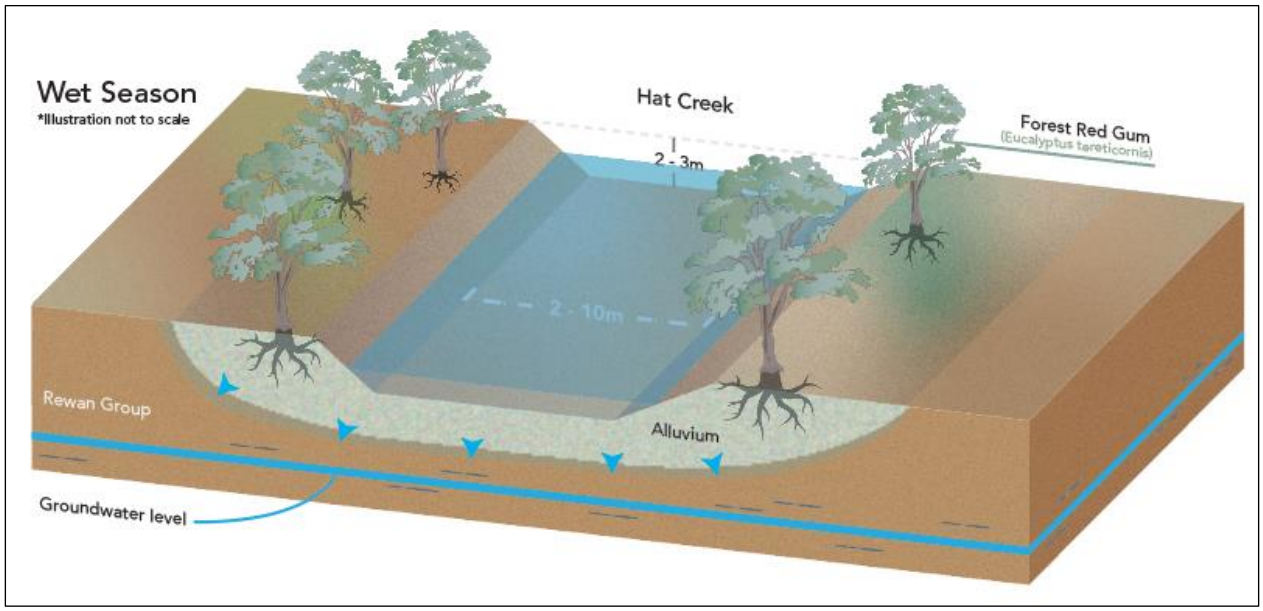
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Figure 3-18 Dry Season Groundwater Access



Source: (Nitro Solutions, 2021) *and* (KCB, 2021)

Figure 3-19 Wet Season Groundwater Access



Source: (Nitro Solutions, 2021) *and* (KCB, 2021)

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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Field Verified GDEs	
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3.1.1.9 Fauna Presence and Populations

Fauna surveys that were undertaken as part of the baseline ecology assessment (Nitro Solutions, 2021) recorded a total of 50 vertebrate species within the ML including: 40 bird species, six mammal species, three reptile species, and one amphibian species. A single invertebrate family (Theraphosidae family), that is listed under the NC Act as least concern, was also recorded within the ML in the form of a tarantula burrow. Whilst most of these species are relatively common and typical of the broader region, two of these species are of conservation significance: The Squatter Pigeon (southern) (*Geophaps scripta scripta*) and the Rainbow Bee-eater (*Merops ornatus*) (refer to **Table 3-8**) are listed as species of conservation significance under the NC Act and/or the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). These bird species were observed at several locations throughout the southern portion of the ML.

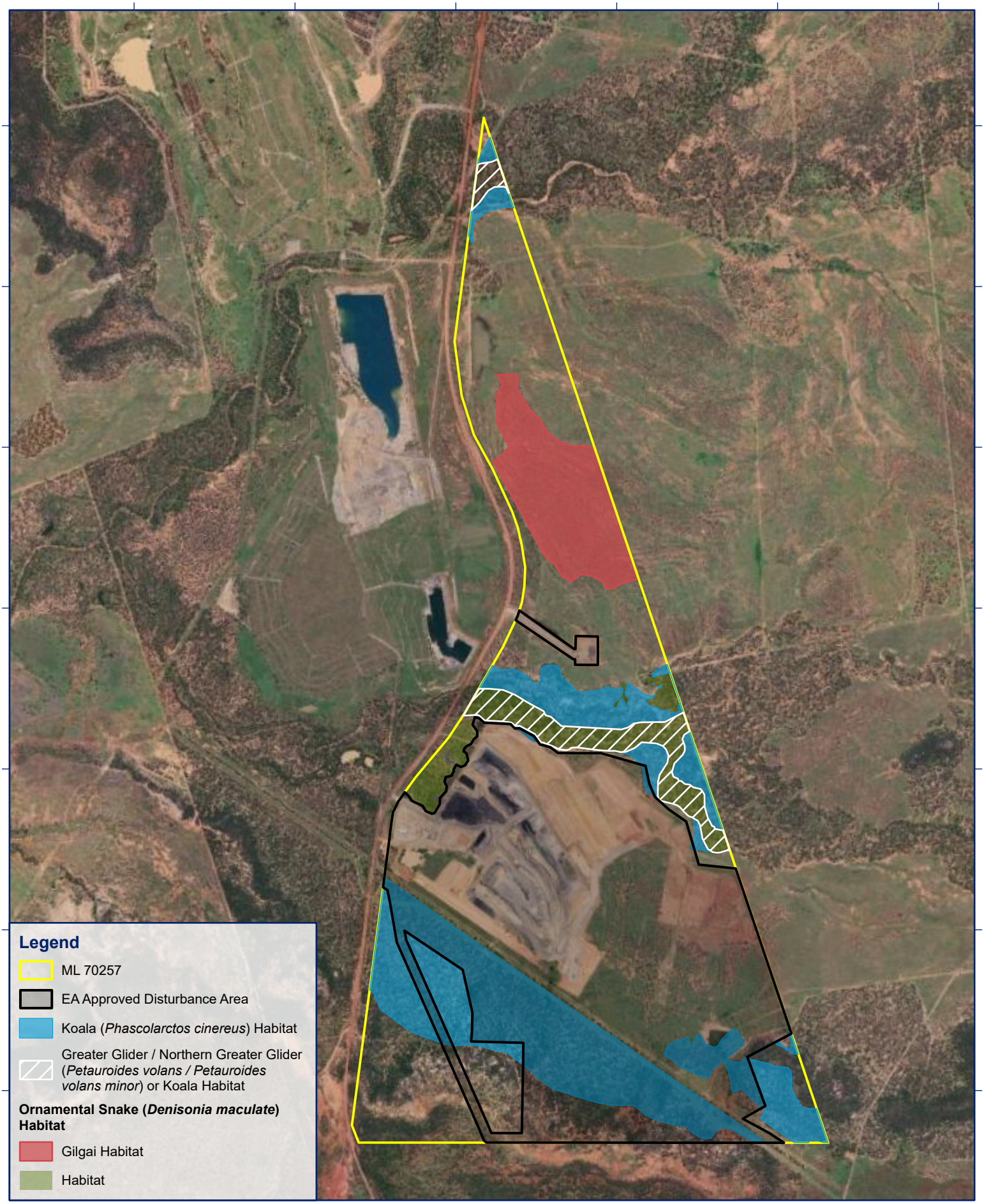
Table 3-8 Species of Conservation Significance found within the ML

Common Name	Scientific Name	NC Act Status	EPBC Act Status
Squatter Pigeon (southern)	*Geophaps scripta scripta*	Vulnerable	Vulnerable

Two pest species recorded opportunistically (visual sightings and scats) within the ML during the various survey activities include the European Rabbit (*Oryctolagus cuniculus*) and Feral Pig (*Sus scrofa*). Evidence of these species was most common along Hat Creek and Teviot Brook, where there was an abundance of scats and diggings. Cattle were also observed throughout the entire ML.

Potentially suitable habitat for species of conservation significance was also identified as part of this baseline assessment and are shown in **Figure 3-21** to **Figure 3-23** and summarised in **Table 3-9**. Significant impact assessments undertaken as part of the baseline ecology assessment determined that the Mine would not have a significant impact upon any of these species.

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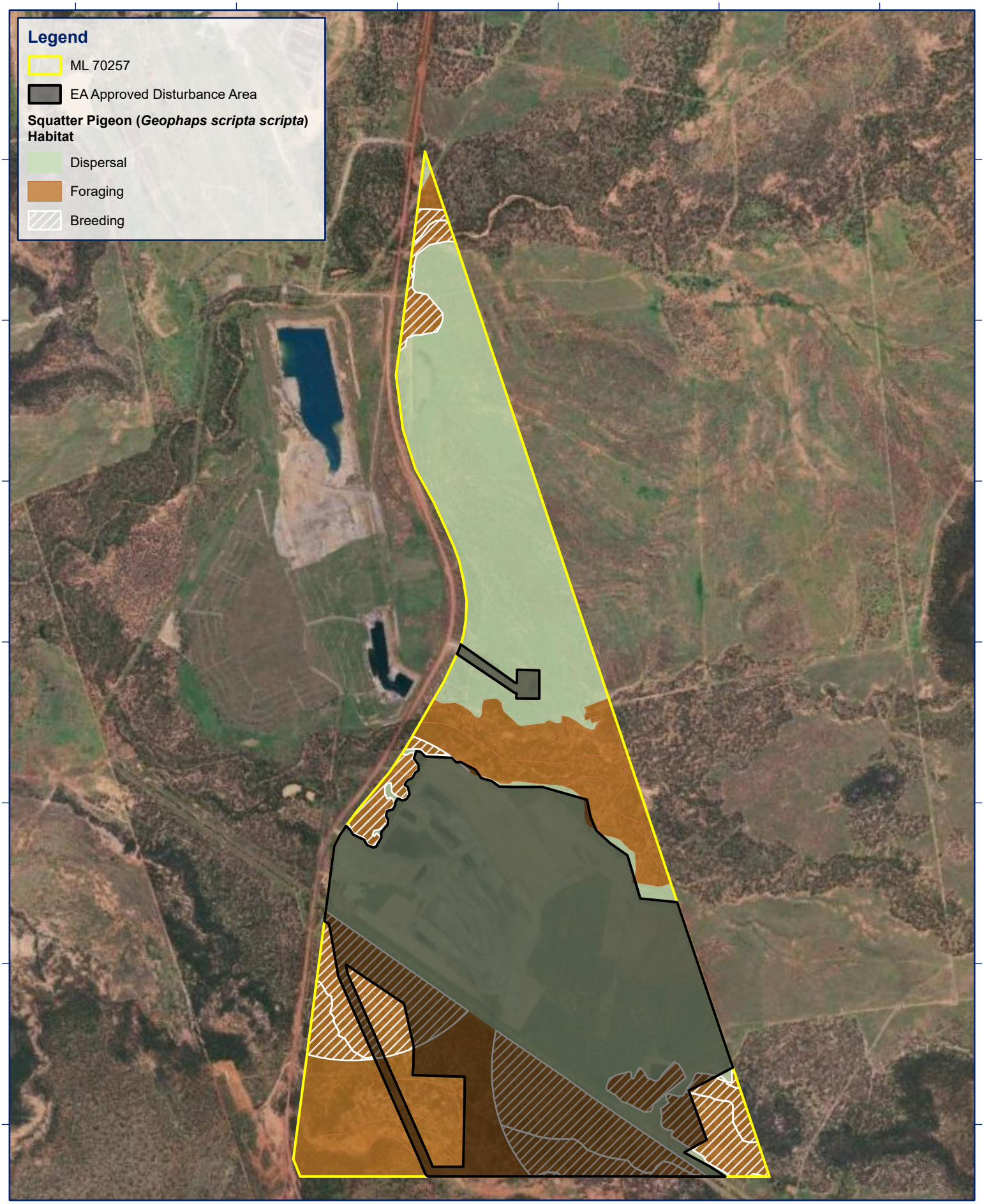
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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Habitat for Fauna Species of Conservation Significance	
Figure 3-21 | ADV-AU-00217 | September 2023	

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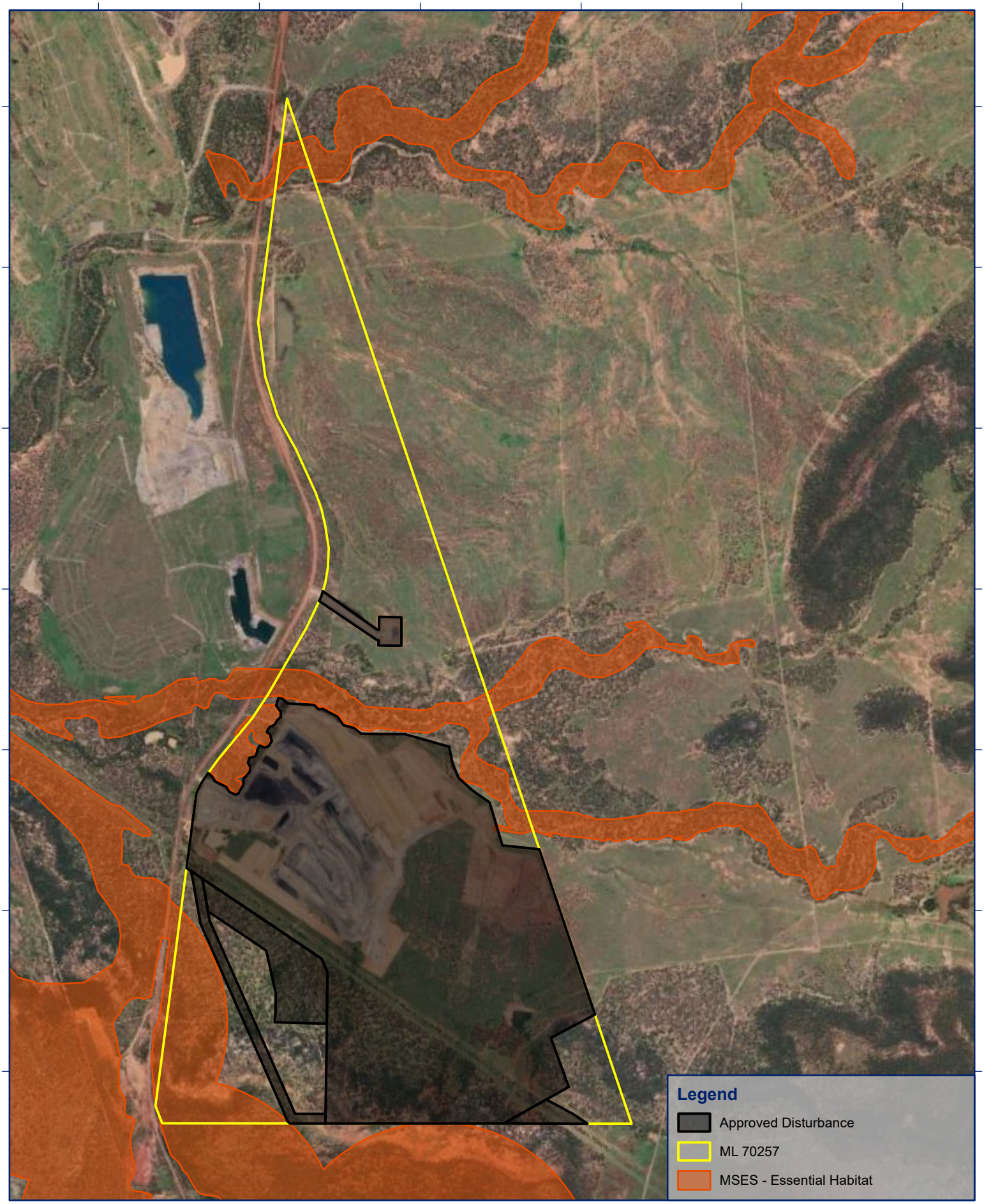
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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Squatter Pigeon Habitat	
Figure 3-22 | ADV-AU-00217 | September 2023	

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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
MSES Essential Habitat	
Figure 3-23 | ADV-AU-00217 | September 2023	

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Table 3-9 Suitable Habitat for Species of Conservation Significance within the ML

Common Name	Scientific Name	Suitable Habitat
Greater Glider or Northern Greater Glider	*Petauroides Volans* or *Petauroides Volans minor*	The Greater Glider and the Northern Greater Glider (subspecies) are nocturnal arboreal mammals. They live in old growth eucalypt forests that provide numerous hollows in which to live (DCCEEW, 2022). Suitable habitat for these species within the ML was identified along Hat Creek and Teviot Brook. These areas corresponded with areas mapped as RE 11.3.25.
Koala	*Phascolarctos cinereus*	The Koala is an arboreal mammal which typically resides within Eucalypt communities for which they depend upon for food (DoE 2021). Suitable habitat for this species was found throughout the ML including patches of RE 11.5.9c/11.5.3, RE 11.3.25, RE 11.5.3 and RE 11.5.3 HVR.
Ornamental Snake	*Denisonia maculate*	The Ornamental Snake is a subterranean species which is typically found near their preferred prey: frogs (DoE, 2020a). Habitat for this species, within the ML, is linked directly with the occurrence of Brigalow (*Acacia harpophylla*) which occurs in several patches of RE 11.9.5. Essential habitat mapping under the VM Act was also identified for this species along Hat Creek (RE 11.3.25)
Rainbow Bee-eater	*Merops ornatus*	The Rainbow Bee-eater occurs mainly in open forests, shrublands and in semi-cleared areas where it hunts on the wing (DoE, 2020c). The entire ML was identified as suitable foraging habitat for this species, however, suitable breeding habitat was limited to Hat and Teviot Brook (RE 11.3.25).
Squatter Pigeon (southern)	*Geophaps scripta scripta*	The Squatter Pigeon is generally found in open forests located within 3 km of a permanent water source (DoE, 2020b). The entire ML was identified as suitable foraging habitat for this species, however, suitable breeding habitat was limited to Hat and Spade Creeks (RE 11.3.25) as well as wooded areas within 1 km of the various man-made dams located within the ML.
Coastal Sheathtail bat	*Taphozous australis*	The Coastal Sheathtail bat is rarely found more than a few kilometres from the ocean, where it roosts in sea caves, rock fissures, boulder piles and abandoned structures such as military bunkers. The species only uses ecological habitats that are within a kilometre or so of the ocean; including dune scrubs and coastal paperbark swamps, where it forages just above the canopy (Hourigan, 2011). Associated with mapped essential habitat. Vegetation communities associated with this species include dune mesophyll/sclerophyll scrub, mangroves (*Rhizophora, Bruguiera),* heath, open forest/woodland, rainforest/monsoon forest and *Melaleuca*/sedge swamp, rocky escarpments, and low shrubfield. (Department of Resources, 2022)

3.1.1.10 Pre-Mining Land Use

The ML is dominated by sparse open vegetation communities, which have been historically cleared and predominantly utilised as pastoral land. The topography across the ML is generally flat to slightly undulating ranging from 275 mAHD to 280 mAHD in the northwest and gradually increasing to 295 mAHD to 300

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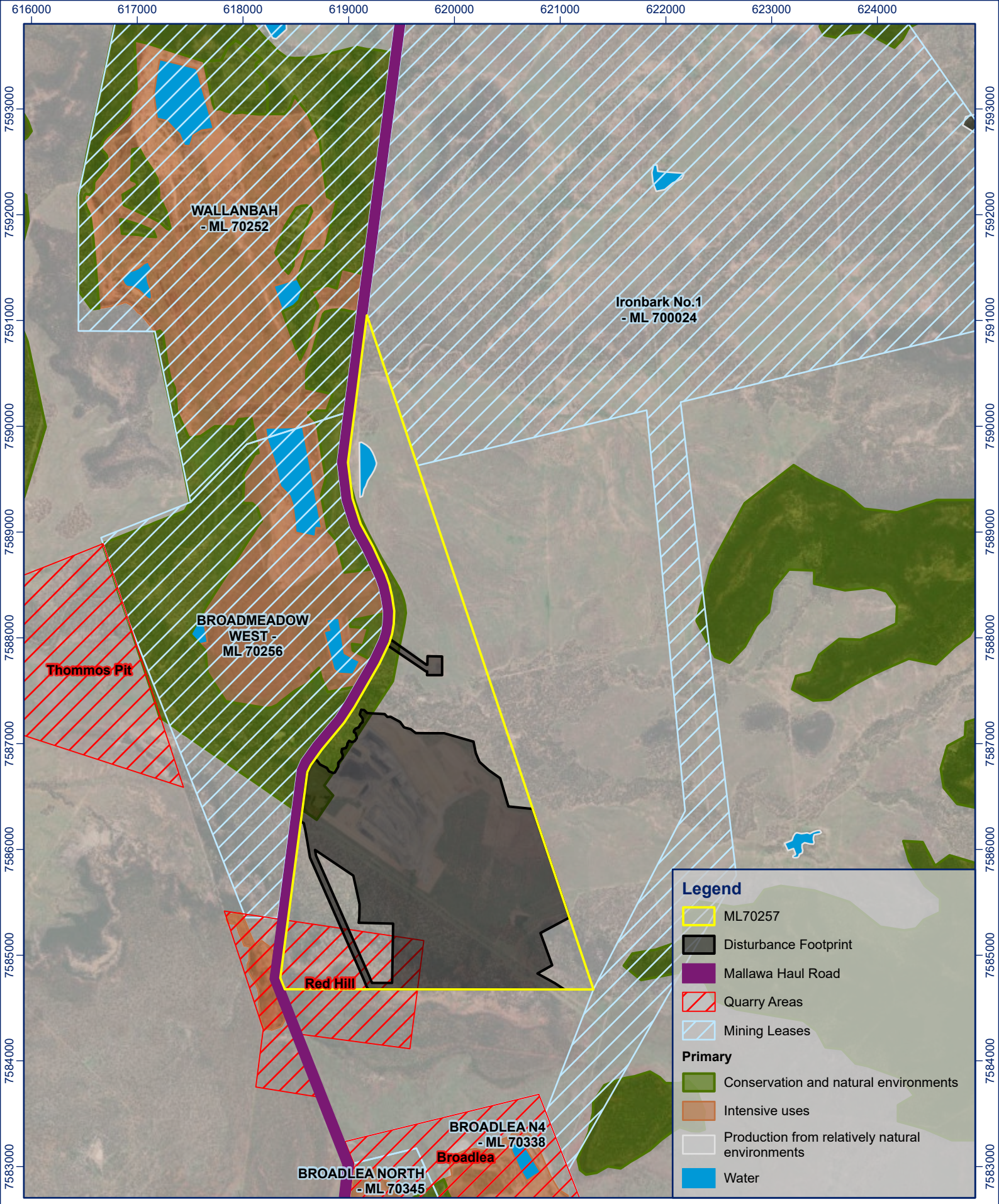
mAHD to the southeast. The southwestern portion of the lease has a residual Tertiary laterite hill that rises approximately 40 m above the surface. A 132 kV powerline traverses the southern boundary of the deposit.

Department of Resources (DoR) defined land uses surrounding the ML, which is within a region that is also generally used for mining and coal seam gas (CSG) activities (**Figure 3-24**). The Broadlea Mine is located about 3 km south of the ML. Immediately west is the former Broadmeadow West ML held by Peabody. Located north of the ML are the other MLs of the Burton Mine held by Peabody and another subsidiary of the Proponent. Arrow Energy and Blue Energy own several of the CSG gas fields located within a 10 km radius of the ML.

The ML is within the Western Cropping Strategic Cropping Land (SCL) subzone, however, there are no areas mapped as SCL. Given the ML was granted prior to the introduction of the *Regional Planning Interests Act 2014*, this does not apply to the ML.

The Mine is within a forest management area regulated by the *Forestry Act 1959.* This is linked with the underlying Pastoral Holding land tenure. The southwestern portion of the ML is mapped as a quarry resource owned by the State of Queensland. The quarry resource extraction area, known as Red Hill Quarry, is off lease to the immediate west of ML 70257 as shown in **Figure 3-24**. The mapped quarry resource area extends and overlaps the southwestern portion of the ML. This portion has not yet been disturbed nor do the proposed Mine activities impact it apart from the establishment of one groundwater monitoring bore.

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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Land Uses within and Surrounding the ML	
Figure 3-24 | ADV-AU-00217 | September 2023	

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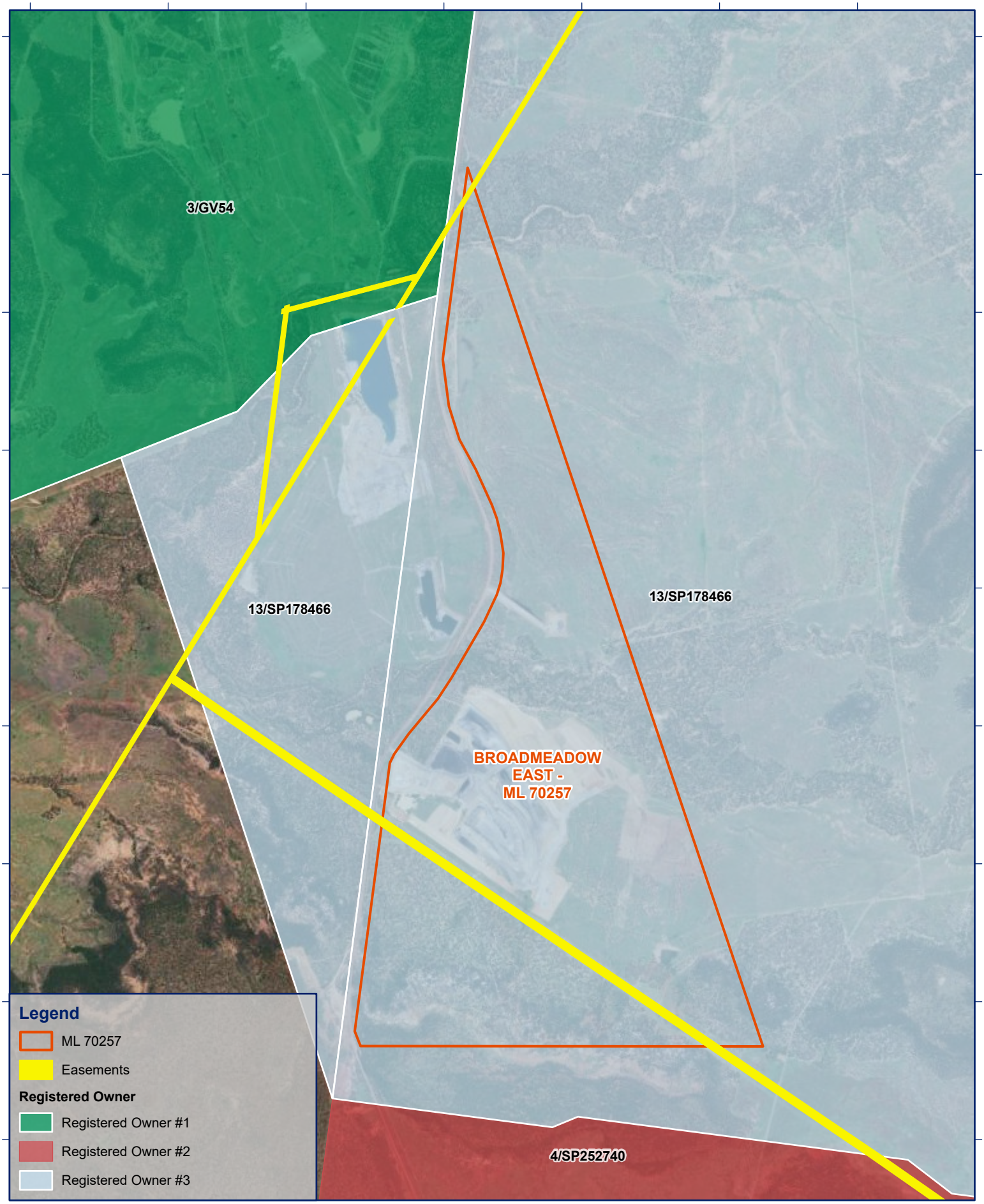
3.1.1.11 Identification of Underlying Landholders

The underlying land tenure of the entire ML is Lot 13 on Plan 178466 which is owned by a private landholder under a rolling pastoral lands lease due to expire on 30 September 2062 (**Figure 3-25**).The Proponent has entered into the appropriate agreements with the landholder.

A Native Title (NT) determination over the entire ML 70257 was made on 29 June 2016 for the Barada Barna Aboriginal Corporation RNTBC (QUD380/2008).

An easement runs across the entire lower portion of the ML. The easement is a 132 kVA powerline managed by Queensland Electricity Transmission Corporation Limited ('Powerlink'). Arrangements to relocate this powerline and associated easement to allow for the development of the southern pit are in progress with Powerlink at the request of the Proponent. The powerline will be realigned in 2024 to allow for the southerly progression of mining.

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BME Mine - PRCP	BOWEN COKING COAL LIMITED
Underlying Tenure and Land Ownership	
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3.1.2 Project Description

The Mine is entirely within ML 70257, located 22 km north-east of Moranbah township and 120 km southwest of Mackay in the Queensland Bowen Basin (**Figure 3-1**). The Peak Downs Highway links the coastal city of Mackay to the Mine via the Suttor Development Road.

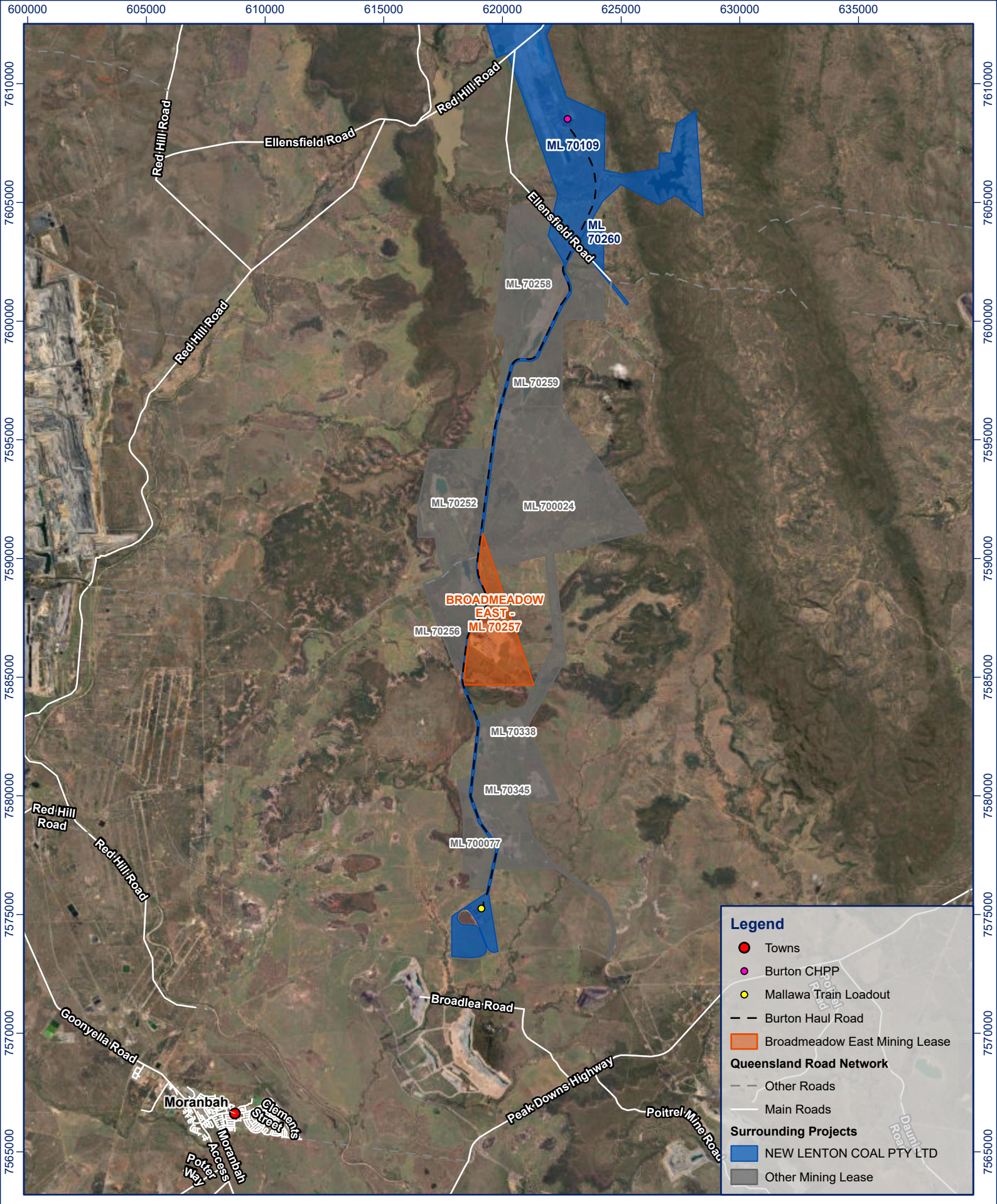
The western boundary of ML 70257 is adjacent to the Mallawa Haul Road (ML 70109) owned and operated by a separate subsidiary of BCC, which provides the only access to the Mine via the Burton Mine administration office located 26 kilometres north. The haul road concludes at the Mallawa Train Load Out facility (TLO) that connects to the Aurizon Goonyella Rail System south of the Mine (**Figure 3-26**).

BCC purchased the 845-hectare (ha) ML 70257 from Peabody (Burton Coal) Pty Ltd, which led to the de-amalgamation from nearby tenures and associated EA on 24 August 2020. The Mine is subject to EA0002465, which was issued under the *Environmental Protection Act 1994*. EA0002465 (**Attachment A**), last issued on 2 February 2023, holds the following Environmentally Relevant Activities (ERA) for ML 70257:

- Resource Activity, Schedule 3, 13: Mining black coal.
- Resource Activity, Schedule 3, 09: A mining activity involving drilling, costeaning, pitting or carrying out geological surveys causing significant disturbance.
- Ancillary Activity, Schedule 2, 60(1): Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection 1(a)—(d) more than 200,000t.
- Ancillary Activity, Schedule 2, 60(2): Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection (1)(b)—(c) more than 5,000t but not more than 10,000t.

The Mine is approved to extract 1.9 million tonnes per annum (mtpa) of high-quality metallurgical coal over an estimated five-year mine life. Mining activities occur within a 434 ha approved disturbance area within ML 70257. The 434 ha approved disturbance area consists of an open pit and associated infrastructure centrally located on the widest section of the ML. Mine construction began in June 2022, and the operation now employs the truck and shovel method to mine the resource in a southerly direction.

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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Mine Location	
Figure 3-26 | ADV-AU-00217 | September 2023	

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3.1.2.1 Resource Tenements

The previously undeveloped ML 70257 was formally a part of the Burton Coal Project. Coking Coal One Pty Ltd (a wholly owned subsidiary of Bowen Coking Coal Limited) commercially acquired it from Peabody (Burton Coal) Pty Ltd in 2020, and ML ownership was officially transferred on 27 January 2021. The Mine abuts the Ironbark No. 1 Project to the north-east (ML 700024), the Broadlea Project to the south (ML 70345), and Peabody Coal Broadmeadow West Mine to the west (ML 70256) (**Figure 3-26**). No public roads are located within the ML, only a series of private farm access tracks and a private haul road that runs adjacent to the entire length of the western side of the ML (ML 70109).

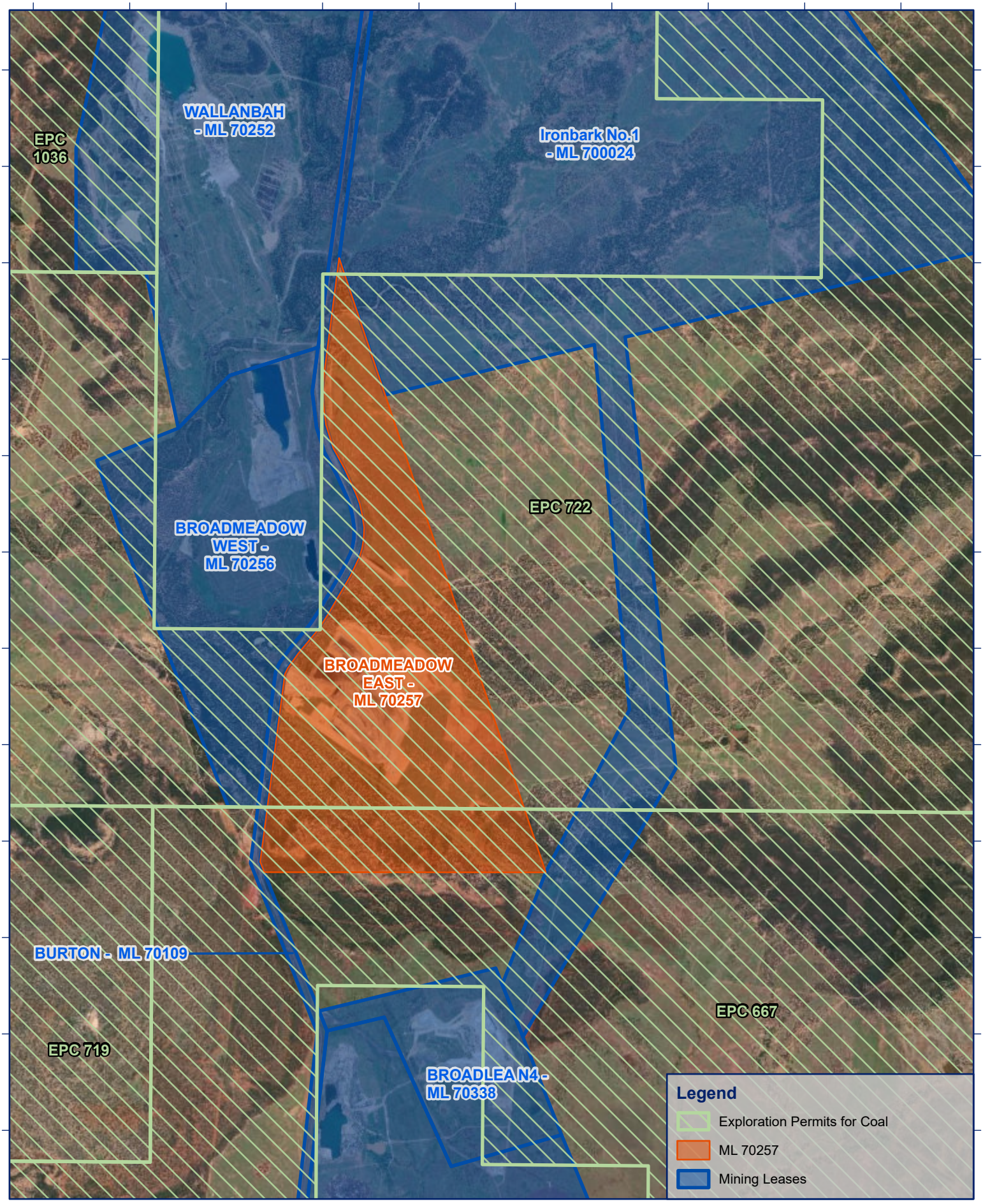
Two (2) Exploration Permits for Coal (EPCs), held by Fitzroy (CQ) Pty Ltd, EPC722 and EPC667, overlap the Project area. Both EPCs are due to expire in 2026. The ML is overlapped by several petroleum tenures, including two Authority to Prospects (ATP814 and ATP1103) and two Potential Commercial Areas (PCA257 and PCA149), which CH4 Pty Ltd owns. The Proponent has entered into appropriate agreements with the overlapping tenure holders.

A summary of the overlapping resource tenures is presented in **Table 3-10** and demonstrated in **Figure 3-27** and **Figure 3-28**.

Table 3-10 Overlapping Mining and Petroleum Exploration Tenures

Tenure	Holder	Sub-Blocks	Minerals	Date Granted	Expiry
EPC 722	Fitzroy (CQ) Pty Ltd	92	Coal	28/09/2004	27/09/2026
EPC 667	Fitzroy (CQ) Pty Ltd	34	Coal	31/05/2000	30/05/2026
PCA 149	CH4 Pty Ltd (100%)	61	Petroleum	19/08/2014	18/08/2029
PCA 257	CH4 Pty Ltd (100%)	28	Petroleum	08/05/2020	07/05/2027
ATP 1103	CH4 Pty Ltd (100%)	1133	Petroleum	23/12/2010	31/12/2025
ATP 814	Eureka Petroleum Pty Ltd	349	Petroleum	02/02/2006	28/02/2018 Renewal lodged
PL 1034	Eureka Petroleum Pty Ltd	24	Petroleum	Application lodged 9 June 2017	

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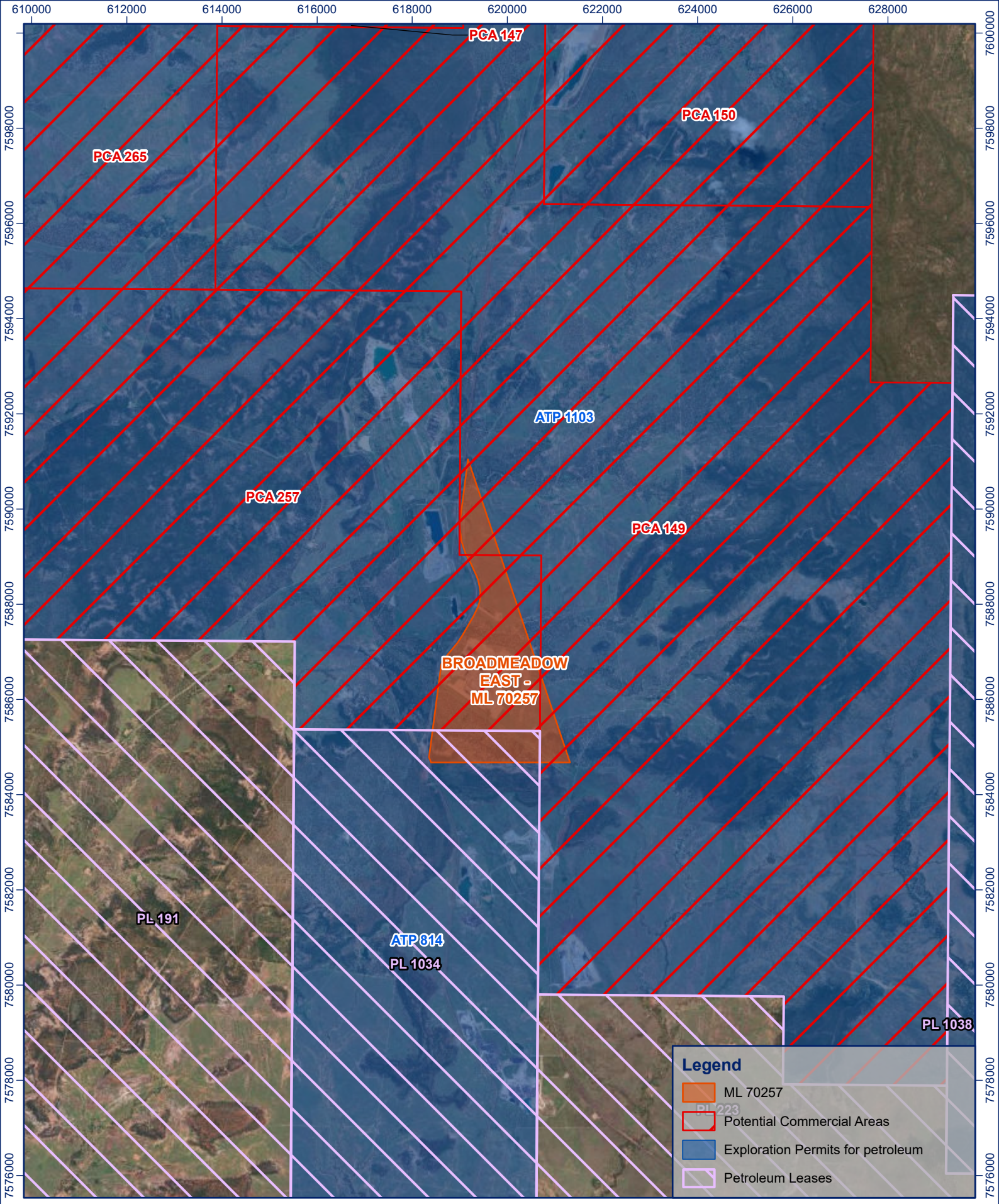
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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Overlapping Coal Tenure	
Figure 3-27 | ADV-AU-00217 | September 2023	

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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Overlapping Petroleum Tenure	
Figure 3-28 | ADV-AU-00217 | September 2023	

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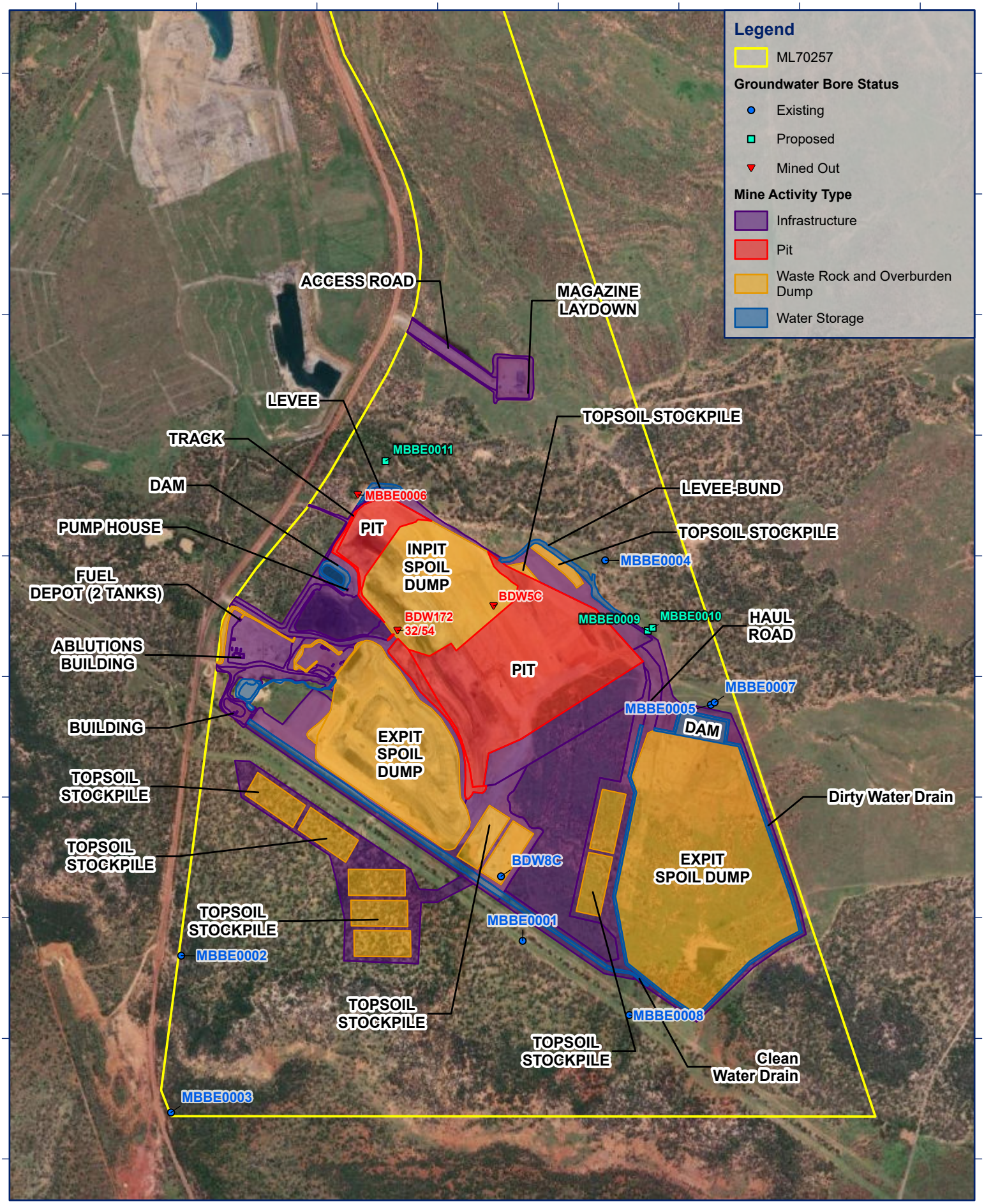
3.1.2.2 Primary Mine Features / Infrastructure

The components of the mine are:

- One Open-cut Pit - North, Central and South sections;
- Two Out of Pit Dumps (OOPD) – East and West;
- Mine Infrastructure Area (MIA), including:
  - Administration offices;
  - Petroleum, oil and lubricant storage and handling facilities;
  - Vehicle and equipment wash-down facilities;
  - Vehicle fuelling facilities;
  - Workshops and store facilities;
  - Laydown and hardstand areas;
  - Diesel generator sets and associated facilities;
  - Water supply for firefighting: and
  - Internal roads and car parking.
- Run of Mine (ROM) stockpile
- Water Management:
  - Sediment dams;
  - Mine Affected Water (MAW) storage (MWD1 and North pit);
  - Flood protection levee;
  - Water distribution pipelines; and
  - Surface water drainage structures.
- Explosive compound;
- Internal haul roads and access tracks; and
- Cleared area/laydown yards.

The coal resource is transported off-site for processing and transport to the nearest port facilities via existing rail networks. The current site layout is shown in **Figure 3-29** and full operational site layout in **Figure 3-30**.

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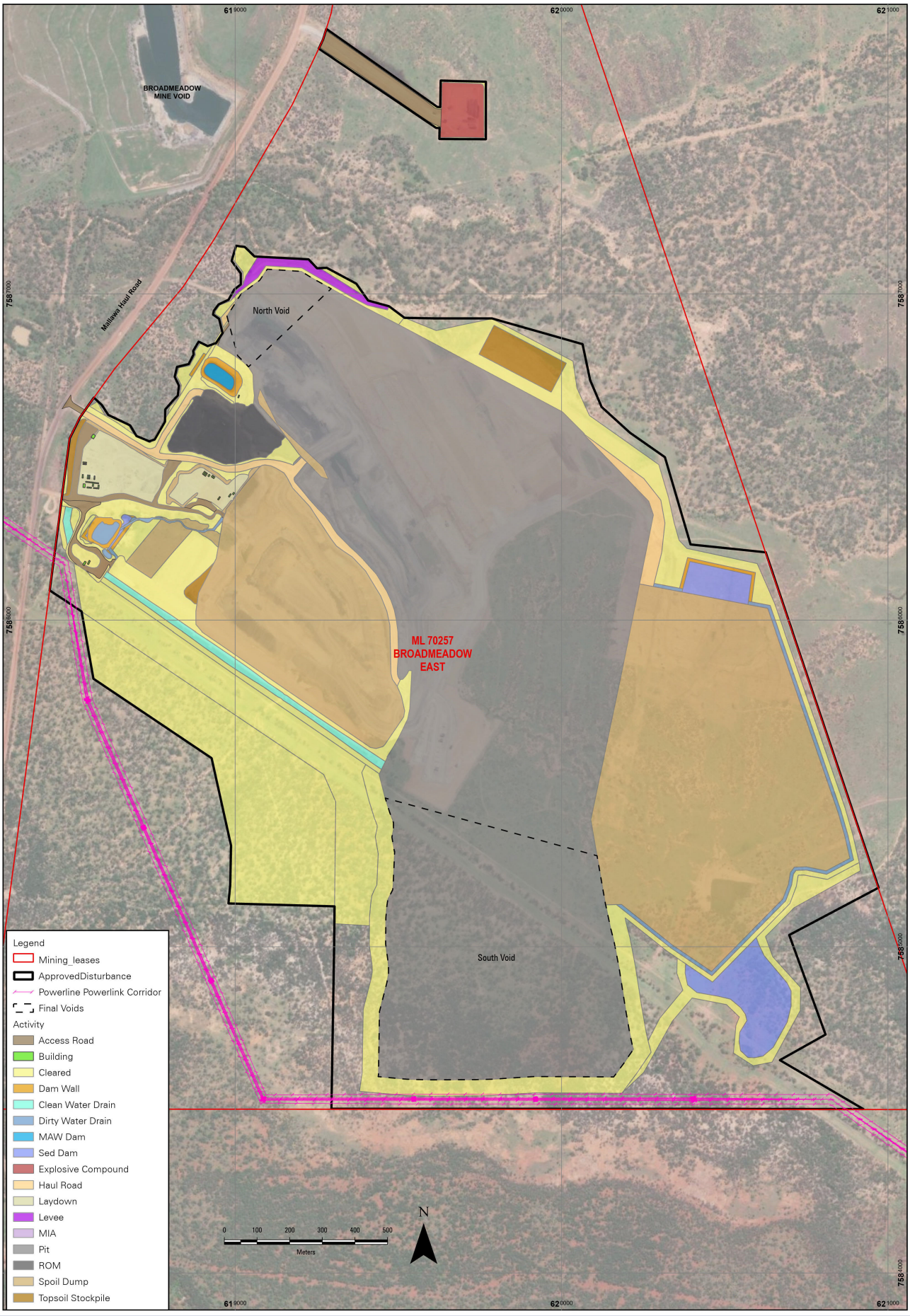
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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Current Mine Footprint	
Figure 3-29 | ADV-AU-00217 | September 2023	

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Source: Minserve

PROJECT	CLIENT
BME Mine PRCP	BOWEN COKING COAL LIMITED
Full Mine Plan	

RPMGLOBAL | Figure 3-30 | ADV-AU-00217 | September 2023

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3.1.2.3 Mining Operation

The truck and shovel mining method is employed to extract the coal resource from the BME open pit mining operation (**Figure 3-31**). This method is the most flexible for various mining situations, including smaller deposits, as is the case for this Mine.

Clearing

Clearing and construction of the previously undeveloped mining area began in May 2022. Vegetation was progressively cleared, grubbed, and stockpiled using a combination of scrapers and dozers. Where possible, vegetation has been accumulated for later placement on completed rehabilitation areas to provide habitat for ground-dwelling species and refuges for other fauna. The pit area has been cleared progressively to preserve the topsoil and reduce erosion potential. The Mine footprint is disturbed up to the current 132 kVA powerline that Powerlink will relocate in 2024 at the request of the Proponent.

Topsoil management

The topsoil is stockpiled in two long term and five temporary locations, to avoid double handling and be easily accessible to the first areas of the Mine eligible for progressive rehabilitation. The first stockpile is adjacent to the northern portion of the pit and is no longer receiving topsoil. The second topsoil stockpile area is south of the West OOPDs and is where the remainder of reclaimed topsoil will be stockpiled until available for use in rehabilitation activities. Several temporary topsoil stockpiles are placed throughout the active mine footprint and earmarked for eventual placement.

Method

Coal mining commenced on the northern end of the deposit in the July 2022 after sufficient overburden was removed. The overburden has been initially dumped out of pit and will soon be backfilled in-pit when sufficient dump room becomes available in 2024. Backfilling is a feature of truck and shovel operations that refers to the waste being hauled and dumped back to previously mined-out areas. This method seeks to take advantage of shorter haul distances by creating bridges across the strip to transport waste from lower benches to the dumping area. The backfill is often keyed into the highwall in this process. While multiple waste haul roads are required to link the terraces to waste benches, haul cycle times for waste removal are reduced by removing the vertical component of the haul.

Mining will proceed in a southerly direction along the strike, with the strip laid down dip in a method known as ‘terrace mining’. The pit is excavated in a series of horizontal terraces, exposing the coal and waste on every bench. Augers are used to extract any coal resource exposed along the highwall.

Processing and Rejects

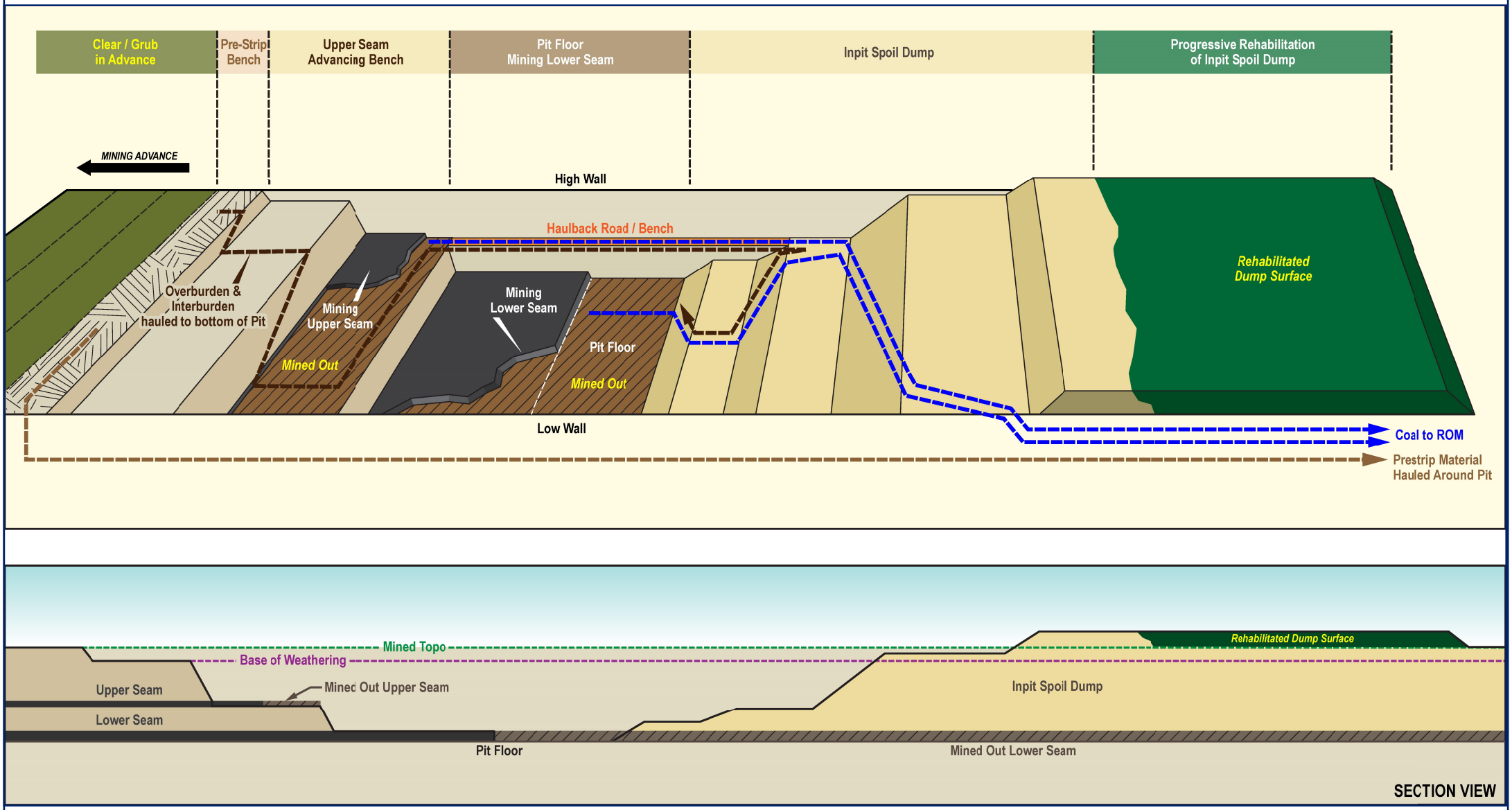
Processing of coal from BME occurs offsite at the Burton Mine Coal Handling and Processing Plant (CHPP), which is owned by another subsidiary of the Proponent and subject to a separate PRCP process. To date, one reject cell has been constructed and encapsulated within the western OOPD of BME on Relative Level (RL) 315 with another 30 m of Non-Acid Forming (NAF) cover material as permitted by the EA. Per Conditions F17 to F18 of the EA, the reject cell design has incorporated a maximum emplacement width of 50 m and maximum emplacement length of 100 m. At the closure stage, the subsequent dozer push from the angle of repose to the final rehabilitation slope will cap these rejects with >5 m of inert waste rock material.

Further encapsulation of rejects within the BME footprint is no longer intended as initially planned.

End of Mining

By the end of mine life, there will be one residual void in the southern end of the pit. The northern portion of the pit will be partially backfilled and kept available for use as bulk water storage during operation. This landform will be filled to the surrounding topography at the end of mine life when bulk water storage is no longer required. The southern void will be constructed as a water storage PMLU subject to the Residual Void (Southern void) Design and Closure Plan required by Condition G8 of the EA.

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PROJECT		CLIENT
September 2023	**BME Mine - PRCP**	BOWEN COKING COAL LIMITED
Figure 3-31		
ADV-AU-00217	**Truck and Shovel Method**	

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3.1.2.4 Life of Mine / Proposed Duration

The active Life of Mine (LOM) is an estimated five years and the Proponent is approved to extract up to 1.9 mtpa run of mine (ROM) tonnes each year. The timeframe post-LOM to achieve the PMLU criteria, as determined through the PRCP Schedule (**Attachment B**), is approximately 14 years. The approximate LOM and post closure timeframes are displayed in **Table 3-11**.

Table 3-11 Life of Mine Activities and Timeframes

Life of Mine Stage	Definition	Timeframe	Year(s)
Exploration and baseline technical studies	Coal quality, geophysical measurements, and geochemical analysis were explored and refined early to pinpoint potential deposits. Environmental baseline studies were simultaneously conducted on surface water, groundwater, land stability and erosion, air, noise, and ecology to aid in environmental management and approval. Impact assessments were conducted on the proposed mine plan using the baseline data gathered.	1.5 years	2020-2021
Mine-site design and planning	Refined conceptual mine planning was conducted to define how the Mine could operate safely, economically, and environmentally and socially responsibly. Environmental approvals that allowed the commencement of Mining were received in early 2022. Environmental and safety management systems were developed prior to the commencement of mining activities.	6 months	2022
Construction	Clearing and grubbing activities. Topsoil removal, handling, and storage. Equipment and MIA components were transported to site and established on cleared areas.	6 Months	2022
Production	Active LOM consists of recovering resources using extractive methods, then processing offsite and transporting them to identified markets via rail and port. Progressive rehabilitation is conducted when areas become available.	5 Years	2022-2027 (approx.)
Closure and Rehabilitation	Dismantling all facilities on the ML. The reclamation stage is then implemented, returning the land to approved post-mine land uses as per the PRCP and Schedule.	2.5 years	2027-2030 (approx.)
Post closure	Monitoring and maintenance activities as per the PRCP and Schedule. Achieving all PMLU criteria.	14 years	2043

Mining has begun at the northern portion of the proposed pit area and is progressively occurring along the resource in a southerly direction. The initial overburden has been placed in the two OOPDs that will likely fill out during the first two years of operation. Overburden will also be placed within the pit as mining progressively moves south, leaving a final void in the southern extent of the pit.

3.1.3 Design for Closure

In accordance with the PRCP Guideline (DES, 2023), transitional PRCPs are not required to demonstrate how aspects of the mine have been designed for closure for any approved disturbance; however, wherever possible, the revised mine design has been optimised for closure when preparing this Plan.

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3.1.4 Rehabilitation and Improvement Planning

The EP Act defines relevant activities as those to be carried out on land the PRC Plan is subject to. All relevant activities will occur with the approved 434 ha disturbance area within ML 70257 as shown in *Appendix 1 Figure 1 – Disturbance Map* in EA0002465 (**Attachment A**). Approximately 10 ha of the 434 ha approved operational area will not be disturbed by the end of mine life.

The domains (or "rehabilitation areas") identified below reflect the relevant activities in the PRCP Schedule (**Attachment B**):

- Out of Pit dumps (OOPD) – East and West;
- Open pit – North, Central and South;
- Mining Industrial Area (MIA), explosives storage area and exploration;
- Water management infrastructure; and
- Roads, tracks and cleared areas.

A Rehabilitation Area (RA) is an area of land within the PMLU that has a number of associated Rehabilitation Milestones (RM). 390 ha of the rehabilitated footprint will be a low intensity grazing PMLU, while 31 ha of rehabilitation land will be a water storage for livestock watering PMLU. Rehabilitation areas are provided in **Table 3-12** and shown in **Figure 3-32**.

Table 3-12 Rehabilitated Areas

Rehabilitation Areas	Description	PMLU	Area (ha)
RA1	Reshaped Final Landform	Low Intensity Grazing	269
RA2	Mine Infrastructure	Low Intensity Grazing	71
RA3	Water Infrastructure	Low Intensity Grazing	22
RA4	Roads and Access Tracks	Low Intensity Grazing	29
RA5	Exploration	Low Intensity Grazing	1.6
RA6	South Void Water Storage	Water storage for livestock watering	31
		Total (approximate)	424

Further detail on the associated RM criteria is provided in **Section 3.3**.

Given most of the mining activity is within a confined disturbance footprint with a relatively short, estimated mine life of five years, the area available for progressive rehabilitation over the LOM is limited. Despite this, several of the identified RAs, or portions of them, as per **Figure 3-32**, will become available for progressive rehabilitation during this time. **Table 3-13** identifies these areas by:

- Relevant activity and associated RAs;
- Predicted duration;
- Size and extent (hectares);
- Availability for progressive rehabilitation; and
- Justification for the limited availability of land for progressive rehabilitation.

The strategy to achieve progressive rehabilitation is presented in **Section 3.1.4.1**. As shown in **Figure 3-33** and **Figure 3-34** the areas that will complete landform development and reshaping/re-profiling (total 81 ha) to the final landform criteria over the LOM are the:

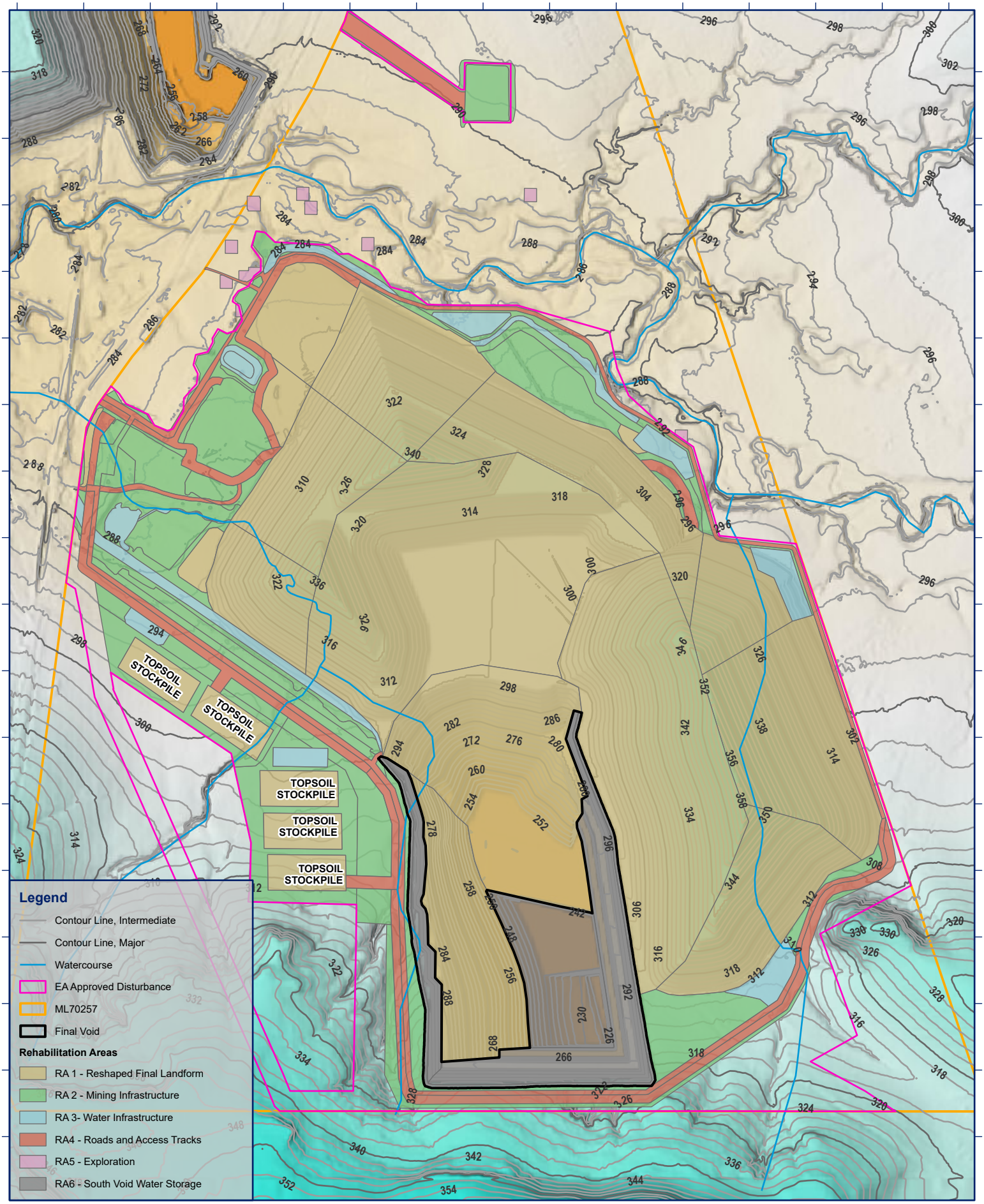
- Outward faces of the OOPDs;
- North pit bulk water storage;
- Remaining portion of the West OOPD; and
- Final face of the East OOPD.

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Sections of the outward faces of the OOPDs, totalling 32 ha, will be the only areas available for topsoil and seeding after landform development and reshaping/re-profiling has been completed during the LOM. These areas will be subject to grazing trials required by Condition G11 of the EA. The risk from not achieving a large amount of progressive rehabilitation over the short mine life is low as the mining footprint is small, confined and subject to continuous activity with the majority of overburden placement and shaping occurring during operation as a part of typical pit in-fill activities.

The remaining final landform development will occur in the concluding months of operation (2027) and during the first two-years of the post closure timeframe (2028 – 2030). Heavy vehicles used in mining will remain or rehabilitation specific mobile equipment will be brought to site to focus on landform reshaping, topsoiling, and seeding activities across the remaining mining footprint over this two-year post closure period. This is to avoid material rehandling, contamination of areas that were progressively rehabilitated and to ensure the final shape and slopes will achieve the grazing PMLU.

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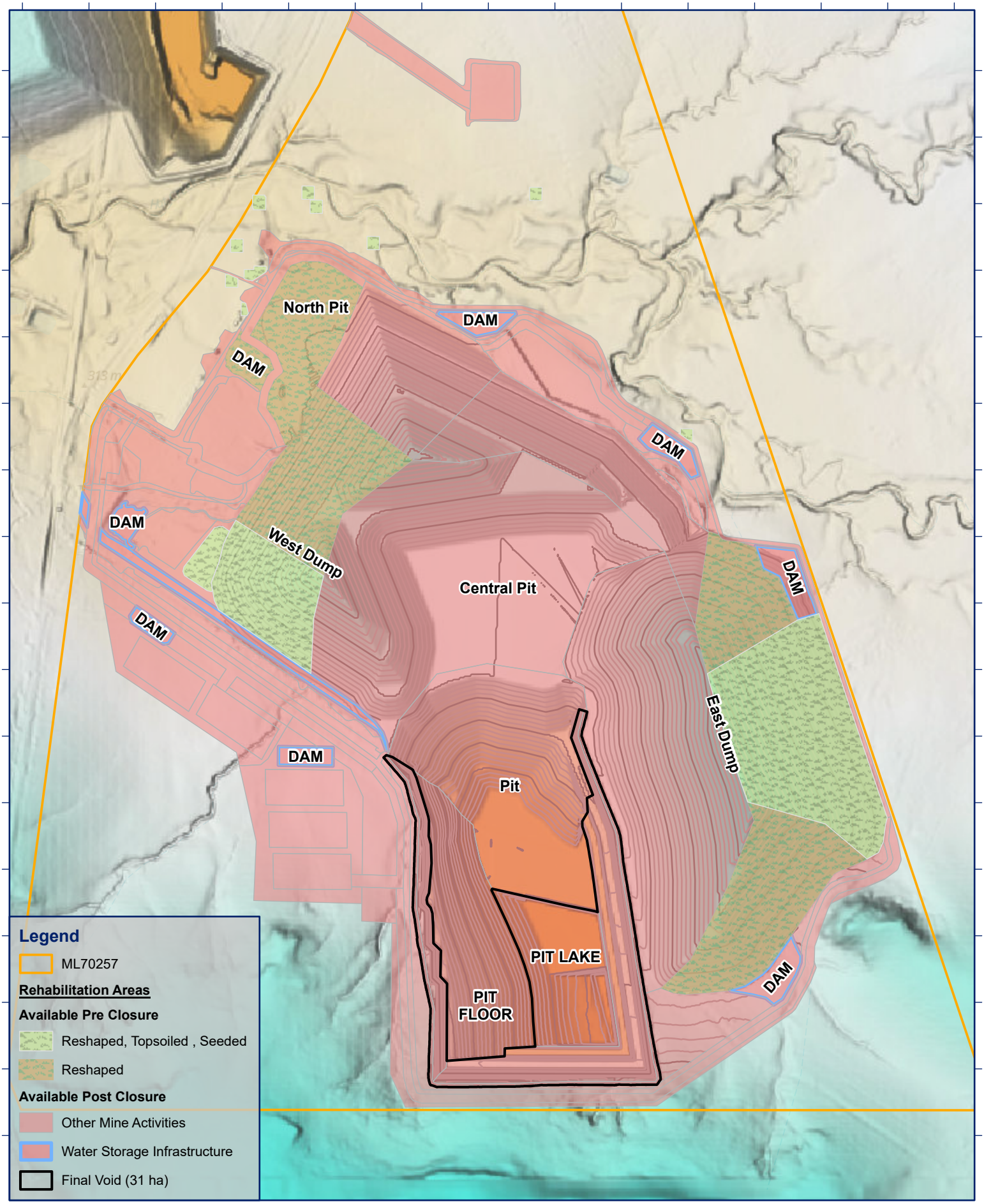
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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Rehabilitation Areas	
Figure 3-32 | ADV-AU-00217 | September 2023	

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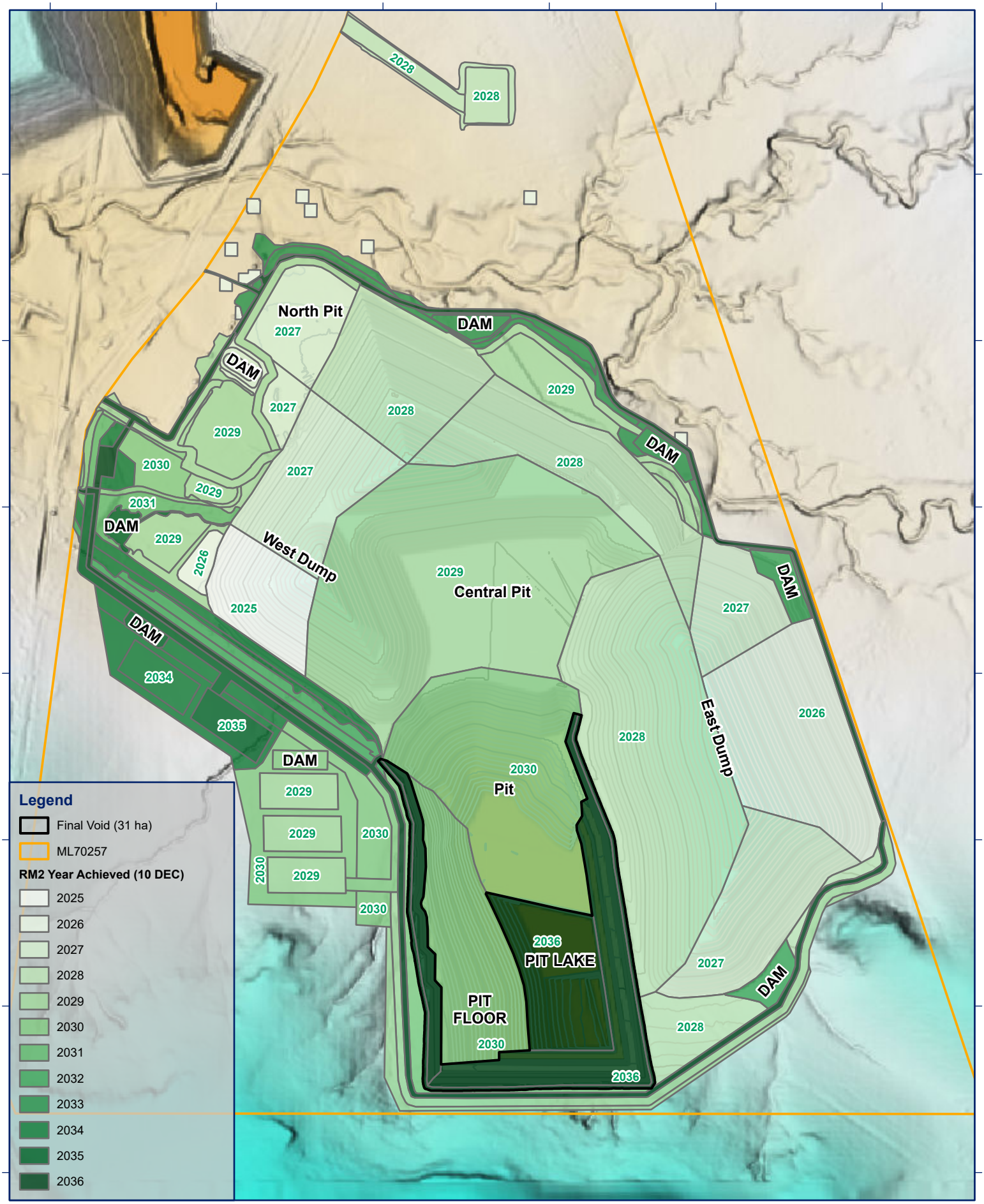
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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Areas Available for Progressive Rehabilitation over the LOM	
Figure 3-33 | ADV-AU-00217 | September 2023	

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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Progressive Rehabilitation Timing	
Figure 3-34 | ADV-AU-00217 | September 2023	

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Table 3-13 Rehabilitation Improvement Planning

Relevant Activity	Predicted Duration (years)	Size (ha)	Progressive Rehabilitation Availability
RA1 Reshaped Final landform			
OOPDs – East and West	June 2022 - December 2028	112.20	The Western OOPD will be filled with ex-pit material within the first three years of operation, with portions of the western outer face becoming available for progressive rehabilitation between 2025 and 2028. The Eastern OOPD will be filled in within the first two years of operation, which will make portions of the outer eastern face available for progressive rehabilitation between 2026 to 2027. Areas that are not rehabilitated will remain open due to access requirements for mining equipment. The remaining areas will be rehabilitated at the end of mine life. Once OOPDs are filled to capacity, overburden will be placed in-pit.
North pit	June 2022 to December 2027	23.2	The overburden removal and coal extraction commenced at the northern extent of the pit footprint in 2022, which will become the North pit in 2024 once mining activities proceed south and replacement of in-pit overburden begins. The North pit will act as bulk water storage for MAW during operations, to capture excess water for use in dust suppression during dry times. The North pit will be completely backfilled and reshaped to the surrounding topography post closure once all MAW is utilised in operational or rehabilitation activities.
Central pit	February 2023 to December 2030	102.7	Mining activities will progress in a southerly direction and, once the resource is fully extracted, will be progressively backfilled with in-pit overburden. The final topography of the backfilled area will be similar to the landscape surrounding the mine footprint. Reshaping to the final landform design will occur two years post closure.
Pit floor (Southern void)	April 2024 to December 2030	16.20	The Southern void will border onto the Central backfilled pit and be established during the final years of mine life. The pit floor includes the reshaped and topsoiled/seeded low wall and 15% topsoiled ramp that will connect the rehabilitated Central pit to the lake beach to allow livestock access in a controlled manner (e.g., via a gate). The entire perimeter of the Southern void will have a fence offset by 30 m from the edge. Construction of this area will be guided by the Residual Void (Southern void) Design and Closure Plan required by Condition G8 of the EA. The pit floor will become available for reshaping to the final landform during the two years post closure rehabilitation activities.
Topsoil stockpiles	June 2022 – December 2029	14.70	There are two long term topsoil stockpile areas, with up to five temporarily placed in the active mine footprint at any one time. The northern stockpile was established adjacent to the northern portion of the open pit during the first year of construction and is currently maxed out. The second topsoil storage area will be used to place the remaining pit area topsoil as mining advances south. Some topsoil stored in these areas will be utilised for the small area of progressive rehabilitation that requires topsoil over the LOM. Most of the topsoil will remain to be used after the entire final landform has been reshaped and other areas that have been prepared for topsoil and seeding (e.g., the explosives area and MIA). As such the topsoil storage footprint will not be available for rehabilitation until 2 years post closure when all decontamination, infrastructure removal and reshaping has been completed.
Total Reshaped Final Landform		**269**	
RA 2 Mining Infrastructure			

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Relevant Activity	Predicted Duration (years)	Size (ha)	Progressive Rehabilitation Availability
MIA	June 2022 to December 2030	63.9	The full MIA is required for LOM and for two years post cessation of mining as it contains all the supporting infrastructure for operations and post closure final landform reshaping activities. The MIA currently has offices, crib rooms, toilet blocks, workshops, laydowns, storage, wash bays, heavy and light vehicle parking in one location. Infrastructure will remain until the entire landform is reshaped, contaminated land removed, topsoil and seeding that will occur over the two years post closure is completed. After the two years post closure final landform reshaping is completed, most of the MIA will be rehabilitated apart from a reduced hardstand area that will remain as a staging ground for any landform maintenance that may be identified as required by post closure monitoring. The hardstand will be rehabilitated in line with the other portions of the MIA area at the successful completion of the PRCP schedule.
Explosives Storage area	June 2022 - December 2028	2.2	The explosives storage area will be required for the LOM. It will be rehabilitated during the bulk reshaping activities that will occur in the first two years of post-closure. Contaminated land will be removed and encapsulated appropriately within the pit as a part of bulk reshaping activities.
ROM	June 2022 - December 2029	4.9	The ROM area will be required for the LOM. It will be rehabilitated during the bulk reshaping activities that will occur in the first two years of post-closure once all coal designated for processing has been removed. Contaminated land will be removed and encapsulated appropriately within the pit as a part of bulk reshaping activities.
Total Mining Infrastructure		**71**	
RA 3 Water Infrastructure			
MAW dam (MWD1)	June 2022 - December 2027	0.8	The MAW dam will be required until the final year of operations. It will be rehabilitated during reshaping associated with the North pit following the removal of rubbish and contaminated material.
North pit flood diversion levee	June 2022 - December 2033	2.0	Required for flood mitigation during operations and two years post closure during bulk reshaping. No other levees have been required over the LOM as defined in the original SWIA and subsequently Appendix 5, Tables G1 and G2 of the EA, therefore no other levees are required to be rehabilitated.
Sediment dams (x5) and clean water dam	June 2022 - December 2032	13.5	Required for water management purposes during operations and the post closure monitoring and maintenance stage until vegetation meets the nominated criteria of 60-70% ground cover. The sediment dams will be repaired, and contamination removed for encapsulation during the reshaping activities that occur during the first two years of post-closure. Dams will be rehabilitated once self-sustaining criteria have been achieved on the OOPDs. The clean water dam will be rehabilitated during final landform reshaping.
Groundwater monitoring bores	January 2021 to December 2034	1.3	Required for monitoring to meet EA obligations during operations. The same bores will continue to be sampled during the post closure monitoring stage until associated outcome criteria have been met. The bores will be available for rehabilitation at the completion of post closure monitoring program.
Farm dam	To remain	4.4	The farm dam at the northern tip of the ML has been established by local landholders and was transferred during the ML upon purchase in 2020. An agreement is in place to retain the dam during operational and to leave it behind as a PMLU. There are no current arrangements to utilise this water for operational or closure purposes, however, appropriate agreements will be reached if required.

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Relevant Activity	Predicted Duration (years)	Size (ha)	Progressive Rehabilitation Availability
Total Water Infrastructure		**22**	
RA 4 Roads and access tracks			
Internal roads, tracks and cleared areas associated with haulage	June 2022 - December 2029	14.3	Required for LOM. Most tracks within the mining footprint are used for haulage during operations. As mining progresses south some haulage routes will be consumed by the in-pit placement overburden. The haulage routes remaining at the end of mining will be rehabilitated during the two years post closure reshaping stage. Operational access tracks around the mining footprint perimeter that will be used for longer term post closure monitoring and maintenance, will have contamination removed and be reduced in size during this stage to take advantage of access to heavy equipment.
External access tracks (including powerline) powerline access	December 2029 – December 2033	14.7.	Tracks that provide access to rehabilitation monitoring and maintenance areas will remain until associated outcome success criteria has been achieved per the PRCP schedule. This PRCP includes measure for rehabilitation of these areas, however there is potential that the underlying landholder will retain tracks that lead to livestock watering sources.
Total RA 4 Roads and access tracks		**29**	
RA 5 Exploration			
Historic exploration	August 2020 to December 2026	1.6	This RA refers to small legacy areas associated with historic exploration campaigns lead by previous owners of the ML as defined in the current EA disturbance mapping. These areas will be rehabilitated during the two-year post-closure reshaping stage. The Proponent has not conducted exploration activities outside of the approved disturbance footprint that have not been consumed by mining given exploration under their tenure has targeted the establishment of coal quality within the previously identified resource area. As such all-exploration lead by the Proponent has been mined out or rehabilitated within six months of disturbance.
Total RA 5		**1.6**	
RA 6 Southern void Water Storage			
Southern void	April 2024 to December 2036	31	The South Void will be the last area of active mining at the end of mine life. RA 6 is defined as the high wall and pit lake that will fill post closure per numerical model predictions. Construction of this area will be as per the Residual Void (Southern void) Design and Closure Plan required by Condition G8 and occur during the two years post closure reshaping activities.
Total RA 6		**31**	
	Total Area Rehabilitated	**424**	-

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3.1.4.1 Transition Strategy

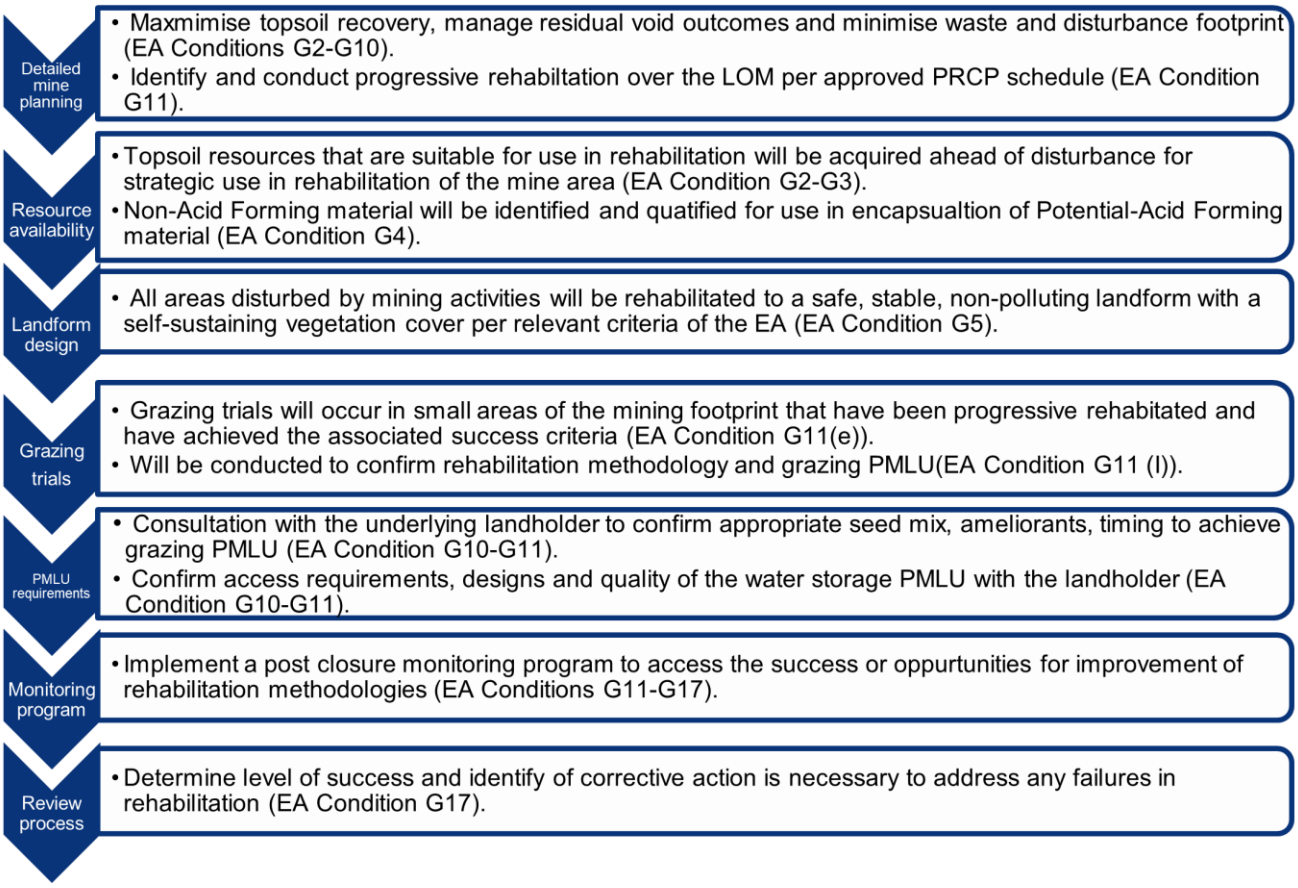
The PRCP aims to successfully restore disturbance from mining activities to enable selected PMLUs. The Proponent has developed a strategy to align the progressive rehabilitation and closure requirements of the PRCP with requirements of the Mine's approved Land Outcome Document (LOD), EA0002465 (**Attachment A**). Condition G5 of EA0002465 requires that land disturbed by mining be rehabilitated to a safe, stable, non-polluting landform with a self-sustaining vegetation cover in accordance with:

- *Appendix 5, Table G1 - Post Ming Land Use (PMLU) and Rehabilitation Methods;*
- *Appendix 5, Table G2 - PMLU Rehabilitation Success Criteria;*
- Condition G10 - Rehabilitation Management Plan (RMP); and
- Condition G7 - Residual Void Design and Closure Plan (RVDCP).

In addition, Condition G11 requires that the RMP contain strategies for progressive rehabilitation, weed and pest management and successfully achieving the rehabilitation requirements of the EA. Rehabilitation monitoring program requirements are captured in the RMP, with reporting requirements outlined by Condition G17. These requirements have been transitioned into **Section 3.7** of this PRCP.

To achieve the progressive rehabilitation and closure goals of the EA as an LOD and the PRCP, a transition strategy has been developed to integrate the key alignment considerations, as outlined in **Figure 3-35**. The information requirements from the RPM and RVDCP are included in the relevant sections of this PRCP to support the transition to the PRCP schedule.

Figure 3-35 Transition Strategy



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3.1.4.2 Improvement Areas

At this stage of project development, no improvement areas have been identified for the Mine.

3.1.4.3 Existing Rehabilitation

At the time of the first version of this PRC Plan and Schedule (29 September 2023) submission, there has been no progressive rehabilitation conducted at BME to date, as the mine has only been in operation for a total of 16 months (May 2022 to September 2023). Progressive rehabilitation opportunities have not become available during the ramp up to steady state operation stage.

As described in **Table 3-13**, **Figure 3-33** and **Figure 3-34**, the first areas available for progressive rehabilitation in the form of reshaping will be the OOPD outer faces from 2025 to 2027. Limited portions of these areas will include topsoiling and seeding for the purposes of the grazing trials required by Condition G11 of the EA. Grazing trials are discussed further in **Section 3.6.2**.

3.1.5 Spatial Information

The following spatial information is being provided as part of the PRCP application (**Attachment C**):

- The location and maximum extent of disturbance footprint for the mine life;
- The PMLU areas within the resource tenures;
- The rehabilitation areas within the resource tenure(s), for a minimum 10-year period;
- Any sensitive receptors;
- Extent of the floodplain; and
- All spatial information outlining the rehabilitation areas that correspond to the PRCP schedule.

The files submitted include naming conventions, file sizes, and metadata requirements as defined by the *Spatial Information Submission Guideline* (ESR/2018/4337) and the PRCP application form (ESR/2019/4957).

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3.2 Community Consultation

Legislative Requirements

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

- Details of the consultation undertaken by the applicant in developing the proposed PRCP, and
- Details of how the applicant will undertake ongoing consultation in relation to the rehabilitation.

The Proponent operates under a Stakeholder Engagement Plan (SEP) that captures consultation requirements of section 126C(1)(c)(iii) and (c)(iv) of the EP Act as discussed in **Section 3.2.3** of this PRCP.

3.2.1 Community Profile

The Mine is within a remote region with few sensitive receptors, the closest of which are anywhere from 10 km to 18 km from the Mine area, as illustrated in **Figure 3-36**. Some of the homesteads are potentially abandoned or only temporarily occupied, with several already near existing and post-closure mines or CSG fields. There are no commercial areas, schools, or nature refuges within a 30 km radius of the Mine. Aside from mining, extensive cattle grazing is the predominate land use of this region, with landholders cognisant and often already in binding agreements with mining companies regarding items such as agistments and stock watering. The Mine is only accessible by a haul road owned and operated by the Proponent with all access points secured by gates to deter any public access.

The Mine is within the traditional country of the Barada Barna people. The Barada Barna people received Native Title determination in 2016 over their traditional lands which cover approximately 3,229 square kilometres and are bound between the Connors Range in the east, Middlemount in the south, Peak Ranges in the West and Lake Elphinstone in the North. The Mine is subject to obligations to the Barada Barna Aboriginal Corporation as legally agreed to in the Cultural Heritage Management Plan (CHMP).

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Scale: 1:250,000
Projection: GDA2020 MGA Zone 55
Created/Reviewed By: AW/MRT
Aerial: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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BME Mine - PRCP

Regional Sensitive Receptors

Figure 3-36 | ADV-AU-00217 | September 2023

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3.2.2 Community Consultation Plan

3.2.2.1 Purpose

In accordance with section 126C(1)(c)(iii) and (iv) of the EP Act and PRCP Guideline, the rehabilitation planning part of the PRCP must include details of consultation undertaken by the applicant and details as to how the applicant will undertake ongoing consultation in relation to rehabilitation and closure activities. The purpose of the Community Consultation Plan (CCP) is to meet these requirements and outline how CCO plans to identify, notify, and engage the community regarding rehabilitation and closure activities at the Mine. CCP requirements are captured within the Proponent's SEP.

Early engagement will allow the Proponent to develop relationships within the community, build an awareness and understanding of community expectations as well as provide stakeholders with an appreciation of mining operations to ensure community expectations are realistic and aligned with the practical aspects of progressive rehabilitation and closure.

Specifically, the purpose of the CCP is to:

- Define objectives for community consultation;
- Define how the community will be engaged;
- Set out proposed consultation frequency;
- Determine what information will be released for community consultation; and
- How feedback/comments will be considered.

3.2.2.2 Objectives

The community consultation component of the PRCP is intended to ensure that anyone impacted by proposed rehabilitation and closure activities at the project has an opportunity to provide input to the planning. The objective of the CCP is to provide a practical and ongoing management tool for effective community consultation. Implementation of the CCP will enable CCO to achieve the following objectives in line with the PRCP Guideline:

- Better understand potential environmental, economic, and social risks associated with mine closure;
- Ensure that anyone impacted by proposed rehabilitation and closure activities at the site has an opportunity to provide input to the planning process;
- Maintain continuous communication throughout the development of the PRCP and LOM to establish and maintain relationships;
- Manage community expectations of how the applicant would operate;
- Demonstrate that sufficient effort has been made to engage the community;
- State the extent to which each PMLU for land identified in the PRCP schedule for the plan is consistent with the outcome of consultation with the community in developing the plan; and
- Meet the PMLUs for the mine area ('Grazing' and 'Water Storage intended to support cattle watering').

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3.2.2.3 Identification of Community Members

The DES Information Sheet - Community Consultation for Progressive Rehabilitation and Closure Plan (ESR/2019/5101, 2019), provides guidance to identify those stakeholders or community members with a "genuine interest" in the land for which the PRC Plan relates. Considerations include:

- Direct impact interest (e.g., underlying and adjacent land holders).
- Cultural interest (e.g., Indigenous communities, Traditional Owners including Native Title holders).
- Heritage interest (e.g., state or local government or relevant community groups where heritage value is identified on the land the activity is to occur).
- Environmental interest (e.g., state or local government or relevant community groups where environmental value is identified on the land the activity is to occur).
- Recreational interest (e.g., relevant community groups who use the immediate, adjacent, upstream or downstream land for recreational purposes).
- Land use interest (e.g., overlapping tenure holders, agricultural entities or local government where a planning scheme for the land is in place).
- Health interest (e.g., state or local government or relevant community groups who have health concerns relating to the rehabilitation processes and final land outcomes for the project).

A summary of identified stakeholders and community members for the BME project are provided in **Table 3-14**.

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Table 3-14 Identified Stakeholders or Community Members

		DIRECT INTEREST	CULTURAL INTEREST	HERITAGE INTEREST	ENVIRONMENT INTEREST	RECREATIONAL INTEREST	LAND USE INTEREST	HEALTH INTEREST
LANDHOLDER	**Redacted** Lot 13 on Plan SP178466	✓			✓	✓	✓	✓
	Redacted Lot 3 on Plan GV54				✓		✓	
UNDERLYING RESOURCE TENURE	Fitzroy (CQ) Pty Ltd EPC 722, EPC 667	✓			✓		✓	✓
	Eureka Petroleum Pty Ltd ATP 814, PL 1034	✓			✓		✓	✓
	CH4 Pty Ltd - Red Hill South (PCA 257), Ellensfield (PCA 149), ATP 1103	✓			✓		✓	✓
TRADITIONAL OWNERS	Barada Barna Native Title Determination area (QCD2016/007)		✓					
GOVERNMENT / ENTITY	Powerlink	✓	✓		✓		✓	
	Department of Environment and Science (DES)				✓	✓	✓	✓
	Town of Moranbah	✓						✓
	Town of Coppabella							✓
	Department of Resources				✓		✓	

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3.2.2.4 Notification and Engagement of the Community

A summary of notification and engagement undertaken throughout the development and implementation of the PRC Plan is provided in **Table 3-15**. All engagement is tracked in the Stakeholder Engagement Register (SER) which is a 'live' appendix of the SEP. The SER captures all information requirements of the Community Consultation Register (CCR) required by section 3.5 of the PRCP Guideline. **Table 3-16** provides a summary of how the objectives of ongoing community consultation identified in **Section 3.2.2.3** will be carried out.

Table 3-15 Stakeholder Notification and Engagement

Community Member	Trigger	How	When	How Feedback is Considered	How Feedback is Tracked
Landholders	Determination of PMLUs, proposed scheduling and rehabilitation activities to be carried out under the Plan.	Meet with BCC representative.	Prior to PRC Plan submission.	Incorporated into PRC Plan if applicable.	Tracked in SER
	Provide a copy of PRC Plan	Advise landholder in writing once PRC Plan is approved.	Once off.	NA	Tracked in SER
	Provide updates on rehabilitation progress against the PRC Plan and discuss any feedback	Meet with BCC representative.	Annual, once rehabilitation commences.	Incorporated into PRC Plan if applicable	Tracked in SER
Traditional Owners	Provide updates on rehabilitation progress against the PRC Plan and discuss any feedback	BCC representative to meet with Barada Barna People and Gaangalu Nation People.	Annual, once rehabilitation commences.	Incorporated into PRC Plan if applicable.	Tracked in SER
Government / Entity (i.e., DES, Powerlink)	Determination of PMLUs, proposed scheduling and rehabilitation activities to be carried out under the Plan.	BCC representative to meet with Government / Entity for PRC Plan pre-lodgment meeting	Prior to PRC Plan submission.	Incorporated into PRC Plan if applicable.	Tracked in SER
	Provide updates on rehabilitation progress against the PRC Plan and discuss any feedback	BCC representative to meet with Government / Entity.	Ongoing, at least annually.	Incorporated into PRC Plan if applicable.	Tracked in SER

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Table 3-16 Community Consultation Plan

Objective	Engagement Type	Proposed consultation frequency	Released information	How feedback/comments are considered
Understand potential environmental, economic, and social risks associated with mine closure.	Approvals and Impact Assessments.	Once off prior to PRC Plan submission.	Approvals and Impact Assessments completed.	Incorporated into PRC Plan if applicable.
Ensure anyone impacted by proposed rehabilitation and closure activities has an opportunity to provide input to the planning process.	In person, email, in writing, phone call.	As required, prior to PRC Plan submission.	Proposed PMLUs	Consideration of PMLU options.
Maintain continuous communication throughout the development of the PRCP and LOM to establish and maintain relationships.	In writing, email, phone call, website.	Ongoing	Provide update on development & operation of the mine	Tracking against PRC Plan progress. Incorporated into PRC Plan if applicable.
Manage community expectations of how the applicant would operate.	In writing, email, phone call, website.	Ongoing	Provide update on rehabilitation progress against the PRC Plan	Discuss feedback and enter into SER.
Demonstrate that sufficient effort has been made to engage the community.	BCC to document in Stakeholder Engagement Register (SER)	Ongoing	SER in PRC Plan	Incorporated into PRC Plan if applicable.
State the extent to which each PMLU is consistent with the outcome of consultation with the community in developing the plan.	This PRC Plan section 3.3	This PRC Plan	PRC Plan.	Incorporated into PRC Plan if applicable.
Meet the PMLUs for the mine area.	Progressive Certification of land by AQP.	Once PMLU has been achieved/verified.	Annual Return once rehabilitation commences. Certification of Land. Notification of Surrender.	NA

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3.2.3 Community Consultation Register

The information requirements of the CCR have been extracted from the SER to capture communication with community members regarding rehabilitation and closure activities at the Mine that have occurred by the time of this PRCP submission (**Table 3-17**).

As per the requirements of the PRCP Guidelines, the CCR includes:

- Consultation dates;
- The identification of community members;
- Consultation type;
- Information provided;
- Issues raised / discussed; and
- How issues were considered by the Proponent, decisions / outcomes of engagement and commitments made by the Proponent.

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Table 3-17 Community Consultation Register

Consultation Date	Community Member(s) (Full Name(s))	Type of community Member(s)	Description of Consultation Type	Information Provided to the community Members	Issues Discussed by the Community Members	How the issues have been considered by the EA Holder	Decisions/Outcomes of Engagement	Commitments made by the EA Holder
September 2020	DES	State Government	Video Conference Meeting	Maps and plans	Pre-lodgment meeting to discuss a minor amendment to the recently de-amalgamated EA from the Peabody Burton complex and the associated changes to post mine land uses no longer associated with the ML.	All conditions adjusted and agreed to in consultation with DES, including those related to post mine land uses.	Post mine land uses would be a part of the major amendment that approved the current mine plan.	Arrange a meeting with the DES PRCP assessment team once rehabilitation areas, associated post mine land uses and land suitability are determined through technical studies.
May 2021	DES	State Government	Video Conference Meeting	Proposed final landforms and pre-lodgment documents for review.	Pre-lodgment meeting between BCC, approval consultants and DES assessment teams reviewing the proposed final landforms was held to discuss criteria to support the proposed final landforms that require approval for the Project to transition to the PRC Plan.	Post mine land uses and land suitability classes adjusted according to advice.	Agreed that a mutually agreeable date for the PRC Plan transition would be determined in due course.	Provide required information as a part of the major EA amendment process to justify a transitional PRCP.
August 2021	DES	State Government	Letter	NA	DES provided BCC with a PRC Plan transition notice for 29 September 2023.	Preparations for the PRCP submissions ongoing, that includes required technical studies.	Submit PRCP by 29 September 2023.	Submit PRCP by 29 September 2023.

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Consultation Date	Community Member(s) (Full Name(s))	Type of community Member(s)	Description of Consultation Type	Information Provided to the community Members	Issues Discussed by the Community Members	How the issues have been considered by the EA Holder	Decisions/Outcomes of Engagement	Commitments made by the EA Holder
2021	*Redacted*	Underlying Landholder	In Person Meeting	Project timings, impacts, proposed final landforms and post mining land uses discussed.	Water for cattle purposes and grazing potential of rehabilitated surfaces were reviewed.	BCC selected post mine land uses based on initial feedback.	The final landform was well received and acknowledged as an optimal outcome.	Upon completion of the project and once post closure criteria are met, the area will be handed back to the landholder that is suitable for grazing and livestock watering.
2021	*Redacted*	Underlying Landholder	In Person Meeting	Location of two registered water supply bores on ML70257.	Discuss status of two registered water supply bores (as per the Department of Regional Development, Manufacturing and Water (DRDMW) database) identified within ML70257.	Groundwater impact studies.	It was determined that neither of these bores are either present or functional.	Continue to consider operational and post closure water supply for livestock activities.
09/09/21	Barada Barna People	Traditional Owner	In Person Meeting	Discussed the Mine with the Barada Barna people and their legal representatives at Hopgood Gamin Offices	A cultural heritage survey and recovery of artefacts was undertaken in August 2021.	Disturbance activities avoid identified scared places.	Further CH survey required.	Another survey was undertaken in December 2022.
5/26/2023	DES	State Government	In Person Meeting	Maps, plans and site tour	Discussed the mine plan, technical closure studies and topsoil handling/placement.	Suggestions will be considered in the PRCP development.	A better understanding of the site to assist with the PRCP assessment in September.	Undertake pre-lodgment meeting ahead of the formal PRCP submission in September.

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Consultation Date	Community Member(s) (Full Name(s))	Type of community Member(s)	Description of Consultation Type	Information Provided to the community Members	Issues Discussed by the Community Members	How the issues have been considered by the EA Holder	Decisions/Outcomes of Engagement	Commitments made by the EA Holder
Monthly	DES	State Government	Video Conference Meeting	Project updates, Proposed amendments to Environmental Authorities (all Projects), Progress of Progressive Rehabilitation and Closure Plans (all Projects), Interactions with other parts of the department.	Feedback varies based on issues at hand.	Documentation adjusted according to agreed outcomes.	Revised submission materials.	To meet agreed timeframes.
3/8/2023	*Redacted*	Underlying Landholder	In Person Meeting	Powerpoint presentation print out. Three maps; 1. Reshaping timing and locations. 2. Rehabilitation Areas 3. Post Mine Land Uses	Explanation of the Proponents obligations under the PRCP process, including submission and approval timing that includes approval of final outcome criteria. Potential timing of the availability of land during mine life for grazing trails (and locations). Expected timeframes to achieve final outcome criteria. Final void details including potential long	Logistics of grazing trials, suggested seed mixes, planting timing, ameliorant suggestions were added to the RMP. Construction logistics (fencing, gates, access, etc) added to the Final Void Closure Plan.	Updated void and rehabilitation management plans. Final confirmation on the selected PMLUs – grazing and water storage. Made plans to conduct a site tour at the appropriate time to view dams and roads that might need to be retained post closure.	To continue to work together on the grazing trials. Discuss the final approved PRCP schedule to confirm timing. Discuss infrastructure that will be retained by the landholder and make appropriate legal arrangements.

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Consultation Date	Community Member(s) (Full Name(s))	Type of community Member(s)	Description of Consultation Type	Information Provided to the community Members	Issues Discussed by the Community Members	How the issues have been considered by the EA Holder	Decisions/Outcomes of Engagement	Commitments made by the EA Holder
					term water quality. Access requirements for water storage. Mine infrastructure that might be ideal to retain.			

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3.3 Post-Mining Land Uses

Legislative Requirements

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

e) The outcome of consultation with the community in developing the plan, and
f) Any strategies or plans for the land of a local government, the State or the Commonwealth

A PMLU is defined under Section 112 of the EP Act as the purpose for which the land will be used after all relevant activities for the PRC plan carried out on the land have ended. It is noted that a PMLU does not include third-party activities or assets that continue to exist once mining activities have ceased, such as third-party pipeline easements, power easements or overlapping tenures for other EAs (DES, 2023). As identified in **Sections 3.1.1.11** and **3.1.2.1**, the ML on which all relevant activities are occurring has underlying resource tenure holders and an easement with a 132 kVA powerline managed by Powerlink. These parties have been identified as stakeholders in the CCP (**Section 3.2.3**) that will be consulted during relevant stages of the PRCP Schedule execution to ensure the PMLU suits their operational needs post-closure (e.g., ongoing access requirements).

Under the transitional provisions of the EP Act, approved PMLUs uses can be transitioned into the PRCP without further assessment or public notification. As such, this section of the PRCP does not include the information required by section 126C(1)(j) of the EP Act given the assigned PMLUs and their associated outcome criteria are approved under the LOD for this mine.

The current EA is considered the only LOD applicable to the relevant activities (**Attachment A**). As the EA associated with the Mine was de-amalgamated from an EA originally issued in 2004, transitional provisions have applied to the Proponent as if they were the original holder. However, in the EA amendment process associated with the current mine plan, updated PMLUs with site specific rehabilitation methods and outcomes based on legislative requirements from are 126C of the EP Act, were approved in 2022 in anticipation of transition to the PRCP. As identified in **Section 3.1.4.1**, these are within Appendix 5 of the EA:

- *Table G1 - Post Ming Land Use (PMLU) and Rehabilitation Methods*; and
- *Table G2 - PMLU Rehabilitation Success Criteria.*

Condition G5 of EA0002465 (last issued 2 February 2023) requires that land disturbed by mining be rehabilitated to a safe, stable, non-polluting landform with a self-sustaining vegetation cover in accordance with Tables G1 and G2 of the EA, the RMP and RDVCP (**Attachment A**).

As the legislative requirements under section 126C(1)(d) of the EP Act still apply to transitional PRCPs, five potential PMLUs were assessed as part of the updated PMLUs for the current Mine disturbance area approved in 2022 per the requirements defined in section 3.2 of the PRCP Guideline (DES, 2023). These included:

- Low-intensity cattle grazing;
- Native vegetation communities (regional ecosystems RE 11.9.5);
- Hardwood (e.g., *Corymbia citriodora*) plantation forestry;
- Water storage for livestock watering; and
- Dryland cropping.

These PMLU options were selected because they are consistent with natural characteristics and land uses of the region as described in the *Isaac Regional Planning Scheme* and the *Mackay, Isaac and Whitsunday Regional Plan* summarised in **Section 3.3.4**. Industrial, large-scale agriculture or landfill PMLU opportunities are not considered feasible for the ML as it is only accessible by a private haul road subject to strict mine

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safety regulations that is unlikely to become available to the public in the foreseeable future. While the opportunity to return the land to a native ecosystem exists, the underlying landholder intends to utilise the rehabilitated land for grazing activities as soon as possible. Selecting a native ecosystem PMLU would be in contravention to the underlying landholder's current intention for the area.

3.3.1 Nominated PMLUs

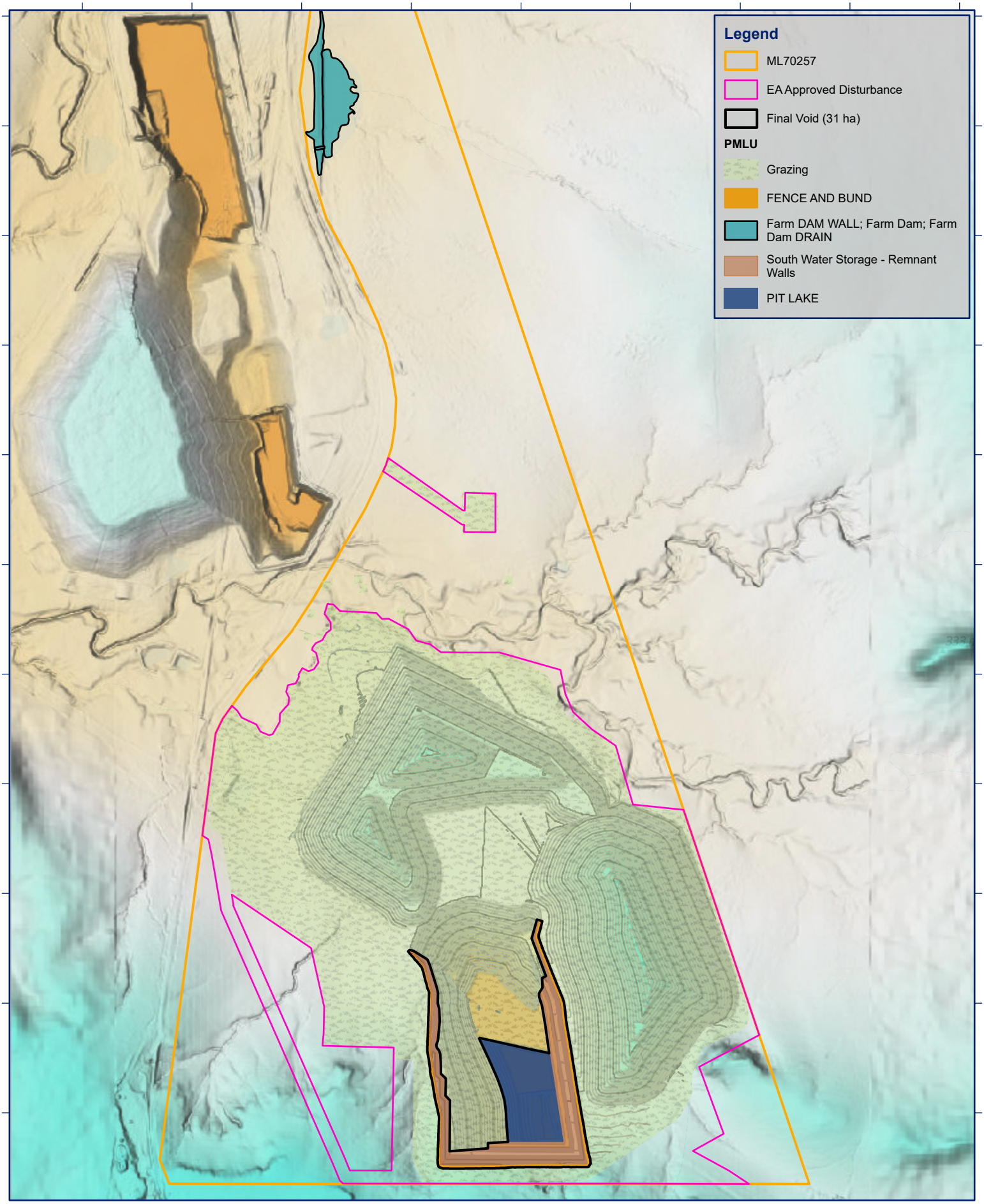
Based on outcomes from the baseline impact studies conducted for all identified environmental values within and surrounding the ML in 2021 as described in **Section 3.1.4**, and through ongoing consultation with the underlying landholder as described in **Section 3.2.2** and **Section 3.3.3**, the PMLUs of low intensity grazing and water storage for livestock watering were selected and approved by the administering authority in 2022. Of the 424 ha disturbance caused from mining activities during the LOM, 393 ha of the rehabilitated footprint will be a low intensity grazing PMLU, while 31 ha of rehabilitated land will be a water storage for livestock watering PMLU (**Figure 3-37**).

The selected PMLUs will meet the post-mining land capability classifications per *Guidelines for Agriculture Land Evaluation in Queensland* (DSITI and DNRM, 2015) as approved in *Table G1 - Post Ming Land Use (PMLU) and Rehabilitation Methods* of the LOD, whereby:

- Grazing will be returned to 'Class 4' Land suitability (Cattle grazing and rainfed broadacre cropping).
- Water storage for livestock water low wall will be returned to 'Class 4' Land suitability (Cattle grazing and rainfed broadacre cropping).

The only infrastructure to remain under legal agreement with the underlying landholder is the pre-existing North Dam, which is not associated with current or planned mining activities. While additional infrastructure may be retained through ongoing consultation with the underlying landholder, as there is currently no agreement in place, this PRCP intends that all infrastructure will be decommissioned, removed, and rehabilitated after the cessation of mining.

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Nominated PMLUs	
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3.3.2 PMLU Criteria

The LOD (**Attachment A**) describes what must be achieved for the nominated PMLUs. These include:

- Management and monitoring plans and reporting;
- Rehabilitation methods;
- Post-mining land suitability class;
- Goals;
- Objectives/indicators;
- Criteria; and
- Validation method.

Rehabilitation milestones and criteria used to determine if PMLUs have been achieved and rehabilitated to a stable condition are provided in **Table 3-18**. The milestone criteria applied to each RM includes current LOD commitments to achieving and validating the two approved PMLUs that will be transitioned to the PRCP as defined in Schedule G (Land), Appendix *5, Table G1 - Post Ming Land Use (PMLU)* and *Rehabilitation Methods* and *Appendix 5, Table G2 - PMLU Rehabilitation Success Criteria* of the LOD. The application of recommendations from grazing trials conducted per Condition G11 of the EA will be considered against the milestone criteria (as discussed in **Section 3.6.2**).

Table 3-18 Rehabilitation Milestones

Milestone Reference	Rehabilitation Milestone	Milestone Criteria
RM1	Infrastructure Decommissioning and Removal	a) All services disconnected b) All buildings demolished and removed
RM2	Remediation of Contaminated Land	a) An AQP has completed a contaminated land investigation. b) Contaminated materials removed and appropriately disposed of. c) Onsite remediation of hydrocarbon contaminated soils completed. d) Certification from an AQP that all measures required by the contaminated land investigation report(s) are implemented.
RM3	Landform Development and Reshaping/Reprofiling	**Out of Pit Dumps:** a) All major earthworks completed. b) Geotechnical adequacy with 1.5 Factor of Safety c) The installation of contour or graded drains as per construction design has been certified by an appropriately qualified person. d) Back-filled pits assessed as geotechnically stable by a suitably qualified geotechnical engineer. e) <u>Outer slopes:</u> ▪ 15% as per landform design. ▪ Vertical distance between berms: 20 m ▪ Berm width: 5 m ▪ Drainage outward away from void towards original topo drainage paths. f) <u>Inner slopes (into full backfill area):</u> ▪ 12% as per landform design. ▪ Vertical distance between berms: 20 m ▪ Berm width: 5 m ▪ Drainage outward away from void towards original topo drainage paths.

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Milestone Reference	Rehabilitation Milestone	Milestone Criteria
		Southern Void Water Storage: ▪ Overall slope: 15% ▪ Vertical distance between berms: 20 m ▪ Berm width: 5 m ▪ Final pit walls (Competent material): 70 degrees ▪ Final pit walls (Incompetent material): 45 degrees ▪ Underwater slopes: Angle of repose 37 degrees ▪ Void maximum surface area (31 ha). ▪ Void maximum depth (105 m). ▪ Maximum Void lake equilibrium level will not reach 300 m AHD. ▪ Drainage direction: into the void ▪ Backfill above the groundwater level (water level based on conceptual modelling). ▪ Safety bund constructed at 2 m high, base width of 5 m from unweathered, freely draining, end-dumped rockfill at a minimum 20 m offset from the pit perimeter as per the closure plan. ▪ Minimised void area and volume based on economic, engineering, geotechnical, geochemical, surface water and groundwater technical reporting outcomes (Condition G8). ▪ Pit waters are contained such that they do not impact or interact surface or groundwater. ▪ Design the void as per the void closure plan.
RM4	Surface Preparation (topsoil)	a) Placement of 300 mm of topsoil. b) An assessment of soil health and suitability has been completed by an appropriately qualified person to confirm soil is suitable for target vegetation establishment.
RM5	Revegetation (grazing)	a) Native or introduced pasture grass seed species used to control erosion at 20 - 25 kg/ha. b) Groundcover is 60% perennial pasture biomass for consecutive years.
RM6	Achievement of Surface Requirements	a) Soil nutrient concentrations, nutrient cycling and vegetation diversity and cover comparable to reference sites. b) Establishment of a mix of perennial grasses suitable for grazing in the area.
RM7	Achievement of PMLU to a stable condition (grazing)	a) Certification from an appropriately qualified person that the area has achieved stable condition. b) Maximum erosion rate of <5 t/ha/yr and 10.0 t/ha/yr as determined by landform design. c) Groundcover is 60% perennial pasture biomass. d) Surface water quality from the receiving environment is at or below: ▪ pH between 6.5 – 8.5 ▪ Electrical conductivity 720 µS/cm ▪ High flow <250 µS/cm ▪ Turbidity - 50 NTU ▪ Arsenic – 13 µg/L ▪ Molybdenum – 0.15mg/L ▪ Selenium – 5 µg/L ▪ Sulfate - 25 mg/L ▪ Suspended Solids - 55 mg/L

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Milestone Reference	Rehabilitation Milestone	Milestone Criteria
		e) Groundwater aquifers maintain their pre-mining or reference bore water quality. f) Groundwater quality as per the water management plan. g) A contaminated land survey carried out by an appropriately qualified person indicates that no contamination unsuitable for the post-mining land use is occurring. h) Land Class 4 for grazing. i) Less than 5% of declared weeds (excluding Parthenium weed-*Parthenium hysterophorus*).
RM8	Achievement of PMLU to a stable condition (water storage for livestock watering)	a) Water Quality meets the relevant WQO Guidelines. b) Certification from an appropriately qualified person that the area has achieved stable condition.

The Proponent recognises that all PMLUs transitioned into the PRCP schedule must meet the requirements of a PMLU as it is prescribed in the EP Act and EP Regulation, particularly that it can be rehabilitated to a stable condition. **Table 3-19** describes how the Proponent intends to meet these requirements.

Table 3-19 PMLU in Stable Condition in Accordance with the EP Act and Regulation

Prescribed criteria	Compliance
The land is safe and structurally stable	The final landform design contains 15% slopes that are known to remain structurally stable as evidenced by rehabilitated landforms with the same criteria in the region. The requirement for 60-70% ground cover has been validated by Water Erosion Prediction Project (WEPP) modelling during the baseline assessments in 2021 that informed final landform criteria approved in the EA and again to confirm the same criteria for the purpose of this PRCP. The LOD requires validation methods to confirm stability. The water storage for the purpose of livestock watering will be fenced to control access thereby making it safe for wildlife and cattle.
There is no environmental harm being caused by anything on or in the land	All contaminated land will be removed and encapsulated within the final landform during reshaping activities. A contaminated land assessment will confirm this has been adequately implemented. All sediment dams and drains will have operational contaminated (sludge) remove at the cessation of mining and will remain until the appropriate amount of vegetation is established. The receiving environment and groundwater bores will be monitored during post closure activities (**Section 3.7**).
The land can sustain a PMLU	The Proponent remains in contact with the underlying landholder to understand PMLU requirements and retains open communication channels in the event of any changes. The landholder will be involved in the grazing trials during the LOM and be provided with post closure monitoring results that include ongoing sampling of the water storage for livestock watering.
Is viable, having regard to the use of land in the surrounding region	The selected PMLUs are complementary to the surrounding land uses which include grazing, mining and CSG. The location of the Mine is not conducive to other industrial users reliant on shared infrastructure, such as public roads. The Proponent has selected PMLUs that are economically feasible in consultation with the landholder and based on site specific baseline data.

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Prescribed criteria	Compliance
Satisfies at least one of the following: i. The use is consistent with how the land was used before a mining activity was carried out on the land ii. The use is consistent with a development approval relating to the land iii. 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 iv. The use will deliver, or is aimed at delivering, a beneficial environmental outcome.	The proposed PMLU of grazing is consistent with the pre-mining land use for the area that is not mining or CSG. The PMLU of water storage for livestock watering will provide a valuable resource to the underlying landholder if developed according to the plans and landholder requirements.

3.3.3 PMLU Consistency with Consultation Outcomes

As recorded in the CCR, engagement with the underlying landholder is ongoing for a variety of operational matters. Representatives from BCC first engaged on matters specific to rehabilitation and closure in 2021, when the PMLUs were being developed for approval in the EA amendment. In August 2023, BCC arranged a formal meeting with the underlying landholders to share the images of the final landform based on the approved criteria within Appendix 5, Table G2 to communicate what will be submitted to the administering authority in the form of this PRCP, approximate timing of PMLU availability and to seek feedback on the proposed PMLUs. This information includes images, approximate sizing and location of the final void as it was designed in the conceptual mine plan.

The landholder has expressed a strong desire to access any available land for grazing as soon as possible. Maps that communicate the availability of land for rehabilitation were provided and discussed at length. Information relevant to establishing successful grazing trials was also discussed and captured in the RMP to assist with its eventual implementation. The Proponent has confirmed that safe and controlled livestock access requirements for the water storage for livestock watering purposes will be established as per the landholders' requirements.

3.3.4 PMLU Consistency with Strategies or Plans

Section126C(1)(d) of the EP Act requires PMLUs to be consistent with any strategies or plans for the land of a local government, the State or the Commonwealth. The local government, the State and the Commonwealth legislation and policies that have been considered in the PMLU selection process are defined below.

3.3.4.1 Local Government

The Mine is located in the Isaac Regional Local Government Area (LGA), and there are three primary strategies and policies that relate the Mine's rehabilitation activities and closure outcomes. These include:

- *Isaac Regional Planning Scheme 2021* - The Mine is within an area zoned as rural. This meets the PMLU outcome of grazing and agricultural rehabilitation and is considered consistent.
- *Mackay, Isaac and Whitsunday Regional Plan (DLGP 2012)* - The approved transitional PMLUs for the Broadmeadow East Project relate to agriculture uses, primarily low-intensity cattle grazing, supporting water storage and pockets of native vegetation where required. These outcomes align with the regional surrounding landscape, which is predominantly agricultural uses.
- *Isaac 2035 Community Strategic Plan* - The approved PMLUs are considered consistent with this as the mining process and rehabilitation outcome of grazing provides key growth opportunities for the economy and therefore meets the community and economy themes. Additionally, the mining voids are

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being backfilled to varying depths and will be made safe, stable and non-polluting which meets the environment theme outcome.

These PMLUs also provide multiple opportunities for other innovative practices in the future once the EA has been surrendered, such as renewable industries, and does not sterilise the land or prohibit other future uses.

3.3.4.2 State Government

The PMLU selection process considered relevant State legislation, prescribed guidelines and plans to ensure compliance and consistency. In addition to the EP Act and Regulation that guides the PRCP Process the following legislation and policies have been considered:

- The *Aboriginal Cultural Heritage Act 2003* (ACH Act) has been considered for the management of all cultural heritage finds to ensure the closure activities do not disturb identified Aboriginal cultural heritage places and artefacts or create a legal mechanism for their return as part of the closure process.
- The *Nature Conservation Act 1992* (NC Act) has been considered for the relevant threatened species or communities that exist within the ML that will be incorporated into the rehabilitation strategy, management and revegetation plans that include relevant principles from this Act.
- Progressive rehabilitation and closure have been designed in consideration of the *Water Act 2000*, for the regulation of surface water and groundwater properties within the ML during operation and post closure to ensure compliance with this Act.
- The *Planning Act 2016* (Planning Act) is not considered relevant to this Mine as all disturbance took place or will take place within the approved ML and no Development Approvals were required for infrastructure to support this Mine.
- The *Land Act 1994* (Land Act) has been considered when ensuring the non-freehold land and deeds of grant in trust are appropriately managed and where PMLU's are relevant, they will reflect considerations of the Act's principles, particularly in relation to sustainability and community purpose (i.e., grazing outcomes).
- The Environmental Protection (Water and Wetland Biodiversity) Policy 2019 has been considered when establishing the operational water release triggers into the receiving environment and will remain to guide post closure trigger limits.

3.3.4.3 Commonwealth Government

The PMLU selection process considered relevant Australian legislation, prescribed guidelines and plans to ensure compliance and consistency. Key legislative considerations included:

- *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) - The progressive rehabilitation of disturbance areas will abide to the legal framework to ensure the appropriate management of protected areas and mitigation of impacts.
- *Native Title Act 1993* - The disturbance areas will be rehabilitated to the proposed final land use with consideration of the native title rights and interests of the Barada Barna Traditional Owners who will be consulted throughout the PRCP process. Interactions will be recorded in the community consultation register and regular interactions will be guided by the Community Consultation Plan.
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality – Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ)* (ANZECC & ARMCANZ, 2000) will assist in the development of appropriate water management for disturbance areas that will return to a water storage as the final PMLU design. This will be incorporated into the surface water management for PMLUs in the Project area.

3.4 Non-Use Management Areas

At closure, no non-use management areas (NUMAs) will be present at the Mine operations. NUMAs have not been considered during the preparations of this PRCP.

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3.5 Rehabilitation Management Methodology

Legislative Requirements

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

- For each proposed post-mining land use for land, state the proposed methods or techniques for rehabilitating the land to a stable condition in a way that supports the rehabilitation milestones under the proposed PRCP schedule. Details of how the applicant will undertake ongoing consultation in relation to the rehabilitation.
- For each proposed non-use management area, state the proposed methodology for achieving best practice management of the area to support the management milestones under the proposed PRCP schedule for the area.

This Section describes how the proposed rehabilitation and management methodology have been developed and will be implemented to meet the milestones in accordance with section 126C(1)(e) and (i) of the EP Act.

3.5.1 General Rehabilitation Practices

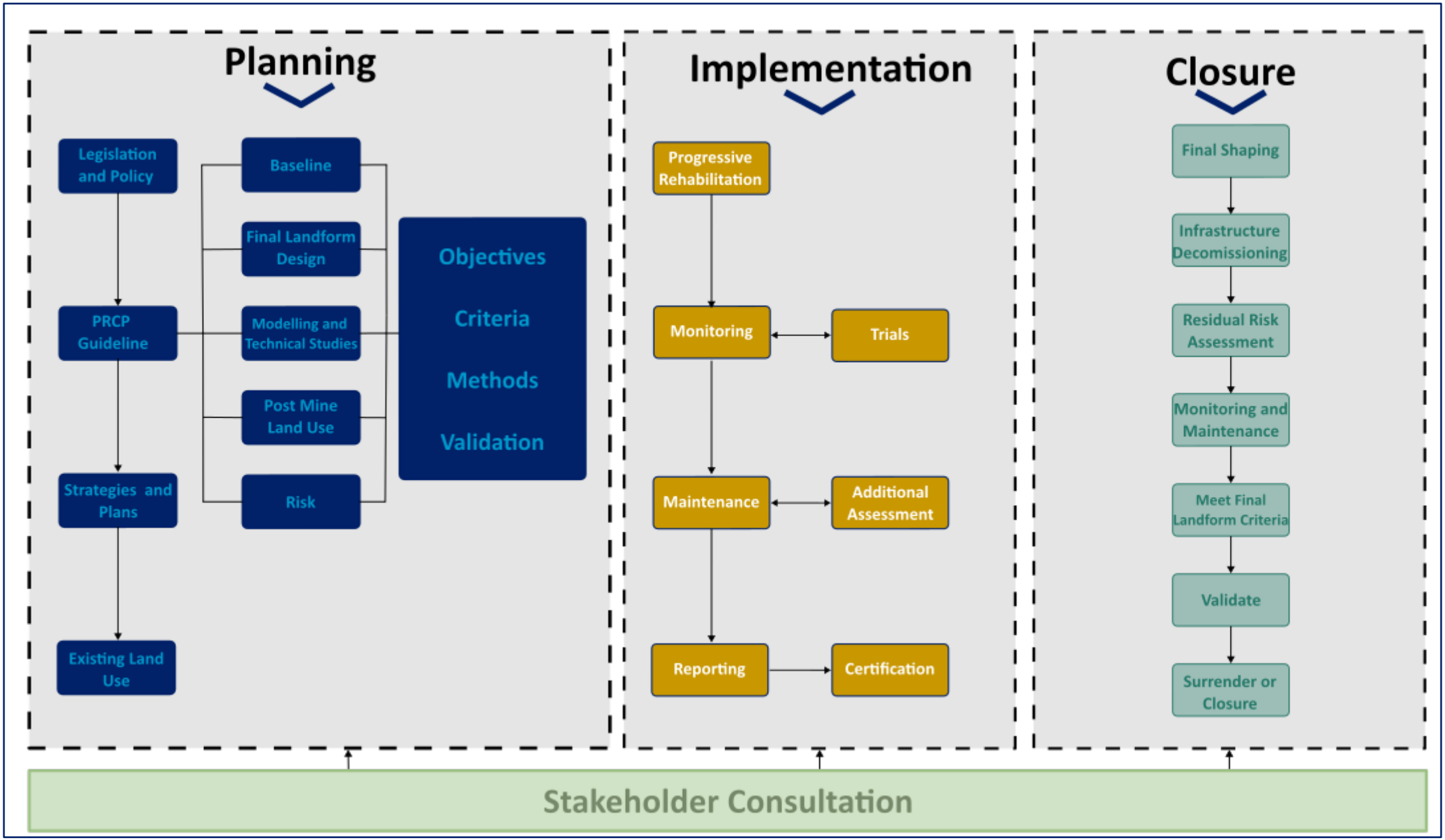
A final landform design was developed on a conceptual mine plan that considered economic, environmental and social considerations in 2021 to identify the associated outcome criteria approved in the LOD, being the EA (**Attachment A**). The original design considered the baseline studies undertaken for all impacted environmental values in and surrounding the ML. To support the first submission of this PRCP in 2023, the revised operational mine plan was reviewed, and a draft final landform was re-designed. Rehabilitation and closure-specific technical studies leveraging off information developed during the baseline impact assessment stage in 2021 were conducted against iterations of the final landform design in 2023 to ensure it was safe, stable, non-polluting, and self-sustaining. The 2023 rehabilitation and closure-specific technical studies and plans that informed and validated the final landform design presented in this PRCP included:

- PRCP Hydrogeological Assessment (KCB, 2023) (**Attachment D**)
- Final Landform Flood Assessment (Engeny, 2023b)(**Attachment E**)
- Final Void Water Balance Assessment (Engeny, 2023a) (**Attachment F**); and
- Erodibility Testing and Erosion Modelling (Landloch Pty Ltd (Landloch), 2023) (**Attachment H**).

The final landform described throughout this PRCP consists of two OOPDs that closely border a predominantly backfilled pit to pre-mining topography with a Southern void remaining in the location mining ceases. Supporting infrastructure such as the MIA, explosives storage and water management infrastructure will be dismantled with any contaminated soils removed and replaced with environmentally benign fill material, prior to ripping and seeding. Most of the rehabilitated footprint will have PMLU criteria for low-intensity grazing (393 ha), while the final rehabilitated Southern void will be minimised to 31 ha with a PMLU of water storage for the purpose of livestock watering. Further detail on the technical details on the landform design is within **Sections 3.5.1.5** (Landform Design), **3.5.1.6** (Cover design) and **3.5.3** (Voids).

Criteria, milestones and methodologies developed for rehabilitating the land to a stable condition is based on the information produced in the baseline and final landform technical studies. The rehabilitation framework or process for rehabilitation and closure planning and implementations is illustrated in **Figure 3-38**. The rehabilitation framework will be progressively updated and are subject to change following the review of completed grazing trials, revised mine plans and technical studies (e.g., progressive material sampling).

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Created/Reviewed By: AW/MRT	**PROJECT**	**CLIENT**
	September 2023	**BME Mine - PRCP**
	Figure 3-38	
RPMGLOBAL	ADV-AU-00217	**BME Rehabilitation Framework**

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3.5.1.1 Hydrogeology

The baseline hydrogeological assessment conducted in 2021 (KCB, 2021) was revisited in 2023 (**Attachment D**) to support the development of the BME PRCP. Both assessments included conceptual and numerical modelling. The 2021 assessment results were used to inform the impact assessment for the maximum extent mine plan during operations. The 2023 update was based on the revised final landform design and additional data collected during the first year of operation, with modelling focused on post-closure groundwater recovery.

Aquifer Characteristics (depth, recharge, discharge, direction of flow)

The surface geology and associated monitoring bores within the ML include:

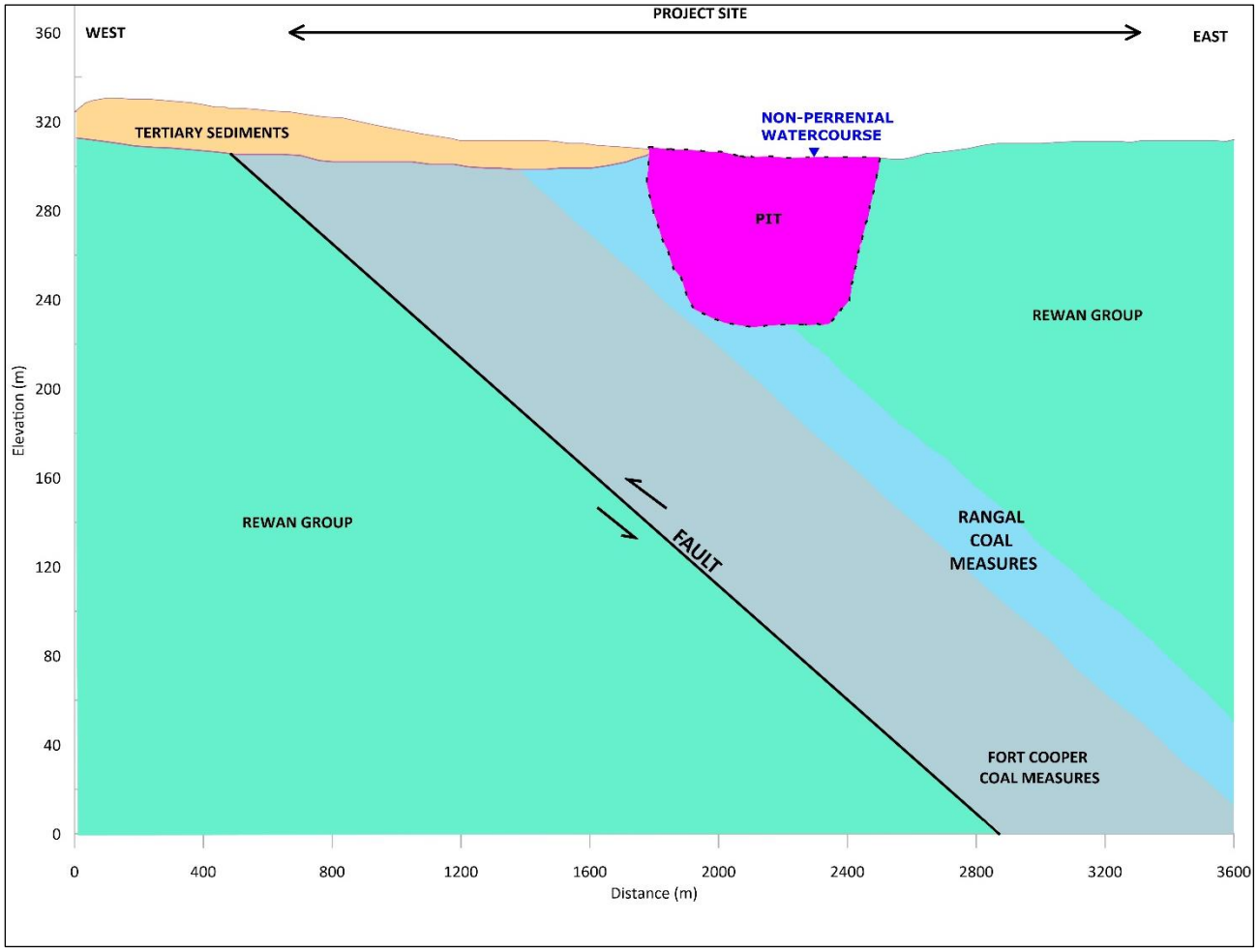
- **Quaternary alluvium** - MBBE0004 and MBBE0006
- **Tertiary sediments** - MBBE0002; and
- **Tertiary basalt** - MBBE0003

The bedrock geology associated monitoring bores within the ML include:

- **Rewan Group -** BDW172 (32) and MBBE0007; and
- **Rangal Coal Measures -** BDW172 (54), BDW8C, BDW5C, and MBBE0001.

The hydrogeological cross section showing impacted aquifers for the Mine is shown in **Figure 3-39**.

Figure 3-39 Cross Section of Impacted Aquifers



Source: (KCB, 2023)

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Table 3-20 describes the occurrence of groundwater in each unit encountered within the ML and, if applicable, includes information on the following:

- Depth to the aquifer;
- Means of recharge or discharge; and
- Flow direction and velocity.

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Table 3-20 Hydrostratigraphic Unit Description, Depth and Recharge/Discharge Within the ML

Description	Groundwater Depth	Recharge/Discharge	Flow direction and velocity*
Quaternary alluvium - MBBE0004 and MBBE0006			
Present across the entire Hat Creek extent within the ML. The alluvium comprises sands, silts and clays associated with stream channels and flood deposits and ranges in thickness from 3 m to 4 m in the ML.	The groundwater depth in this unit is variable, in function with recent rainfall events. The two monitoring bores targeting upstream and downstream flows within this unit are often dry.	Groundwater recharge in this unit is associated with surface seepage from ephemeral creek flows after significant rainfall events. These flows result in discrete, short-duration recharge events through the alluvium that will dissipate to the surrounding groundwater regime and/or flow downstream within the alluvium.	When groundwater is present, it flows from east to west, following the gradient and alignment of Hat Creek through the ML. No impacts to flow will occur during operations, which will continue to be confirmed through operational and post-closure monitoring.
Tertiary sediments - MBBE0002			
Present to the south of Hat Creek and typically consists of semi-consolidated quartz sandstone, clayey sandstone, mudstone and conglomerate and fluvial-lacustrine sediments. Tertiary sediments are not considered a significant aquifer as they do not store a large amount of groundwater due to their limited thickness, typically less than 15 m.	The water level has not significantly changed since monitoring of this aquifer began in 2021, indicating there is limited recharge.	Recharge to the Tertiary sediments is interpreted to occur due to direct rainfall infiltration from the surface. Short-duration recharge also occurs via seepage from the alluvium (where present) following surface water flow events.	Due to the limited thickness of the Tertiary sediments in the vicinity of the Project area (maximum thickness of ~15 m) and the depth of the regional groundwater level being below the Tertiary sediments (i.e. Tertiary sediments are unsaturated in the vicinity of the Project area), the residence time of the groundwater in the Tertiary sediments is low, and infiltration to the underlying hydrostratigraphic units generally occurs. No impacts to flow will occur during operations, which will continue to be confirmed through operational and post-closure monitoring.
Tertiary Basalt - MBBE0003			
Mapped to the south of the Project area and comprises a heterogeneous profile of vesicular and massive basaltic lavas	While Tertiary basalt is typically a key water-baring unit in the Bowen basin, no water has been encountered during	The only basalt encountered within the ML is associated with a topographic high and is limited in its extent. Conceptual	Unknown due to lack of water encountered in the associated monitoring bore.

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Description	Groundwater Depth	Recharge/Discharge	Flow direction and velocity*
with minor tuff and ash. The Tertiary basalt is below the Tertiary sediments and above the Rewan Group or Permian Coal Measures. Given this basalt is shallow and highly weathered due to the breakdown of clay, it does not contain significant groundwater and can even act as a barrier to flow. There is a limited extent of this hydrostratigraphic unit located within the southwestern corner of the ML and has limited thickness, which is the likely cause of its limited groundwater storage capacity identified in the field investigation.	sampling conducted to date within the ML due to its relatively thin (~7 m), highly weathered and unsaturated nature. Limited groundwater occurrence is observed in the vicinity of the mining area, as observed through basalt monitoring bore MBBE0003 (KCB 2022).	modelling has assumed that it is likely to be a plug or minor flow.	
Rewan Group - BDW172 (32) and MBBE0007			
Present across the ML. It is recognised as a regional aquitard that acts as a confining unit overlying the Permian sediments and is typically characterised by low primary porosity. The Rewan Group is uniformly saturated at depth and may become unsaturated where it outcrops or sub-crops above the regional groundwater table.	The groundwater level records from most of these bores indicate limited variability in levels over the monitoring period (Jan 2000 to March 2023), with limited variability due to seasonal changes, indicating limited connectivity with overlying strata or the surface water system. The depth to groundwater level in the Rewan Group ranges from 18 metres below ground level (mbGL) to 27 mbGL across the Project area.	Limited connectivity with the overlying strata and low primary porosity within the Rewan in the ML indicates limited connectivity with adjacent aquifers.	Limited to no flow with adjacent aquifers.
Rangal Coal Measures - BDW172 (54), BDW8C, BDW5C, and MBBE0001			
This is the primary coal-bearing unit at BME. This unit outcrops and sub-crops within the Project area and is overlain by the Rewan Group and underlain by the	Data shows limited changes in water levels in the Coal Measures due to seasonal climatic variability, indicating	Recharge occurs via rainfall infiltration on localised outcrops of the Permian coal measures located within the Project	Conceptually, the interpreted groundwater flow direction in the Permian coal measures is towards the west-southwest, which is a subdued

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Description	Groundwater Depth	Recharge/Discharge	Flow direction and velocity*
Fort Cooper Coal Measures. Individual coal seams form the principal water-bearing strata within the coal measures. Therefore, they are typically saturated throughout their full thickness but may become unsaturated where they outcrop or sub-crop above the regional groundwater table.	limited connectivity with overlying strata the surface water system.	area. As a result, the groundwater recharge to the Permian coal measures is typically very low.	reflection of the surface topography. However, the current flow direction is influenced by existing zones of depressurization in the groundwater, particularly in the vicinity of adjacent residual open pit voids where pit lakes, in connection with the groundwater system, are present. Therefore, groundwater follows the hydraulic gradient towards the existing pit lakes (e.g., northwest).

* *Includes conceptual and post-closure modelling.*

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The Groundwater Monitoring Annual Report 2022 (KCB, 2023) and PRCP Hydrogeological Assessment 2023 (**Attachment D**) chart pre-mining water levels (**Figure 3-11**). Hydrographs based on data collected from groundwater monitoring bores within the ML during 2022 and early 2023 (**Attachment D**) have also been developed for each bore to understand operational impacts to certain aquifers visually. The groundwater level data reported in **Table 3-21** was collected from the start of the operation in mid-2022 to current operations.

Table 3-21 Groundwater Levels within the ML

Bore ID	Water Level – mTOC					Screened Stratigraphy
	10/02/2022	02/06/2022	14/09/2022	05/03/2023	07/07/2023	
Monitoring Bores						
MBBE0002	12.60	12.57	12.38	12.28	12.25	Tertiary sediments
MBBE0003	Dry	Dry	Dry	Dry	Dry	Tertiary basalt
MBBE0004	Dry	Dry	Dry	Dry	Dry	Quaternary alluvium
MBBE0006	2.76	Dry	Dry	Mined out	Mined Out	Quaternary alluvium
MBBE0008	18.37	18.40	18.63	18.42	19.53	Rangal Coal Measures
BDW172 (32) **	13.48	****	****	*	*	Rewan Group
BDW172 (54) **	13.51	****	****	*	*	Rangal Coal Measures
BDW5C ***	12.58	12.59	****	*	*	Rangal Coal Measures
BDW8C	17.60	17.47	18.41	20.31	21.91	Rangal Coal Measures
Compliance Bores						
MBBE0001	17.40	17.49	17.49	17.48	17.57	Rangal Coal Measures
MBBE0007	18.25	18.25	18.33	18.06	18.15	Rewan Group

** Mined out*
*** Decommissioned prior to June 2022*
**** Decommissioned prior to September 2022*
***** Inaccessible*

MBBE0003 and MBBE0004 have been historically dry since installation, while MBBE0006 recorded groundwater levels directly following rainfall events. MBBE0006 has the potential of being decommissioned due to the advancement of the open pit development, and if this occurs, it will be replaced with MBBE0011 (Quaternary alluvium). Three bores were decommissioned during 2022 (BDW172 (32), BDW172 (54), and BDW5C). However, replacement bores will be added to sufficiently target each stratigraphic group (two bores per group). Monitoring bore BDW172 (32) will be replaced by MBBE0010, targeting the same respective stratigraphic group (Rewan Group). Compliance bore MBBEE0001 will be replaced with MBBE0009 (Rangal Coal Measures) prior to being mined out.

Groundwater levels in bores within the Rewan Group showed limited variability, which may indicate limited connectivity with overlying surface water systems. All bores located within the Rewan Group returned groundwater level readings above the assigned trigger elevation. A slight decline was measured at BDW172; however, this decline is likely due to the proximity of the advancing pit, with the bore being mined out before June 2022 (KCB, 2023).

Bores within the Rangal Coal Measures returned similar trends of groundwater elevation, with relative stability recorded in all bores but MBBE0008 and BDW8C. BDW8C recorded the highest drawdown of 0.81 m in 2022, most likely due to ongoing mining activities near the bores (KCB, 2023).

Groundwater Quality

The groundwater quality of the Rangal Coal Measures has been analysed since 2009, while the Rewan Group has only been historically monitoring for groundwater level due to the nature of the monitoring bore targeting this aquifer within the ML. Historical data from neighbouring mines sampled from the same aquifers have been analysed to gain better insight into regional water quality from aquifers impacted by other mines.

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In 2021, new groundwater monitoring bores were established for each aquifer identified on-site. Compliance monitoring bores were established for the two aquifers impacted by mining (Rewan Ground and Rangal Coal Measures). As monitoring bores associated with the Quaternary alluvium and Tertiary basalt are often dry, more is understood about groundwater quality for the Tertiary sediments, Rewan Group and Rangal Coal Measures within the ML before mining commencement and during operation. Sampling of these bores has been conducted quarterly since early 2022. Table D2 from EA0002465 contains the groundwater trigger limits applicable to operations that will continue to be the case for post-closure monitoring.

Piper and Durov plots that include pH and EC as additional differentiators were created with groundwater quality data collected within the ML and the vicinity of the Mine since early 2022 (KCB, 2023). The plots for the groundwater quality from bores in the vicinity of the Project area indicate that the proportion of major ionic constituents for the three main hydrostratigraphy units are relatively similar, with the dominant water types being Na/K–SO_4 to Na/K–HCO_3.

A review of groundwater quality data from the current Project groundwater monitoring network (as per EA0002465) by an AQP indicates that the water quality in the ML remains relatively stable, and the key parameters noted in Table D2 of the EA are within baseline levels. The Piper and Durov plots and graphs depicting the groundwater chemistry for each analyte sampled can be found in **Attachment D**. A summary of groundwater quality for each water baring hydrostratigraphic unit within the ML is as follows:

- **Quaternary alluvium** - MBBE0004 and MBBE0006 – Water has only been encountered during one quarterly sampling event for MBBE0006 since it was established in early 2021. As such, water quality trends for this aquifer within the ML have not been analysed. Regional analysis of historical data for this hydrostratigraphic unit is included in **Attachment D**.
- **Tertiary sediments** - MBBE0002 - Generally, neutral to slightly alkaline groundwater conditions exist. Bore MBBE0002 recorded declining pH values ranging from 5.12 to 3.69 and is the only bore from the monitoring bores that recorded an acidic pH. Sulphate concentrations have been declining since the monitoring bore was installed in 2021.
- **Tertiary basalt** - MBBE0003 – Water has never been encountered in this bore since it was established in early 2021. As such, water quality trends for this aquifer within the ML have not been analysed.
- **Rewan Group -** BDW172 (32) and MBBE0007 – Sulphate concentrations displayed a slight increasing trend, ranging from 876 mg/L to 956 mg/L.
- **Rangal Coal Measures -** BDW172 (54), BDW8C, BDW5C, and MBBE0001 – Sulphate concentrations in the groundwater from Rangal Coal Measures bores remained stable at <1 mg/L. BDW5C, BDW8C, and MBBE0008 have neutral to alkaline pH and show a slight increase in EC overtime, which recorded a rise in EC in February 2022 before dropping in June 2022. This bore has since been mined out.

Table 3-22 provides water quality data against trigger limits from EA0002465 Table D2 over the last year of operation. The Proponent enacts measures from the Trigger Action Response Plan (TARP) in response to any slight exceedances encountered during operations and will continue to do so during post-closure monitoring.

Public domain information of mapped springs and wetlands (DNRME, 2023) indicates that no known springs or wetlands are located within 5 km of the ML.

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Table 3-22 Compliance Bore Groundwater Quality (Table D2, EA0002465)

Parameter	Trigger	MBBE0001						Trigger	MBBE0007					
		Q1 22	Q2 22	Q3 22	Q1 23	Q2 23	Q3		Q1 22	Q2 22	Q3 22	Q1 23	Q2 23	Q3 23
pH	6.5 – 8.5 (range)	8.11	8.09	7.96	7.99	8.18	8.20	6.5 – 8.5 (range)	7.51	7.34	7.63	7.21	7.33	7.47
EC	888.3 µS/cm	864	903	909	858	945	953	48,540 µS/cm	48600	47900	56400	47530	45636	42750
Sulfate (SO_4)	0.5 mg/L	<1	<1	<1	<1	<1	<1	937.6 mg/L	876	926	956	940	966	912
Arsenic	0.002 mg/L	0.001	0.001	0.001	<0.001	<0.001	<0.001	0.005 mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Aluminium	0.8 mg/L	0.03	0.03	0.01	<0.01	0.02	0.02	0.37 mg/L	<0.05	0.64	<0.05	<0.05	<0.05	<0.05
Molybdenum	0.001 mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.025 mg/L	0.020	0.026	0.015	0.015	0.015	0.027
Selenium	0.005 mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.046 mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

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Current and Potential Users

An assessment of potential third-party users within the Mine and its 5 km radius was conducted as a part of the Groundwater Impact Assessment (GIA) (KCB, 2021). A total of 43 registered bores from the Department of Regional Development, Manufacturing and Water (DRDMW) database were identified within the study area and were comprised of the following:

- One bore screened in the Quaternary alluvium;
- Three bores screened in the Tertiary sediments;
- Eight bores screened in the Tertiary basalt;
- Three bores screened in the Rewan Group;
- Fifteen bores screened in the Rangal Coal Measures;
- Four bores screened in the Blackwater Group; and
- Nine bores screened in the Fort Cooper Coal Measures.

Of the 43 registered bores, two bores are classified for use as water supply and are located within the ML (81908 and 105678). However, it has been determined in consultation with the underlying landholder that neither of these bores are present or functional. No other unregistered bores were confirmed within the study area.

Post-Closure Groundwater Modelling

The 2021 numerical groundwater flow model developed for the GIA that supported the approval process for the original mine plan was used to support the BME PRCP development by predicting changes in groundwater levels and flow during operations and into closure. The objectives of the model include:

- Estimating groundwater inflow/outflow in the final void; and
- Predicting the extent and area of influence of groundwater level drawdown associated with the final void.

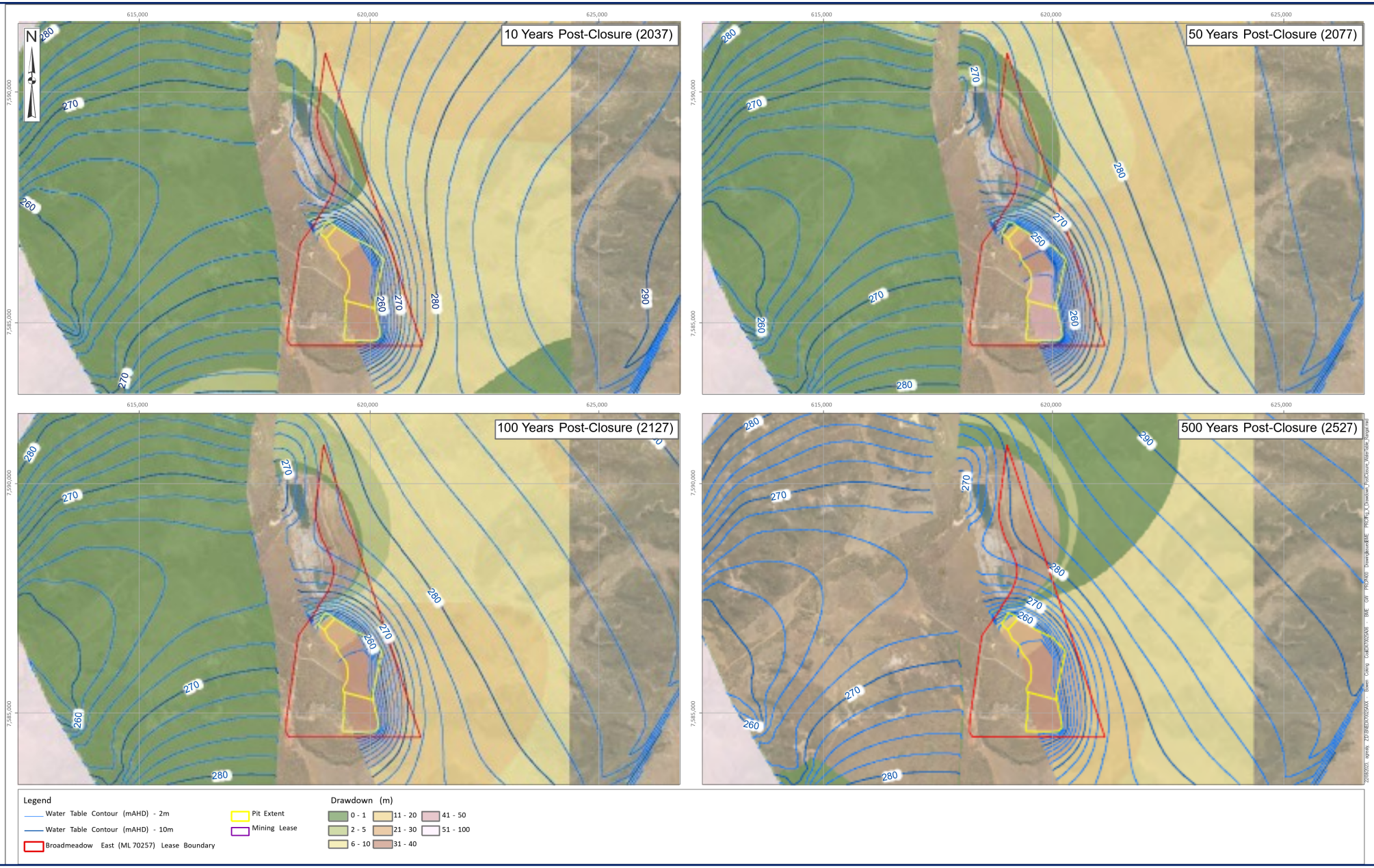
The 3D numerical groundwater flow model was developed using the MODFLOW-USG platform to represent the conceptual hydrogeological model. The model was calibrated with regional groundwater level data from 18 monitoring bores with reliable measurements. Despite the persistent dry nature of some of the monitoring bores installed across the ML in the shallow hydrostratigraphic units (e.g. Quaternary alluvium, Tertiary sediments, Tertiary basalt), this unsaturated characteristic also provided a calibration criteria for the model. A detailed description of the modelling methodology is provided in **Attachment D**.

Post-closure groundwater conditions were simulated to assess the final Northern Pit and Southern Void water elevation within the proposed post-closure landform. Final pit lake elevations were simulated in the void water balance study (**Attachment F**) that considered contributing fluxes to the pit voids, including the groundwater inflow. The post-closure groundwater inflow flux was simulated for a range of pit void lake elevations, from the maximum inflow rate when groundwater levels are at the base of the pit to the pre-mining groundwater level elevation where no groundwater inflow is observed.

The steady-state elevations of the pit void as calculated by the Water Balance Model (WBM) were applied to the groundwater model to simulate post-closure groundwater conditions. Affects from evaporation and recharge were captured in the WMB only. A groundwater simulation that allowed surrounding groundwater levels to recover to equilibrium / steady-state conditions was run over a 500-year period using the same climate data as the WBM. The 10-, 50-, 100- and 500-year post-closure simulations results all demonstrate the southern void as a sink with groundwater flowing towards the void, as shown in **Figure 3-40** and **Figure 3-41**.

The post-closure simulation was also undertaken using climate predictions from the CSIRO/BOM "*Climate Change in Australia. Climate Information, Projections, Tools and Data*" for the Australia East Coast Cluster and subcluster (CSIRO and BoM, 2015). Results from the model prediction with current predicted climate change show very little to no impact on groundwater levels due to predicted long-term impacts from climate change.

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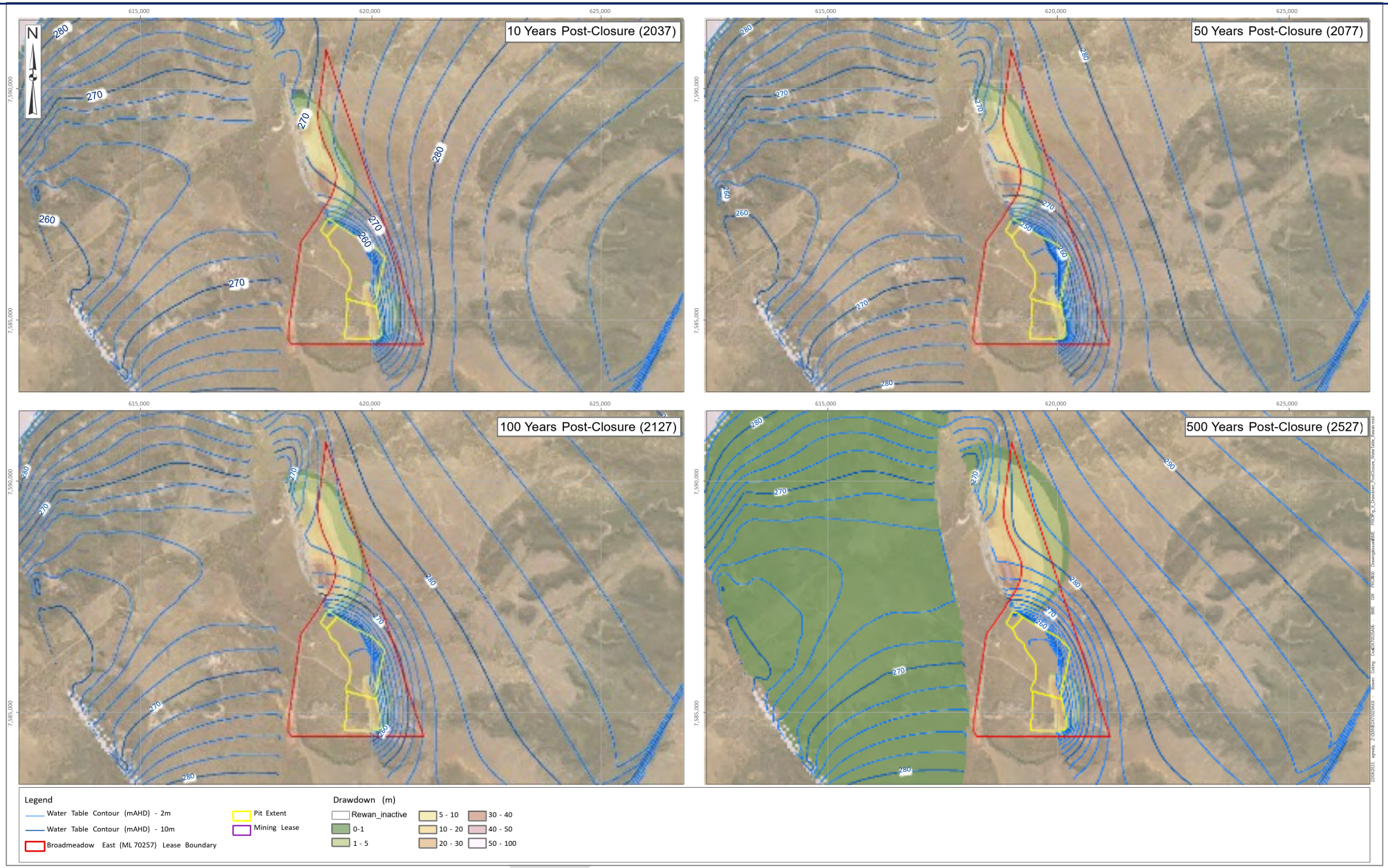
Not to Scale
Source: KCB 2023

PROJECT		CLIENT
September 2023	**BME Mine - PRCP**	BOWEN COKING COAL LIMITED
Figure 3-40		
ADV-AU-00217	**Post - Closure Head for Rangal Coal Measures - 10-,50-,100- and 500-Years Post Closure**	

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Not to Scale
Source: KCB 2023

PROJECT		CLIENT
September 2023	**BME Mine - PRCP**	BOWEN COKING COAL LIMITED
Figure 3-41		
ADV-AU-00217	**Post - Closure Head for Rewan - 10-,50-,100- and 500-Years Post Closure**	

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3.5.1.2 Flooding

Although a residual void is proposed for the project (PMLU Water Storage for livestock watering), the void is not located in a flood plain.

A rehabilitation flood assessment for the ML was conducted to address the requirements of the PRC Plan and to define the potential impacts on the receiving environment throughout and post-mining life (**Attachment E**).

Location of domains in relation to potential flood levels

The northern portion of the pit will be partially backfilled and kept available for use as bulk water storage during operation. Before closure, the bulk water storage will be filled to the surrounding topography at the end of mine life when no longer required.

The initial overburden has been placed in the two OOPDs constructed over the operational period before rehabilitation works. Overburden will also be placed within the pit as mining progressively moves south, leaving one final void in the southern extent of the pit (South Pit).

South pit drainage and pit protection infrastructure (e.g., bund/road) along the South Pit high wall is proposed to remain post-closure to direct surface water around the South Pit towards Hat Creek to the north. This ensures the natural catchment area (~35 ha) that would otherwise report into the pit is redirected towards Hat Creek and retained in the receiving environment catchment (Engeny, 2023b).

At closure, no surface infrastructure will remain on the rehabilitated sections of the ML, except for the Powerlink powerline (as described in **Section 3.5.5**). The only domain to remain at closure that potential flood levels may impact will be the rehabilitated final landform and Southern void. Flood modelling methodologies and the potential impact of flood levels on the final landform and Southern void domain are described below.

Flood modelling

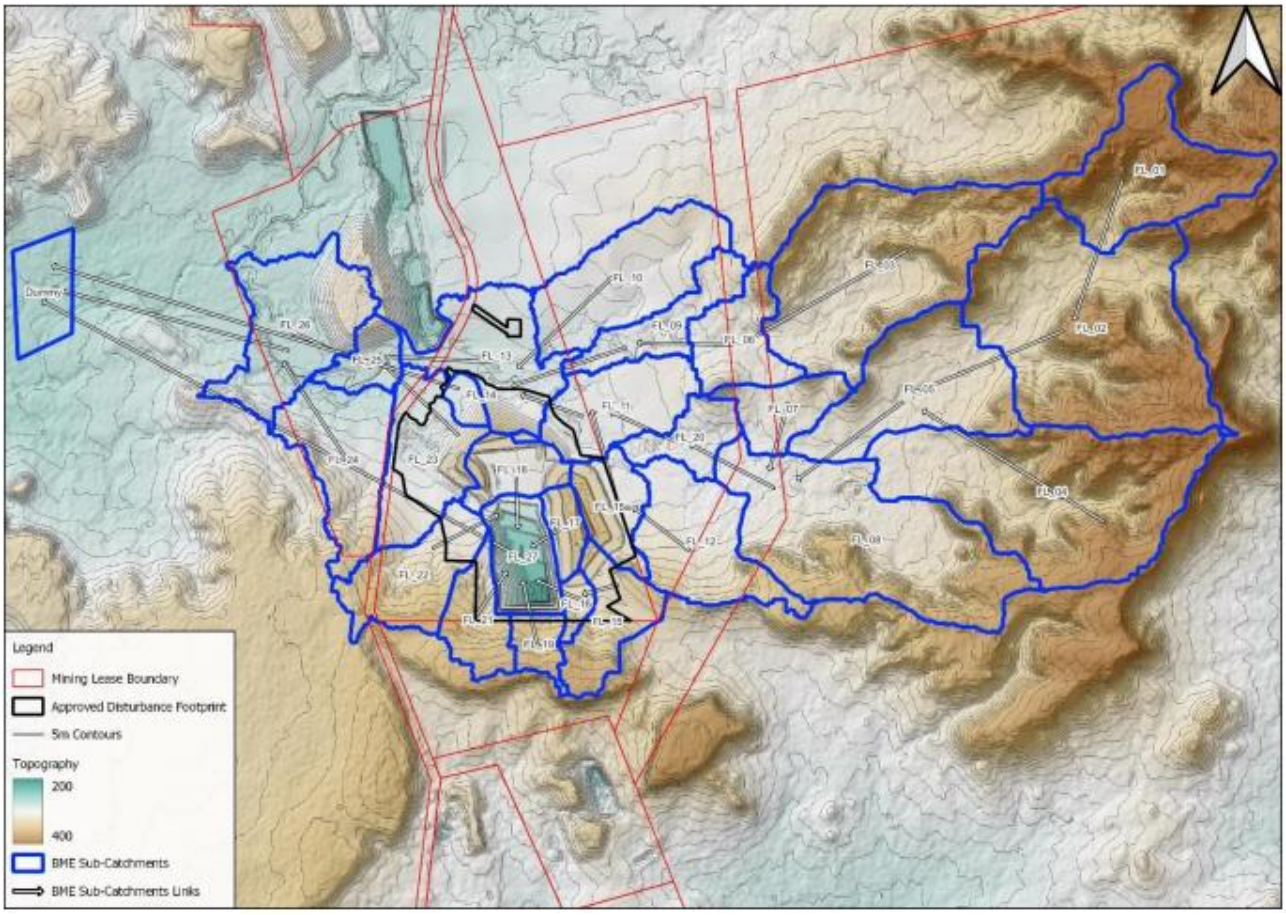
Hydrologic modelling

A runoff routing hydrological model using the Watershed Bounded Network Model (WBNM) was developed (Engeny, 2023b).

The sub-catchments were developed using the final landform topography shown in **Figure 3-42**. The hydrological model extends from the upper reaches of the Hat Creek catchment to just upstream of the Teviot Brook/Hat Creek confluence and includes a total area of approximately 39 km^2. As the final landform is to be filled to the surrounding topography and fully rehabilitated, the model has assumed no impervious surfaces remain and a 0% impervious fraction (Fi) for catchments, with the exception of the Southern void.

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Figure 3-42 BME WBNM Sub-Catchments



Source: Engeny, 2023 (Attachment E)

Hydrologic model inputs included:

- Design rainfall for 50% Annual Exceedance Probability (AEP) (1.44 year), 20% AEP (4.48 year), 10% AEP (10 year), 1% AEP (100 year), 0.1% AEP (1000 year) and Probable Maximum Flood (PMF) was determined using the Australian Rainfall and Runoff 2019 Intensity-Frequency-Duration (IFD) generation tool available on the BoM website (www.bom.gov.au), at Latitude 21.817S, Longitude 148.184E.
- Extreme events (Probable Maximum Precipitation (PMP)) were determined using the Estimation of Probable Maximum Precipitation in Australia: Generalised Short-Duration Method (**Attachment E**). PMP rainfall was estimated using the Generalised Short Duration Method (GSDM) for up to the 6-hour duration.
- Temporal patterns were determined by utilising the 'East Coast North' point temporal patterns, with duration ranges assessed from 1 hour to 36 hours.
- Initial and Continuing Losses used 40 mm and 2.7 mm/hr, respectively, for pervious surfaces, whilst a loss of 1 mm and 0 mm/hr was used for impervious surfaces. For the PMP event, an initial and continuing loss of 0 mm and 1 mm/hr has been used for pervious surfaces.
- Other model parameters used the default stream lag factor of 1.0, pervious lag parameter of 1.6 and impervious lag parameter of 0.1.
- Two climate change sensitivity assessments have been proposed for this stage of final landform assessment, a Representative Concentration Pathway (RCP) 4.5 and RCP 8.5 for 2090. RCP is a greenhouse gas concentration (not emissions) trajectory adopted by the International Pannel on Climate Change (IPCC). This corresponds to a rainfall factor of 9.5% and 19.7% respectively and will be simulated for the 1% and 0.1% AEP events.

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Hydrologic model results indicated that there are two focus locations for the ML. These are the Hat Creek/Teviot Brook confluence (FL_26) and the critical events for the catchments reporting to the void (FL_27) as shown in **Figure 3-42**. The peak flow , critical duration, and temporal pattern for each of these catchments for all simulated events have been provided in **Table 3-23** and **Table 3-24**.

Table 3-23 BME WBNM Peak Flow Results

	Hat Creek/Teviot Brook Confluence (FL_26)		BME Void and Surrounding Catchments (FL_27)	
Event	**Peak Flow (m^3/s)**	**Critical Duration & Temporal Pattern**	**Peak Flow (m^3/s)**	**Critical Duration & Temporal Pattern**
PMF	1695.0	3 hr_tp1	384.1	1.5 hr_tp8
0.1% AEP	340.7	6 hr_tp1	83.9	1.5 hr_tp7
1% AEP	190.2	6 h_tp3	42.5	6 hr_tp10
10% AEP	88.7	6 hr_tp7	25.5	3 hr_tp6
20% AEP	58.5	12 hr_tp2	17.0	9 hr_tp6
50% AEP	25.5	24 hr_tp10	7.2	18 hr_tp9

Table 3-24 BME WBNM Peak Flow Results - Climate Change Events

	Hat Creek Teviot Brook Confluence (FL_26)		BME Void and Surrounding Catchments (FL_27)	
Event	**Peak Flow (m^3/s)**	**Critical Duration & Temporal Pattern**	**Peak Flow (m^3/s)**	**Critical Duration & Temporal Pattern**
0.1% AEP 2090 RCP 8.5	426.1	6 hr_tp1	108.3	1.5 hr_tp11
0.1% AEP 2090 RCP 4.5	381.9	6 hr_tp1	96.3	2 hr_tp11
1% AEP 2090 RCP 8.5	242.8	6 hr_tp3	58.3	2 hr_tp8
1% AEP 2090 RCP 4.5	213.9	6 hr_tp8	51.3	2 hr_tp8

Hydraulic modelling

A two-dimensional hydraulic model using TUFLOW was developed (Engeny, 2023b) and included the following assumptions:

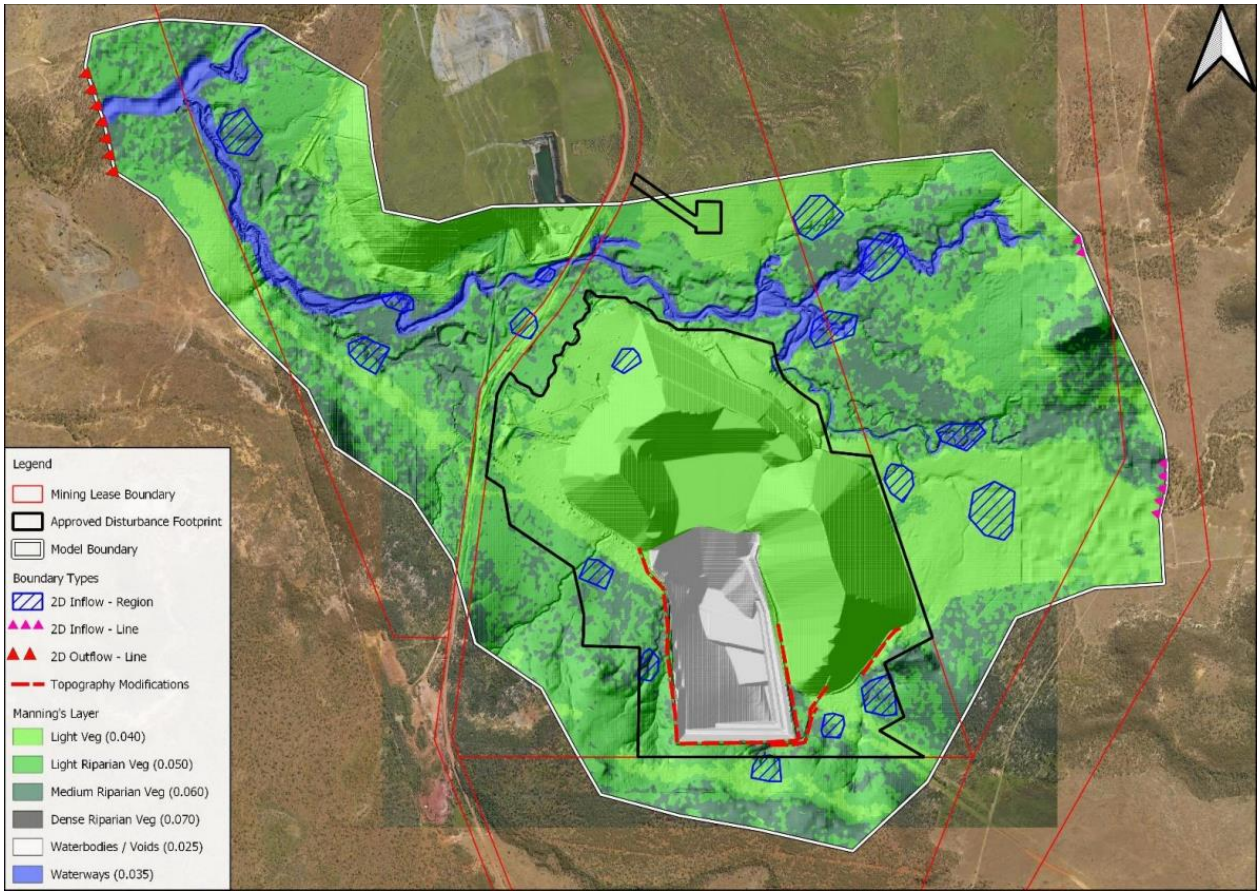
- Boundary Conditions for inflow used hydrographs generated for the sub-catchments shown in **Figure 3-42** and flow over areas boundary, with the location of these boundaries being based on the sub-catchments they apply the flow for. The outflow boundary condition used an auto-generated stage-discharge relationship based on an outlet slope of 0.1%. The WBNM Sub-Catchments are shown in **Figure 3-43**.
- Surface Roughness values were adopted based on aerial imagery and channel geometry (Manning's 'n' roughness) as per **Table 3-25**.
- Topography Modifications were introduced around the South Pit and the southern toe of the OOPD to accommodate drainage and flood protection.
- Hydraulic Structures were conservatively not included in modelling due to an existing haul road that crosses Hat Creek (directly downstream of the ML boundary, north of the BME site), which is currently 100% blocked and flagged for future upgrade.
- Climate Change events adopted in the hydrologic modelling (using the relevant climate change hydrograph).
- Model Resolution of 5 m and the latest TUFLOW GPU/HPC version, involving a variable Time Step was used.

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Table 3-25 Manning's 'n' Roughness

Land Use	Manning's 'n'
Waterway	0.035
Riparian Zone	0.06
Floodplain	0.05

Figure 3-43 BME Final Landform TUFLOW Build



*Source: Engeny, 2023 (**Attachment E**)*

Model flood levels for a range of storm events

Flood modelling for final landform conditions has been conducted for selected design events (50%, 20%, 10%, 1%, 0.1% AEP and PMF modelled scenarios). 1% AEP, 0.1% AEP and PMFs event are shown in **Figure 3-44** to **Figure 3-46,** while the remaining results, including RCP are found in **Attachment E**.

An assessment of flood susceptibility and influence across site found that (for final landform conditions):

- For a 50% AEP event:
  - There would be a flood depth of up to 1.2 m at the west corner of the final landform with velocities up to 1 m/s along the final landform edge at the toe of the embankment.
  - There would be a flood depth up to 0.6 m around the most north/northwest corner of the final landform with velocities up to 0.5 m/s.
  - There would be a flood depth of up to 0.6 m ponding along the most east/southeast corner of the final landform at the toe of the embankment with velocities up to 1.5 m/s.
- For a 20% AEP event:

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  - There would be an increase in flood depth by 0.4 m to 1.2 m at the west corner of the final landform with velocities up to 1.5 m/s along the final landform edge at the toe of the embankment.
  - Flood depth around the most north/northwest corner of the final landform remains the same (up to 0.6 m); however, velocities increase up to 1.5 m/s.
  - There would be minimal change in flood depth and velocities along the east/southeast corner of the final landform at the toe of the embankment, except for a small area where it increases to 1.2 m and >1.5 m/s respectively.
- For a 10% AEP event:
  - There would be an increase in flood depth by 0.4 m to 1.8 m at the west corner of the final landform, with velocities remaining >1.5 m/s along the final landform edge at the toe of the embankment.
  - Flood depth and velocity around the final landform's most north/northwest corner remain the same.
  - There would be an increase in flood depth along the most east/southeast corner of the final landform up to 1.8 m at the toe of the embankment with minimal change in velocity.
- For a 1% AEP event (**Figure 3-44**):
  - There would be minimal flood depth and velocity change at the westmost corner of the final landform.
  - There would be an increase in flood depth by 0.4 m to 1.8 m at the most north/northwest corners of the final landform, with velocities increasing up to 1.5 m/s.
  - There would be minimal flood depth and velocity change along the east/southeast corner of the final landform.
- For a 0.1% AEP event (**Figure 3-45**):
  - There would be an area of ponding against the eastern toe of the final landform (<0.6 m) with velocities against the landform of <1.5 m/s.
  - There would be some areas of up to 1.8 m flood level and velocities exceeding 2 m/s around the western side, where drainage will be provided along the final landform edge at the toe of the embankment.
  - No flood ingress into the void.
  - There would be an area on the southeast side of the final landform where ponding will reach up to 2.5 m and velocities exceeding 3 m/s within the drain.
  - There would be a flood depth of up to 1 m and velocities exceeding 1.5 m/s within the drain at the southeast side of the final landform.
- For a PMF event (**Figure 3-46**):
  - There would be flood water velocities exceeding 2 m/s on the eastern side of the final landform.
  - There would be depths of up to 3 m in the drain on the southeast corner of the final landform with velocities against the landform of <1.5 m/s and exceeding 3 m/s within the drain itself.
  - There would be a ponding of flood water to a depth of 4 m to the southeast of the final landform.
  - There would be overtopping of the void bund and ingress into the void on both the east and west sides.

Alteration of flow upstream and downstream

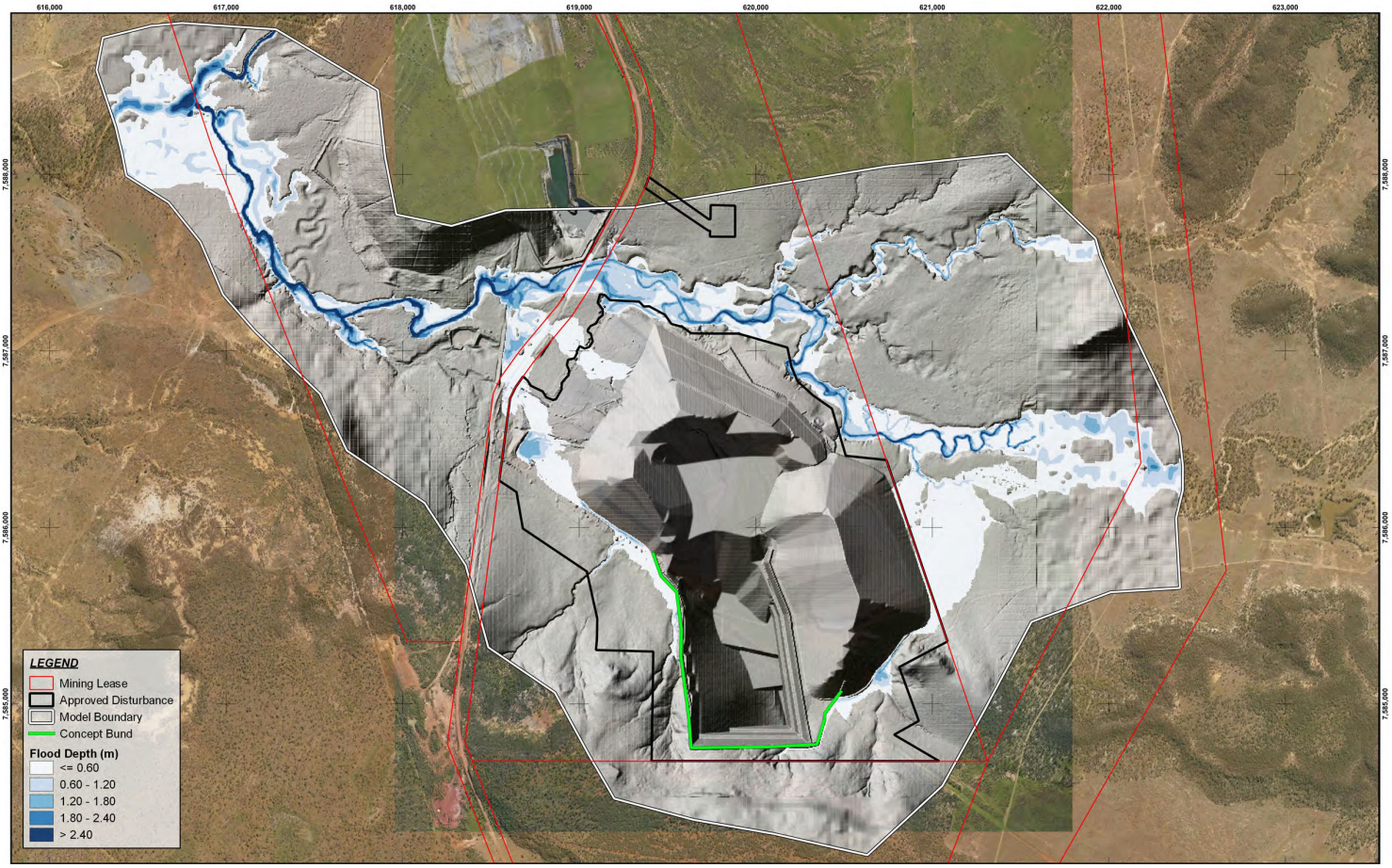
Flood modelling focused on Hat Creek, as it flows through the central portion of the ML to the north of the final landform. As such, potential alterations to upstream and downstream flows during the modelled scenarios are described below:

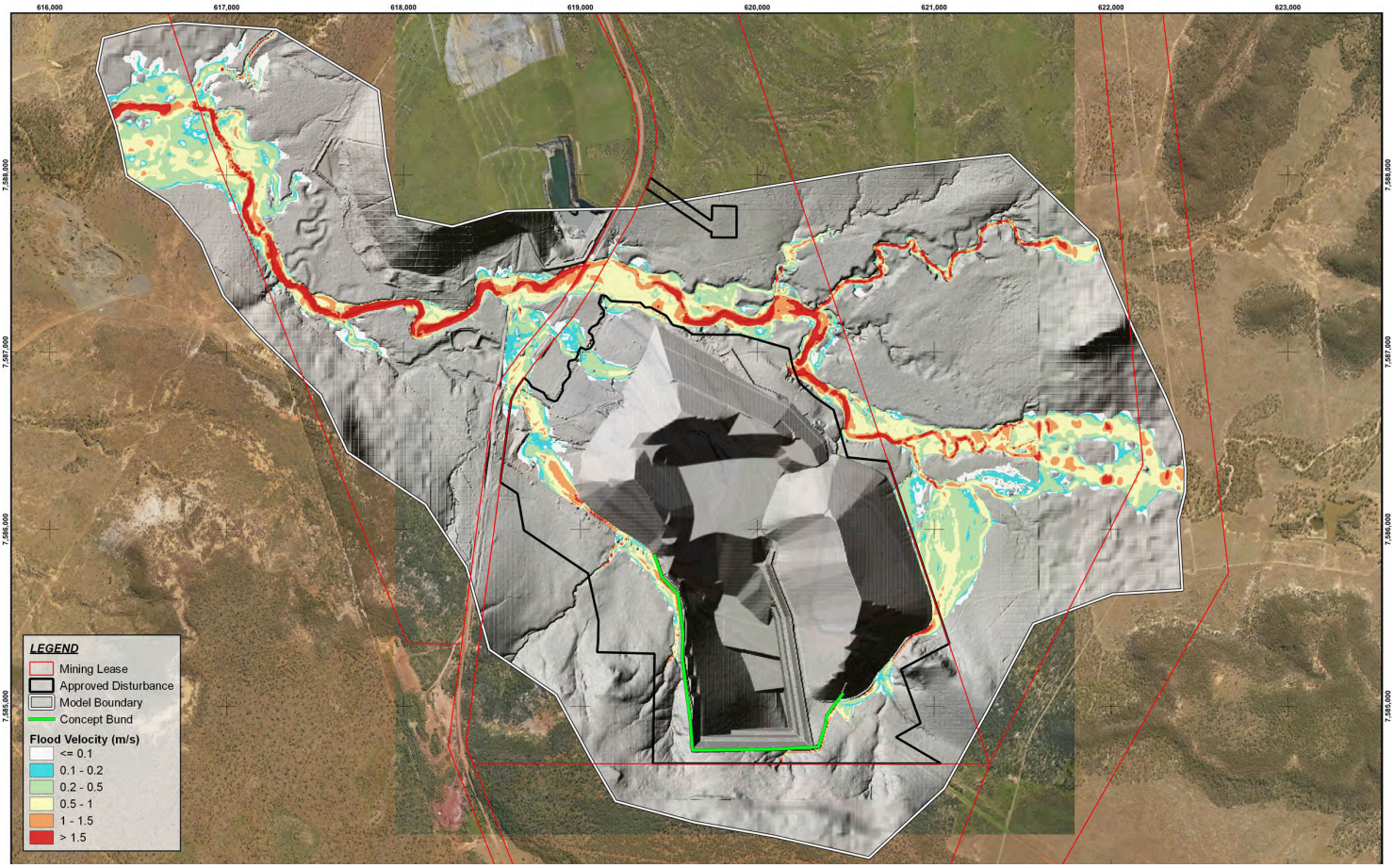
- For a 50% AEP event in Hat Creek:
  - Upstream (inflow): up to 1.2 m flood depth and 1 m/s velocity.
  - Through ML: up to 1.2 m flood depth and 1 m/s velocity.
  - Downstream (outflow): >2.4 m flood depth and velocities up to 1.5 m/s.
- For a 20% AEP event in Hat Creek:

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  - Upstream (inflow): minimal change in flood depth, but velocity increases up to 1.5 m/s.
  - Through ML: up to 1.8 m flood depth and 1.5 m/s velocity.
  - Downstream (outflow): minimal change in flood depth; however, velocities up to >1.5 m/s.
- For a 10% AEP event in Hat Creek:
  - Upstream (inflow): minimal change to flood depth or velocities (1.2 m and 1.5 m/s respectively). Upstream waters start to connect to ponding on the eastern side of the final landform.
  - Through ML: up to 2.4 m flood depth and velocities up to >1.5 m/s.
  - Downstream (outflow): minimal change to flood depth and velocities (2.4 m and >1.5 m/s respectively). Downstream waters pool at the Teviot Brook confluence beyond the designated watercourse boundary.
- For a 1% AEP event in Hat Creek:
  - Upstream (inflow): minimal change to flood depth, velocities or connection to ponding against the eastern side of the final landform.
  - Through ML: increase of areas with flood depth of 2.4 m and velocities >1.5 m/s.
  - Downstream (outflow): minimal change to flood depth and velocities (>2.4 m and >1.5 m/s respectively). Downstream waters significantly pool at the Teviot Brook confluence.
- For a 0.1% AEP event in Hat Creek:
  - Upstream (inflow): up to 1.8 m flood depth and >1.5 m/s velocity.
  - Through ML: minimal change to flood depth and velocities.
  - Downstream: minimal change to flood depth and velocities.
- For a PMF event in Hat Creek:
  - Upstream: significant spread of upstream (inflow) waters with flood depths up to 2.4 m and typical velocities of 1.5 m/s.
  - Through ML: significant water was observed beyond the northern watercourse boundary, primarily >2.4 m flood depth and >1.5 m/s velocity. Encroachment of flood waters against most northeastern side and north corner of final landform >2.4 m depth and 1 m/s velocity.
  - Downstream: significant water was observed beyond the downstream (outflow) watercourse boundary, primarily >2.4 m flood depth and >1.5 m/s velocity.

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Not to Scale
Source: Engeny 2023

PROJECT

BME Mine - PRCP

Final Landform - 1% AEP Flood Depth and Velocity

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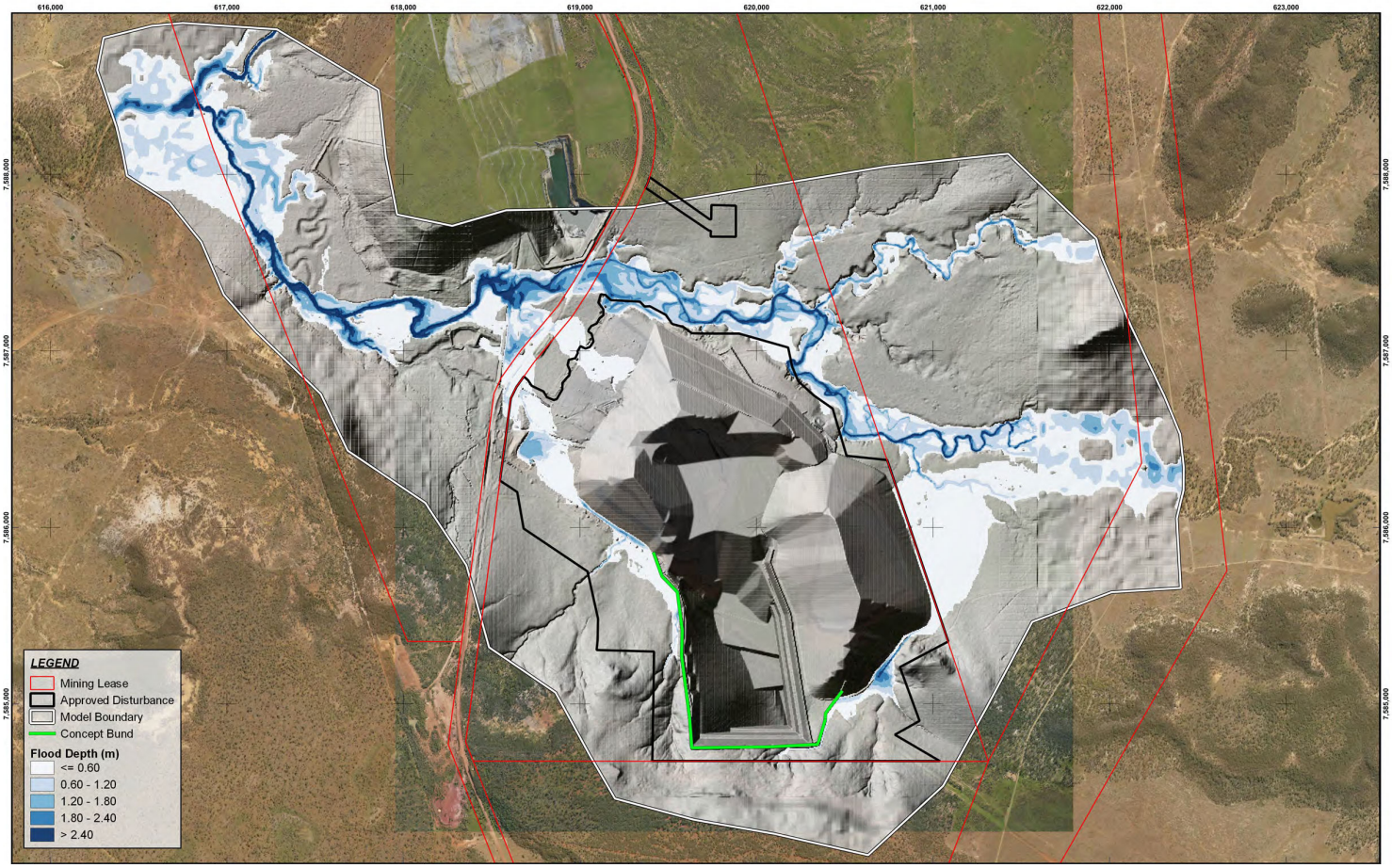
BOWEN COKING COAL LIMITED

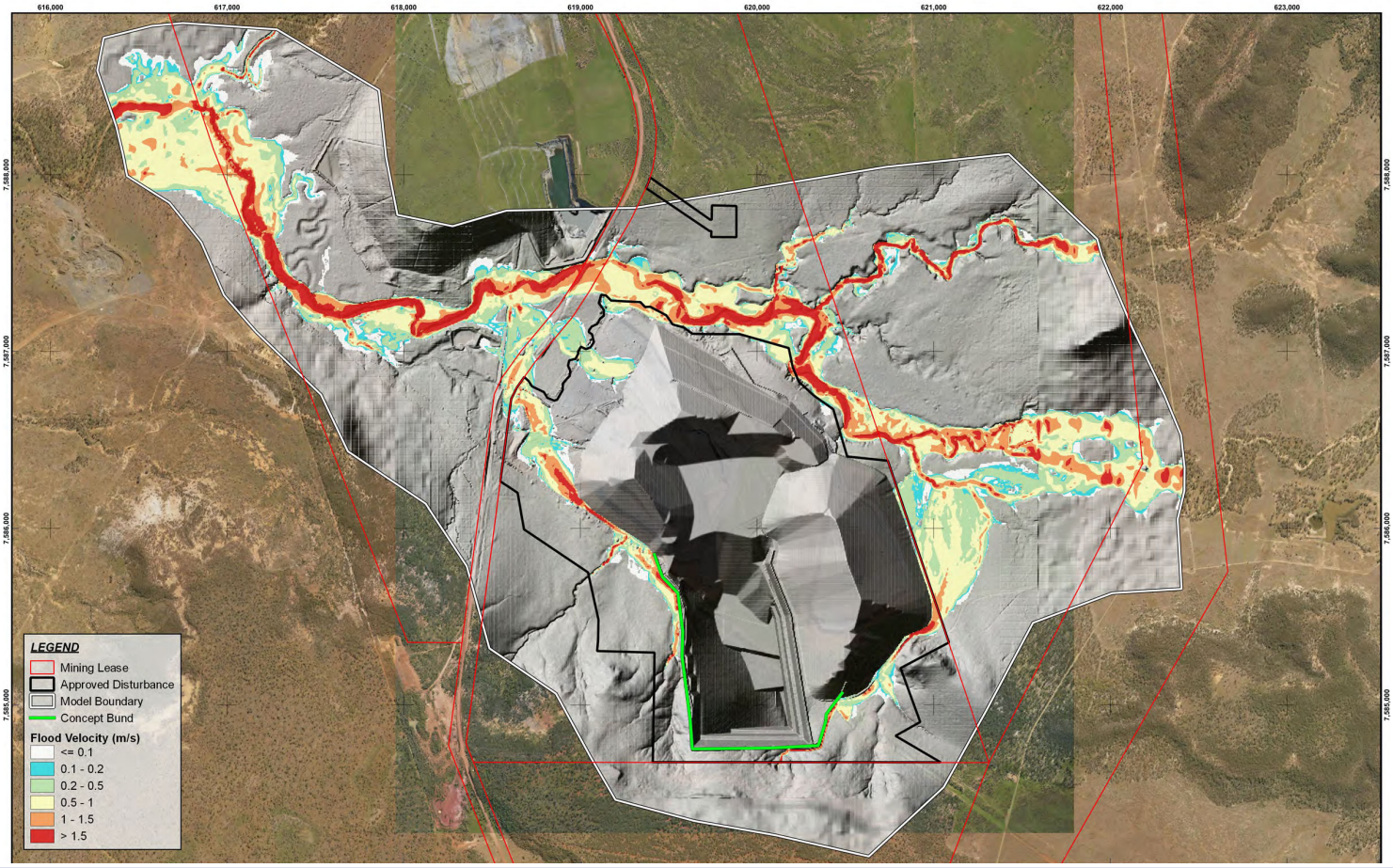
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Figure 3-44	ADV-AU-00217	September 2023

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Source: Engeny 2023

PROJECT

BME Mine - PRCP

Final Landform - 0.1% AEP Flood Depth and Velocity

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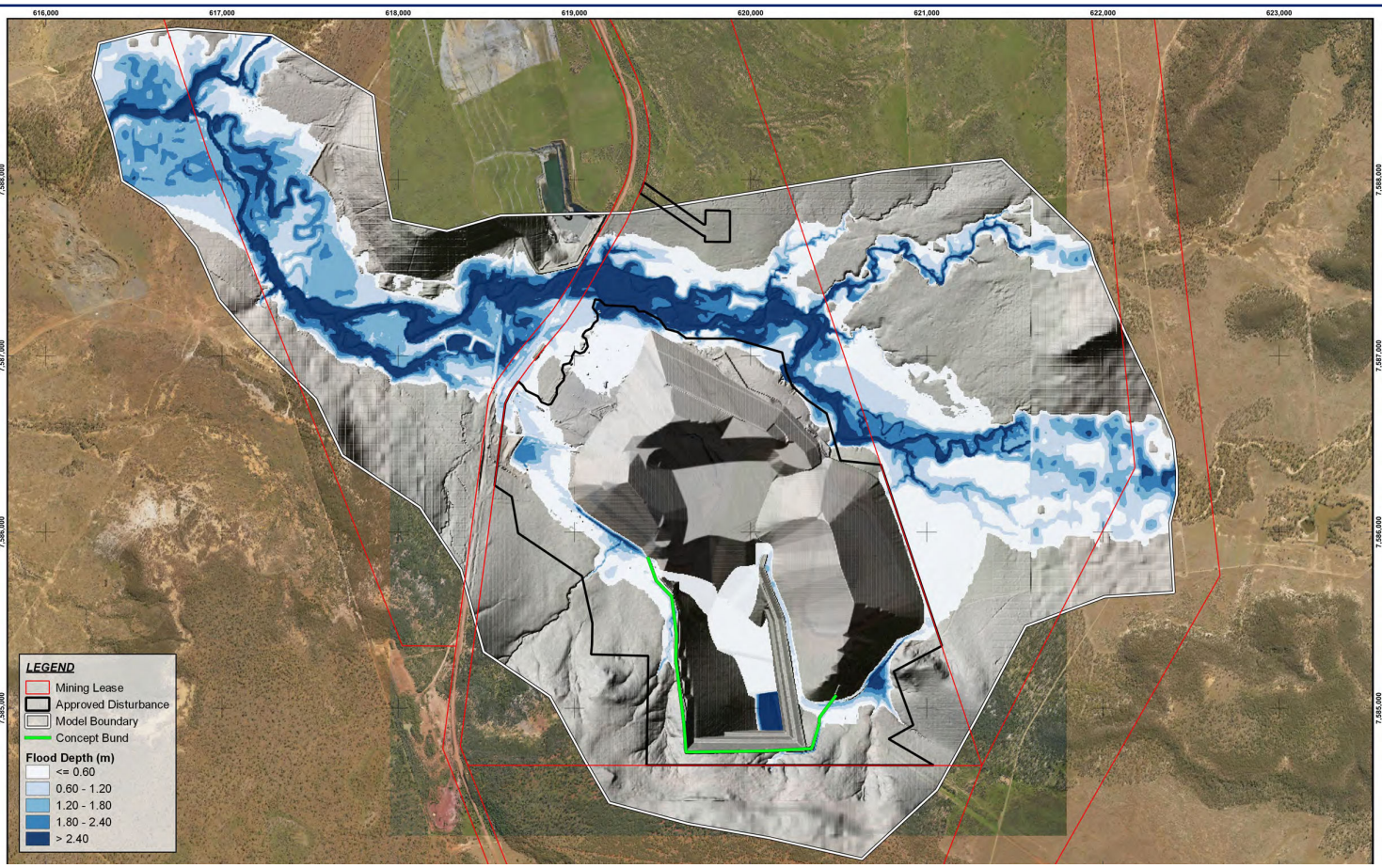
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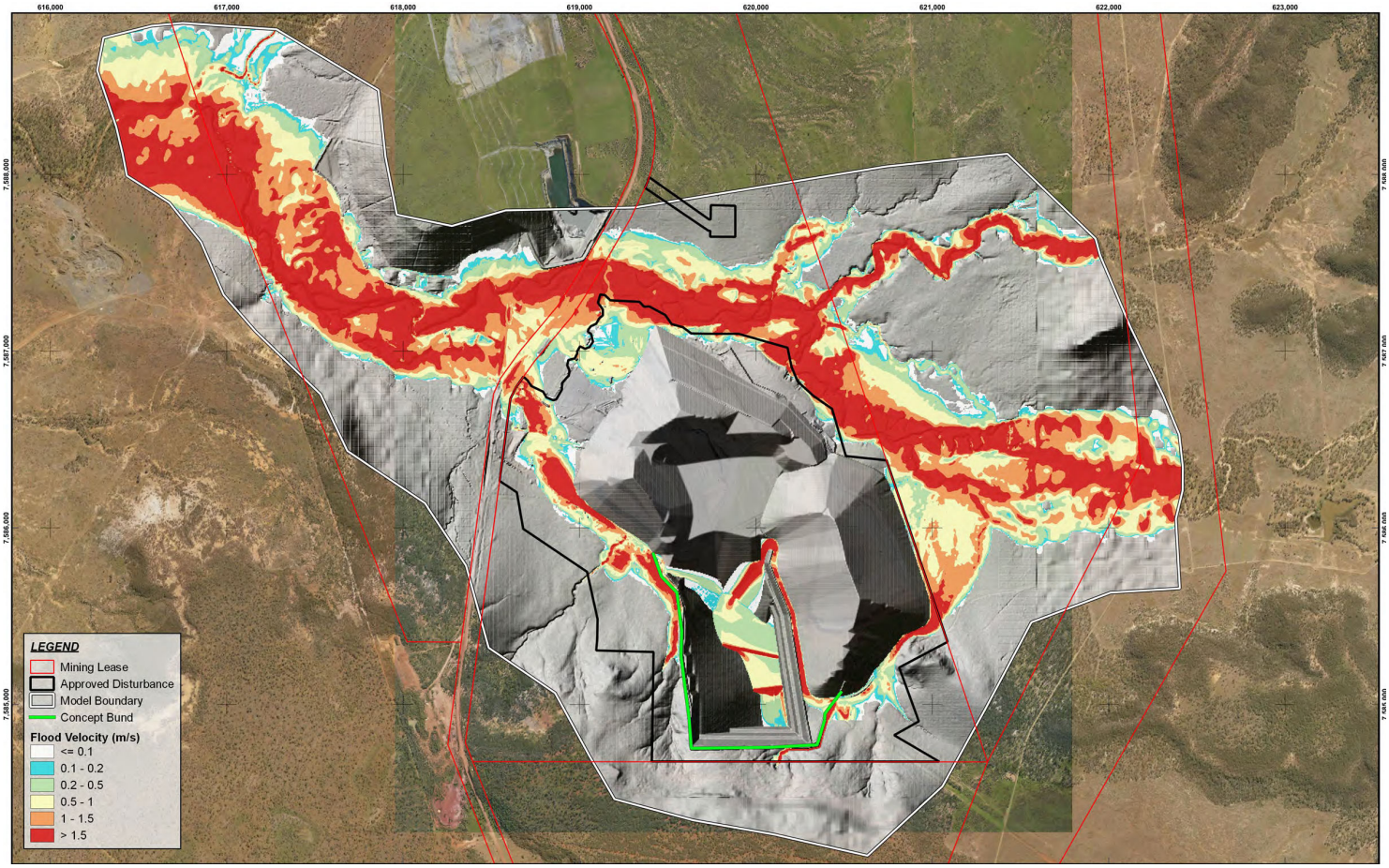
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Figure 3-45	ADV-AU-00217	September 2023

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Not to Scale
Source: Engeny 2023

PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Final Landform - PMF Flood Depth and Velocity	
Figure 3-46 | ADV-AU-00217 | September 2023	

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Flooding Risk Profile

The flooding risks identified in the modelling (**Attachment E**) of the rehabilitated final landform are summarised below.

- Drainage is required around the southern edge of the void and eastern landform. This has been incorporated within the hydraulic model based on concept drainage pathways along the southeastern edge of the void and landform. It is noted that minor reshaping may be required for the OOPD to provide these drainage pathways. The final void footprint is satisfactory because the local drainage works outside the current footprint are feasible.
- Flood ingress into the void occurs during the PMF event only. No flood ingress into the void occurs during the 0.1% AEP event. The final bund height was set to be above the 0.1% AEP flood depth and is intended as conceptual only. Void inflows are caused by local catchment runoff only, and it is not anticipated that flooding within Hat Creek would generate any inflows to the void based on the flood results and ground levels.
- In the 0.1% AEP event, depths adjacent to the final landform range from approximately 1 – 1.5 m. In the PMF event, depths adjacent to the final landform range from 2 – 2.5 m.
- In the 0.1% AEP event, velocities adjacent to the final landform range from approximately 1.5 – 3.5 m/s. In the PMF event, velocities adjacent to the final landform range from 2 – 3.5 m/s. As a result of these model results, these locations will be suitably protected (i.e., with rock or some alternative form of armouring) to minimise scour potential and ensure the longevity of the final landform.

Proposed Management Measures to Meet the PMLU

There are several locations where drainage around the Southern Void and the northern and southern toe of the final landform had not initially been considered. As such, topographic modifications will be introduced to the final landform in the form of either flood protection bunds or drainage channels. These topographic modifications are only conceptual and will require further investigation to identify the optimal design. Additionally, adjustments to the inner east dump batter will address concerns regarding flood ingress into the pit during PMF in future iterations of the final design plan.

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3.5.1.3 Soil and Capping Material Assessment

Soil and waste rock characterisation and associated mapping is a critical component of rehabilitation planning and will inform rehabilitation strategies at BME. Effective topsoil management will ensure sufficient topsoil quantity and quality are available when subsoil or overburden cannot support the proposed PLMU of a rehabilitation area.

The northern, central and southern pits and MIA are the largest areas requiring topsoil replacement and material capping during rehabilitation.

Soil mapping (**Figure 3-12**) was based on 240 soil observations and shows Chromosol, Dermosol, Kandosol, Kurosol, and Vertosol soil types are present within the project's ML, and the distribution of soil types within the disturbance areas is provided in **Table 3-26**.

Table 3-26 Spatial Distribution by Soil Type

Soil	Disturbance Footprint (ha)	%
Chromosol	120.5	36.4
Dermosol	45.5	13.8
Kandosol	58.9	17.8
Kurosol	1.0	0.3
Vertosol	104.7	31.7
Total	**330.6**	**100.0**

Of the five soil types, those present over the disturbance area (and therefore available to be stripped and stockpiled) are dominated by Chromosols (36%) and Vertosols (32%). Kandosols and Dermosols make up an appreciable proportion (18% and 14%, respectively). Kurosols make up a minor component (Landloch, 2023).

Quality and Quantity of Available Resources

Quality

A soil fertility, geochemical, and physical assessment of mine materials (overburden, coal, coal roof, coal floor, and soils) was conducted to inform relevant application conditions for an EA amendment and PRCP for BME (**Attachment G**).

The main findings of the geochemical assessment are as follows:

- Most waste materials have low sulphide content, excess ANC, and are classified as NAF. These materials have a very low risk of acid generation and a high factor of safety with respect to the potential for the generation of acidity.
- No significant metal(loid) enrichment was measured in whole rock analysis using a two acid Aqua Regia digest in the samples compared to median crustal abundance in unmineralized overburden.
- 52 major ions and metal(loids) were analysed for by Induced Coupled Plasma Mass Spectrometry (ICP-MS) using a 1:3 – 16-hour water soluble shake flask extraction method. Elements at concentrations above 1 mg/L included Al, B, Ba, Ca, Fe K, Mg, Mb, Na, and Sr. Other elements including Al, As, B, Ba, Ca, Ce, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo Ni, Pb, Rb, Sb, Se, Sr, Ti, V and Zn were also in the water-soluble fraction at 0.01 mg/L to 1 mg/L. Water soluble elements at concentrations in overburden greater than 1 mg/L include Al, B, Ba, Ca, Fe, K, Mg, Na, and Sr.
- Initial and ongoing surface runoff and seepage from overburden and coal materials are expected to be circum-neutral to mildly alkaline, have a low salinity, and low dissolved solids.
- Baseline values have been obtained to be used as rehabilitation criteria for the Mine.
- Mine material characterisation should be continually assessed throughout mine life.
- The geochemical assessment of mine waste materials has provided information to aid the development of the landform evolution and landform stability for the Mine.

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Quantity

Rehabilitation areas for built infrastructure will have compacted ground deep ripped, and seeded and will not require the application of soil or capping material. The only exception will be water storage infrastructure that will require fill material to meet the surrounding topography before ripping and seeding. The rehabilitation design for the OOPDs will adopt a surface cover comprised of topsoil (with underlying subsoil where possible), and vegetation established on the surface (Landloch, 2023).

A soil and land assessment undertaken across the ML as a part of the 2021 baseline studies identified that topsoil material is available at 0.0 m - 0.5 m across the entire pit area. Subsoil depth across the ML is variable, starting at 0.5 m to depths of 1 m to 6 m below ground level (BGL) with a mean depth value of 3 m across the pit area.

Based on the identification of topsoil depths across the ML during the baseline studies, the total volume of topsoil that could be stripped from the disturbance footprint was calculated to be 871,900 m^3. Given that stockpiled soil has a tendency to swell, a swell factor of 1.2 was applied to the stockpile volume estimates (SGM Environmental, 2021). As a result, the Proponent has allowed for a total topsoil stockpile volume of 1,046,280 m^3. Erosion modelling conducted to support this PRCP has recommended topsoil thicknesses of approximately 0.5 m to be applied to rehabilitated landforms (Landloch, 2023).

The total volume of subsoil that is available from the disturbance footprint is 413,650 m^3. Where possible, the proposed thickness at which subsoil will be placed will be 2.5 m or greater (Landloch, 2023). Rejects were initially proposed to be disposed of deep within the central pit or placed in the OOPD throughout mine life; however, the arrangement for offsite processing changed shortly after the Mine began operation, whereby rejects were no longer being returned to site for encapsulation. Only one reject cell has been established and since encapsulated with inert overburden. Any other mineral waste or contaminated material disposed of ex-pit will be capped with 7-8 m of inert overburden waste material, with a final minimum 6 m capping.

Based on stripping depths calculated by AQPs, the available material balance of topsoil and subsoil is sufficient for landform rehabilitation (SGM, 2021). Maximising the stripping depth wherever possible is encouraged to increase the available material balance. To reduce the potential for erosion rates, the addition of rock armour (adjustment of surface materials) may be considered. If fresh, competent, blocky waste rock that is geochemically benign can be sourced, the addition of this waste to the topsoil layer (forming topsoil:rock mix) will be used (Landloch, 2023).

Table 3-27 provides a summary of mine material available, whilst **Table 3-28** indicates soil stripping depths and material balance for those soil types indicated in **Figure 3-12** (SGM, 2021).

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Table 3-27 Summary of Mine Material

Material	Description	Depth from	Depth to	Lithology
Topsoil	The top layer of the native soil profile recognised by higher organic carbon content, some development of soil structure, the presence of plant roots, and typically containing the soil seed bank.	0.0	0.5	Soil
Subsoil	Soil layer underlying the native topsoil typically identified by a decrease in organic carbon content and fewer (and finer) roots. The characteristics of subsoil materials vary markedly depending on the soil type. Subsoils that are not acidic, saline, or sodic are a valuable resource suitable for use during the rehabilitation program.	0.5	1.0	Soil
Subsoil (clay)	Clays with low permeability, high plasticity, and increased soil strength. The characteristics of these materials vary depending on the clay mineralogy and the presence of salts in the landscape. Weathered clay that is not sodic may be suitable for use as a subsoil during rehabilitation due to its capacity to retain water. Weathered clay is often used as a sealing layer. Clay-rich topsoil or subsoil may also be substituted.	1.0	6.0	Soil, clay, sand
Extremely weathered regolith	Weathered-rock materials identified by the presence of iron and aluminium oxides. Depending on the chemistry, these materials may be suitable for use as a subsoil or rocky soil mulch layer during the rehabilitation program due to its more favourable physical characteristics when compared to the clay overburden.	1.0	6.0	Soil, clay, silt, sand
Partially weathered regolith	Regolith is weathered rock material that develops into soil through a process called pedogenesis. Over time, extremely weathered soil becomes structured into layers or 'horizons' which vary in fertility, due to properties such as nutrients, organic matter, and texture (particle size distribution). By contrast, human-made soils, or anthroposols, have limited or no structure, depending on (1) the complexity of the artificially made cover, and (2) the duration of time since the soil was disturbed.	6.0	25	Clay, silt, sand
Base of weathering (pre-mine groundwater level)	Depth of weathering is related to the chemical and physical characteristics of materials and their environmental and geomorphic history (EA Bettis, 2007). According to the Hat Creek report (2007), weathering in the Project area was reported 10.0 m – 25.9 m BGL, averaging 16.7 m. Depths of weathering were expected to increase where faults penetrate the profile.	10.0	25.9	Clay, silt, sand

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Table 3-28 Soil Stripping Depths and Material Balance

Soil type	Depth to strip Topsoil (m)	Depth to strip Subsoil (m)	Topsoil volume (m^3)	Subsoil volume (m^3)
Chromosol	0.30	0.20	361,500	241,000
Dermosol	0.25	0.25	113,750	113,750
Kandosol	0.40	0.10	235,600	58,900
Kurosol	0.40	nil	4,000	-
Vertosol	0.15	nil	157,050	-
Total	**-**	**-**	**871,900**	**413,650**

Location and Accessibility of available resources

The location description of current and proposed topsoil stockpiles throughout the LOM is provided in **Section 3.1.2.3** and **Table 3-13**. No other approvals will be required as all topsoil and cover material are located on the ML.

The strategic placement of stockpiles will ensure that accessibility is unhindered and that haulage distances are minimised (maximum of 2 km from areas requiring topsoil return).

Ameliorants and Fertilisers

Soil amelioration may be required as physical, chemical, and biological attributes of soil may change over time. The Proponent will assess soil viability prior to its use in rehabilitation. This involves comparing soil attributes (via field observations and laboratory analysis) to existing soils to determine if a reduction in rehabilitation value has occurred. If a reduction has occurred, the most suitable amendment strategy should be determined and applied to enhance the resource.

A reduction of rehabilitation value over time in a soil resource may be improved using the following methods:

- Physical amelioration:
  - Ripping topsoil in rehabilitation stockpile areas to promote water infiltration, prevent erosion, and encourage plant root uptake and growth.
- Chemical amelioration:
  - **Alkaline** (high) pH: elemental sulfur or iron sulfate will be used if alkaline soil conditions are impacting plant growth. Bacteria in the soil will oxidise the sulfur, forming sulfuric acid, which will then lower soil pH.
  - **Acidic** (low) pH: gypsum and lime can be used to manage strongly acidic soils (i.e., increase pH). All soil types need to be monitored for acidic pH due to phytotoxic levels of aluminium that will impact plant growth.
  - **Erodibility**: gypsum and lime can facilitate effective erosion and sediment control.
  - **Sodium** (Na) deficit: gypsum and lime, referred to as soil conditioners, can be used to assist in Na management.
  - **Sodicity** (dispersion): gypsum may be used to ameliorate sodic soil. Where sodic soils occur close to the ground surface, it is important to accurately identify topsoil stripping depths to avoid mixing non-sodic topsoils with sodic subsoils. This can reduce the ameliorant application rates and, therefore the cost of rehabilitation. Gypsum applied to subsoil will be spread and scarified before replacing the topsoil. Amelioration of topsoil can be incorporated prior to or directly following topsoil spreading. A soil analysis may be required to determine the correct amount of gypsum required. In Kandosol soils, organic matter (such as green waste, mulch or compost) may be incorporated into the soil to reduce erodibility.
  - **Fertility**: fertilisers such as monoammonium P (MAP), diammonium P (DAP), or equivalent may be used to increase fertility. To assess nutrient levels, soil samples should be collected close to applying fertilisers. This will enable the appropriate fertiliser type, formulation, and application rates. Selecting a suitable fertilizer will depend on the condition of the soil resource, viable seed bank, and exposure to the elements, which may affect the soil chemistry (leaching). Certain fertilizers may also increase favourable nutrient levels while potentially causing an unfavourable change, such as a decrease/increase in pH. A review of the relevant soils' chemistry (SGM, 2021) is recommended

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before selecting a fertiliser application rate. Suitability for the selected PMLU vegetation is also important.

- Biological amelioration:
  - Sowing seed in the rehabilitated areas
  - Harvesting established vegetation from natural areas and relocating it onto rehabilitated areas
  - Planting nursery-raised seedlings; and
  - Re-introducing native fauna will also assist in establishing the local ecosystem. This may be achieved by setting up nest boxes adjacent to the area and reintroducing larger desirable habitat features (such as trees, logs, and rockery) to encourage birds, mammals and reptiles.

Specific recommendations for topsoil, subsoil, recommended amelioration and general guidance for each soil type are provided in **Table 3-29**.

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Table 3-29 Recommended Amelioration for Topsoil and Subsoil for Each Soil Type

Soil ID	Australian Soil Classification (ASC)	Topsoil Recommended Rehabilitation Use	Subsoil Recommended Rehabilitation Use
1	Haplic, Mesotrophic, Brown Chromosol (Brown Chromosol)	Re-establish low-intensity grazing activities and support native vegetation and grasses. Ameliorants include gypsum or lime to reduce pH and reduce erosion after handling. Organic amendments and fertiliser to improve fertility. Physical ripping to encourage drainage of salts. For rehabilitation of areas that may include slopes above 3% or under, such as the slopes for elevated landforms or other level rehabilitation areas.	Re-establish low-intensity grazing activities and support native vegetation and grasses. Ameliorants include gypsum or lime to reduce pH and reduce erosion after handling. Organic amendments and fertiliser to improve fertility. For rehabilitation of areas that are relatively flat and very gently undulating areas (less than 3.0% slope), such as the MIA or the top of elevated landforms.
2	Mottled, Mesotrophic, Red Chromosol (Red Chromosol)	Re-establish low-intensity grazing activities and support native vegetation and grasses. Ameliorants include gypsum to neutralise pH and reduce erosion after handling. Organic amendments and fertiliser to improve fertility. Physical ripping to encourage drainage of salts.	Re-establish low-intensity grazing activities and support native vegetation and grasses. Ameliorants include gypsum to neutralise pH and reduce erosion after handling. Organic amendments and fertiliser to improve fertility. Physical ripping to encourage drainage of salts.
3	Acidic, Dystrophic, Red Dermosol	Re-establish low intensity grazing activities and support native vegetation and grasses. Ameliorants include gypsum to neutralise pH and reduce erosion after handling. Organic amendments and fertiliser to improve fertility.	Re-establish low intensity grazing activities and support native vegetation and grasses. Ameliorants include gypsum to neutralise pH and reduce erosion after handling. Organic amendments and fertiliser to improve fertility. Physical ripping to encourage drainage of salts.
4	Haplic, Eutrophic, Brown Dermosol	Re-establish low intensity grazing activities and support native vegetation and grasses. Ameliorants include gypsum to reduce erosion after handling. Organic amendments and fertiliser to improve fertility. Physical ripping to encourage drainage of salts.	Re-establish low intensity grazing activities and support native vegetation and grasses. Ameliorants include gypsum to reduce erosion after handling. Organic amendments and fertiliser to improve fertility.
5	Haplic to Sodic, Mesotrophic, Grey Dermosol	Re-establish low intensity grazing activities and support native vegetation and grasses. Ameliorants include elemental sulfur or iron sulfate for alkaline subsoil. Organic amendments and fertiliser to improve fertility. Gypsum to facilitate effective erosion and sediment control. Physical ripping to encourage drainage of salts.	Re-establish low intensity grazing activities and support native vegetation and grasses. Ameliorants include elemental sulfur or iron sulfate for alkaline subsoil. Organic amendments and fertiliser to improve fertility. Gypsum to facilitate effective erosion and sediment control.

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Soil ID	Australian Soil Classification (ASC)	Topsoil Recommended Rehabilitation Use	Subsoil Recommended Rehabilitation Use
6	Haplic, Eutrophic, Brown Kandosol	Re-establish low intensity grazing activities and support native vegetation and grasses. Ameliorants include organic amendments and fertiliser to improve fertility and reduce erosion potential.	Re-establish low intensity grazing activities and support native vegetation and grasses. Ameliorants include organic amendments and fertiliser to improve fertility and reduce erosion potential. Physical ripping to encourage drainage of salts.
7	Mottled, Magnesic, Red Kurosol	Re-establish low-intensity grazing activities and support native vegetation and grasses. Ameliorants include gypsum or lime to neutralise pH. Organic amendments and fertiliser to improve fertility.	Re-establish low-intensity grazing activities and support native vegetation and grasses. Ameliorants include gypsum or lime to neutralise pH. Organic amendments and fertiliser to improve fertility. Physical ripping to encourage drainage of salts.
8	Epihypersodic, Crusty, Brown Vertosol	Re-establish low-intensity grazing activities and support native vegetation and grasses. Ameliorants include organic amendments and fertiliser to improve fertility. Gypsum to facilitate effective erosion and sediment control.	Re-establish low-intensity grazing activities and support native vegetation and grasses. Ameliorants include organic amendments and fertiliser to improve fertility. Gypsum to facilitate effective erosion and sediment control.

Relationship between Soils and Vegetation Ecosystems

An assessment to determine the need for ameliorants and fertilisers will be done prior to seeding so that necessary soil amendments are identified and implemented to ensure successful revegetation.

Soil fertility results indicate that soils will support native vegetation and are suitable for rehabilitation and achieving post-mine land use of cattle grazing or rainfed broadacre cropping. The use of a cover crop to stimulate the accumulation of carbon, organic matter and nutrients in the topsoil and subsoil horizons may further assist in improving soil texture and structure and reduce the effects of sodicity. A carefully managed grazing land use is likely to have significant benefits for the long-term stability of the constructed mine landform, which could include recycling nutrients through the soil profile (RGS, 2022).

The revegetation species selected for the site (**Section 3.5.1.8**) and the PMLUs are species selected from locally derived regional ecosystems occurring on the site. These species have been selected to have a high likelihood of successful germination, growth, and reproduction on the site.

Proposed Management Measures to Meet the PMLU

Topsoil Stripping

Soil resources will be stripped and stored in dedicated areas suitable for long-term storage to maximise retrieval of suitable topsoils and subsoils. The stripping methods aim to minimise soil degradation and compaction and retain optimal value for plant growth is provided below:

- The area to be stripped will be clearly defined on the ground, avoiding any waterlogged or similarly constrained areas.
- The target depths of topsoil and subsoil to be stripped for each location will be communicated to machinery operators and supervisors.
- Suitable earthworks equipment will be used for stripping and placing soils in stockpiles.
- Machinery circuits will minimise compaction of the stockpiled soil.
- All machinery brought onto the ML for soil stripping will comply with weed management protocols and biosecurity.

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- Stockpile locations will be identified during planning and will be stripped of topsoil before being used for stockpiles.
- Trees will be cleared and grubbed before topsoil salvage. Where possible cleared vegetation is stockpiled and used in the rehabilitation.
- Topsoil will be stripped to the depths as nominated and stockpiled. Subsoil will be stripped and stockpiled separately were identified as suitable. Depending on compaction and recovery rates, deep ripping may be needed to maximise topsoil recovery. Where soils are shallower, topsoil and subsoils will be stripped and stockpiled together.
- Where the recommended stripping depth exceeds 0.2 m, a two-stage stripping method will be undertaken where practicable to minimise mixing of topsoil and subsoil. The soils will be stockpiled separately as primary and secondary growth media.
- Handling and rehandling of stripped topsoil will be minimised as far as practicable by progressively stripping vegetation and soil as needed.
- Soil stripping in very wet conditions will be avoided where practicable because of the risk of compaction, nutrient deterioration and less suitable soil available.
- To avoid dust hazards, stripping of soil during particularly dry conditions will be avoided.

Topsoil Stockpiling

Stockpiles at BME will be designed and located to prevent contamination, development of anaerobic conditions and to avoid erosion and dust generation. The stockpiles will be seeded with grasses, so that they remain stable, and be regularly inspected for weeds. Stockpiles will be:

- Located at an appropriate distance from water courses, dams and drainage lines.
- Where practical, topsoil and subsoil will be separated.
- Designed and constructed to a height of no greater than 3 m to limit anaerobic conditions and minimise deterioration of nutrients, soil biota and seed banks.
- Constructed with a slope grade of 1 vertical (V): 4 horizontal (H) or less to limit erosion potential.
- Constructed so that that surface is left in a ‘rough’ condition to promote water infiltration and minimise erosion via runoff and, if required, have sediment controls installed downstream to collect runoff.
- Managed so that any known overland flow and drainage lines within the area of the stockpiles will be diverted (or have appropriate measures in place) to prevent erosion.
- Seeded with grass or legume species to stabilise the surface, restrict dust generation and minimise erosion and weed growth.
- Excluded for general use by machinery and vehicles (except for maintenance works) once stockpiles are established.
- Located on-site and project maps to ensure they are easily identified. This is to protect stockpiles from advancing mining activities and mixing with overburden stockpiles.
- Managed using a stockpile register. This will identify the designated topsoil surveyed locations and availability for use. Other details to be kept include the date, soil types and volumes present.
- Monitored for weeds and control programs implemented.

Topsoil Application

Soil will be applied to landforms once they have been reshaped and drainage works completed. This may include contour or diversion banks with stable discharge points if needed and ripping of compacted zones under infrastructure and other hardstand areas.

The soil application procedure will essentially be the reverse of the stripping procedure. It will be undertaken to minimise any degradation of soil characteristics, consistent with industry-leading practice. Generally, all soil will be applied to a thickness of 0.3 m to provide enough depth for ripping and plant growth.

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The following measures will be implemented to minimise loss of soil during respreading and promote successful vegetation establishment (SGM, 2021):

- A soil inventory will be prepared before topsoil is spread, providing the depths and volume of soils to be reapplied to each nominated area.
- Relative erodibility of the soils will be accounted for during placement, with more erodible soil being placed on flatter areas to minimise the potential for erosion;
- Soil will be spread immediately after the area has been reprofiled and deep-ripped;
- Soil will be applied in even layers to the thickness needed for the post-mining land use;
- Soils will be lightly scarified or deep ripped on the contour to encourage rainfall infiltration and minimise run-off;
- Grasses will be seeded as soon as practicable after application; and
- Erosion and sediment controls will be implemented where deemed necessary prior to vegetation establishment.

Topsoil Deficit

Any potential or actual deficit in topsoil volumes will be assessed against available topsoil and suitable subsoils identified in the topsoil inventory. Optimally, soil will be placed in the following PMLUs, as outlined (SGM, 2021):

- Low intensity grazing on native pastures PMLU;
  - Subsoil to be spread on overburden to a nominal depth of 0.30 m;
  - Topsoil to be spread on subsoil to a minimum depth of 0.20 m;
- Light grazing on open woodland PMLU;
  - Subsoil to be spread on overburden to a nominal depth of 0.30 m; and
  - Topsoil to be spread on subsoil to a nominal depth of 0.3 m.

Topsoil and subsoils that are assessed as unfavourable will be reviewed for further management utilising soil amelioration techniques. This will seek to increase suitable topsoil inventory rehabilitation volumes.

If there is an insufficient volume of topsoil available at the time of rehabilitation, or if the topsoil has been degraded, the following contingency measures may be implemented:

- Topsoil will be spread at a shallower thickness and/or only on selected areas;
- Subsoil will be used as a topsoil substitute; and
- Fertilisers and other soil additives will be added to the topsoil and/or subsoil to improve fertility and structure.

If contingency measures need to be implemented, satisfactory rehabilitation will be achieved, although completion criteria may take longer to be reached.

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3.5.1.4 Waste Characterisation

Before the Mine began operating, a preliminary geochemical testing and assessment of overburden and coal was carried out between 2021 to 2022 (**Attachment G**) based on the 2021 mine plan and final landform design. The scope of the Mine material and landform stability assessment was to assist with the interpretation of soil fertility, geochemical and physical information to support appropriate mine material handling and placement. The assessment involved the following:

- Sample and analysis of major lithological units from the topsoil to the deepest mined surface to quantify their potential to produce acid, neutral, or alkaline water that may contribute to saline or metalliferous drainage.
- Evaluation of the physical properties of the main lithological units and, in combination with the proposed landform design, provide technical advice on the stability of the constructed mine landform.
- Provide information to advise rehabilitation materials storage management, waste material management, and residual void outcomes to support beneficial post-mine land use, inform water and waste management strategies, and comply with the EA conditions in EA0002465 (**Attachment A**).
- Contribute to the mine planning stage of the Mine by providing recommendations for the management of mine materials to comply with the conditions in EA0002465 (**Attachment A**).

The Mine material and landform stability assessment included both static and kinetic testing. Kinetic testing was conducted over a 12-month period with the report updated and finalised at the conclusion of the sampling program. The results of the first six months of kinetic testing was included in the original report provided to the administering authority in support of the amendment application that approved the current Mine plan. **Attachment G** reports the outcome of the full 12-month program.

The Mine material and landform stability assessment was supplemented with more recent total S testing of washery rejects produced by the Mine in early 2023.

As per condition G4 of the EA, the Mine must also operate under a Mineral Waste Management Plan (MWMP). The MWMP developed for the Mine includes:

- A program of progressive sampling and characterisation to identify the physical properties of mineral waste, the dispersive and non-dispersive material, salinity, acid and alkali producing potential, and metal concentrations.
- Information on the availability or leachability of metals from mineral waste.
- A materials balance and disposal plan demonstrating how potentially acid forming, acid forming and sodic mineral waste will be selectively placed and/or encapsulated.
- Where relevant, a sampling program to verify encapsulation and/or placement of potentially acid forming, acid-forming and sodic mineral waste.
- Details as to how seepage and leachability from mineral waste will be managed both during operation and the foreseeable future.
- Mechanisms for review of the MWMP.

The MWMP was developed in July 2022 to support the beginning of operations. Progressive geochemical sampling as required by EA Condition G4 and defined in the MWMP. The first progressive sampling program will occur by mid 2024.

Sampling Regime

A drilling program was conducted during the first quarter of 2021 to confirm the coal quality of the target resource area. The sampling program was developed and overseen by an AQP. As part of this process, soil fertility, geochemical, and physical analysis was conducted on:

- 279 drill hole samples collected via Rotary Chip (RC) drilling from seven drill hole locations along strike of the target coal seam;
- 12 soil samples were collected from three test pits adjacent to drill holes; and

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- 32 composite coal, coal roof, and coal floor samples were collected from the coal quality RC drilling program from six drill hole locations.

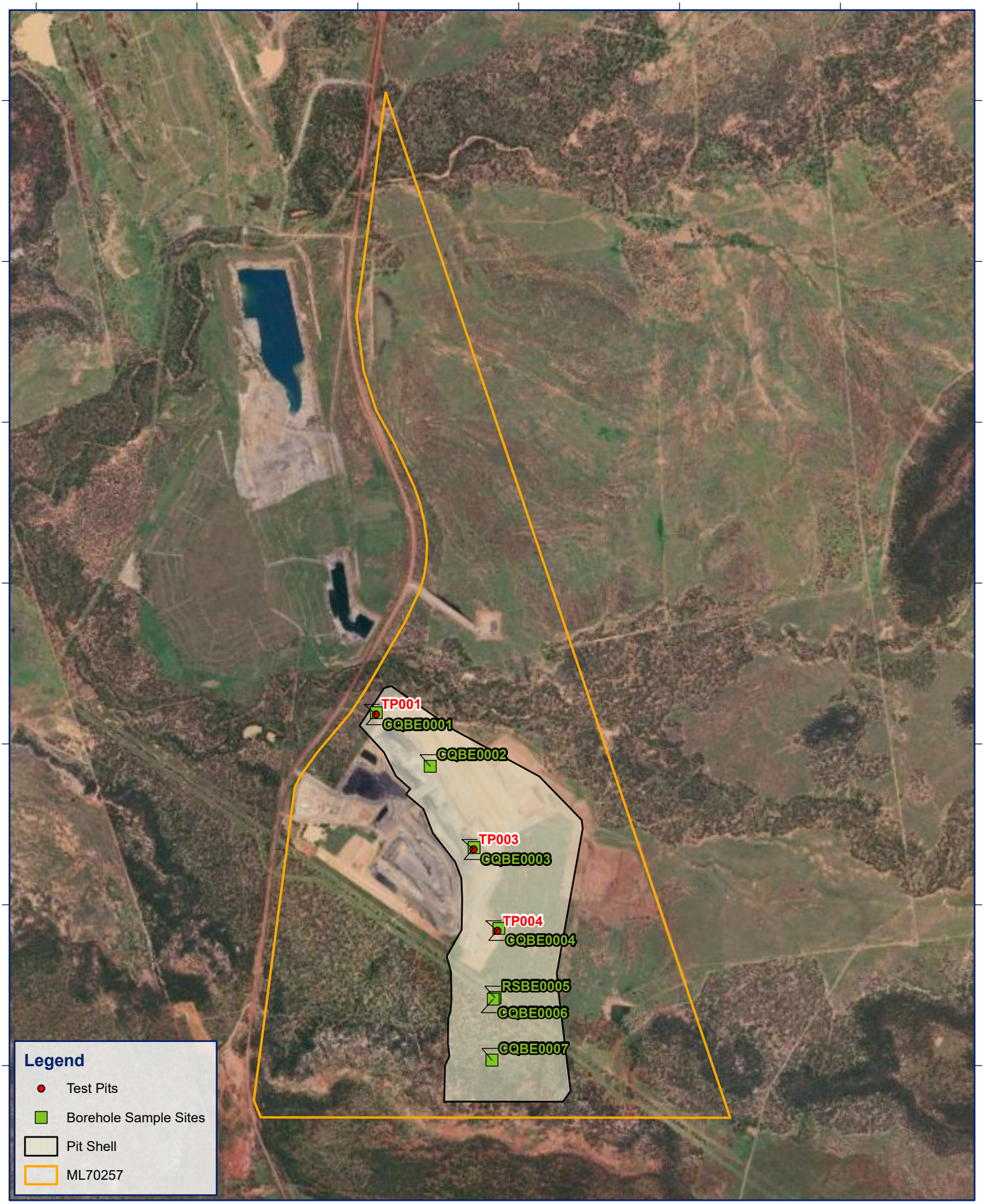
The sampling program was designed to be a first pass assessment, which was carried out on open hole composite samples of overburden from 6 drillholes, and coal quality samples of coal, roof and floor materials from 6 drillholes. Testing comprised initial screening using pH and electrical conductivity (EC) on one part solid to five parts deionised water (pH 1:5 and EC 1:5), acid neutralising capacity (ANC), total S, chromium reducible sulphur (CRS), and multi-element analyses of solids and deionised (DI) water extracts. Results of preliminary Acid Rock Drainage (ARD) testing are shown in **Attachment G**.

Sample locations are shown on **Figure 3-47** and summarised in **Table 3-30**.

Table 3-30 Geochemical Assessment Sample Summary

Total No. of Samples	Sample Origin	Test Program	No. of Samples Tested	Sample Type
279	6 open hole drill holes	1-1	73	Composites based on lithology (**Attachment G**)
		1-2	32	Composites based on results from Test Program 1-1
		1-3	6	Composites of top 5 m of six drill holes
		1-4	30	1 m samples for top 5 m of six drill holes
12	3 test pits	N/A	12	Three test pits adjacent to drill holes
32	Coal quality samples collected from 6 drill holes	3-1	32	Individual samples as received
		3-2	3	Composites by material type (coal, coal roof, coal floor)
		3-3	6	Splits of the three samples from Test Program 3-2 for Kinetic Leach Column (KLC) testing.

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Scale: 1:30,000
Projection: GDA2020 MGA Zone 55
Created/Reviewed By: AW/MRT
Aerial: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

0 500 1,000 m

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PROJECT

BME Mine - PRCP

Geochemical Sample Locations

Figure 3-47 | ADV-AU-00217 | September 2023

CLIENT

BOWEN COKING COAL LIMITED

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Classifying Mine Waste

Static tests

Static analyses quantify the soil fertility, geochemical, and physical properties of the materials. Static geochemical analyses included actual acidity (pH1:5), salinity (EC1:5), total sulfur (TS), acid neutralising capacity (ANC), soil fertility, and whole rock elemental analysis or water-soluble concentrations. This helps to evaluate the potential for Acid Mine Drainage (AMD) to determine the risks and opportunities for their use in rehabilitation.

An initial $pH_{1:5}$ and $EC_{1:5}$ analysis of the chip samples from the six drill holes was conducted by the AQP before implementing the full geochemical and physical sampling and analytical program (GaPSaAP) for individual or composited samples. Composite samples were compiled by lithological unit. All compositing of samples by lithology was based on the geological logs provided by the site drilling and coal quality analysis team.

As shown in **Table 3-31**, the main findings from the geochemical assessment are the majority of mineral waste contains low sulfide content, excess ANC and are classified as non-acid forming (NAF). NAF mineral waste have a very low risk of acid generation and a high factor of safety with respect to the potential for acid generation. Any surface runoff and seepage from mineral waste is expected to be circum-neutral to mildly alkaline, with low salinity and low dissolved solids.

Table 3-31 Geochemical Classification Criteria for Spoil Samples (n = 105)

Simplified ARD classes	Total S (%)	NAPP (kg H_2SO_4/t)	Overburden/ Interburden samples	Coal samples
Acid consuming (AC)	n/a	≤ -100	7	0
Non-acid forming (NAF)	≤ 0.05	n/a	78	8
	> 0.05	≤ 0		
NAF – high sulphur (NAF-HS)	> 1.0	≤ 0	0	1
PAF – low capacity (PAF-LC)	≤ 0.5	> 0	0	2
Potentially acid forming (PAF)	> 0.5	> 0	0	9
Total Samples			**85**	**20**

The following is a summary of results:

- The paste pH1:5 of the samples tested were generally circum-neutral to mildly alkaline, varying between 5.8 and 9.2 for the drill hole samples and between 6.6 and 9.4 for the coal quality samples.
- The total S of the drill hole samples was generally very low with a median of 0.02%. Only 6 drill hole samples reported total S higher than 0.2% including 2 samples with total S over 1.5%, which were both coal. The total S content of the coal quality samples were also low with a median of 0.28%, and the samples with the highest total S (from 0.4% up to 2.3%) were all coal.
- The ANC of drill hole samples and coal quality samples varied from negligible to over 250 kg H_2SO_4/t (**Figure 3-48**).
- The difference between Maximum Potential Acidity (MPA) (derived from total S) and ANC is calculated as the net acid producing potential (NAPP). Of the 73 drill hole samples in Test Program 1-1, only 2 samples reported positive NAPP (and both less than 5 kg H_2SO_4/t), while 4 of the 32 coal quality samples tested reported positive NAPP with the highest NAPP of 25 kg H_2SO_4/t calculated for a coal sample. The negative NAPP of the majority samples indicates that there might be enough acid neutralising capacity in these materials to neutralise the acidity produced from sulphide S oxidation.
- The neutralising potential ratio (NPR) is calculated by dividing ANC by MPA, which is often used to gauge the risk of net acid generation. An NPR value above 2 usually indicates sufficient acid neutralising capacity of the samples and an NPR above three indicates a high factor of safety, while an NPR less than 1 indicates that the intrinsic acid neutralising capacity is insufficient to neutralise the acidity generated. As shown in **Figure 3-48**, most drill hole samples fall in the domain of NPR>3. The three coal samples with the highest total S contents had NPR near or less than 1. The five coal samples from

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the coal quality sample set had NPR less than 2, while the samples collected from the roof and floor had high NPR with negligible risk of AMD generation.

- A preliminary AMD classification was applied based on total S, NAPP and NPR, as shown in Table 2. The classification shows that the samples tested were predominantly NAF. There was only a small portion of the samples classified potentially problematic as Potentially Acid Forming (PAF), PAF low capacity (PAF-LC) and NAF high S (NAF-HS), all of which were from coal.
- The whole rock assay shows that none of the samples tested were enriched in environmentally important elements, and the only exception is S which was found enriched in some coal samples.

Under circumneutral to slightly alkaline pH condition (pH 7.1 to 8.9) of the DI water extraction, the dissolved concentrations of trace and minor elements were generally very low and often below or near the respective report limits.

Kinetic tests

Kinetic analyses quantify changes over time for soil fertility (e.g. sequential extraction procedures), geochemical (e.g. kinetic leach column analysis) and physical properties (soil water characteristics, permeability, consolidation). Kinetic geochemical analyses are used to determine the long-term characteristics of mine waste material and can be used to further evaluate the potential for AMD. The criteria used by the AQP to classify the AMD potential and the number of mineral waste samples in each class is provided in **Table 3-31**. A summary of the Kinetic Leach Column (KLC) testing is in **Table 3-32**.

Table 3-32 KLC Program Summary

KLC column	Material	KLC method	Start date	End date	Water added each leach event (mm)
KLC # 1	Coal roof (100%)	Saturated	30/04/2021	20/05/2021	938
KLC # 2	Coal (100%)	Free leach	30/04/2021	03/03/2022	1400
KLC # 3	Coal floor (100%)	Saturated	30/04/2021	20/05/2021	611
KLC # 4	Coal roof (100%)	Free leach	30/04/2021	03/03/2022	1400
KLC # 5	Coal (100%)	Saturated	30/04/2021	20/05/2021	875
KLC # 6	Coal floor (100%)	Free leach	30/04/2021	Free leach	1400

KLC tests run over time. The KLC leach events for the Mine commenced 30/04/2021. Saturated columns ran weekly for four weeks and ended 20/05/2021. Free-leach columns ran monthly for 12 months and ended 03/03/2022. pH stayed stable over the leach events and EC has decreased over time in all columns (RGS, 2022). There has been no enriched metal(loids) reported in the KLC program for coal roof, coal, or coal floor samples. The full results are available in **Attachment G**.

Reject testing

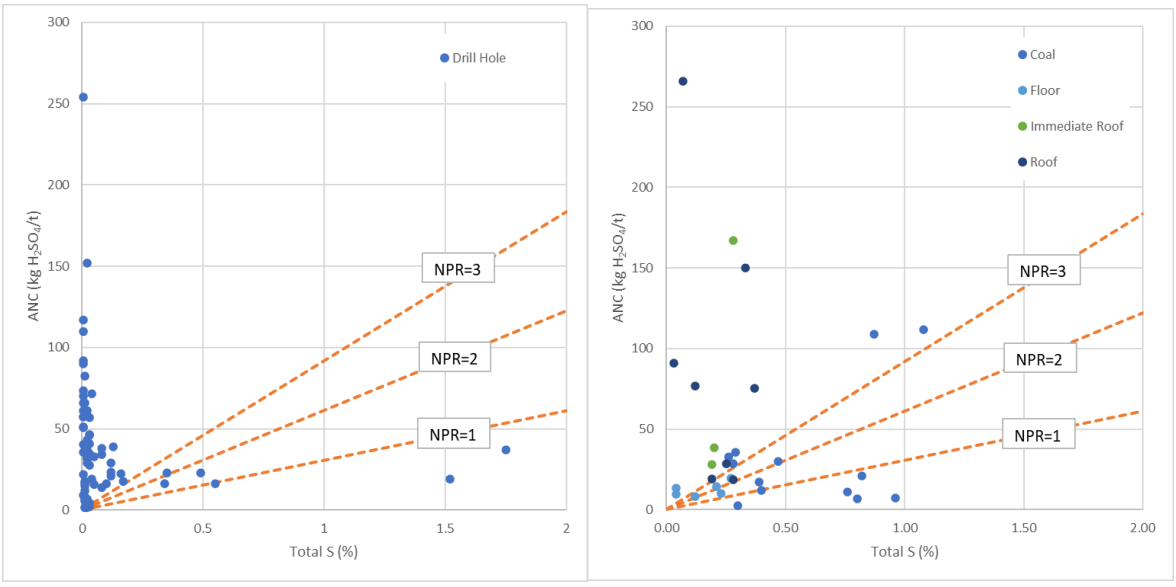
As shown in **Table 3-33**, the 20 rejects materials mostly had low total S, with a median of 0.2%. Four of the samples had elevated S greater than 0.5% and based on the preliminary assessment from an AQP (**Attachment G**), these may be PAF. More detailed geochemical testing will be conducted as a part of the MWMP progressive sampling program to accurately classify the rejects samples, but based on data available, it has been assumed that a portion may be PAF, and rejects have been conservatively managed as PAF.

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Table 3-33 Total S test results for Broadmeadow East rejects grab samples

Date	Sample ID Number	BVM Number	Total S (%)
22/11/2022	BME BCC Reject Sample 1	3393925	0.19
22/11/2022	BME BCC Reject Sample 2	3393926	0.19
22/11/2022	BME BCC Reject Sample 3	3393927	0.15
22/11/2022	BME BCC Reject Sample 4	3393928	0.19
22/11/2022	BME BCC Reject Sample 5	3393929	0.18
22/11/2022	BME BCC Reject Sample 6	3393930	0.19
22/11/2022	BME BCC Reject Sample 7	3393931	0.12
22/11/2022	BME BCC Reject Sample 8	3393932	0.24
22/11/2022	BME BCC Reject Sample 9	3393933	0.41
22/11/2022	BME BCC Reject Sample 10	3393934	0.64
22/11/2022	BME BCC Reject Sample 11	3393935	0.18
22/11/2022	BME BCC Reject Sample 12	3393936	0.17
22/11/2022	BME BCC Reject Sample 13	3393937	0.4
22/11/2022	BME BCC Reject Sample 14	3393938	0.66
22/11/2022	BME BCC Reject Sample 15	3393939	0.17
22/11/2022	BME BCC Reject Sample 16	3393940	0.19
22/11/2022	BME BCC Reject Sample 17	3393941	0.22
22/11/2022	BME BCC Reject Sample 18	3393942	0.29
22/11/2022	BME BCC Reject Sample 19	3393943	0.55
22/11/2022	BME BCC Reject Sample 20	3393944	0.66

Figure 3-48 Ratios of ANC to total S for drill hole samples (left figure) and coal quality samples (right figure)



These results indicate that mineral waste is unreactive and the risk of acid drainage (e.g., AMD) is negligible and poses a low environmental risk. Based on these results, the Mine does not currently estimate the volume of mine waste using block models. Progressive mine waste sampling currently in process will confirm if the Mine can continue to operate in this manner.

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Management and Mitigation of Waste Streams

The primary objective in managing the potential environmental impacts from mining operations and the long-term storage of PAF and / or sodic mineral waste (reactive material), is to resist or prevent the migration of AMD and to reduce the erosive potential of waste materials.

An effective means of risk mitigation is to restrict the transport of AMD into the receiving environment. This can be achieved by eliminating or limiting the flow of water, including seepage and leachate, through high-risk mineral waste (PAF rejects and fine tailings). Sodic material can be segregated and selectively placed to minimise erosive potential, with integrated control measures and management actions to further reduce environmental risk.

The risks associated with the improper management of waste streams at BME include:

- Acid in mine affected water:
  - Oxidation of sulphide minerals such as pyrite that produce sulfuric acid;
  - Rainfall and leaching of cations (Ca, Mg, K and Na) that reduce soil acidification; and
  - Organic matter decay.
- Salts in mine affected water:
  - Oxidation of sulphide minerals, production of sulfuric acid and neutralisation reactions that mobilise major ions (sulphate and Ca);
  - Chemical weathering of soil and rock by sulfuric acid that release major ions (Na, K, Mg and Cl);
  - Mobilisation of contaminants that are present within geological units and groundwater; and
  - Release of contaminants in fluxes as mined materials are extracted, processed and placed into final landforms.
- Metal(loids) in mine affected water; and
- Significant surface runoff event.

These risks can be realised via seepage, leaching, and capillary rise. The receptors for BME would largely be the surrounding environment that includes native vegetation, fauna habitat and livestock as there are currently no known downstream surface water users or nearby water supply bores in use by third parties.

Management and mitigation measures include:

- Segregation of PAF and / or sodic materials.
- Selective placement of PAF and / or sodic materials in the central zone of the OOPDs capped beneath non-reactive materials (e.g. inert overburden) or placed in-pit.
- Erosion and sediment control:
  - Reduced slope angles;
  - Managed surface runoff;
  - Establishment of vegetation cover;
  - Final cover designed for site specific conditions; and
  - Stable landform design with minimal erosion potential.
- Surface water and groundwater management:
  - Operational and post closure monitoring;
  - Maintenance of any subsidence, slumping or erosion prior to the establishment of vegetation.

During operations a progressive waste characterisation program will occur to assess the potential geochemical risk for mine domains containing reactive materials per the requirements of the MWMP. Sampling will be representative of the number and type of lithologies and of material that constitutes the bulk (>95%) of materials excavated or exposed to oxidising conditions. Material collected will represent the variability of each mine domain and represent the full stratigraphic sequence. The information gathered

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from this program will refine the Proponent's understanding of geochemical risk on site and how to manage them post-closure.

3.5.1.5 Landform Design

The rehabilitated mine site will comprise a partially backfilled void that has been battered down for stability, as well as two water shedding OOPDs that have been designed to accommodate a self-sustaining ecosystem, in line with the agreed PMLUs.

The final landform has been designed in reference to the proposed PMLUs to demonstrate that the land will be safe and structurally stable. The 2021 final landform design has informed the criteria for the OOPDs and voids approved within Table G2 of the EA. These criteria and additional details required by the PRCP guideline were modelled in the technical studies conducted in 2023 to ensure these design criteria remain relevant to mine plan changes that have occurred since the Mine became operational in 2022.

Determining the Final Landform Design

The relevant criteria from Table G2 of the EA and that required by the PRCP guideline are within **Table 3-34**.

Table 3-34 Final Landform Construction Criteria

Relevant activity	Final landform criteria
OOPDs – West and East	
Structure location	Two out-of-pit dumps are located on the eastern and western edge of the pit.
Footprint	**East OOPD:** 88 ha **West OOPD:** 22 ha
Height	**East OOPD**: Max – 358 mAHD, 44-60 m **West OOPD:** Max - 337 mAHD, 35-45 m
Surrounding topography	**East OOPD**: 292 mAHD to the northeast and 330 mAHD to the southeast. **West OOPD:** 288 mAHD to the west and 296 - 306 mAHD to the southwest.
Outer slopes	15% linear slope profile. Vertical distance between berms: 20 m Berm width: 5 m Outward draining, away from pit void and toward natural topography.
Inner slopes (into full backfill area)	12% linear slope profile (15% overall slope). Vertical distance between berms: 20 m Berm width: 5 m Drainage outward away from void towards original topo drainage paths.
Southern void	
Structure location	Southern portion of the mined deposit.
Footprint	31 ha
Depth	105 m
Overall slope	Overall slope: 15% Vertical distance between berms: 20 m Berm width: 5 m Drainage outward away from void towards original topo drainage paths.
Highwall and end wall slope (*Final pit walls (Competent material)*)	70 degrees
Highwall and end wall slope (*Final pit walls (Incompetent material)*)	45 degrees
Low Wall slope *(Final pit walls (Incompetent material))*	45 degrees
Low wall Spoil slope (*Underwater slopes*)	Angle of repose 37 degrees

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The rehabilitation surface will be comprised of a 0.3m thick layer of topsoil overlying overburden, with a target vegetation groundcover of 60%, as Table G2 of the EA requires. The final landform is located lower in the landscape, with hills located directly south, east, and west of the landform. Flood modelling conducted on the final landform indicates drainage across the undisturbed area flows north-westerly (**Attachment E**). Several drainage lines intersect with the conceptual design, including the southern section of the eastern landform and the eastern section of the western landform. The risk of long-term erosional stability, if the velocity of these flows exceeds the capacity of the sheeting materials to withstand detachment, will be mitigated through rock armouring along the batter toe.

The final landform is shown in **Figure 3-49** and **Figure 3-50**. As described in the baseline section, the regional topography is in an undulating valley of the Kerlong ranges that includes nearby mines with rehabilitated relevant activities with a similar final landform design. The Southern void will not be seen from any sensitive receptor locations at ground level after it is transformed into water storage for the purpose of livestock watering PMLU. The rehabilitated OOPDs are the only visual amenity considerations post closure, noting the rehabilitated mine opposite the haul road has rehabilitated slopes and a pit lake with a similar design. The nearest sensitive receptors are grazing homesteads that are inhabited on a seasonal basis, and the only road to the Mine is privately operated and subject to strict safety considerations.

As the Mine does not require or have a Tailing Storage Facility (TSF), criteria related to the prevention of water or air ingress and for seepage release minimisation are not included in the final landform design and related outcome criteria in Tables G1 and G2 of the EA.

Principles of Landform Design

The following principles of landform design are consistent with the values of the Proponent and conform to leading industry practice.

- Begin with the end in mind. Create a shared vision for the reclaimed land among the mine, its stakeholders and work together to earn each other's trust.
- Establish governance. Assemble a multidisciplinary design team and appoint a lead designer.
- Set clear land-use targets, goals, design objectives, and design criteria in a Design Basis Memorandum. Support the vision. Anticipate the land will evolve over time — physically, chemically, ecologically, and socially. Design and maintain the land to adapt to these changes, including those driven by an ever-changing climate.
- Work collaboratively in every endeavour. Build the reclaimed landscape with (not for) the land's users.
- Work all spatial scales — regional, landscape, landform internal and external), element — simultaneously.
- Design for construction and operations. Landforms and landscapes should be easy to build and reclaim using available technology that is fit for purpose. Control the source of contaminants. Avoid producing soft tailings.
- Use a risk-based approach. Design for the most reliable or most likely case. Embrace the observational method and true adaptive management. Enact predetermined contingencies as needed to allow the evolving land to perform as intended.
- Follow every drop of water through the landscape. Water is both a key to life and a great agent of disruption.
- Know your materials. Cover and revegetate all mine waste. Ensure adequate borrow. Conserve soils.
- Favour progressive reclamation. Learn by doing and document achievements. Ensure timely access to reclaimed land. Collaborate for progressive signoff. Minimize the work required after the last tonne of ore is mined and the mill shuts down.
- Acknowledge the land will revert to the local community and support their duty of stewardship. Reclaim every square metre. Avoid unnecessary long-term care but anticipate where it will be required. Provide full financial assurance for all phases of mine life.

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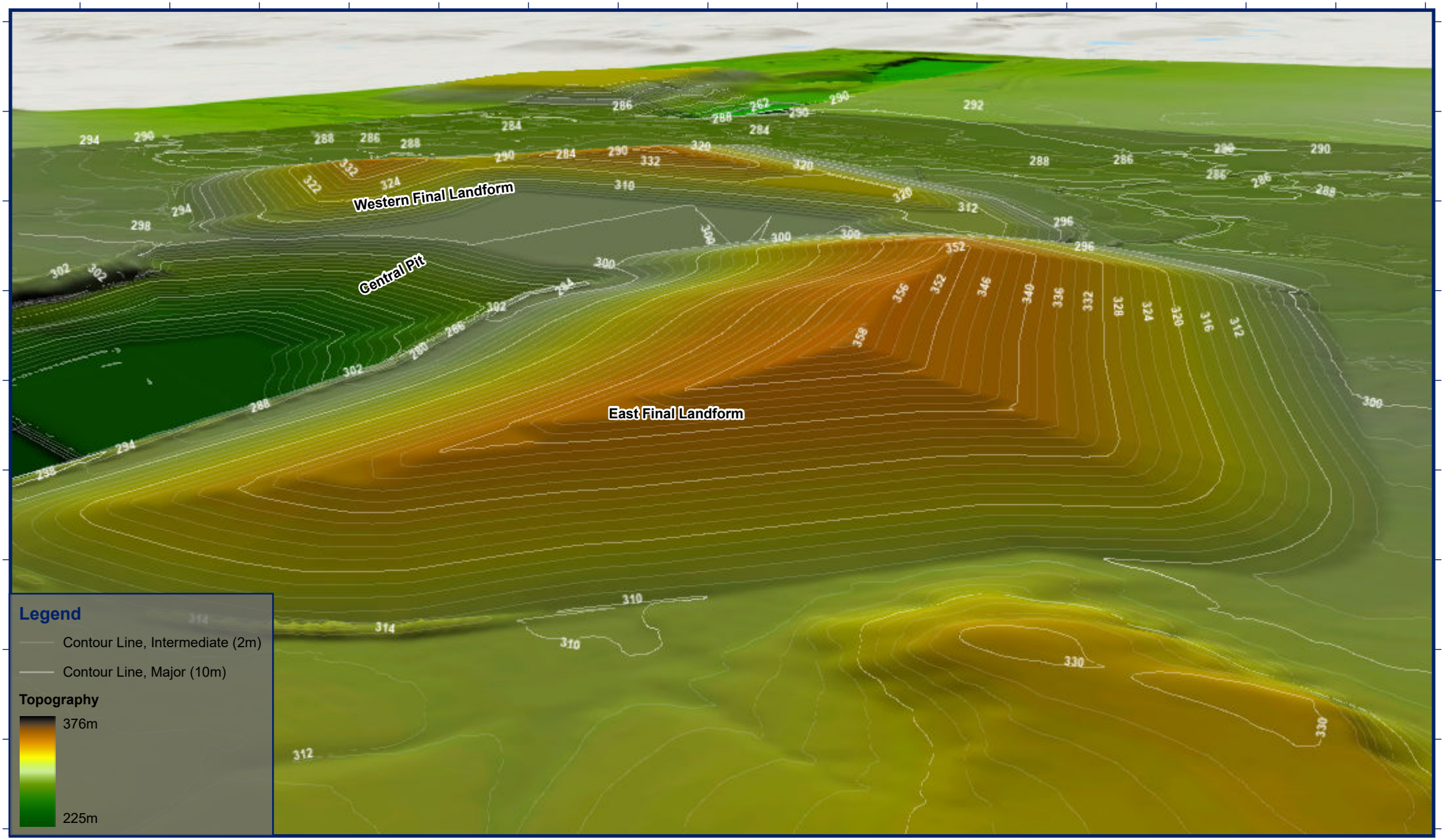
Source: Map My Mine & Minserve

PROJECT		CLIENT
September 2023	BME Mine - PRCP	BOWEN COKING COAL LIMITED
Figure 3-49		
ADV-AU-00217	Final Landform Design	

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Scale: 1:1,999
Projection: GDA2020 MGA Zone 55
Created/Reviewed By: AW/MRT
Aerial & Data Source: Minserve

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0 50 100 200 300 400 m

PROJECT		CLIENT
September 2023	BME Mine - PRCP	BOWEN COKING COAL LIMITED
Figure 3-50		
ADV-AU-00217	Final Landform - Out of Pit Dumps	

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Determining Stability through Modelling

Erodibility testing and erosion modelling were conducted (Landloch, 2023) on the 2023 final landform design (**Attachment H**). To assess the long-term erosional stability of the proposed surface treatment, a review of the available surface cover materials for use in rehabilitation was conducted first. Bulk samples of these materials were collected and underwent erodibility testing, with outcomes used to derive input parameters for erosion modelling. One bulk sample selected for erodibility testing was taken from the existing stockpiled topsoil (Vertosol/Chromosol), and one bulk sample of was taken from the undisturbed Kandosol.

The erosion model then assessed the erosion performance of a range of batter geometries and vegetation groundcover levels. The following steps were undertaken to inform the report included as **Attachment H** to this PRCP:

- Review available soil characterisation data with specific reference to the structural stability and erodibility of the soils available for rehabilitation.
- Select suitable soils and undertake erodibility testing of bulk samples extracted from the Mine using laboratory-based techniques.
- Determine material-specific erodibility parameters for soils at the site using the erodibility testing results.
- Conduct 2D runoff /erosion modelling to define:

  a. Erosionally stable waste rock landform batter geometries for the cover materials tested, and

  b. Vegetation cover levels required to achieve erosional stability.
- Provide guidance on the rehabilitation design of surface treatments through meetings with the Proponent and reporting.

Testing results:

Sub-sample analysis of the Vertosol/Chromosol and Kandosol bulk samples was conducted to get a better understanding of the materials available for landform rehabilitation including their ability to achieve the required landform design outcomes (**Attachment H**). These soil types were selected for sampling as they are the representative of the topsoil that will be most used for rehabilitation.

Soil pH for the Vertosol/Chromosol is circum-neutral, and for the Kandosol slightly alkaline. These values are in line with those recorded during the baseline soil and land assessment and are unlikely to be restrictive to plant growth (SGM, 2021).

Both the Vertosol/Chromosol and the Kandosol have low salinity, with values of 0.19dS/m and 0.03dS/m, respectively. Salinity is not considered to be a limiting factor for plant growth (Landloch, 2023).

Structural stability of the arrangement of primary particles into secondary units or peds was undertaken to understand if the soil has potential to have an unstable structure based on its chemical and its physical characteristics. Materials with a high combined proportion of fine sand, silt, and clay (particles ≤0.2mm) are prone to structural instability, even if their clay fractions are not chemically dispersive. This is because these smaller particles can mobilise within the coarser sand matrix.

In general, the Vertosol/Chromosols are sodic, and due to low salinity have an Electrochemical Stability Index (ESI) value that is low (<0.05), and as such are considered to be prone to structural instability. The sodicity of the soils will lead to dispersion of the clay fraction, leading to reduced infiltration capacity, hard setting, and also the potential to be prone to tunnel erosion. The low ESI value may also lead to structural instability, especially given the low abundance of coarse fragments. As a result of these risks, the Vertosol/Chromosol may be more prone to erosion.

The Kandosols are non-sodic, but similar to the Vertosol/Chromosol, have low salinity resulting in a low ESI value. Given the low coarse fraction of the Kandosol, it could be expected that this soil will have a reduced infiltration capacity and higher density values, and also be more prone to tunnel erosion.

Both soils have no major limitations from a growth medium perspective based on their chemical properties (pH, EC).

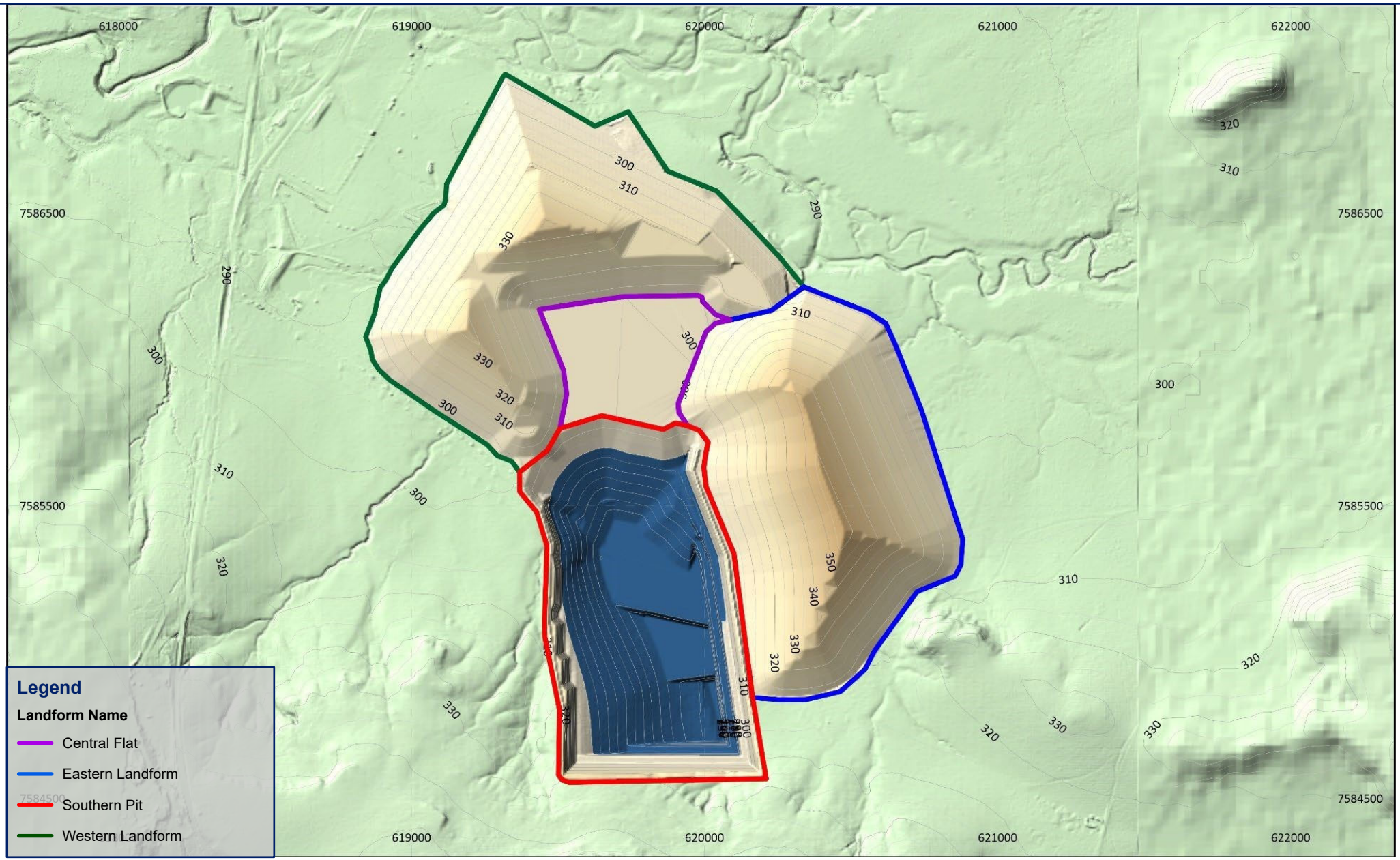
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Landform design

The conceptual landform rehabilitation design for the OOPDs is comprised of four distinct sections (**Figure 3-51** and **Figure 3-52**):

- Eastern landform;
- Western landform;
- Central flat; and
- Southern pit.

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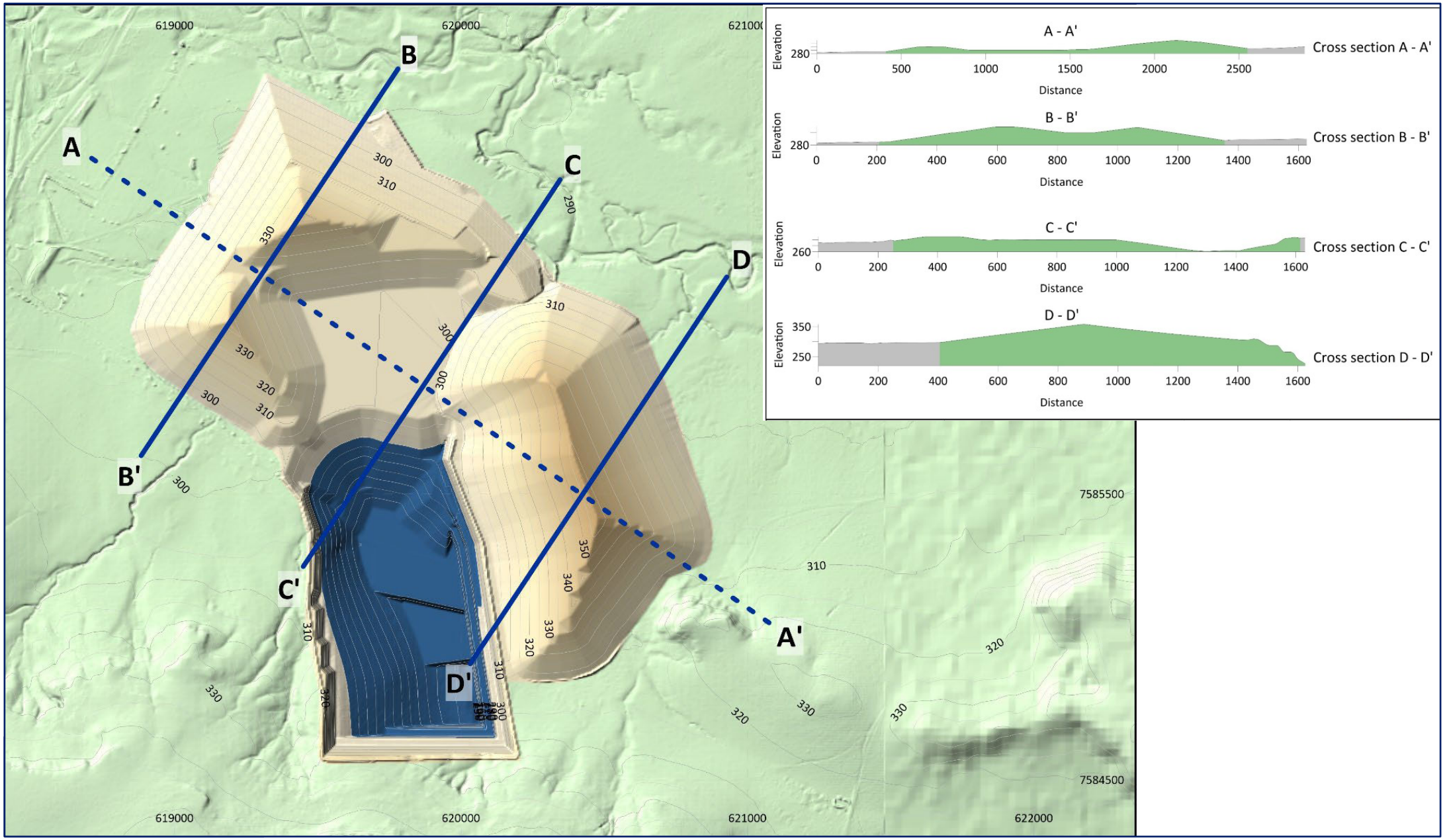
Not to Scale
Source: LandLoch 2023

PROJECT		CLIENT
September 2023	**BME Mine - PRCP**	BOWEN COKING COAL LIMITED
Figure 3-51		
ADV-AU-00217	**Areas of the Proposed OOPD East and West Rehabilitation Design**	

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Not to Scale
Source: LandLoch 2023

PROJECT		CLIENT
September 2023	**BME Mine - PRCP**	BOWEN COKING COAL LIMITED
Figure 3-52		
ADV-AU-00217	**Proposed Rehabilitation Design for OOPD East and West**	

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Model parameters

The WEPP (Water Erosion Prediction Project) model was used to predict runoff, erosion, and deposition for mine landform batter slopes as a part of the 2023 erodibility testing and erosion modelling assessment of the final landform design (**Attachment H**). WEPP is a simulation model with a daily input time step, although shorter time steps are used by internal calculations for the prediction of runoff and erosion on days when rain occurs. If runoff is predicted to occur, the model computes sediment detachment, transport, and deposition at points along the slope. On days without rain, the WEPP model uses the climate data to modify plant and soil characteristics, whereby soil dries through evaporation between rain events.

The erosion component of WEPP uses a steady-state sediment continuity equation as the basis for erosion computations. Soil erosion in rills is predicted to occur if the flow hydraulic shear stress is greater than the material's critical shear stress, and when the sediment concentration in the runoff is less than its transport capacity.

The components within the WEPP model that are relevant to this Mine are summarised below:

- **Material erodibility** – conducted on subsets of the bulk soil samples collected from the Mine, placed in settling columns and tested for:
  - Interrill erodibility;
  - Rill erodibility;
  - Critical shear for rill initiation;
  - Effective hydraulic conductivity; and
  - Sediment particle size and density distributions.
- **Slope geometry** – a user-defined range of geometries for various batter heights (10–60m) and gradient (10% and 15%) to assess the impact of shape on erosion was modelled.
- **Climate** - a long-term climate sequence was developed using 10 daily climate variables. Of the 10, the four related to rain (rainfall, rainfall duration, peak rainfall intensity, and time to rainfall peak) are the most critical as they are related to because predicted runoff and erosion are most sensitive to these variables.
- **Vegetation** - impacts of vegetation cover on infiltration rates were estimated using the relationship between vegetative groundcover. Direct impacts of groundcover on erosion rates were estimated using cover (C) factors for the Revised Universal Soil Loss Equation (RUSLE). Vegetation groundcover levels assessed include 0%, 30%, 40%, 50%, 60%, 70%, and 80%.
- **Model assumptions** - no runoff from upslope areas is permitted onto the batter profile being modelled. This is consistent with the condition where a bund or back sloping berm is present at the crest of the batter that blocks the flow of runoff from upslope areas onto the batter.
- **Acceptable erosion** - Some degree of erosion will always occur from any land surface. The model adopted long-term annual erosion rates that produce batters with a low tendency to rill, which are existing criteria in the EA:
  - Mean average annual erosion – 5t/ha/y; and
  - Mean peak annual erosion – 10t/ha/y.
- **Derived parameters** - WEPP erodibility parameters were derived for both the Vertosol/Chromosol and the Kandosol. Based on the amount of effective hydraulic conductivity, the Vertosol/Chromosol parater was modelled as ~50% of the sediment produced will be easily mobilised, and for the Kandosol 35% will be easily mobilised.

Model results

Modelling of long-term erosion for the OOPDs designed to the final landform criteria currently approved in the EA considered combinations of surface materials, batter geometries, and vegetation groundcover levels. The following combinations were initially assessed:

- Batter gradient of 15%, consistent with those present on the proposed rehabilitation landform;

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- Batter heights varying between 10–60m (at 10m intervals), consistent with those present on the proposed rehabilitation landform; and
- Vegetation groundcover levels varying from bare (0%), and 30–80% (at 10% intervals).

The raw data from this assessment on varying heights, gradients, and slopes in mean and peak rainfall events can be found in **Attachment H.**

The Vertosol/Chromosol is more prone to erosion than the Kandosol, primarily driven by the low effective hydraulic conductivity of the Vertosol/Chromosol. The runoff potential for the Vertosol/Chromosol without vegetation is high compared to Kandosol. Erosion for both soil types is limited by the capacity of runoff to transport sediment. As such, the higher runoff values for the Vertosol/Chromosol result in an increased rate of erosion compared to the Kandosol.

The erosion modelling indicates that batter height has little impact on the rate of erosion. This indicates that adjustments to the height of the batters are not predicted to result in a significant difference in erosion performance. This is consistent with a material for which erosion is sediment transport limited.

Batter gradient has a moderate impact on the rate of erosion. When considering the impacts of vegetation, the reduction in batter gradient results in a decrease in the percentage of vegetation cover required by 10% for both soil types. As such, alteration of the batter gradient may play a role in the development of an erosionally stable landform.

Vegetation establishment will be vital if the soils are to be used for rehabilitation. Model predictions indicate that a minimum vegetation groundcover level of 70% is required for the Vertosol/Chromosol and 60% for the Kandosol based on a 15% batter gradient (as is currently adopted for the conceptual rehabilitation landform). The reduction of the batter gradient to 10% is predicted to reduce the cover level requirements by 10% (60% for Vertosol/Chromosol and 50% for Kandosol).

Results from the erosion modelling show that adoption of topsoil as a cover material limits the potential options available to improve long-term erosional stability. As the topsoil is highly erodible, adjustment of batter geometries (shorter slope lengths, lower batter heights, shallower batter gradients) will have only a minor impact on long-term erosion rates. Vegetation groundcover is the only remaining option for reduction in erosion rates, and reliance on vegetation cover does present a potential risk (Landloch, 2023).

The erodibility testing and erosion modelling assessment (**Attachment H**) concluded in the that the conceptual rehabilitation design of the OOPDs is likely to be erosionally stable in the long term provided that a vegetation cover level of 70% can be consistently achieved. To address this model result, the Proponent has committed to achieving a 70% vegetation cover in rehabilitation milestone criteria for achieving a PMLU of grazing (RM7) instead of the 60% prescribed in the EA.

Flood modelling of the rehabilitated landform as discussed in **Section 3.5.1.2**. The relevant control measures suggested by this study has been incorporated in the final landform design.

Construction

There is an annual mining and mine placement schedule for the project to specify material movement. The cumulative volume of excavated waste from open cut activities includes approximately 103.8 million loose cubic metres (Mlcm) consisting of spoil, subsoils (i.e. those subsoils which are not suitable for mine rehabilitation) and reject coal. Approximately 22.4 Mlcm of spoil materials to be stored within the OOPD beyond the maximum extent of the pit rim on unmined ground. Spoil materials generated during the mining operations have been initially emplaced within the OOPDs during development of the open cut pit and will soon be placed in-pit as mining of the resource continues to progress south.

Reject coal is co-disposed with spoil materials within the OOPD and within the pit. These materials will be disposed in locations well below the elevation of the final landform design. Exposed coal on the pit floor will be capped to avoid contributing to solutes in the final void.

The OOPDs have been developed during the initial open cut activities, which included the installation of appropriate water management structures) to assist with the management of erosion and clean water diversion. The internal dump slopes can only be made available for rehabilitation at the end of mining due

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to continuous in-pit dumping and mine access ramps. Towards the end of mining operations, the outer faces of the OOPDs will be shaped to the final landform design as summarised at the start of this section. The OOPDs will be rehabilitated and regraded such that where practicable surface water drains away from the Southern void during the final landform reshaping stage.

The East OOPD (eastern landform) is comprised of variable batter heights ranging from 15–50m, with most of the landform at a height of 50m above the surrounding ground level. A linear outer batter gradient of 15% has been adopted for the entire landform. The northern and north-eastern sides of the landform include 5m wide berms at a 20m batter height interval. These berms are not intended to be permanent features of the landform, but rather are intended to assist with the initial establishment of vegetation and to reduce erosion in the short term. The eastern landform tops are typically ridges, with 15% gradient batter slopes on both sides. There are several small flat tops which have zero gradient, with no crest bunding present on these tops.

East OOPD will be available for rehab commencing 2026 as the limited spoil room available requires that most of the dump is completed before it can be reshaped. The risk of long-term erosional stability if the velocity of these flows exceed the capacity of the sheeting materials to withstand detachment will be mitigated through the introduction of rock armouring along the batter toe.

The West OOPD (western landform) has batter heights that range from 35 - 45m, with linear batter gradients of 15%. The eastern face will drain internally contributing to a catchment to ensure clean water inflows to the pit lake. The top of the landform is characterised by a ridge that runs from north to south, splitting into two at the southern end. This area will be the first ex-pit spoil available in 2025 for reshape once steady state mining commences in the Central Pit and heads south.

The Central Pit (central flat) is a large section in the middle of the landform with zero gradient. This area receives surface water runoff from sections of the eastern and western landform. The southern end of this section abuts the pit. After the cessation of mining, the remaining materials within the OOPD, central pit and parts of the Southern void will be reshaped, covered with subsoil where possible and topsoil, and rehabilitated to achieve the final landform design.

The Southern void section is comprised of variable batter heights and gradients (15-30%). The northern end of the pit has a 50m batter height, and a 15% linear batter gradient. The western end is comprised of a variable batter height, ranging from 50–100m, increasing in height further to the south. The batter is comprised of two sections. The top section is 20m in height and is at angle of repose (~60°), and the bottom section varies from 30– 70m with a linear batter gradient of 15%. The southern and eastern sections of the pit are comprised of a typical pit face, with three lifts at a height of 20-30m, with benches 20m wide separating each lift.

The Southern void pit floor will be ripped and reshaped where necessary to achieve the post mining land use and minimise the final water storage size to 31 hectares. Coal seam capping post mining, in the highwall, low wall and end wall will ensure the contamination of the pit lake by contact with exposed coal seams will be minimised.

Security fencing and safety bunds will surround the final Southern void low wall and highwalls. These bunds in close proximity to the wall crest will ensure water run off over the walls is minimised to reduce potential erosion.

Surface water management

The majority of the mine waste will be contained within the footprint of the backfilled void. This is a beneficial outcome of the landform design because it will lead to almost all of the soluble major ions and metal(loids) percolating through the mine waste into the backfilled void, rather than as seepage from the toe of the dumps onto the natural (un-mined land) land which subsequently runs off into the two adjoining creeks.

The two OODPs are water shedding as there no flat upper areas to store excess stormwater, with all water shedding from the slopes. Temporary rock drains will be used to control water flow until vegetation is established **Figure 3-53**.

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The final landform design includes linear slopes or linear slopes with (temporary or permanent) contour drains that direct runoff to drop structures. Contour grooving, channel linings, rock mulching and drop structures will be constructed on the outer slopes to prevent long watercourse runs and minimise slope erosion as shown in **Figure 3-53**.

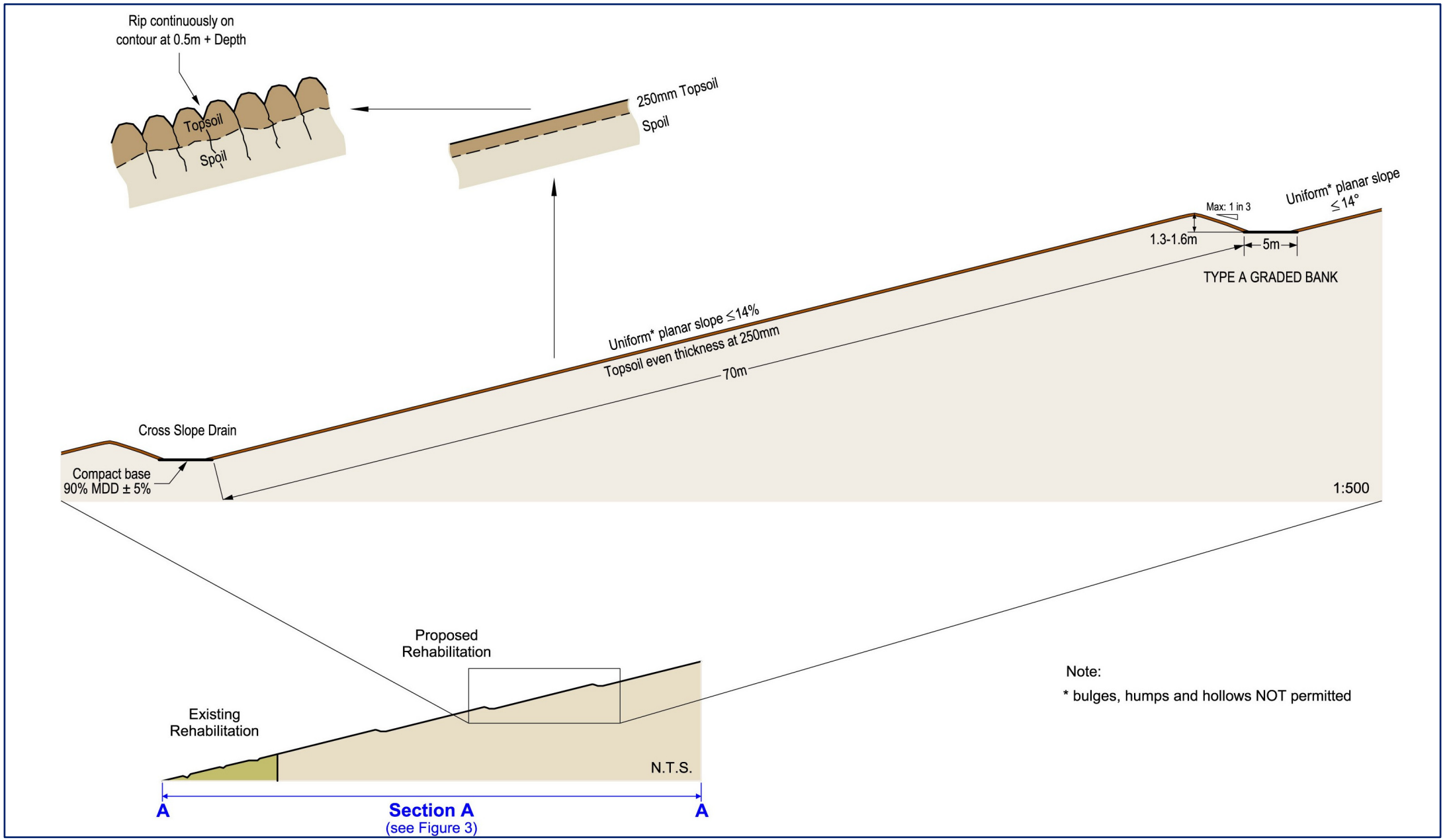
Settling and subsidence

Landform stability issues associated with backfilling mine waste to the mined open pits is likely, as the short mine life does not allow for “years” of loading and settlement of the backfill material prior to reshaping to final landform design. Reshaping and iterative repairs may be required until landform stability is attained.

Stakeholder consultation

The Proponent has engaged with multiple stakeholders on the final landform design. Input, such as access, locations for grazing trials and preferred seeding mixes, have been considered in the development of the design. Consultation with the underlying pastoral landholder will be ongoing as the grazing trials are implemented and relevant monitoring data obtained.

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Not to Scale
Source: Minserve

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PROJECT		CLIENT
September 2023	BME Mine - PRCP	BOWEN COKING COAL LIMITED
Figure 3-53		
ADV-AU-00217	Typical Integrated - Conceptual Cross Slope Drains Concept	

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Monitoring Performance - Quality Assurance / Quality Control

Key risks associated with final landform construction include a failure to follow the design, construction materials not conforming to specifications, poor or inadequate construction quality and the failure of quality assurance and quality control (QA/QC) to identify construction inadequacies.

Final landform construction management, technical supervision and QA/QC will be done by an AQP who can make sure that construction is carried out in accordance with the design plan. A QA/QC document would be prepared by an AQP to verify that the final landform design has been done in accordance with the design plan and is stable as per the PRCP.

Section 3.7 describes the locations across the entire landform that will be monitored for stability, subsidence and other factors to confirm outcome criteria are being met. Other validation methods will include:

- Certification from an AQP that the area has achieved stable condition.
- All rehabilitated areas are geo-technically stable for the intended post mining grazing land use, with no active areas of rill or gully erosion, and drainage follows appropriate drainage paths.
- Assessment of soil health and suitability has been completed by an AQP.
- Receiving water quality indicators do not exceed specified criteria limits.
- Groundwater monitoring demonstrates that the groundwater quality is within 95th percentile of the results of baseline pre-mining bore monitoring results, or when baseline is not available, reference bores which have not been impacted by mining activities.
- Certification by an AQP that rejects are buried under geochemically and physically inert overburden with a minimum cover thickness of 5m.
- Results, that rehabilitated areas meet the land suitability assessment that meets class 4 for cattle grazing as defined by the *Guideline for Agricultural Land Evaluation in Queensland* (State Department of Queensland 2015).
- Certification of less than 5% declared weed and pest species identified in rehabilitated areas.
- Post closure flora and fauna monitoring as per the monitoring plan.
- Receiving water quality indicators do not exceed specified criteria limits.

Trial methodology

The results of the erodibility testing and erosion modelling are based on the two predominate soil types found in the disturbed area. The Proponent will undertake further assessment of the topsoil to determine whether poorer quality soils exist over the life of the Mine in life with the Topsoil Management Plan (TMP). Prior to the application of stored topsoil on rehabilitated areas, sampling will be conducted to determine if fertilisation or amelioration is required as detailed in **Section 3.5.1.3**.

Grazing trials will be conducted from 2025 to 2029 as required by EA Condition G11 and as detailed in **Section 3.6.2**. The presence of vegetation will be monitored throughout the year, particularly in higher erosivity months to understand how cover is being maintained. Grazing rates, fire frequency and intensity, frequency of drought and several seed mix options will also be assessed during these trials. As there are only four years remaining of the five-year mine life, preliminary results will only be able to inform the implementation of the final design across the remaining landform. The Proponent will rely on the results of longer-term studies and experiences of mining in the surrounding region, with a focus on the most relevant which is Broadmeadow West and Burton.

Limitations and Assumptions

The 2023 erodibility testing and erosion modelling assessment of the final landform design has used the available soil but is limited to two bulk samples, one from an existing stockpile, and the other undisturbed. The act of stripping soils will impact of the physical and chemical characteristics of the materials. As mining progresses, an assessment of the erodibility of the soils available for rehabilitation should be undertaken.

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3.5.1.6 Cover Design

As discussed in **Section 3.5.1.4**, the Mine is expected to generate considerable inventories of low risk NAF overburden and to a lesser extent medium to high-risk PAF coarse and fine reject coal and fine coal tailings (rejects). Careful management of these inventories is essential to achieve the principles of landform design as described in **Section 3.5.1.5**and to minimise environmental harm.

When the Mine first began operating in 2022, the intention was to transport ROM coal offsite for processing and to return the associated rejects generated at the offsite CHPP to the Mine. The rejects were to be placed within the OOPDs or in-pit backfill area and encapsulated with a minimum of 5 m of spoil, and later sheeted with ~ 0.2 m of topsoil and seeded in the surface treatment stage proposed in the PRCP schedule.

Processing of coal from BME still occurs offsite, however at the Burton Mine CHPP, which is owned by another subsidiary of the Proponent and subject to a separate PRCP process. To date, one reject cell has been constructed and encapsulated within the western OOPD of BME on 315 RL with another 30 m of NAF cover material as permitted by the EA. Per Conditions F17 to F18 of the EA, the reject cell design has incorporated a maximum emplacement width of 50 m and maximum emplacement length of 100 m. At the closure stage, the subsequent dozer push from the angle of repose to the final rehabilitation slope will cap these rejects with >5 m of inert waste rock material.

Objectives of the Cover System

The careful consideration of mineral waste management in the design and operation phase has been implemented as an integral component of successful rehabilitation and closure. Management and disposal consider the potential impacts to surface water and groundwater quality, erosion and relevant Environmental Values (EVs) of the surrounding environment.

The selective placement, encapsulation and disposal of mineral waste is done so that it minimises the risk of environmental harm and satisfies the following objectives:

- Prevent and minimise the evolution and release of acid and alkali producing mineral waste and / or saline drainage from mineral waste containing dissolved metal(loids) and non-metallic inorganic substances AMD;
- Selectively place and / or encapsulate sodic mineral waste with inert material;
- Place mineral waste in a constructed stable and safe landform with a suitable profile and where practicable, place mineral waste in-pit;
- Manage spoil (ie subsoil and overburden) to enhance its future potential; and
- Demonstrate risk mitigation post closure.

The general closure objectives are to ensure that the post-mining condition of the landscape and final constructed landforms are:

- Safe, stable and minimises long-term environmental impact;
- Without any future liability to the stakeholders; and
- In conformance with the agreed PMLU (low-intensity grazing).

Design

The reject disposal and containment strategy has been designed to meet the following conditions of the EA:

Condition F17 – Rejects are authorised to be disposed of within spoil emplacements in the following disturbance areas:

a) Out of pit overburden dumps; and

b) Central pit.

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Condition F18 – Rejects must be disposed of according to, at a minimum, the following emplacement design criteria:

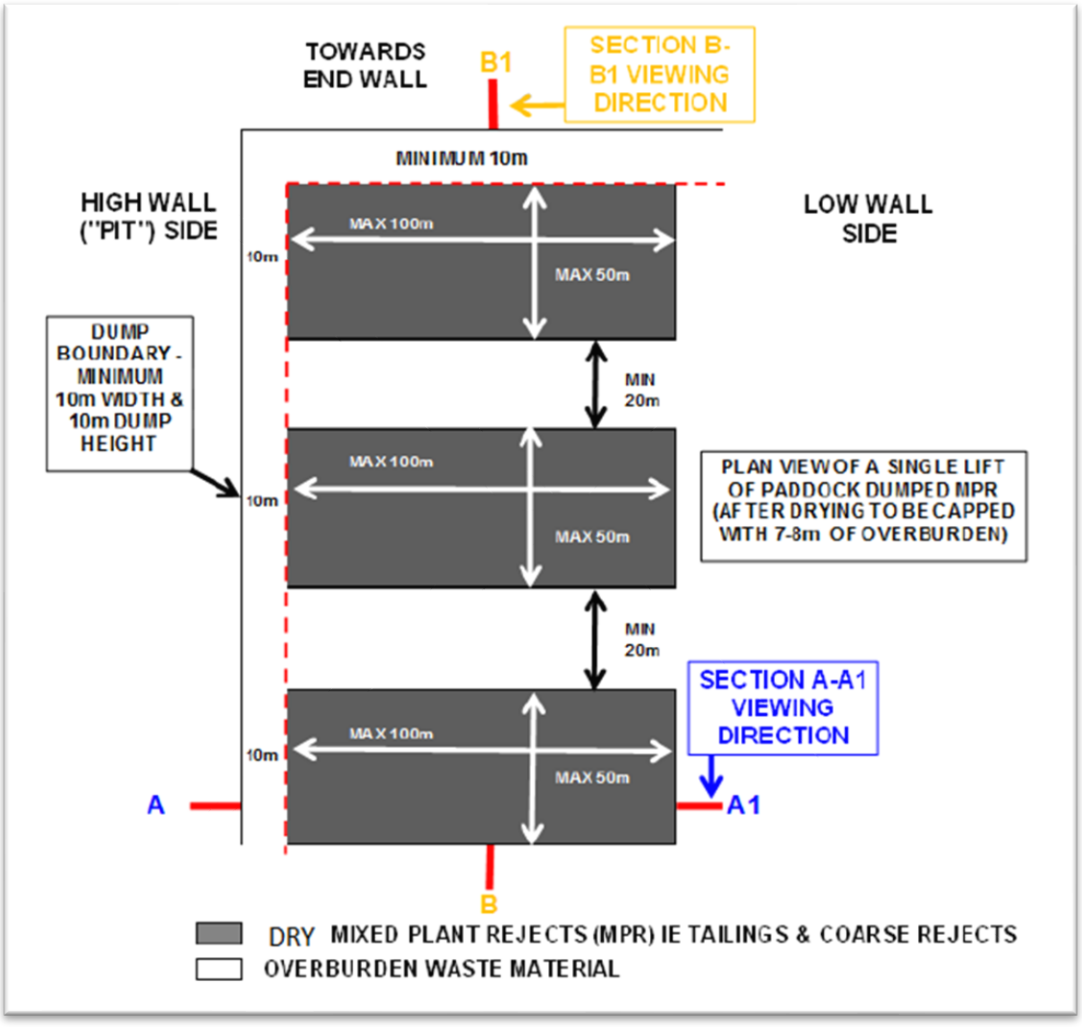
a) Each emplacement is not more than 50 metres in width and 100 metres in length;

b) There is not less than ten (10) metres in between reject emplacements; and

c) Each emplacement is not less than ten (10) metres from a spoil dump boundary.

As per the EA conditions, cell design incorporates a maximum emplacement width of 50 m and maximum emplacement length of 100 m (**Figure 3-54**). One reject cell has been disposed of deep within the West OOPD with no further plans to continue the practice. As only one reject cell has been constructed, the requirement for each additional cell to be less than ten (10) m in between reject emplacements is no longer relevant to the design. The one emplacement is less than ten (10) m from a spoil dump boundary as required. Mineral waste disposed ex-pit has been capped with 7-8 m of inert overburden waste material, with a final minimum 6 m capping.

Figure 3-54 Plan view of a single lift (generic cell diagram)



Construction Methodology

Sodic and non-sodic materials

The disposal of sodic mineral waste is done in a manner that avoids and minimises erosion and runoff. As sodic material is identified, it is picked up and either selectively placed on the prepared base of the OOPDs and capped beneath non-reactive materials (eg inert overburden) or the surplus sodic mineral waste will

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remain and / or be end tipped in-pit. These measures will encapsulate the mineral waste with the most potential to disperse, reducing the risk of environmental harm.

Mineral waste validated as non-sodic and / or non-dispersive will be selectively placed on the outer slopes of the OOPDs to limit dispersion and erosion. Geochemically low risk (non-sodic) mineral waste will be placed on the surface extent of final landforms and used in areas where there is a greater potential for erosion on outer slopes.

PAF materials

Coal roof, reject coal, and coal floor will be mixed with overburden and emplaced in the OOPD and / or backfilled into mined voids. PAF material is only associated with rejects and fine tailings. PAF material is encapsulated within the OOPDs and not placed near or on the surface to prevent the oxidation of sulphide minerals and generation of AMD.

PAF materials will be buried with at least 6 m of cover (e.g., inert overburden), sheeted with ~0.2 m of soil and sown with pasture seed. The selective placement of PAF materials captures and contain residual leachates, which will be transferred by water management infrastructure, contained and managed as per the conditions of the EA. Reject cells from the offsite CHPP are no longer being returned to site for encapsulation.

Quantitative Assessment

Reject coal is co-disposed with inert spoil materials within the OOPD. These materials will be disposed in locations well below the elevation of the final landform design. The only PAF material identified is associated with the reject coal, and this only represents a very small proportion of the overall mine material balance (RGS, 2022).

The mining schedule by period is summarised in **Table 3-35** below and includes details of estimated rejects (maximum quantity) generated following coal processing at the CHPP. The amount of reject materials in **Table 3-35** reflects a maximum estimation and is likely to vary depending on the amount of coal extracted and processed on an annual basis.

Table 3-35 Mining Schedule by Period

Year	Volume (Mbcm)*	Accumulative Total (Mbcm)*	In-Pit Dump (Mlcm) **	Ex-Pit Dump (Mlcm) **	Ex-Pit-2 (Mlcm)**	Ex-Pit 1 (Mlcm)**	CHPP Total Rejects (Tonnes)
P1	10.3	10.3	0	10.5	3.4	7.1	428,346
P2	14.1	24.4	9.7	5.9	4.6	1.3	418,752
P3	13.7	38.1	10.8	4.7	4.5	0.2	391,778
P4	13.5	51.7	15.4	0.1	0.1	0	336,360
P5	13.3	65.0	15.1	0	0	0	390,363
P6	14.5	79.5	16.3	0	0	0	356,548
P7	3.4	82.8	3.5	0	0	0	280,379
Total	**82.8**	**-**	**70.8**	**21.2**	**12.6**	**8.6**	**2,602,527**

** Inert waste - Million bank cubic metres (Mbcm)*
***Million loose cubic meters (Mlcm)*
Source: (RGS, 2022)

As only one cell has been constructed, filled an encapsulated within the West OOPD, with no additional reject cells planned, the CHPP reject volumes presented in **Table 3-35** are no longer relevant to materials required to cover additional reject cells.

Criteria for Discharge

Water quality monitoring of surface waters is required to identify any potential influence on or threat to receiving waters. Monitoring in relation to both clean (diverted) water and site water management systems

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is done on a regular basis during operations. This will be refined and continued into the post closure monitoring stage as discussed in **Section 3.7**.

Surface water monitoring is conducted to identify the physical and chemical properties of runoff water generated from mineral waste seepage or leaching. It forms part of the strategy to manage seepage and leaching from mineral waste during both the operation and closure phases as per the relevant conditions of the EA and rehabilitation milestone criteria.

Testing will be undertaken of any water management structures that remain in the post-closure stage until the appropriate amount of vegetation (70%) is achieved on all sloped areas.

The water quality of any water releases is monitored immediately downstream as per the EA and will continue to be monitored against the rehabilitation milestone criteria that are relevant indicators of contaminated run off in the post closure stage. Clean water runoff from surrounding catchments will continue to be diverted around the OOPDs when shaped to the final landform and allowed to continue in the natural watercourse where possible.

Groundwater monitoring will continue to be done to identify the availability or leachability of metals from mineral waste post closure. The groundwater monitoring program forms part of the strategy to manage seepage and leaching from mineral waste during both the operation and closure phases as per the relevant conditions of Schedule G under the EA and rehabilitation milestone criteria.

All surface water monitoring trigger values in the EA are per regional WQO's and groundwater triggers are based on baseline data. As these values are the most stringent and relevant to the current impacts at the Mine, these will continue to be used post closure.

Suitable vegetation

As the cover design is relevant to the West OOPD, which is a grazing PMLU, the seed mixes proposed in **Section 3.5.1.8** are considered suitable. Groundcover establishment will be monitored to ensure key species are present, suitable diversity is present and the cover / density is adequate.

The use of a cover crop to stimulate the accumulation of carbon, organic matter and nutrients in the topsoil and subsoil horizons will assist in improving soil texture and structure and reduce the effects of sodicity. A carefully managed grazing land use is likely to have significant benefits for the long-term stability of the constructed mine landform that could include recycling nutrients through the soil profile (RGS, 2022).

Quality Assurance and Quality Control Key risks associated with final landform construction include a failure to follow the design, construction materials not conforming to specifications, poor or inadequate construction quality and the failure of quality assurance and quality control (QA/QC) to identify construction inadequacies.

Final landform construction management, technical supervision and QA/QC will be done by an AQP who can make sure that construction is carried out in accordance with the design plan. A QA/QC document will be prepared by an AQP to verify that the final landform design has been done in accordance with the design plan and is stable as per the PRCP.

An AQP will conduct visual inspections of water, soil, vegetation and infrastructure effects on and / or at relevant areas to evaluate indicators and assess conditions. The inspection will consider signs of erosion, tunnelling and / or accelerated runoff on the OOPDs and other ex-pit stockpiles and landforms.

Inspection for seepage, and if seepage is observed, the specific location and flow rate will be recorded, and a sample collected for water quality analysis.

These inspections will occur on a routine basis and as soon as reasonably practicable after a significant rainfall event.

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3.5.1.7 Water Management

BME operates under a Water Management Plan (WMP) and Groundwater Monitoring and Management Plan (GMMP) as required by relevant conditions of the EA. These management plans address water extraction, consumption, use and management of water at the Mine in accordance with EA0002465. Relevant operational monitoring and management measures from these plans will be continued into the post closure phase as described in this section.

The main types of water that require management in the post-closure phase are:

- Clean water (natural rainfall and runoff of clean catchments that has not come into contact with final landforms and rehabilitated areas); and
- Sediment water (runoff from landforms being reshaped to the final design and rehabilitation that is not yet established).

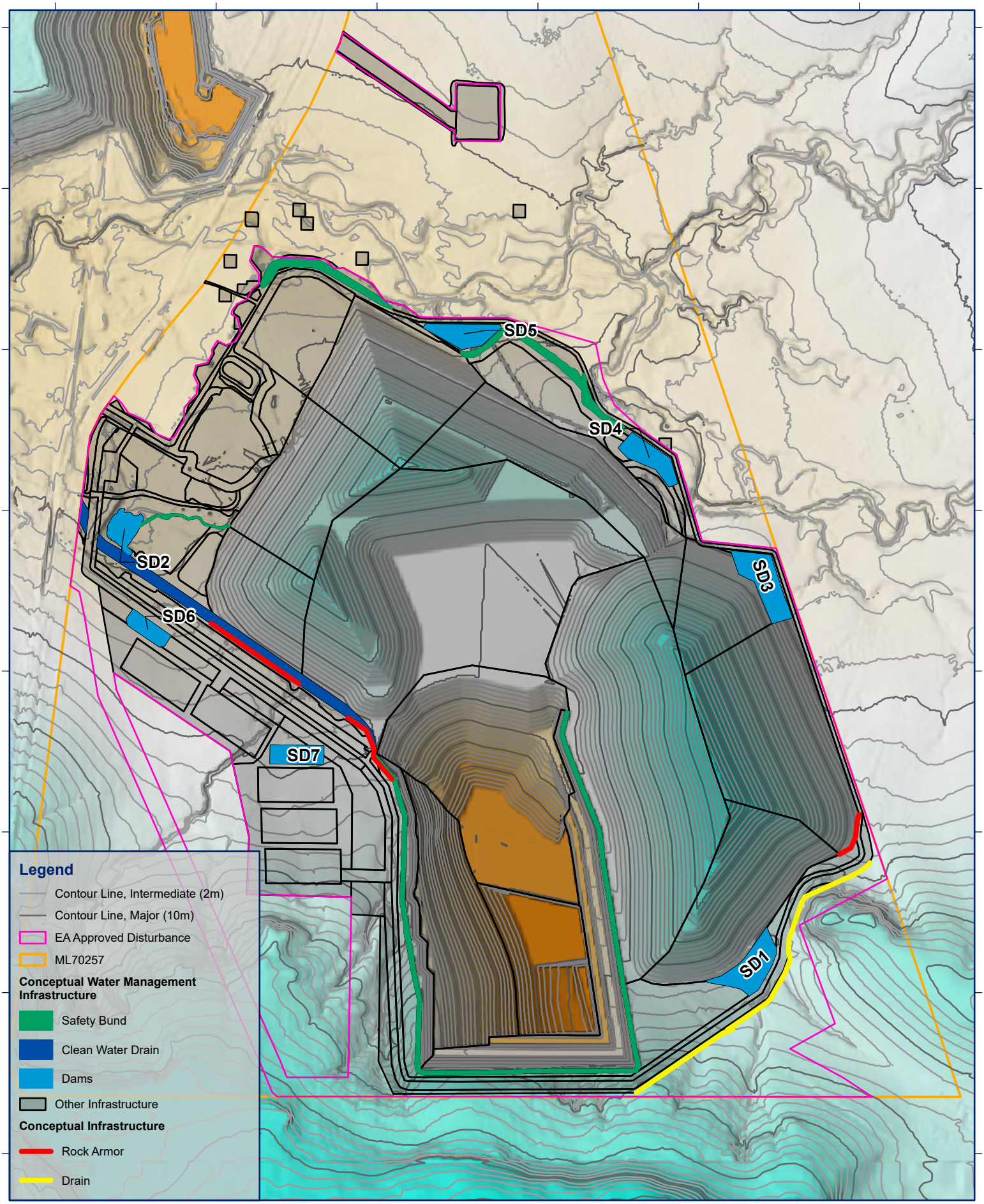
The water quality release trigger limits within the surface water schedule of the EA are based on regional EVs and WQOs for aquatic ecosystem protection in the Isaac River Sub-basin. As these are the most conservative values that can be applied to monitor potential harm to the receiving environment in the event of any release or run-off from the Mine, these have been retained as milestone criteria.

The MAW dams and flood protection levee required during operation will be rehabilitated during the initial reshaping to final landform design that will occur in the first two years post closure. Operational water management infrastructure relevant to rehabilitation and closure will be retained up to five years post closure until the target vegetation cover is achieved. Rock armouring will be established in some locations along OOPD toes to control for water velocity during modelled flood events. An overview of the water management infrastructure that will remain at the Mine during the initial rehabilitation and closure activities is shown in **Figure 3-55** and described below:

- Sediment Water Storages
  - Sediment Dam 1 – 12 ML
  - Sediment Dam 2 – 10 ML
  - Sediment Dam 3 – 20 ML
  - Sediment Dam 4 – 12 ML
  - Sediment Dam 5 – 12.0ML
  - Sediment Dam 6 – 10 ML
  - Sediment Dam 7 - 10 ML
- Drainage network:
  - Clean water diversion drain - west; and
  - Clean water diversion drain – southeast.
- Diversion bunding:
  - Diversion/safety bund around the northern tip of the final landform adjacent to Hat Creek; and
  - Diversion/safety bund and fence around the south end of the final landform to prevent flood ingress.
- Rock armour:
  - OOPD west outer face; and
  - OOPD east outer face.

Contaminants generated during operations (sludge) will be removed from all sediments dams and encapsulated during the first two years of landform reshaping to final design. When the appropriate amount of vegetation cover is achieved on sloped batters, sediments dams will be gradually removed, and the footprint rehabilitated. Sediment dams associated with topsoil storage areas will be among the first to be rehabilitated post closure after all topsoil has been spread across the reshaped landforms and the hardstand areas that hosted topsoil storage are ripped and seeded.

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Scale: 1:15,000
Projection: GDA2020 MGA Zone 55
Created/Reviewed By: AW/MRT
Aerial & Data Source: Minserve

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PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Post Closure Water Management	
Figure 3-55 | ADV-AU-00217 | September 2023	

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Contaminants – Description, Source, Pathway and Fate

Sources of potential water contamination, description of contamination, fate and containment strategies identified in the WMP that will remain relevant post closure, particularly during the first two years of major reshaping activities to the final landform design are outlined in **Table 3-36** During the first year of post closure rehabilitation most contaminated land at the MIA, predominately associated with the ROM, will be removed and the footprint rehabilitation to a reduced staging area for heavy equipment and offices associated with final landform reshaping activities. The area will contain a go-line for heavy vehicles and equipment, light vehicle parking, a workshop, fuelling area, office and ablution blocks required for a small team of operators. Contaminants associated with these activities are considered in **Table 3-36**, along with any potential residual impacts from recently rehabilitated operational relevant activities such as the ROM or MAW dam.

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Table 3-36 Potential Surface Water Contaminants

Source	Description of Contaminants	Potential Fate	Environmental Value at Risk	Containment Strategy
Surface Runoff from Disturbed Areas	Disturbance activities for the Mine operations include a mining pit, out of pit dumps, topsoil storage area, mine infrastructure hardstand areas, access and internal roads. Runoff from these areas could contain sediment and other contaminants above natural surface water runoff concentrations.	▪ Contamination of stormwater and receiving environment. ▪ Runoff from cleared areas, overburden dumps or roads that would be expected to have elevated sediment load. ▪ Runoff from mine pit walls that may contain contaminants in addition to sediment (e.g., dissolved salts, metals, hydrocarbons and nutrients etc) – i.e. Mine Affected Water. ▪ Enter surface water drainage lines and reduce holding capacity of storage dams.	▪ Aquatic ecosystems. ▪ Livestock water.	▪ MIA isolated from the receiving environment via drainage system which drains to mine water storage dams (no release). Most contamination will be removed in the first year of post closure rehabilitation activities and the MIA will be reduced to a staging area for associated heavy equipment. ▪ Piping and pumping systems monitored and maintained to ensure no leakages to ground. ▪ Maintain appropriate water levels in storages that remain post closure. ▪ Implement Erosion and Sediment Control Plan. ▪ Water Monitoring.
Groundwater Ingress	EC between 3,080 – 48,600 µS/cm.	Potential for elevated salinity concentrations to impact surface waters (although EC of groundwater ingress is generally below the adopted WQO for livestock watering).	▪ Aquatic ecosystems. ▪ Livestock water.	▪ Flow meter installed to measure the volume of water taken during dewatering. ▪ Groundwater monitoring.
Chemical and Hydrocarbon Storage	Spills and contamination by metals and hydrocarbons, waste disposal, fuel, sediment, or other chemicals.	Impact soil, surface waters (run-off) and groundwater.	▪ Aquatic ecosystems. ▪ Soil quality	▪ Sumps to collect hydrocarbon runoff and direct oil/water separator. ▪ Adequate bunding. ▪ Spill kits. ▪ Personnel training. ▪ MIA isolated from the receiving environment via drainage

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Source	Description of Contaminants	Potential Fate	Environmental Value at Risk	Containment Strategy
				system which drains to mine water storage dams (no release). ▪ Recovered oil removed from site by a licenced regulated waste disposal contractor.
Effluent	Increased nutrients.	▪ Irrigated to land. ▪ Impact to human health.	Aquatic ecosystems.	▪ Monthly monitoring of effluent quality. ▪ Separation distance requirements from groundwater bores and surface waters. ▪ Disposal of Sewage Treatment Plant sludge removed by licenced waste contractor. ▪ Maintenance and integrity testing will be completed for all sewage related infrastructure at the required frequency. ▪ Contingency allowed for sewage storage before its disposal.

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Infiltration and seepage intervention and collection controls

The potential seepage sources at the Mine post closure are the rehabilitated OOPDs and site water storages (sediment dams). While the MAW water storages will be rehabilitated during initial stages of post closure reshaping, including the removal or use of MAW, potential residual impacts will continue to be monitored post closure. As the Southern void has been defined as a 'sink' in water modelling studies as described in **Section 3.5.1.1** it is not considered a source of potential seepage to the surrounding environment that requires controls.

As described in **Section 3.5.1.6** only one reject cell has been constructed and appropriately encapsulated in the West OOPD. Any potential seepage issues associated with this will be captured in post closure monitoring activities associated with this relevant activity as described in **Section 3.7**.

The potential sources of seepage are not considered significant enough to warrant the establishment of post closure seepage controls.

Surface water diversions and long-term management requirements

The majority of the undisturbed clean water catchment upstream of the Mine footprint (in the south) will be directed around the mine via a diversion drain. Clean water overland flow water will be diverted away around the south-eastern end of the eastern out of pit dump where the topography allows.

As the northern extent of the mining footprint is located within the pre-mining 1 in 1,000 year flood extent, a safety/diversion bund will be established around the final landform which will predominately include the recently backfilled North pit after it is no longer required for the storage of MAW.

To protect the final landform against the various flood modelling scenarios, a diversion bund is proposed to be constructed around the southern end of the final landform. Rock armoring will also be established at some locations around the base of the OOPDs as identified in the rehabilitation flood study to mitigate any impacts from the predicted velocity of floodwaters around the final landform (**Attachment F**).

Dewatering requirements

Mine water storages will be used to contain surface water runoff and groundwater ingress collected within the mining pit and runoff from the MIA area during operations. These structures will be managed during operations in accordance with relevant EA conditions and management plans. The operational mine water strategy is flexible, whereby it continuously reviews the monitoring and management strategy for accumulated mine water to ensure there are no uncontrolled overflows. These learnings will transfer to the post closure monitoring and management strategy. Operational water storages not required during the post closure stage, such as the MAW Dam and North Pit, will be dewatered and rehabilitated towards the end of operations or shortly after the cessation of mining during the final landform reshaping stage.

Dewatering activities required post closure are only required for the sediment dams that will remain until the appropriate amount of vegetation is established on the final landform. These will be dewatered after significant rain events to maintain the designed capacity for sediment runt off capture. Water will be tested and treated prior to any releases to ensure compliance with relevant milestone criteria.

The southern void will be constructed as a water storage PMLU with no dewatering necessary.

Ongoing water management and reduction requirements

Table 3-37 outlines the range of management strategies proposed to mitigate potential adverse environmental impacts on water resources throughout the receiving environment post-closure.

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Table 3-37 Ongoing Water Management Strategies and Reduction Requirements

Mitigation/Monitoring Measure	Function
Diversion of clean water overland flow catchments around rehabilitated areas	▪ Diverting the clean water overland flow catchments (particularly from the south) around the mine footprint reduces the Mine's impact on streamflow in the receiving waterways and reduces the potential accumulation and contamination of natural surface runoff. This diversion of clean water overland flow catchments throughout the life of mine has minimised the reductions and impacts to streamflow and environmental values within the receiving waterways (including livestock watering). This will be maintained for the final landform. ▪ The diversion of clean water also therefore meets the intent of the Environmental Protection Policy (EPP) (Water and Wetland Biodiversity) objective to reduce use of water and/or production of wastewater or contaminants.
Progressive rehabilitation	▪ Progressive rehabilitation will ensure runoff from disturbed areas continuously improves and progresses back towards clean water runoff, minimising mine and sediment water inventories. In this way, potential contamination of natural surface runoff will be continuously reduced during the LoM as rehabilitation is established.
Erosion and sediment controls for treatment of sediment runoff	▪ Erosion and sediment controls will be implemented during appropriate stages of rehabilitation under an Erosion and Sediment Control Plan to prevent/minimise erosion and ensure effective sediment control. A key strategy to achieve this is the drainage or diversion of clean water runoff around rehabilitated areas. The retention and use of sediment basins post closure have been proposed to ensure sediment water runoff from areas recently reshaped to the final landform is captured until vegetation has been successfully established. ▪ As the only expected contaminant of concern is suspended solids (sediment), sediment laden water would be managed by erosion and sediment controls. The sediment dams have been sized and designed in accordance with the International Erosion Control Association (IECA) guidelines to conservatively capture an 85th percentile 5-day rainfall event. Post closure monitoring includes visual inspections for evidence of seepage of these structures.
Spill response and containment	▪ The appropriate operational emergency and incident response procedures will be in place during the post closure reshaping stage to continue to ensure that any spills or leaks of contaminated substances do not contaminate surface waters. ▪ The continued management of any required fuels and hydrocarbons in accordance with AS1940 will ensure there are effective means of secondary containment to prevent or minimise releases to the environment. ▪ The emergency and incident response procedures will also therefore support the intent of the EPP (Water and Wetland Biodiversity) objective for prevention of wastewater or contaminants into waters.
Controlled release strategy	▪ Sediment dams have been sized such that there are no modelled uncontrolled releases. Controlled releases will be based on water quality results before and after the application of treatment such as flocculant. In this way, the design and sizing of the mine water infrastructure meets the intent of the EPP (Water and Wetland Biodiversity) objective to reduce use of water and/or production of wastewater or contaminants.
Use of mine and sediment water for dust suppression demands	▪ Any water dewatered from the MAW or North pit prior to rehabilitation will be used preferentially for dust suppression. Sediment water will also be used opportunistically. The use of this water minimises the volume of external water supply requirements for rehabilitation activities. ▪ The use of accumulated water for site dust suppression demands also therefore supports the intent of the EPP (Water and Wetland Biodiversity) objective for prevention of wastewater or contaminants into waters.
Final landform design	▪ The final landform has been designed to minimise stored inventories within the final void to minimise impacts on water resources post-closure. In addition, the final landform will continue to provide flood control to reduce flood ingress from Hat Creek onto the recently rehabilitated areas.

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Proposed Management Measures to Meet the PMLU

In addition to those strategies outlined in **Table 3-37**, routine monitoring of the water infrastructure will be developed and documented within the Water Management Plan and will include visual inspections for evidence of seepage.

3.5.1.8 Revegetation

As discussed in **Section 3.3**and shown in **Figure 3-56**. The primary PMLU proposed for this Project will be grazing. This land-use reflects one of the most common pre-mining land-uses of the surrounding region, not associated with mining activities. A review of historical aerial imagery indicates that broad acre clearing of native vegetation in the region surrounding the ML commenced sometime between 1966 and 1978, after which cattle grazing and mining activities took over as the dominant land uses. Considering this, the Proponent has elected to revegetate all operational areas (except those designated as water storage for the purpose of livestock watering) using pasture species to best achieve the low-intensity grazing PMLU.

Revegetation Objectives

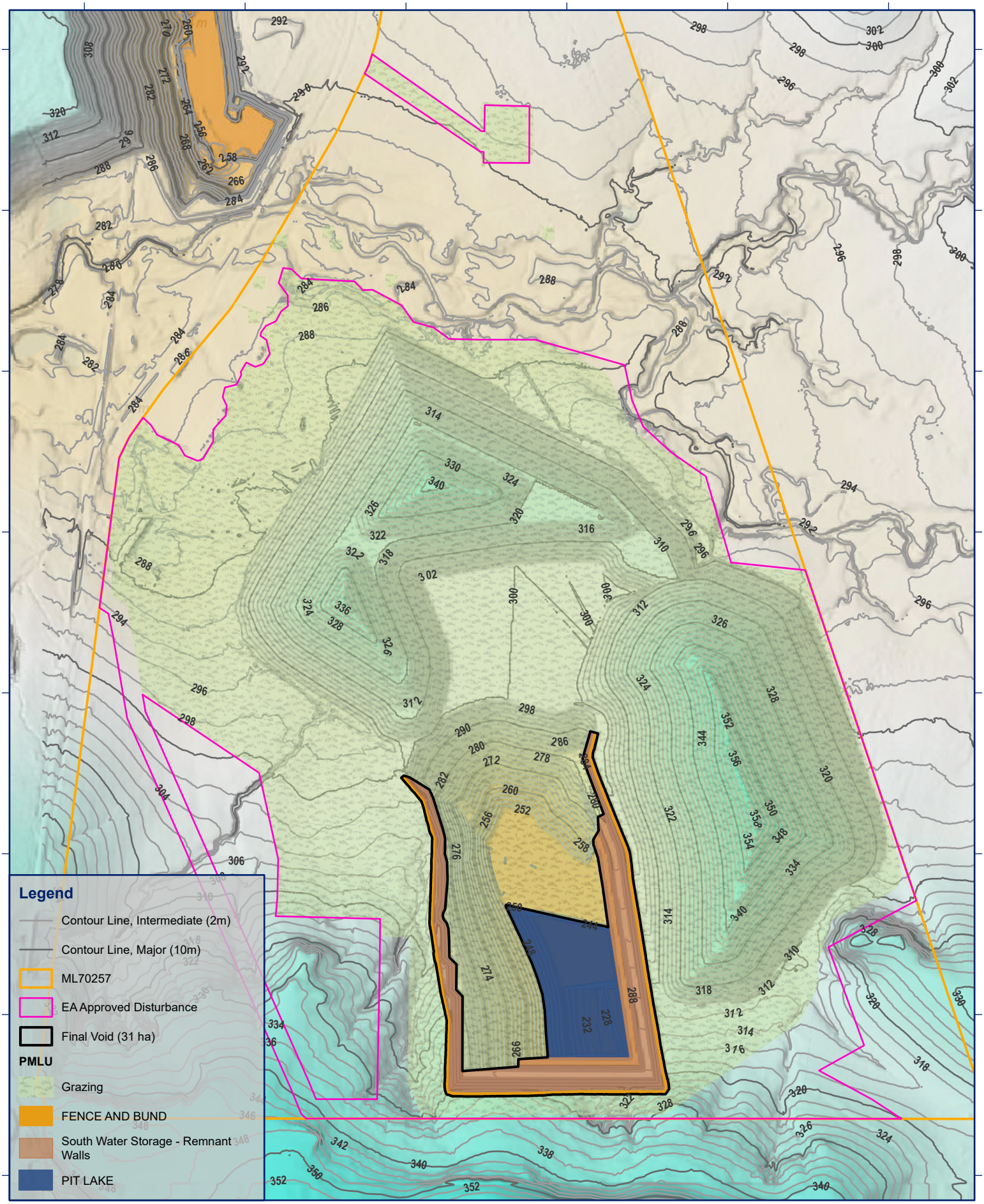
To help ensure the low intensity grazing PMLU is achieved, the Proponent has developed revegetation objectives (**Table 3-38**) consistent with the relevant rehabilitation milestones identified in the PRC Plan schedule. **Figure 3-56** illustrates the revegetation to milestone completion criteria.

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Table 3-38 Revegetation Objectives

Rehabilitation Area/s (Domain)	Revegetation Objective	Indicator	Completion Criteria
RA1: Reshaped Final Landform **RA2:** Mine Infrastructure **RA3:** Water Infrastructure **RA4:** Roads and Access Tracks **RA5:** Exploration	▪ Achieve PMLU of low intensity grazing. ▪ Adequate revegetation and aquatic species richness. ▪ Littoral zone increases and linkages with terrestrial vegetation. ▪ Adequate revegetation and connectivity to the surrounding landscape including into the final voids.	▪ Revegetated with native or introduced pasture species to control erosion. ▪ Self-sustaining, resilient pasture can support cattle grazing. ▪ Nutrient cycling in grazing pasture. ▪ Declared weed populations in rehabilitated areas do not compromise the intended post-mine land use of grazing.	▪ Groundcover 60% perennial pasture biomass. ▪ Less than 5% of declared weeds (excluding *Parthenium* weed-*Parthenium hysterophorus*) ▪ Land Class suitability 4 for grazing. ▪ Abundance of declared weeds is less than reference sites. ▪ No active areas of rill or gully erosion and drainage follows the appropriate drainage paths. ▪ Resilience to fire and drought. ▪ Soil nutrient concentrations and nutrient cycling comparable to reference sites.
RA6: Southern Void Water Storage	▪ Domain supports intermittent cattle watering hole. ▪ Adequate revegetation and aquatic species richness. ▪ Littoral zone increases and linkages with terrestrial vegetation. ▪ Structurally sound at time of handover.	▪ Water available to cattle as an intermittent water supply when grazing in the vicinity. ▪ Cattle able to source water safely and intermittently throughout the year when grazing. ▪ Declared weed populations do not compromise the intended post-mine land use.	▪ Certification by an AQP that verifies the long-term stability and hydraulic adequacy of void lake. ▪ Battered slopes with 60% vegetation cover as per the closure and revegetation plans. ▪ Structural, geotechnical and hydraulic factors based on the physical and chemical characteristics of the site. ▪ Spoil shaped to connect to the surrounding landscape where possible. ▪ No active erosion. ▪ The void lake water is suitable for stock watering as per Australian and New Zealand Guidelines for Fresh and Marine Water Quality (the Guidelines). ▪ Sign off by post-mining landholder accepting the structural integrity and ownership of void lake.

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Scale: 1:15,000
Projection: GDA2020 MGA Zone 55
Created/Reviewed By: AW/MRT
Aerial & Data Source: Minserve

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RPMGLOBAL

PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Revegetation to Milestone Completion Criteria	
Figure 3-56 | ADV-AU-00217 | September 2023	

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Key Flora Species for PMLU

Pasture species – low intensity grazing

The proposed key flora species and seed mix ratios (**Table 3-39**) have been selected for their overall performance as seeded pasture species, drought tolerance and ability to become quickly established. While these are the preferred pasture species, seed availability at the time of rehabilitation activities will also need to be considered and adjustments may be made based on rehabilitation monitoring results. Pasture seeds will be sourced from a local supplier wherever practical to optimise results, as locally occurring genetic material is more likely to become established and survive under local climatic and soil conditions.

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Table 3-39 Pasture species mix for grazing PMLU

Common Name or Variety	Scientific Name	Indicative Seed Mix Percent	Species Description
Buffel Grass	*Cenchrus ciliaris*	40	Adapted to a range of soil textures and very persistent on lighter-textured soils. The most drought tolerant introduced grass, and is mainly used as a permanent pasture. Quick to respond after relatively small falls of rain. Aggressive coloniser.
Creeping Bluegrass	*Bothriochloa insculpta*	20	Widely used as a cultivated species, especially in Australia, and naturalised globally in the tropics and subtropics. Tolerant of dry conditions and responds quickly to rain. Successful coloniser due to its tolerance of low fertility soils and regular cattle grazing. Has an ability to produce significant yields of seed.
Rhodes Grass	*Chloris gayana*	10	Used as a permanent or annual pasture species which can be used (in medium-term pastures) to restore soil structure, improve organic matter levels, and reduce nematode numbers. Develops good ground cover and effectively controls erosion once established.
Japanese Millet	*Echinochloa esculenta*	5	Annual grass that is often grown as forage where it can produce up to 4 t/ha. Considered to be a weed-suppressing cover crop that can grow up to 1.2 m in 45 days. Fast-growing and fibrous root system makes it a good plant for controlling erosion.
Sabi Grass	*Urochloa mosambicensis*	20	Drought-resistant, palatable pasture grass that can establish rapidly forming ground cover. Moderate salinity resistance. Grows on different soil types over a range of fertility levels, is tolerant of heavy grazing, and produces an abundance of seeds.
Seca Stylo	*Stylosanthes scabra*	5	Perennial pasture legume commonly associated with other sown and native grasses. Extremely drought hardened and is well adapted to infertile or hard-setting, sandy-surfaced soils. As a legume, this species is also able to fix Nitrogen (N) and cycle it back into the soil for other pasture species to utilise.

Species of conservation significance

Vegetation communities and fauna species of conservational significance on the ML were discussed in **Sections 3.1.1.8** and **3.1.1.9**. The MNES and MSES biodiversity values determined for the are summarised in **Table 3-40**.

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Table 3-40 Species of conservational significance relevant to Project's approval

Species of Conservation	Type of Matter	Details
Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community (TEC)	MNES	Patches of remnant and high-value regrowth Regional Ecosystem (RE) 11.9.5 on the northern side of Hat Creek and in the southeast corner of the ML. (**Figure 3-16**). Mine plan updated to avoid the Brigalow TEC, hence the project will not have any impacts on patches of Brigalow TEC. Listed as Endangered (EPBC Act).
Squatter Pigeon (southern) (*Geophaps scripta scripta*)	MNES, MSES	Suitable breeding, foraging and dispersal habitat within the Project area based upon the distance from permanent water sources (**Figure 3-22**). BME has an approved high-risk Species Management Plan (SMP) for tampering with protected animal breeding place in Queensland and has specific management actions for the Squatter Pigeon. Listed as Vulnerable (EPBC Act and NC Act).
Greater Glider (*Petauroides volans*), Northern greater glider (*Petauroides volans minor*)	MNES, MSES	Suitable habitat identified along the riparian corridors of Hat Creek and Teviot Brook (**Figure 3-21**) which will not be impacted by the project. Large patches of remnant vegetation can still be utilised for foraging and breeding by the species. Listed as Vulnerable (EPBC Act) and NC Act (northern greater glider).
Koala (*Phascolarctos cinereus*)	MNES, MSES	Several REs (11.5.9c/11.5.3 and 11.5.3) were identified as providing suitable habitat for this species including (**Figure 3-21**). Activities may contribute to fragmentation of habitat through clearing, however, large patches of remnant vegetation can still be utilised for foraging and breeding by the species. Listed as Endangered (EPBC Act) and Vulnerable (NC Act).
Short-beaked echidna (*Tachyglossus aculeatus*)	MSES	Activities will reduce terrestrial refugia and potential for vehicle strikes however the entire ML determined to be suitable habitat for the species. Listed as a Special Least Concern (NC Act).
Ornamental Snake (*Denisonia maculata*)	MNES, MSES	Several REs including the riparian corridors along Hat Creek and Teviot Brook (RE 11.3.25) and the Brigalow TEC communities (RE 11.9.5) were identified as providing suitable habitat for this species (**Figure 3-21**) which will not be impacted by the project. Large patches of remnant vegetation can still be utilised for foraging and breeding by the species. Listed as Vulnerable (EPBC Act and NC Act).
Rainbow Bee-eater (*Merops ornatus*)	MNES	Observed within the ML on two separate occasions with potential breeding and nest construction associated with RE 11.3.25 (**Figure 3-16**). Entire ML identified as potential habitat for this species, with several possible burrows identified along the riparian corridor of Hat Creek which will not be impacted by the project. Listed as Marine and Migratory (EPBC Act).
RE 11.9.5 *Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks	MSES	Remnant and regrowth patches will be avoided by project layout. RE 11.9.5 is listed as an Endangered RE (VM Act class/Biodiversity Status) under the Vegetation Management Act 1999 (VM Act) (**Figure 3-16)**
Native Frangipani *(Cerbera dumicola)* population	MSES	Large population has been mapped in the southern portion of the ML in RE 11.7.2 and 11.7.3 (**Figure 3-16**). BME have developed an Impact Management Plan (IMP) for *Cerbera dumicola*. It contains management measures to protect remaining *C. dumicola* population and habitat for the species in the ML. Listed as Near Threatened (NC Act).

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Fauna habitat and use requirements

Table 3-9 and **Figure 3-22** to **Figure 3-23** identify suitable habitat for species of conservational significance within in ML. Significant impact assessments undertaken as part of the baseline ecology assessment determined that the Project would not have a significant impact upon any of the conservation significant species listed in **Table 3-40** (Nitro Solutions, 2021).

Based upon observations made in the Baseline Ecology Assessment (Nitro Solutions, 2021), the assigned low-intensity grazing PMLU areas will likely be used as dispersal habitat for resident Squatter Pigeon (*Geophaps scripta scripta*) populations identified within the ML. The lack of tree species within these revegetated areas means they are unlikely to be suitable as primary foraging habitat (DOE, 2022) however, Squatter Pigeons may move through these areas to get to nearby foraging and/or breeding habitat.

As Hat Creek will not be interfered with, no vegetation or fauna species reliant on the riparian corridor will be impacted by the relevant activities during mining or post-closure.

Analogue sites of the monitoring plan

Analogue (or reference) sites within the ML have been selected for their ability to represent the desired vegetation PMLUs as determined by EA0002465 and in consultation with the underlying landholder (i.e., low intensity grazing). Monitoring of analogue sites, in comparison to rehabilitation monitoring sites, will help to confirm if the PMLU completion criteria has been achieved.

Three vegetation related (low intensity grazing) analogue sites were selected across the ML to ensure monitoring results could be considered statistically relevant, whilst one water storage was deemed suitable.

The Project is dominated by sparse open vegetation communities, which have been historically cleared. Post-clearing the land has predominantly been used as pastoral grazing (SGM, 2021)). Low intensity grazing PMLU (analogue) monitoring sites (PRC_MS_1, PRC_MS_2 and PRC_MS_3) were selected because the land is currently used for grazing by the underlying landholder, is outside of active mining areas and is representative of impacted baseline vegetation communities.

The water storage PMLU (analogue) monitoring site (PRC_MS_4) was selected because the underlying landholder currently utilises it as a watering hole for livestock on the ML.

Section 3.7.1.1 provides further details of the proposed analogue monitoring sites, whilst **Figure 3-61** illustrates their location.

Growth media to sustain the PMLU

As described in **Section 3.1.2.3**, the initial stages of mining will see overburden dumped out of pit, however when sufficient dump room becomes available in 2024, backfilling in-pit will occur in the northern pit areas (in line with the surrounding topography) as the mine progresses in a southerly direction.

Baseline soil studies indicate that there will be sufficient topsoil and subsoil for landform rehabilitation if the recommended stripping depth has been achieved across the disturbance footprint (**Section 3.5.1.3** and **Table 3-28**). To ensure growth media will sustain the PMLU, mine material characterisation will be continually assessed throughout the mine life as will the analysis of soils prior to rehabilitation to determine if soil amendments (ameliorants or fertilisers) are required.

Requirements for revegetation success and sustainable PMLU

The soil stripping, stockpiling and application process is detailed in **Section 3.5.1.3**.

Generally, all soil will be applied to a thickness of 0.3 m to provide enough depth for ripping and plant growth.

Grass species will be chosen to suit the grazing strategy and include species that are suitable for fast establishment of cover growth. The proposed seed mix to achieve low intensity grazing is provided in **Table 3-39**.

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As discussed in the *Heritage Seed Perennial Pasture Guide* (Perennial Pasture Guide, 2017), it is recommended that for medium rainfall sites (475 – 625 mm of annual rainfall), that seed application rates for pasture species be approximately 20-25 kg/ha. Long-term climatical monitoring data collected from Moranbah suggests that the Project area sits within this range as the average rainfall experienced by the Mine and surrounding region is approximately 600 mm (Moranbah Water Treatment Plant: 034038) (Nitro Solutions, 2021).

This pastoral seed mix will be sown using a conventional tractor mounted seeder to a minimum depth of 30 mm, as recommended in the *Perennial Pasture Guide*.

The optimal timeframe for sowing should be from late August to early October each year to coincide with the onset of the wet season experienced in the local region. If vegetation growth appears to be limited four weeks post-germination, the application of Monoammonium P, Diammonium P or equivalent fertiliser will be considered (SGM, 2021). Ameliorants and fertilisers are detailed further in **Section 3.5.1.3**.

It is proposed that rehabilitated areas will be protected from cattle grazing for at least two seasons to ensure pasture establishment.

Monitoring of revegetation will be undertaken as per **Section 3.7.2** which will determine if the management of revegetation is adequate to achieve low intensity grazing PMLU or if intervention is required (i.e., contingency strategies).

Infrastructure Required to Protect Revegetation

Temporary cattle fencing will be installed to protect recently rehabilitated areas until the appropriate amount of vegetation has been established to allow cattle grazing. Permanent fencing will be installed around the Southern void, to control cattle interaction after closure.

Proposed Management Measures to Meet the PMLU

The following management measures will be adopted to ensure revegetation objectives (as stated earlier in this section) for a low intensity grazing PMLU to be achieved and that minimal impact to flora and fauna species of conservational significance occurs:

- Adherence to RPM as required by Condition G11 of EA0002465 prior to approved transition to the PRCP schedule;
- Minimise vegetation clearing where possible in the disturbance footprint;
- Topsoil and subsoil resources recovered, stockpiled and applied as per **Section 3.5.1.3** to ensure adequate growth media is available to sustain revegetation to PMLU;
- Amendment of soil (fertilisers or ameliorants) undertaken when required to support revegetation;
- Proactive weed and pest management (as per BME Weed and Pest Management Plan) to reduce impacts on establishing vegetation and habitat required by species of conservational significance;
- Once areas have been seeded, they will be temporarily fenced to prohibit premature grazing and damage by cattle and pest animals before the establishment of vegetation; and
- Implementation of monitoring program and contingency strategies for biodiversity, land capability and water as per **Sections 3.7.2.1**, **3.7.2.2** and **3.7.2.3** of this PRC Plan.

3.5.2 Tailings Storage Facilities

The relevant activities covered in this PRCP do not include a Tailings Storage Facility (TSF). Coal processing occurs offsite, with only one reject cell having been constructed and encapsulated to date which is discussed in **Section 3.5.1.6**. Rejects now remain at facility where coal is currently processed, which is subject to a separate PRCP process.

3.5.3 Voids

By the end of mine life, there will be one residual void in the southern end of the pit (referred to as the Southern void). The northern portion of the pit will be partially backfilled and kept available for use as bulk water storage during operation. This landform will be filled to the surrounding topography at the end of mine life when bulk water storage is no longer required. The southern void will be constructed as a water storage

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for the purpose of livestock watering PMLU subject to the Residual Void (Southern void) Design and Closure Plan required by Condition G8 of the EA whose information requirements will be transitioned into the PRCP.

3.5.3.1 Void Minimisation, Final Dimensions and Slopes

North pit

The 2021 final landform design that informed the original EA approval process initially included retaining a rehabilitated and minimised North Pit at the end of mine life as currently approved in Tables G1 and G2 of the EA. Given the original final void water balance study (conducted in 2021) (Engeny, 2021) identified that this part of the final landform may become a source of groundwater contamination in extreme climate scenarios, the Proponent agreed to backfill above the baseline groundwater level understood to be 270 mAHD through numerical modelling. As a result of this commitment, the outcome criteria for the North pit in Table G2 currently includes the backfill level of 270 mAHD. This level was modelled in the 2023 final void water balance model (WBM) that informs this PRCP submission to confirm if backfilling to above 270 mAHD for the North pit would ensure it does not become a source of groundwater contamination in any climatic scenario and would predominately not retain water. As the first iteration of the 2023 final void WBM confirmed the criteria for this part of the final landform could not be met, the Proponent has redesigned the final landform with the North pit backfilled to the surrounding topography (284 to 286 m AHD) at the end of mine life when it is no longer required for bulk water storage of MAW. As such, the North pit has effectively been minimised and is no longer considered an environmental risk post-closure.

Southern void

The final void has been designed to meet criteria from the LOD, being Table G2 of the EA. **Table 3-41** combines the criteria of the EA with the information requirements of the PRCP guideline for voids.

Table 3-41 Southern Void Dimensions and Criteria

Void aspect	Dimension
Overall slope	15%
Vertical distance between berms	20 m
Berm width	5 m
Highwall and end wall slope (*Final pit walls (Competent material)*)	70 degrees
Highwall and end wall slope (*Final pit walls (Incompetent material)*)	45 degrees
Low Wall slope *(Final pit walls (Incompetent material))*	45 degrees
Low wall Spoil slope (*Underwater slopes*)	Angle of repose 37 degrees
Void maximum surface area	31 ha
Void maximum depth	105 m
Low wall length	1050 m
End wall length	700 m
Highwall length	1200 m
Maximum void lake equilibrium level	Will not reach 300 m AHD
Drainage direction	Into the void

The remnant high and low walls will form part of the water storage for livestock watering PMLU. Coal seams will be capped, and the pit floor below the wall will be rehabilitated to the grazing PMLU. The incompetent material will be left at a safe and stable angle of 45 degrees or less and competent rock at 70 degrees or less, subject to final geotechnical assessment. In-pit final spoil will be reshaped to overall slopes of 15% to allow grazing down to the approximate long-term water recovery level below the natural surface. This minimises the final void size to better meet the PMLU criteria. Access roads used for final rehabilitation activities will be reshaped and remain in place for future rehabilitation monitoring. The Proponent will continue to engage with the pastoral leaseholder on retaining these tracks to support usage and maintenance of the water storage. A safety bund and fence will protect the void from uncontrolled access by cattle. A gate will be installed at a controlled access point that can support light vehicles and minimal cattle access.

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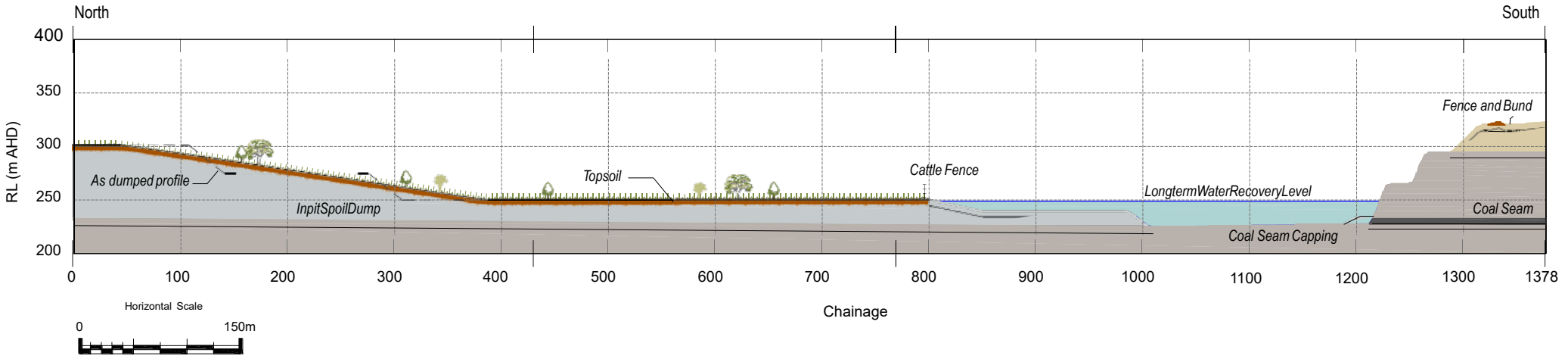
Figure 3-57 and **Figure 3-58** show how the final void will look at the end of rehabilitation works to meet the PMLU criteria for water storage for the purpose of livestock watering (**Table 3-41**). The revised final landform design has retained the criteria from Table G2 of the EA, apart from backfill to above the groundwater level, which is subject to approval by the administering authority in a simultaneous EA amendment process based on the findings from the 2023 hydrogeological study (KCB, 2023) that defines the void as a sink.

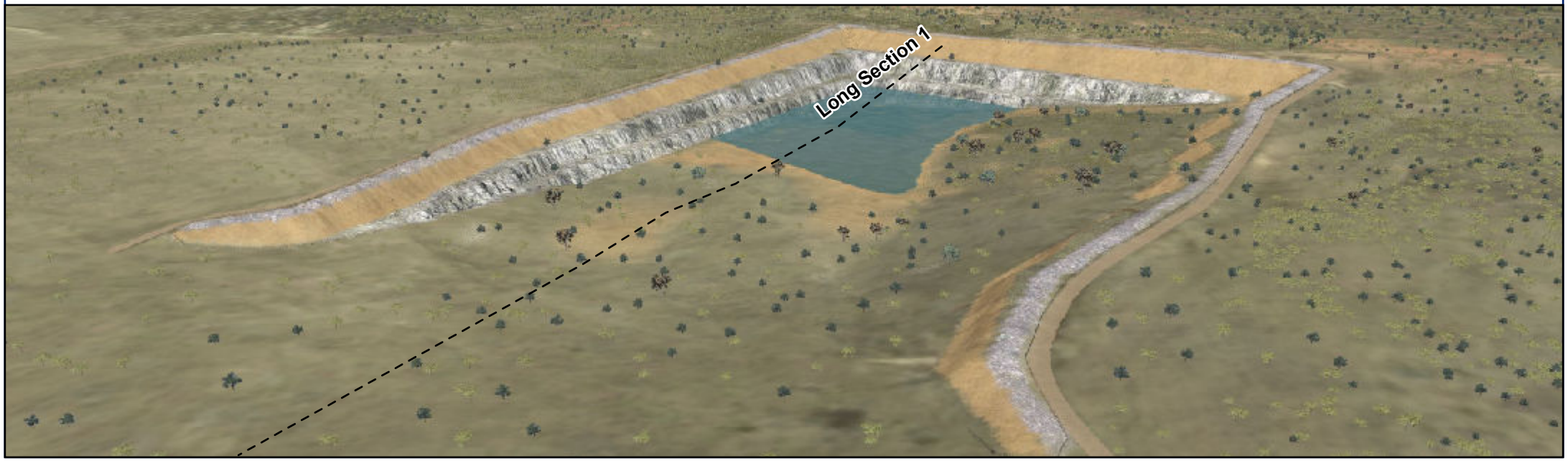
The 2023 mine plan has been developed iteratively, with ongoing inputs from groundwater and surface water specialist studies being simultaneously conducted. Partial backfill of the Southern void will be undertaken as part of mining operations to minimise the void to 31 hectares before its rehabilitation to the PMLU of water storage for livestock watering. The resultant end of mining in-pit dump position will allow for reshaping that both maximises the area with slopes of 15% or less and minimises the total void size to 31 hectares.

No other water retaining pits/voids are proposed at the closure of BME.

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Long Section 1 - Final Void Section | Viewed Looking East





Source: Map My Mine & Minserve

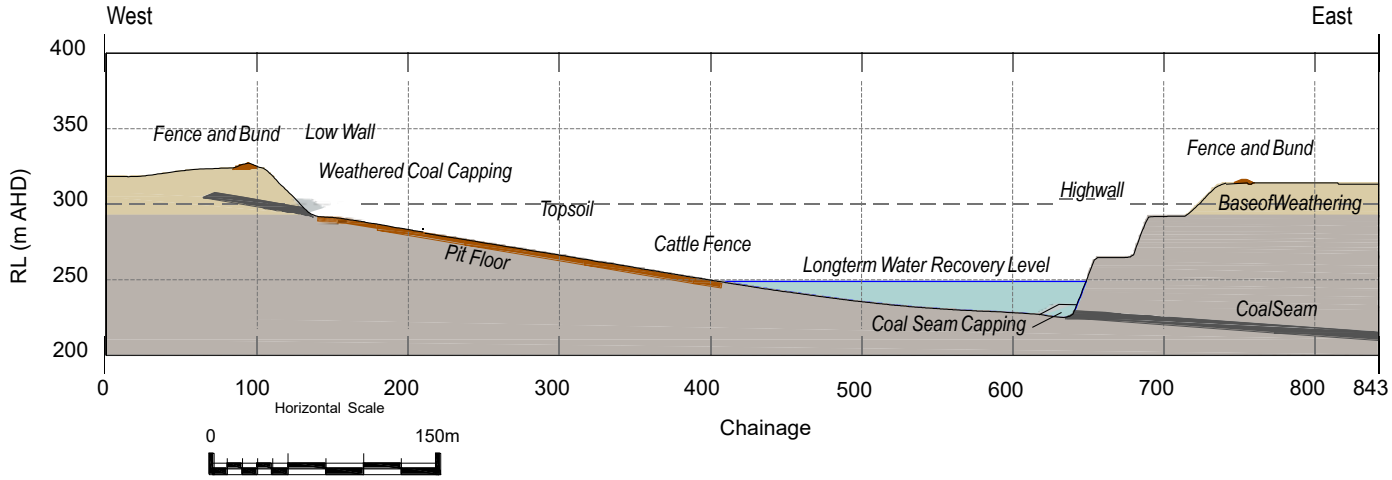
PROJECT		CLIENT
September 2023	BME Mine - PRCP	BOWEN COKING COAL LIMITED
Figure 3-57		
ADV-AU-00217	Final Void Section | Viewed Looking East & South	

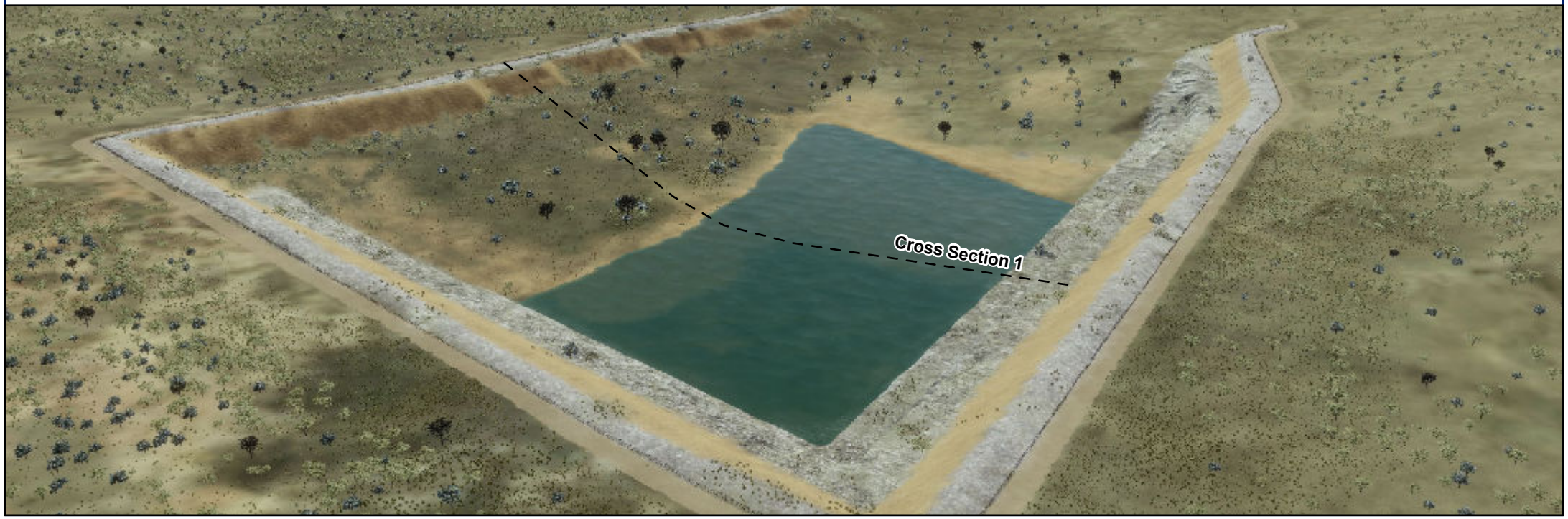
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Cross Section 1 - Final Void Section | Viewed Looking North





Source: Map my Mine & Minserve

PROJECT		CLIENT
September 2023	BME Mine - PRCP	BOWEN COKING COAL LIMITED
Figure 3-58		
ADV-AU-00217	Final Void Section | Viewed Looking North	

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3.5.3.2 Pit wall stability

A preliminary geotechnical assessment (GTS, 2021) based on the results of drilling, geophysical logging, and laboratory testing was conducted on samples obtained from one partially cored geotechnical borehole in the mining area prior to the commencement of relevant activities.

The test results identified the following:

- Low wall stability with respect to the sub crop line;
- The position of the northern end wall with respect to the large normal fault;
- Potential for localised disruption where a fault intersects the low wall;
- The presence of tuff within the Leichhardt seam floor (as per logged lithology) may present a low wall and/or dump stability issue;
- Steep joints into the eastern highwall, but historically these are understood to have not presented a significant issue; and
- A history of low angle thrusts (within the Burton area) which may represent zones of weakness in the floor along which the low wall may detach, but historically have not presented an issue.

Pit design recommendations for operations were pre-dominantly made on the Bowen Basin experience with similar material characteristics due to the limited sample size and inconsistencies between laboratory-measured strengths and those interpreted from geophysical logging. These design recommendations have been considered in final landform planning. Further geotechnical studies are planned as the pit development progresses south to the final void.

The bulk of the final pit voids walls are assumed to be dominated by NAF overburden, with potential for AMD from areas of residual exposed coal before they are covered at closure in compliance with relevant EA criteria. Given the small relative area of coal exposed compared to NAF overburden, and the effects of dilution and interaction with alkaline groundwater (KCB, 2021), if coal is exposed at closure it is not expected to significantly impact water quality. It is assumed that pit void quality at closure will be controlled by rainfall and groundwater inputs, and evaporation processes, rather than any effects of AMD generation. Pit void management will be therefore focussed on salinity.

3.5.3.3 Void Hydrology

Post-closure groundwater conditions were simulated to assess the final North pit and Southern void water elevation within the proposed post-closure landform. Final pit void lake elevations were simulated in a WBM using GoldSim modelling software as part of the surface water assessment in 2021 (Engeny, 2021). The final void WBM was re-run in 2023 using the revised final landform and updated groundwater inflows (**Attachment F**). The 2023 WBM (Engeny, 2023b) assumed all disturbed areas to be rehabilitated apart from the area below 250 m AHD), which will be permanently inundated with water post closure, as this is considered to be the longer-term pit lake level (**Figure 3-57** and **Figure 3-58**).

The WBM (**Attachment F**) has been designed to represent the final landform configuration for the site to assess the behaviour of the Southern void long-term post-closure. The indicators considered to be representative of the hydrological behaviour of the void in this assessment include the following:

- **Void lake equilibrium level** – the level at which the void lake is most likely to sit following the initial filling period.
- **Void lake equilibrium volume** – the equilibrium volume that corresponds to the equilibrium level.
- **Void lake maximum level** – the highest void lake level forecast during the simulation.
- **Void lake filling time** – the initial period of filling of the void after cessation of mining until the lake reaches its equilibrium volume.
- **Ponded area at equilibrium** – determined by the balance between lake inflows (primarily catchment runoff) and outflows (primarily evaporation). The evaporation rate is governed by the ponded area of the lake based on the adopted storage curve.

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- **Void lake water quality (EC) 300 years after cessation of operations** –reported at the end of the simulation to indicate the general trend of EC over time.
- **Residual void outcome** - The void equilibrium and maximum level results have been compared with the regional groundwater levels supplied by the numerical groundwater model (**Attachment D**) to determine whether the void will likely act as a groundwater 'sink' or a 'source'.

This water balance incorporated all contributing fluxes to the void lake, including the groundwater inflow, catchment runoff and direct rainfall. The only defined outflow in the model was evaporation. The model assumptions were based on the following:

- **Groundwater inflow into the void** - groundwater ingress determined by the 2023 numerical model update.
- **Groundwater quality** –baseline water quality results from sampling conducted with the ML.
- **Void starting level** – the model assumed the void lake would accept the water remaining from the North Pit bulk water storage and MAW dam when those domains undergo rehabilitation (total 380 ML).
- **Climate inputs** - Monthly average rainfall, evapotranspiration (Morton's Potential Evapotranspiration) and lake evaporation (Morton's Lake Evaporation) from the Scientific Information for Land Owners (SILO) climate dataset for the ML.
- **Catchment runoff** – the Australian WBM was used to estimate rainfall runoff from adopted local climate data inputs and developed as part of a calibrated water balance model for the Bowen Basin Isaac River catchment. Catchment water quality (salinity) was simulated with a contaminant transport model within site storages. Salinity generation rates were based on the assigned land use type that includes natural, mining pit floor and rehabilitated spoil.

The post-closure groundwater inflow flux was simulated for a range of void lake elevations, from the maximum inflow rate when groundwater levels are at the base of the void to the pre-mining groundwater level elevation where no groundwater inflow is observed. Post-closure steady-state elevations of the voids associated with the final landform were then calculated from the WBM.

The final void WBM was simulated for 300 years based on historical climate data with 131 realisations. The key model outputs for the Southern void include:

- Southern void lake levels:
  - No overflows have been predicted.
  - The lake levels will fluctuate over time based on prevailing climatic conditions.
  - The approximate Southern void equilibrium level of 249 m AHD is 40 m below the pre-mining groundwater level of 289 m AHD as defined by site-specific numerical groundwater modelling (**Attachment D**).
  - The maximum Southern void lake level is 46 m below the pre-mining groundwater level at 254 m AHD, demonstrating no predicted overflows to the surrounding environment or groundwater.
  - The void lake level generally rises over the initial 25 years following the cessation of mining.
- Southern void lake quality:
  - The salinity of the Southern void lake is forecast to continue to increase over time due to the ongoing concentration of salt due to evaporation with no outflows of salt from the system.
  - WBM Southern void water quality results forecast lake water EC over 10,000 µS/cm within 70 years of closure.

The summary of WBM results for the Southern void is within **Table 3-42**.

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Table 3-42 WMB Model Outputs

WBM model output	Value
Catchment area (ha)	167
Void equilibrium level (m AHD)	249
Maximum water level (m AHD)	254
Void spilling elevation level (m AHD)	300
Pre-mining groundwater level (m AHD)	289
Void equilibrium volume (ML)	1,130
Ponded area at equilibrium (ha)	11
Void equilibrium EC at 300 years (µS/cm)	45,548
Maximum void EC (µS/cm)	130,000*
Initial void filling period (years)	25

** The maximum EC represents the fluctuations in water quality due to evaporation resulting in the concentration of salt in the pit lake during dry periods.*

Stratification involves multiple layers of differing water quality based on density differences in the final void. The likelihood of stratification is mainly attributed to the depth of the final void water body. Some stratification is likely to occur in Southern void due to the average water depth within the pit of 29 m, however stratification is likely to be a negligible risk due to the average salinity level results.

3.5.3.4 Groundwater Modelling Outcomes

The void equilibrium and maximum level results have been compared with the regional groundwater levels generated from the updated 2023 numerical groundwater model to determine whether the void will likely act as a groundwater 'sink' or a 'source' (**Attachments D** and **F**). The designation as a 'sink' refers to a void with a modelled equilibrium and/or maximum levels lower than the regional groundwater level. The hydraulic gradient generated by this level change would result in groundwater ingress to the void. A groundwater 'source' refers to a void that has a net outflow of water from the void lake into the surrounding geology (generally identified by a water level above the regional groundwater level) where such outflow is not into the low wall backfill material. In these cases, the hydraulic gradient could result in water within the void seeping into groundwater systems.

The groundwater in the Rewan Group and the Rangal Coal Measures within and local to the Mine will experience drawdown due to mining activities as predicted by baseline numerical modelling (KCB, 2021) and observed in the first year of groundwater sampling during operations. The modelled post-closure groundwater levels for these hydrostratigraphic units show that the void is predicted to develop as a groundwater sink after mining operations cease (KCB, 2023) **– Attachment D**). Localised groundwater will flow from the south and southwest towards the Southern void, as demonstrated in **Figure 3-40** and **Figure 3-41**. The post-closure simulation was also undertaken using climate predictions from the CSIRO/BOM (CSIRO and BoM 2015) for the Australia East Coast Cluster and subcluster. Results from the model prediction with current predicted climate change show very little to no impact on groundwater levels due to predicted long-term impacts from climate change.

3.5.3.5 Water Balance Study

The water balance study conducted to meet the information requirements of the PRCP guideline was an iterative process between hydrogeological AQPs (**Attachment D**) and hydrology AQPs (**Attachments E** and **F**) to assess the void surface and groundwater interactions. The outcomes of these assessments are elaborated throughout **Sections 3.5.1.2** and **3.5.2** of this PRCP and summarised below.

Reduction in hydraulic head

The groundwater reduction in hydraulic head is predicted for Rewan Group and the Rangal Coal Measures. These steady-state elevations in the voids were applied to the groundwater model, using a General Head Boundary (GHB) to simulate the post-closure groundwater conditions. This simulation was conducted for a 500-year duration, using the same climate data as the final void WBM, to allow surrounding groundwater

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levels to recover to equilibrium / steady-state conditions. The results show that the void is predicted to develop as a groundwater sink, with groundwater flowing towards the void.

Cones of depression

Figure 3-40 and **Figure 3-41** show the extent of draw-down impacts simulated over a 10-, 50-, 100- and 500-years post-closure timeframe. The entire void experiences the greatest level of drawdown for the Rangal Coal Measures and likewise for the Rewan group however, to a lesser extent, given how the units are positioned within the impact area.

Drainage and flooding behaviours of surface waters

The Southern void is not within a floodplain; however, it is subject to interaction with the localised overland flow that predominantly interacts with the perimeter of the rehabilitated final landform, including the Southern void. Flood modelling for final landform conditions for selected design events (50%, 20%, 10%, 1%, 0.1% AEP and PMP modelled scenarios) and 1% and 0.1% AEP with climate change sensitivities are discussed in **Section 3.5.1.2**. Of these five climatic events, the PMF and 0.1% AEP RCP 4.5 and RCP 8.5 climate change sensitivities resulted in the overtopping of the void bund and ingress into the void on both the east and west sides. While this rare and potentially unlikely climatic event is modelled to introduce water to the void, it can be seen as valuable input of fresh water. However, as it may lead to instability in the walls, reshaping the toe of the rehabilitated OOPDs and conceptual drainage structures will be designed to direct water away from these areas identified in the final landform flood modelling.

Conceptual projected inflows, outflows, and recharge rates

The final void WBM considered the void inflows to include:

- Runoff from a 167 ha area comprised of 31 ha final void surface area and 136 ha rehabilitated land.
- Direct rainfall on the final void surface area calculated from daily rainfall applied to the surface area of the final void is dynamically calculated using the stage storage relationship for the Southern void.
- Groundwater inflows are calculated based on the final void level groundwater inflow relationship as determined by updated numerical modelling.

The final void WBM considered the void outflows to include:

- Evaporation from the final void lake surface area calculated from the daily Morton's Lake Evaporation time series extracted from the SILO Data Drill at the Mine location. The average annual Morton's Lake evaporation at the final void waterbody is 1,806 mm/year.

Water storage and long-term water balance

The predicted long-term water storage volume for the water storage for the purpose of livestock watering is 1,130 ML after 25 years. The maximum lake level is 35 m below the pre-mining groundwater level at 254 m AHD, demonstrating no predicted overflows to the surrounding environment or groundwater. The complete results of the final void WBM are reported in **Table 3-42**.

Major water fluxes into and out of the void

The results show that the void is predicted to develop as a groundwater sink, with groundwater flowing towards the void. Outflow from the void to the surrounding surface environment and groundwater system is not currently anticipated in the final void WBM (**Attachment F**) or the post-closure numerical model simulations (**Attachment D**).

Surface influences on water quality

The final void WMB included a contaminant transport model to simulate water quality (salinity) within site storages as introduced by different land use types. The salinity values assigned to each land use type and the source of this data are reported in **Table 3-43**.

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Table 3-43 Modelled Final Void Water Quality Influences (Engeny, 2023b)

Land Use Type	Salinity (µS/cm)	Source of Data
Natural	178	80th percentile water quality results of the tributaries of Burton Gorge Dam (Teviot Creek and Sandy Creek) were averaged and adopted for the WBM.
Mining pit floor	1,370	BME geochemical testing undertaken in February 2021
Rehabilitation Spoil	425	Without project-specific water quality data for rehabilitated landuse, the parameter has been sourced from the regional model calibrated to the Isaac River.

3.5.3.6 Long-Term Water Quality

Groundwater hosted in the hydrostratigraphic units underlying the Mine is generally of poor quality with low yields and high salinity, as observed in regional mining impact assessments (KCB, 2023). It is assumed there are limited beneficial uses for groundwater in the vicinity of the Mine before mining impact occurred based on the lack of water supply bores in the local area. The Proponent has directly experienced this in the first half of 2023 when attempting to establish water supply bores on behalf of the pastoral landholder within the ML with no success and before the full extent of mining impacts occurred.

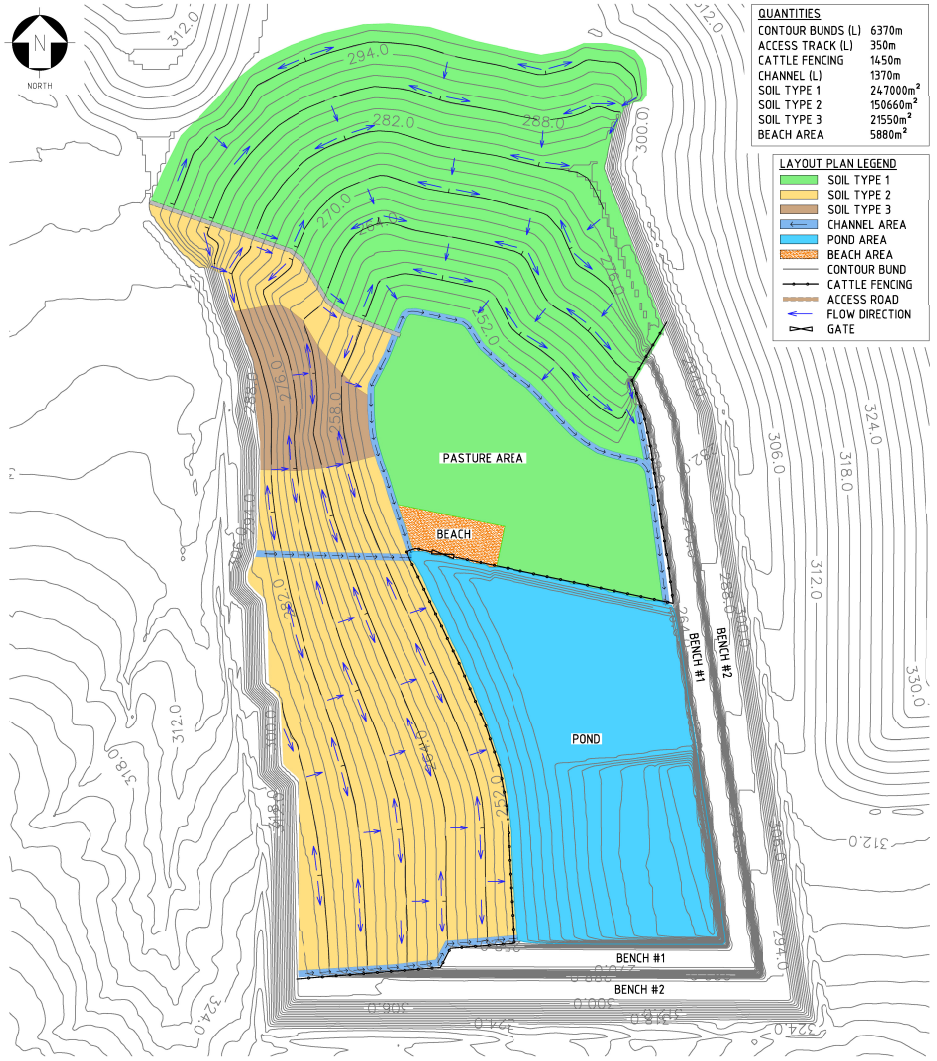
The concentration of salts is forecast to increase beyond the simulation period as there are negligible outflows of the salts from the residual void. As outflow from the void into the surrounding groundwater system is not predicted by the post-closure numerical modelling simulations (**Attachment D**), the water quality of the void water will not impact the surrounding environment. As the impacted hydrostratigraphic units are not connected to potential Groundwater Dependent Ecosystems associated with Hat Creek, there will continue to be no impact on these post-closure.

BME has a number of groundwater trigger values in place for key analytes, including pH, sulphate, chloride and dissolved metals, designed to detect potential changes in groundwater quality that identify potential impact. These trigger levels remain relevant into the closure period.

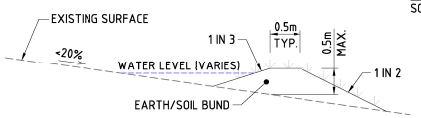
3.5.3.7 Design Plan

16 ha of the Southern void will be rehabilitated to low intensity grazing PMLU and 31 ha will be rehabilitated to a water storage for livestock watering PMLU per criteria in the EA. A conceptual 3D design plan has been developed for this area as show in **Figure 3-59**. The conceptual 3D design plan includes 30 ha of the Central pit grazing PMLU to establish continuity between the two areas in the reshaping stage to enable light vehicle a limited livestock access in a controlled manner.

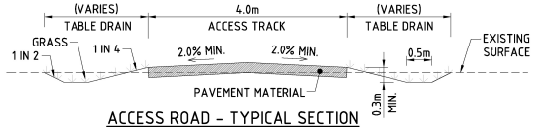
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LAYOUT PLAN
SCALE 1:3000



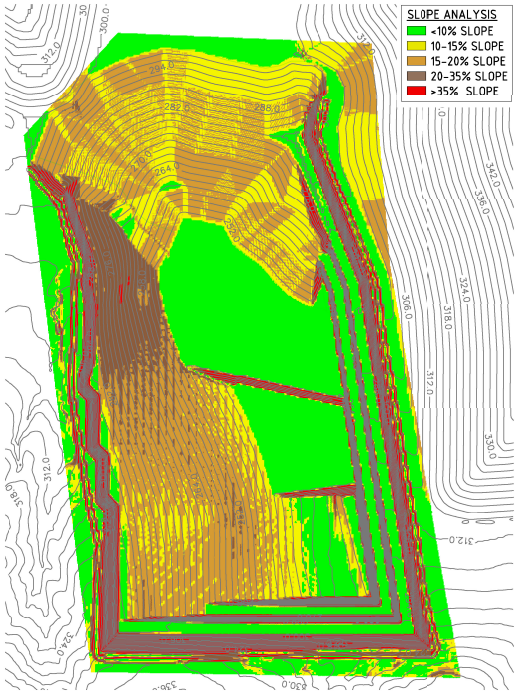
CONTOUR BUND - TYPICAL SECTION
SCALE 1:40



ACCESS ROAD - TYPICAL SECTION
SCALE 1:50



AERIAL LAYOUT
SCALE 1:5000



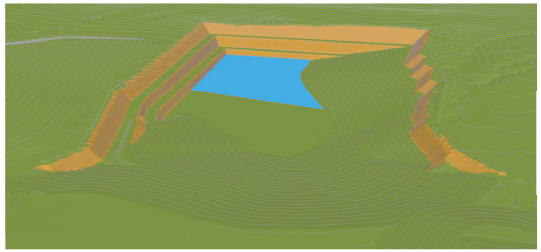
SLOPE ANALYSIS
SCALE 1:5000

SOIL TYPE DESCRIPTIONS

SOIL TYPE 1
POST MINE OPERATIONS FINISHED LAND FORM USING SELECTED SPOIL MATERIAL WITH 100mm RECLAIMED TOP SOIL WITH HYDROMULCH APPLICATION OF SELECTED GRASS SEED AND FERTILISER.

SOIL TYPE 2
PIT LOW WALL EXPOSED ROCK STRATA AT AVERAGE 15% SLOPE RIPPED ACROSS SLOPE TO MIN 100mm DEPTH & LEFT LOOSE AS DRAINAGE LAYER WITH 250mm SELECTED SPOIL WITH NO ROCKS LARGER THAN 150mm PLUS 100mm RECLAIMED TOP SOIL WITH HYDROMULCH APPLICATION OF SELECTED GRASS SEED AND FERTILISER.

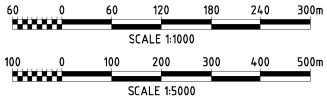
SOIL TYPE 3
PIT LOW WALL EXPOSED ROCK STRATA AT GREATER THAN 25% SLOPE RIPPED ACROSS SLOPE TO MIN 100mm DEPTH & LEFT LOOSE AS DRAINAGE LAYER WITH 500mm ROCK MULCH WITH ROCKS NO LARGER THAN 300mm.



ISOMETRIC LANDFORM VIEW
N.T.S

NOTES

1. FORMALISED CHANNELS SHALL BE SIZED AND HAVE SURFACE TREATMENT (SUCH AS DUMP ROCK) TO PREVENT SCOURING. CHECK DAMS SHALL BE USED WHEN CHANNEL RUNS PERPENDICULAR TO CONTOURS.
2. ACCESS ROAD TO PASTURE AREA SHALL NOT EXCEED MAXIMUM GRADES AND CONSIDERATION SHALL BE GIVEN TO TRACK MATERIAL PENDING NEED FOR ALL WEATHER ACCESS. TRACK SHALL BE RAISED SLIGHTLY ABOVE SURROUNDING SURFACE.
3. PASTURE AREA SHALL BE GRADED AT A MINIMUM OF 1.0% TOWARDS THE POND AREA TO MINIMISE PONDING & ALLOW SHEET FLOW OF SURFACE DRAINAGE.
4. CONTOUR BERMS MAY BE SLIGHTLY GRADED TOWARDS DIRECTION OF FLOW ALLOCATED (ALTHOUGH THIS SHOULD HAPPEN BY ITSELF). ALLOW BREAKS BETWEEN CONTOUR BERMS (APPROX 10.0m).
5. BENCHES HAVE BEEN ASSUMED TO BE OUTSIDE CATTLE PASTURE LAND & THEREFORE MAY BE LEFT WITHOUT REHABILITATION.
6. CHANNEL AREA SHALL BE CONSTRUCTED TO BE TRAFFICABLE & EASY FOR CATTLE TO TRAVERSE IN AREAS OF ACCESS. MATERIAL AND SIDE SLOPE TO SUIT USE.



Not to Scale
Source: BG&E 2023

PROJECT

September 2023

Figure 3-59

ADV-AU-00217

BME Mine - PRCP

Final Void Erosion Protection & Rehabilitation Concept Plan

CLIENT

BOWEN COKING COAL LIMITED

RPMGLOBAL

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The conceptual 3D design plan proposes the following:

Contour Berms

- Nominal 50 m spacing between contour berms on the less than 20% slopes with 100 m long berm segments with staggered breaks to help slow down the flow velocities and minimise the need for catch drains that would be required for continuous contour berms.
- 35-40 m spacing on higher slopes.

Soil Treatment

- The soil treatment for the flat areas (nominally 1 to 2% fall to the pit lake) and the nominal 15% areas on placed fill (northern and central areas) will be recovered topsoil 75 mm thick on top of the placed backfill.
- The western areas (both green and tan coloured) will require additional preparation including cross ripping to create a drainage layer nominally 100 mm thick on top of the rock strata + a sub soil layer nominally 150 mm thick (being select material from the out of pit dumps preferably kandosol soils for better erosion resistance without any salinity or acid potential) and 75 mm of recovered topsoil.
- The steeper areas in the tan-coloured western area (nominally steeper than 20%) will be rock mulch instead of pasture area.
- The beach area and any areas where concentrated cattle movements are expected should a sandy gravel surface. The drainage channels are shown as 8 m wide with a nominal 1:10 side batter for easy crossing access by cattle and mustering vehicles.

Access Track

The 3D plan shows an access track with a max grade of 1:6 (15%) which is considered suitable for light vehicle (4WD) occasional access for water testing and stock movement. Some table drains that will require rip rap stabilisation are also included.

3.5.3.8 Rehabilitation Strategies

The rehabilitation of the Southern void will be subject to the transitionary requirements of the RVDCP required by Condition G8 of the EA. The RVDCP's construction and rehabilitation strategies developed to support long term stability are summarised below.

Mining and construction:

- Coal seam capping post-mining in the high wall and end wall to ensure the contamination of the pit lake by contact with exposed coal seams will be minimised.
- The void pit floor slopes range from 15-30% and will be ripped and reshaped where necessary to achieve the post-mining land use and minimise the final water storage size to 31 hectares.
- Central Pit in-pit spoil can only commence reshaping after mining is completed. This area will be rehabilitated in conjunction with the exposed pit floor.
- Security fencing and safety bunds will surround the final PMLU low wall and high walls. The bunds near the wall crest will ensure water runoff over the walls is minimised to reduce potential erosion.
- The remnant low wall weathered coal will be capped as part of the pit floor rehabilitation.
- Partial backfill of the southern void will be undertaken as part of mining operations so that the void is minimised to achieve the final water storage size of 31 hectares.
- Due to continuous in-pit dumping and mine access ramps, the internal dump slopes can only be made available for rehabilitation at the end of mining.
- The long-term recovery level of the water storage for the purpose of livestock watering is predicted to range from 245 to 254 m AHD. Reshaping and rehabilitation works will be to 250 m AHD in order to ensure minimal exposed in-pit waste rock slopes and maximise the in-pit post-mining land use.

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- An AQP will conceptually design final drainage structures to prevent the entry of PMF event into the void per the 2023 rehabilitation flood modelling results (**Attachment E**).

Stability:

A geotechnical assessment will be conducted on this design to confirm that the void will achieve post-closure slopes and exhibit stability characteristics consistent with the relevant EA requirements which have been adopted as milestone criteria.

Long term water quality management options:

- Introduce additional outflows to the lake, such as paddock irrigation infrastructure, within the first 25 years.
- Pump void lake water to existing farm dams in the vicinity of the void and mix it with fresh water.
- Include salt-tolerant vegetation for low wall rehabilitation.

3.5.4 Underground Mining

The Mine is an open pit operation only. The relevant activities covered in this PRCP do not include underground mining.

3.5.5 Built Infrastructure

Condition G18 EA0002465 requires all infrastructure constructed by or for the Environmental Authority holder during the mining activities, including water storage structures, to be removed from the site before mining lease surrender, except where agreed in writing by the post-mining landowner/holder.

The intended PMLU for all infrastructure areas is low-intensity grazing. All infrastructure will be removed at the cessation of mining activities so that the land can meet the assigned PMLU criteria. The pre-existing North Dam is the only infrastructure to remain under legal agreement with the underlying landholder, which is not associated with current or planned mining activities. While additional infrastructure may be retained through ongoing consultation with the underlying landholder, as there is currently no agreement in place, this PRCP intends that all infrastructure will be decommissioned, removed, and rehabilitated after the cessation of mining.

The waste management hierarchy will be adhered to during the decommissioning and removal of infrastructure (i.e., in order of preference: reuse, recycle, energy recovery and disposal).

Table G1 of EA0002456 outlines rehabilitation methods for the various disturbance areas (including built infrastructure), summarised below.

Infrastructure to be Decommissioned

Water Storages (Sediment and Mine Water Dams)

Sediment and Mine Water Dams were designed in accordance with the *Water Supply (Safety and Reliability) Act 2008*. They will be decommissioned to avoid serious environmental harm to land, surface waters or any recognised groundwater aquifer after mine closure.

The methodology used to decommission and rehabilitate redundant water storages are described below:

- Dams to be dewatered;
- Top 250 mm of sediment removed and buried;
- Contaminates are to be removed by authorised (licenced) waste contractor for disposal;
- Dam walls and drains reshaped to ground level or to a gradient of <10%; and
- Landform will be deep ripped, spread with soil and seeded.

Sediment dams will have contaminates removed at the end of mining to ensure they are disposed of appropriately while the relevant personnel and equipment are on-site during the two-year post-closure timeframe when the entire landform is being reshaped to the final design. The sediment dams will remain

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in place until the vegetation density criteria is met on all rehabilitated sloped areas. Once they are no longer required, they will be decommissioned and reshaped into the dumps.

Mining Industrial Area (MIA), Explosives Storage Area and Exploration

Surface infrastructure not required for the post-closure stage will be decommissioned, and contaminated land removed and treated where required upon the cessation of mining. This includes some workshops, ROM, excess offices and ablution blocks, waste, explosives area and chemical storage. The ROM stockpile will be removed to the void as soon as possible to minimise the amount of heavy mining fleet equipment required during the rehabilitation period.

A minimised staging ground that supports heavy and light vehicle parking, small office space, one toilet facility, a workshop and a fuel bay will remain for the two-year post-closure reshaping period to support the rehabilitation activities as conceptually visualised in **Figure 3-60**.

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Source: Map My Mine & Minserve

PROJECT		CLIENT
September 2023	BME Mine - PRCP	BOWEN COKING COAL LIMITED
Figure 3-60		
ADV-AU-00217	Post Closure Rehabilitation Facility	

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The methodology used to decommission and rehabilitate all infrastructure after the post-closure rehabilitation stage has been completed is described below:

- Disconnect and terminate (i.e., de-energise) the diesel generator and wiring to make safe.
- Remove and properly dispose of road surface and fencing.
- Rehabilitate remaining boreholes not required for post-closure monitoring.
- Remove all explosives, liquids, fuels, and lubricants and properly dispose of general and regulated waste.
- Decontaminate plant and equipment.
- Remove contaminated land and encapsulate it in backfilled pits or open waste dumps.
- Remove portable office blocks from site.
- Licenced contractors will take sewage from the ablution blocks to an offsite treatment facility.
- Assess areas for contaminated lands and remediate identified areas;
- Deep rip to aerate the compacted soil material.
- Seed the ripped and treated areas with suitable pasture species.

Roads, Tracks and Cleared Areas

Built infrastructure includes internal roads, tracks, cleared areas associated with haulage, and site and powerline access.

The methodology used to decommission and rehabilitate the abovementioned infrastructure is described below:

- Remove signage and other non-permanent markers;
- General reshaping and pushing trimming to achieve pre-disturbance contours (including re-establishment of bed and banks);
- Installation of long-term erosion and sediment control systems where required;
- Deep rip to aerate the compacted soil material; and
- Seed the ripped and treated areas with suitable pasture species.

Infrastructure to remain post-rehabilitation

Other infrastructure (owned by third-party operators) that will remain post-rehabilitation on the ML include:

- North dam which is managed by the pastoral leaseholder and not currently used by operations.
- Powerlink Powerline and associated tracks (managed by Powerlink).

Transfer of Ownership

Mine-generated infrastructure that will (or is likely to) remain post-rehabilitation include:

- Water storage for the purpose of livestock watering (Southern void, as detailed in **Section 3.5.4**);
- Ring road around final landform; and
- Hardstand area to facilitate rehabilitation activities, monitoring and maintenance throughout closure may be retained by the pastoral leaseholder to support mustering activities in the region.

Before infrastructure is retained, the Proponent will obtain a formal agreement / sign-off by the landholder stating that they accept the infrastructure condition and formally accept the transfer of ownership.

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3.5.6 Voids in Floodplains

The one void remaining post-closure proposed as a PMLU for water storage for livestock watering is only subject to localised overland flow and not within a floodplain.

3.6 Risk Assessment

Legislative Requirements

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

This Section describes how risks of a stable condition for each proposed post-mining land use (PMLU) not being achieved were identified and managed to minimise the impact or likelihood of those risks. Section 126C(1)(f) of the EP Act requires completion of this risk assessment. This Section provides a summary of the risks and treatments related to final landform stability that were identified in the risk assessment process. The entire rehabilitation and closure risk assessment and treatment plan is included in **Attachment I**.

This Project consists of two PMLUs. Of the 424 ha disturbance caused from mining activities during the LOM, 393 ha of the rehabilitated footprint will be a low intensity grazing PMLU, while 31 ha of rehabilitated land will be a water storage for livestock watering PMLU.

3.6.1 Methodology

The methodology used for rehabilitation and closure risk assessment draws on guidance from two documents:

- AS ISO 31000:2018 *Risk Management – Guidelines* provides guidelines on "…managing risks faced by an organisation", which describes risk assessment as the "…overall process of risk identification, risk analysis and risk evaluation."; and
- Section 3.7 of the PRCP Guideline which provides additional guidance on the process of risk identification, analysis and evaluation.

The risk assessment was a collaborative and iterative process between BCC and RPM representatives considered to have the greatest knowledge of the events that might pose a risk to the PMLUs achieving a stable condition. The risk assessment team included:

- Chief Operating Officer - Bowen Coking Coal
- Sustainability Manager - Bowen Coking Coal
- Senior Environmental Advisor - Bowen Coking Coal
- Executive Consultant – RPM Global; and
- Principal Advisor – RPM Global.

Risk events specific to rehabilitation and closure were identified and evaluated through a collaboration of knowledgeable personnel to understand their impact and likelihood of occurrence with and without specific controls being in place. The information gathered was used to evaluate the inherent and residual risks based on consequence definitions in **Table 3-44** and likelihood in **Table 3-45**. These were used to calculate the risk of each event using the risk matrix in **Table 3-46** into four levels being low, medium, high and very high whose definitions are described in **Table 3-47**.

Where residual risk remained at high or very high additional controls were considered to ensure confidence that the risk was at or below medium. This was then documented by RPM and for BCC for comment and or confirmation. The latest iteration of the risk evaluation at time of publication is in **Attachment I**.

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Table 3-44 Consequence Definitions

Risk Rating	Financial	Environmental	Personal, Commercial, Community, Reputation, Media	Legal
Catastrophic	>$10M	Irreversible, long-term environmental impairment of ecosystem functions.	Definite serious negative personal and or commercial effect; attention from regulators, workforce, contractors, public or media outcry (including international coverage) .	Significant prosecution and fines. Very serious litigation.
Major	$1M -$10M	Very serious, long-term environmental impairment of ecosystem functions.	On-going serious social issues. Significant damage to structures/items of cultural significance. Serious public or national media outcry.	Major breach of regulation. Major litigation.
Moderate	$100K- $1M	Serious medium-term environmental effects.	On-going serious social issues. Significant damage to structures/items of cultural significance. Significant adverse national media/public/Non Government Organisation (NGO) attention.	Serious breach of regulation with investigation or report to authority with prosecution and/or moderate fine possible.
Minor	$10K - $100K	Moderate, short-term effects but not affecting ecosystem functions.	On-going social issues. Permanent damage to items of cultural significance. Attention from media and/or heightened concern by local community. Criticism by NGOs.	Minor legal issues, non-compliances and breaches or regulations.
Insignificant	<$10K	Minor effects on biological or physical environment.	Minor medium-term social impacts on local population. Mostly repairable. Minor Adverse local public or media attention or complaint.	N/A

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Table 3-45 Likelihood

Likelihood	Description	Frequency	Probability
Almost Certain	The event will occur on an annual basis.	More than once per year	>95%
Likely	The event has occurred several times or more in your career.	At least once per 1 year	60% – 95%
Possible	The event might occur once in your career.	At least once in 3 years	30% – 60%
Unlikely	The event does occur somewhere from time to time.	At least once in 10 years	5% – 30%
Rare	Heard of something like the event occurring elsewhere.	Less than once in 30 years	<5%

Where risks were high or above additional controls were considered to treat to confident that the risk was at or below medium.

Table 3-46 Risk Matrix

Risk Matrix					
	Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost Certain	M	H	H	VH	VH
Likely	M	M	H	H	VH
Possible	L	M	H	H	H
Unlikely	L	L	M	M	H
Rare	L	L	M	M	H

Table 3-47 Risk Levels and Actions

Risk Level	Risk Levels and Actions
Very High (VH)	Risk Management Committee attention needed, action plans and management responsibility specified
High (H)	Senior executive management attention needed, action plans and management responsibility specified.
Medium (M)	Manage by specific monitoring or response procedures, with management responsibility specified.
Low (L)	Manage by routine procedures, unlikely to need specific application of resources.

The controls used to keep the risks below medium were documented in a risk treatment plan (**Attachment I**) including the specific details outlined in the PRCP Guideline that must be included for risk treatment:

- The reasons for selecting the treatment option;
- Those responsible for the approval and implementation of the plan;
- Proposed actions;
- Resource requirements;
- Performance requirements;
- Performance measures and constraints;
- Reporting and monitoring requirements; and

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- Timing and scheduling.

3.6.1.1 Risk Assessment Findings

There was a total of 28 risks identified at the beginning of the risk assessment process. There were none identified with an inherent risk of very high with 16 risks rated as high with only one risk assessed as being low (**Table 3-48**). Following the introduction of controls and treatments through the development of the PRCP all risks had a residual risk rating of medium or lower.

The risk assessment details are documented in the **Attachment I** along with the risk treatment plan for all the 28 risks identified. A summary of the 16 initial high-risk events, their impacts and treatments are presented in **Table 3-49**. Nine of the 16 risks are related to stability as identified in the 'event or activity' column.

Two of the initial high risks and two medium risks were dealt with using the highest level of risk control, elimination. These risks were associated with the original closure plan to leave a second void for water storage by only partially backfilling the North pit. Elimination of this void by fully backfilling at the end of mining was the safest way of removing the risks of landform stabilisation, erosion, potential poor surface water quality and vegetation establishment and integration with surrounding vegetation.

Six of the initial high risks were able to be classified with a low residual risk which were associated with stability related concerns such as erosion, and vegetation establishment. The remaining eight risks rated initially as high were classified with a medium residual risk by applying the identified controls. Four of the eight risks are related to stability. These medium risks will remain the focus of the management team to endeavour that these risks are not realised. The remaining medium risks are to do with:

- Not meeting the vegetation target criteria on the OOPD (Stability);
- Material not available to contour the Central Pit into the surrounding landform (Stability);
- Ensuring PAF is encapsulated to ensure no seepage into the groundwater system;
- Ensuring backfilled materials are chemically stable to keep surface water runoff within acceptable limits;
- Safety of access to remaining water storage areas (Stability);
- Meeting long term water quality objectives in the water storage areas;
- Containing pit water to ensure surface and groundwater remain within acceptable limits for the receiving environment; and
- Keeping erosion within acceptable limits during significant rainfall events (Stability).

Table 3-48 Risk Rating Results

PRCP Risk Results			
Risk Levels	**Initial Risk Rating**	**Residual Risk Rating**	**Eliminated**
Low	1	16	
Medium	11	10	
High	16	0	2
Very High	0	0	
Total Risks	**28**	**26**	**2**

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Table 3-49 Summary of Risk Treatments for High Inherent Risks Events

Ref No.	Event or Activity	Impact(s) Summary	Treatment Summary	Residual Risk
R2	*Stability*: Erosion following significant wet weather events results in landform instability.	▪ Landform instability. ▪ Lack of vegetation establishment. ▪ Exposure of problematic waste materials. ▪ Erosion and downstream sedimentation. ▪ Reduced surface water quality. ▪ Reduced visual amenity. ▪ Increased fugitive dust.	▪ Waste characterisation and management. ▪ Landform designed to minimise and control stormwater and sediment. ▪ Landform design uses non-erosive materials on the outer surfaces. ▪ Remediate subsidence and erosion before sourcing, delivering, and spreading growth media. ▪ Apply ameliorants and fertilisers. ▪ Trim/rip and apply seeding. ▪ Rehabilitation.	Low
R5	*Stability:* Vegetation fails to establish on rehabilitated landform or does not meet the target vegetation criteria.	▪ Loss of habitat or beneficial land use. ▪ Reduced visual amenity. ▪ Increase in fugitive dust. ▪ Reduced water quality. ▪ Landform unable to meet post closure land use criteria.	▪ Rehabilitation trials and/or benchmarking. ▪ Material characterisation and accounting ▪ Minimise drainage velocities ▪ Long term erosion and sediment control. ▪ Remediation of subsidence and erosion issues before sourcing, delivering, and spreading growth media. ▪ Growth medium selection. ▪ Appropriate species selection. ▪ Restriction of access by grazing species.	Medium
R7	*Stability:* Significant wet weather event destabilises North Pit walls and slopes on northern pit	▪ Landform instability. ▪ Lack of vegetation establishment. ▪ Exposure of problematic waste materials (e.g. PAF). ▪ Reduced surface water quality. ▪ Increased fugitive dust.	▪ Redesign of final landform has removed the partial backfilling of the Northern Pit and it is to be recontoured to blend into surrounding landform eliminating the risk.	Eliminated
R9	North Pit rehabilitation fails to link with terrestrial vegetation and does not meet the species richness criteria.	▪ Landform unable to meet post closure land use criteria. ▪ Disconnection of terrestrial vegetation linkages. ▪ Loss of habitat. ▪ Reduced visual amenity.	▪ Redesign of final landform has removed the partially backfill of the North Pit and it is to be recontoured to blend into surrounding landform. This eliminates the risk as there is no linkage from aquatic to terrestrial ecosystems.	Eliminated
R10	*Stability:* Central Pit not completely backfilled.	Unauthorised access results in potential human or fauna injury or death.	▪ Ongoing materials and accounting during operations to ensure adequate supply. ▪ Final landform and associated backfilling design accounts for material characteristics and volumes.	Medium

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Ref No.	Event or Activity	Impact(s) Summary	Treatment Summary	Residual Risk
R11	*Stability:* Erosion in Central Pit area following significant wet weather events results in increasing landform instability.	▪ Landform instability. ▪ Lack of vegetation establishment. ▪ Erosion and downstream sedimentation. ▪ Reduced surface water quality. ▪ Reduced visual amenity. ▪ Increased fugitive dust. ▪ Failure to meet target PMLU criteria.	▪ Landform design based on structural, geotechnical and hydraulic factors ▪ Based on the physical and chemical characteristics of the site. ▪ Long term erosion and sediment control systems. ▪ Drainage measures and structures ▪ Directing overland flow away from the highwall edge	Low
R12	Poor handling and encapsulation of PAF materials in Central Pit results in seepage of contaminated water to groundwater resources.	▪ Unmitigated seepage. ▪ Ongoing erosion that creates seepage pathways. Exposure of problematic waste materials. ▪ Unusable for future users. ▪ Reduced groundwater quality.	▪ Landform designed to minimise and control stormwater and sediment. ▪ Installation of long-term erosion and sediment control systems/features. ▪ Remediate subsidence and erosion issues before sourcing, delivering, and spreading growth media. ▪ Rejects buried above the expected (post closure) groundwater level, if required. ▪ Non-erosive materials used to sheet outer surfaces.	Medium
R13	Surface run off from backfilled Central Pit area causes exceedance of receiving environment contaminant limits.	▪ Lack of vegetation establishment over backfilled pit. ▪ Loss of vegetation in surrounding area. ▪ Degraded groundwater and surface water quality. ▪ Failure to meet target PMLU criteria.	▪ Installation of certified contours and drains as per design by an AQP. ▪ Problematic waste managed in accordance with dedicated MWMP. ▪ Landform design encapsulates problematic materials and promotes low energy stormwater runoff.	Medium
R14	*Stability:* Vegetation fails to establish on Central Pit rehabilitated landform or does not meet the target vegetation criteria.	▪ Landform unable to meet post closure land use criteria. ▪ Loss of habitat/beneficial land use. ▪ Reduced visual amenity. ▪ Increase in fugitive dust emissions.	▪ Growth medium demonstrated to be appropriate for selected vegetation. ▪ Rehabilitation trials and/or benchmarking to determine most effective rehabilitation methodology and seed species if required.	Low
R15	*Stability:* Access to water storage results in human or fauna injury or death.	▪ Unrestricted access to water storage resulting in potential human, stock or fauna injury or death.	▪ Safety bunds constructed at minimum 20 m offset from the pit zone of instability. ▪ Fence entire perimeter and bund to high wall areas. ▪ No public access to high wall or end wall areas. ▪ Minimise void area. ▪ Partial backfill according to the groundwater level.	Medium

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Ref No.	Event or Activity	Impact(s) Summary	Treatment Summary	Residual Risk
R16	Uncontained pit waters in the southern void impact surface or groundwater and exceed receiving environment contaminant limits.	▪ Reduction in aquatic fauna health. ▪ Reduced surface and groundwater quality. ▪ Reduced long-term water quality for livestock consumption.	▪ Final void outside the Isaac River floodplain. ▪ Pit wall geochemical characterisation. ▪ Development of a robust hydrogeological model. ▪ Long term pit lake water modelling (geochemical and water balance). ▪ Coal seams to be treated, removed or covered in the backfilling process. ▪ Conduct a water balance study to assess the void surface and groundwater interactions. ▪ Conduct effective measures to avoid generation or release of saline drainage and AMD.	Medium
R17	*Stability:* Erosion in the southern void following significant wet weather events.	▪ Landform instability. ▪ Lack of vegetation establishment. ▪ Downstream erosion and sedimentation. ▪ Reduced surface water quality. ▪ Reduced visual amenity. ▪ Increased fugitive dust. ▪ Failure to meet target PMLU criteria.	▪ Landform design uses non-erosive materials on the outer surfaces. ▪ Landform design considers structural, geotechnical and hydraulic factors ▪ Based on the physical and chemical characteristics of the site. ▪ Long term erosion and sediment control systems/features. ▪ Drainage measures directing overland flow away from the highwall edge.	Medium
R18	Target long term water quality is not achieved resulting in a final landform that does maintain its PMLU.	▪ Landform unable to meet post closure land use criteria. ▪ Long term impacts to the receiving environment.	▪ Ensure the void is a sink not a source through design and modelling. ▪ Treat or remove exposed coal seams. ▪ Develop specific rehabilitation strategies that includes monitoring, surveying, stability analysis and reporting.	Medium
R22	*Stability:* Rehabilitation does not meet the target vegetation criteria in the water storage areas.	▪ Loss of habitat. ▪ Reduced visual amenity. ▪ Landform unable to meet post closure land use criteria.	▪ Conduct land contamination investigation. ▪ Remove sediment or bury in-situ.	Low
R25	Rehabilitation of infrastructure areas do not meet the target vegetation criteria.	▪ Failure to establish vegetation and meet completion criteria. ▪ Excessive runoff during wet weather events. ▪ Fugitive dust. ▪ Loss of habitat. ▪ Reduced visual amenity.	▪ All disturbance areas will be contour ripped to break up compaction. ▪ Seeding and amelioration if required.	Low

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Ref No.	Event or Activity	Impact(s) Summary	Treatment Summary	Residual Risk
R28	Soils in infrastructure areas remain heavily compacted.	▪ Lack of vegetation establishment. ▪ Loss of vegetation in contaminated areas. ▪ Reduced visual amenity	▪ Progressive rehabilitation. ▪ General reshaping and pushing trimming to achieve pre-disturbance contours (including reestablishment of bed and banks). ▪ Installation of long terms erosion and sediment control systems where required. ▪ Source, cart and spread growth media. ▪ Rip and seed.	Low

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3.6.2 Rehabilitation Trials

3.6.2.1 Objective

The objective of rehabilitation trial(s) at BME is to improve the chances of achieving the nominated rehabilitation outcome (i.e., PMLU) and establish a method for managing and minimising the risks of a stable condition not being achieved.

3.6.2.2 Trial Design and Details

Of the 424 ha disturbance footprint approved for mining activities throughout the project's LOM:

- 393 ha has a nominated rehabilitation outcome (PMLU) of low intensity grazing; and
- 31 ha has a nominated rehabilitation outcome (PMLU) of water storage for livestock watering.

The Proponent will undertake progressive rehabilitation in areas that become available during the LOM when practicable. As approved disturbance within the confined mining footprint is to be undertaken within a relatively short, mine life (estimated to be five years with mining to cease in 2027), the area available for progressive rehabilitation throughout will be limited.

A section of the outward face of the West OOPD in 2025, totalling 32 ha, will be the first area available on which to conduct a rehabilitation trial (as shown in **Figure 3-34**) as required by Condition G11 of EA0002465.

The commencement of a grazing trial in this area will enable the comparison of trial outcomes with the low intensity grazing PMLU completion criteria and support the refinement of rehabilitation methodologies where necessary.

According to the PRCP Schedule that supports this PRC Plan, the achievement of a PMLU to a stable condition (grazing) is four years after the area is available for rehabilitation. Therefore, the duration of the trial is expected to be between 2025 and 2029 (**Attachment B**).

Potential issues of the trial relate to the impact of any extended climatic conditions such as prolonged drought which will affect the establishment of revegetation.

3.6.2.3 Trial Assessment for Success

Indicators for rehabilitation trial(s) success will be determined by:

- Landform cover design, specifically:
  - Landform stability; and
  - Adequacy of growth media.
- Productivity of grazing pasture, specifically:
  - Land capability (i.e., cattle grazing Class 4 and / or 5);
  - Soil fertility (noting soil amendments required);
  - Seed mix and rate;
  - Presence of declared weeds;
  - Expected stocking rates; and
  - Expected rate of pasture recovery.

Prior to and throughout the duration of the rehabilitation trial(s) the underlying landholder will be consulted with on a regular basis given their experience with grazing pasture on the ML and cattle requirements.

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3.6.2.4 Incorporation into Rehabilitation Strategies and Milestones

If the productivity of grazing pasture (i.e., species diversity, coverage or health) does not show a trajectory to the desired rehabilitation outcomes (i.e., low intensity grazing PMLU - self-sustaining completion criteria), then remediation strategies such as reseeding, weed control, soil amendments or irrigation may be required.

If landform cover or growth media does not show a trajectory to desired rehabilitation outcomes (i.e., low intensity grazing PMLU - safe and stable completion criteria) then earthworks will be carried out to rectify the landform (such as erosion repair or installation of more competent material).

Monitoring and Contingency strategies are covered in more detail in **Section 3.7**.

If alterations to rehabilitation strategies are required, the responsible personnel and departments will be advised (i.e., Environmental, Mine Planning, Survey, Mining), relevant management plans updated and mine plans adjusted to reflect information and knowledge gained to benefit rehabilitation efforts.

3.6.2.5 Previous Trials

As no rehabilitation has been carried out to date, the trials have not commenced at the time of the first submission of the PRCP. The Proponent has conducted rehabilitation trials and monitoring of rehabilitated legacy areas associated with the Burton Mine owned by a separate subsidiary of BCC and subject to a separate PRCP. Insight and knowledge gained from these experiences will be transferred to rehabilitation trials conducted at BME.

3.7 Monitoring and Maintenance

Legislative Requirements

In accordance with section 126C(1)(j) of the EP Act, the administering authority considers monitoring and maintenance necessary to decide if the PRC plan is consistent with the requirements of the legislation. The rehabilitation planning part must contain a monitoring and maintenance program that identifies and describes the monitoring systems that will be carried out in order to demonstrate a milestone and milestone criteria have been achieved.

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

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

As per section 3.8 of the PRC Plan Guidelines, the rehabilitation planning part must contain a monitoring and maintenance program that identifies and describes the monitoring systems that will be carried out in order to demonstrate a milestone and milestone criteria have been achieved.

The proposed monitoring and maintenance program in this Section will:

- Help identify and quantify problems, risks and opportunities for corrective actions and adaptive management throughout progressive rehabilitation and closure activities at BME;
- Describe the systems that will be used to determine the biophysical state of rehabilitation and closure;
- Be a standardised and repeatable approach to the measurement of biophysical attributes; and
- Be comparable against the PRCP Schedule.

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3.7.1 Monitoring Sites

To enable the repeatable collection of relevantly statistical valid data, reference and permanent monitoring sites are essential to determine rehabilitation and closure success. A summary of all monitoring sites used to demonstrate milestone and milestone criteria have been achieved (as per the PRCP Schedule) are provided below in **Sections 3.7.1.1** and **3.7.1.2**.

3.7.1.1 Reference Sites

The purpose of a reference (analogue) site is to serve as a benchmark for the rehabilitation of disturbed areas. A reference site (according to EA0002465) "may reflect the original location, adjacent area or another area where rehabilitation success has been completed for a similar biodiversity". It should represent, as close as possible, the landform, orientation and target vegetation characteristics intended for rehabilitation areas.

The number of reference sites required to develop rehabilitation success criteria is not stipulated in EA0002465. Although there is only one vegetation related PMLU at BME, three monitoring sites for the approved PMLU of low-intensity grazing will be established to be considered statistically relevant. These are shown in **Table 3-50** in Geocentric Datum of Australia (GDA) 2020 grid space.

Table 3-50 Reference Monitoring Sites

Reference Site ID	Easting (GDA 2020 Zone 55)	Northing (GDA 2020 Zone 55)	Description of Reference Land Use
PRC_MS_1	619243	7590178	Low-intensity grazing - Flora, Fauna, Erosion and Weed and Pest (North of Farm Dam)
PRC_MS_2	619522	7588007	Low-intensity grazing - Flora, Fauna, Erosion and Weed and Pest (North of magazine access road)
PRC_MS_3	621028	7584693	Low-intensity grazing - Flora, Fauna, Erosion and Weed and Pest (ML Southern Boundary)
PRC_MS_4	619171	7589620	Local farm dam to be retained (in north of ML) used for livestock water consumption
MP1/GS1	617623	7587216	Downstream Surface Water Quality
MP2	619175	7587536	Downstream Surface Water Quality
MP3/GS2	620310	7587196	Upstream Surface Water Quality
MP4	622473	7586183	Upstream Surface Water Quality
MBBE0001*	619884	7585428	Groundwater Quality and Level
MBBE0007	620615	7586415	Groundwater Quality and Level
AQMS1	610579	7566850	DES AQ Monitoring Station - PM10 and PM2.5 at Moranbah (Utah Drive)

**As per EA0002465 - MBBE0001 is to be to be monitored until mined out and replaced in Year 3 by another bore.*

3.7.1.2 Rehabilitation Sites

Areas that have been disturbed because of mining activities, that are intended to be re-established to a land use (PMLU) as defined in Table G1 of EA0002465 (**Attachment A**), require monitoring. Rehabilitation monitoring sites will be established in each rehabilitated area to allow for an assessment to be made against the relevant reference site (and target PMLU).

The number of sites established will be dependent on the area to be rehabilitated and the rate at which rehabilitation activities occur. Rehabilitation sites will be located within each area being reinstated to a particular Land Class/PMLU.

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Additional sites will be included in the monitoring program as new areas are rehabilitated. The density of rehabilitation sites within a disturbed area will be based on the NSW Office of Environment and Heritage BioRanking Assessment Methodology and Credit Calculator Operational Manual (NSW Office of Environment and Heritage, 2016) which is summarised below in **Table 3-51**.

Table 3-51 Number of Rehabilitation Monitoring Sites Required

Land Use Rehabilitation Area (ha)	Minimum Number of Rehabilitation Monitoring Sites
0 - 4	1
>4 - 20	2
>20 - 50	3
>100 - 250	4
>250 - 1000	5

The location of proposed rehabilitation and closure monitoring sites are shown in **Figure 3-61** and detailed in **Table 3-52**.

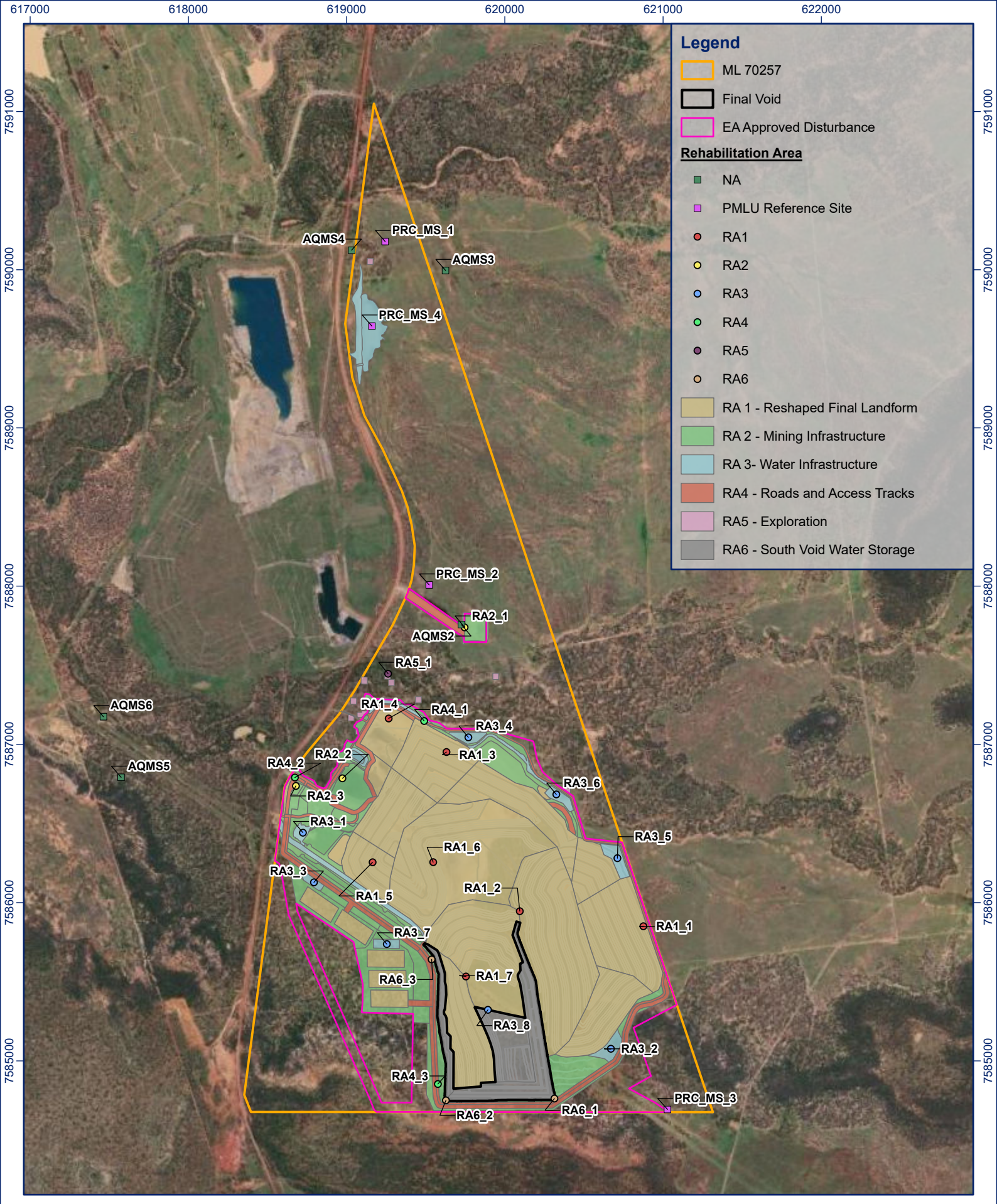
Table 3-52 Rehabilitation Monitoring Sites

Rehabilitation Area (Domain)	Rehabilitation Site ID	Easting (GDA 2020 Zone 55)	Northing (GDA 2020 Zone 55)	Area Description
NA	AQMS2	619726	7587757	Dust Deposition monitor during rehabilitation
NA	AQMS3	619625	7589995	Dust Deposition monitor during rehabilitation
NA	AQMS4	619032	7590123	Dust Deposition monitor during rehabilitation
NA	AQMS5	617575	7586792	Dust Deposition monitor during rehabilitation
NA	AQMS6	617464	7587175	Beta Attenuation Mass (BAM) dust monitor during rehabilitation
RA1 - OOPD East (outer face)	RA1_1	620875	7585851	OOPD East (outer face)
RA1 - OOPD East (inner face)	RA1_2	620094	7585946	OOPD East (inner face)
RA1 - North Pit (outer face – facing Hat Creek)	RA1_3	619631	7586952	North Pit (outer face – facing Hat Creek)
RA1 – North Pit (former bulk water storage)	RA1_4	619266	7587164	North Pit (former bulk water storage). To monitor stability of landform
RA1 – OOPD West (outer face – facing MIA)	RA1_5	619164	7586255	OOPD West (outer face – facing MIA)
RA1 - OOPD West (inner face / Central)	RA1_6	619547	7586256	OOPD West (inner face / Central)

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Rehabilitation Area (Domain)	Rehabilitation Site ID	Easting (GDA 2020 Zone 55)	Northing (GDA 2020 Zone 55)	Area Description
RA1 – OOPD (Southern pit floor / low wall)	RA1_7	619754	7585533	OOPD (Southern pit floor / low wall)
RA2 – Explosive Storage	RA2_1	619746	7587740	Explosive Storage
RA2 - ROM	RA2_2	618973	7586786	ROM
RA2 - MIA	RA2_3	618680	7586738	MIA
RA3 - Water Infrastructure	RA3_1	618724	7586442	Water Storage for livestock (along haul road, north of powerline)
RA3 – Water Infrastructure	RA3_2	620670	7585077	Southeast Sediment Dam to be rehabilitated
RA3 – Water Infrastructure	RA3_3	618794	7586128	Sediment Dam to be rehabilitated
RA3 – Water Infrastructure	RA3_4	619770	7587045	Sediment Dam to be rehabilitated
RA3 – Water Infrastructure	RA3_5	620711	7586281	Sediment Dam to be rehabilitated
RA3 – Water Infrastructure	RA3_6	620325	7586684	Sediment Dam to be rehabilitated
RA3 – Water Infrastructure	RA3_7	619254	7585738	Sediment Dam to be rehabilitated
RA3 - Void - Southern	RA3_8	619893	7585323	Water to remain in Southern Void.
RA4 – Ring Road near Hat Creek / levee	RA4_1	619490	7587148	Ring Road near Hat Creek / levee
RA4 – Site entrance Haul Road	RA4_2	618673	7586791	Site entrance Haul Road
RA4 – Ring Road southern	RA4_3	619577	7584854	Ring Road southern
RA5 – Exploration pad	RA5_1	619262	7587446	Exploration pad
RA6 – Southern Void (SE corner)	RA6_1	620313	7584762	Southern Void (SE corner)
RA6 – Southern Void (SW corner)	RA6_2	619628	7584751	Southern Void (SW corner)
RA6 - Southern Void (NW corner)	RA6_3	619537	7585641	Southern Void (NW corner)

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Scale: 1:30,000
Projection: GDA2020 MGA Zone 55
Created/Reviewed By: AW/MRT
Aerial: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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RPMGLOBAL

PROJECT	CLIENT
BME Mine - PRCP	BOWEN COKING COAL LIMITED
Rehabilitation and Closure Monitoring Sites	
Figure 3-61 | ADV-AU-00217 | September 2023	

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3.7.2 Monitoring and Maintenance Program

Monitoring of rehabilitated areas should be undertaken at an early stage so results can be compared against completion criteria. Areas trending away from completion criteria will require management and or maintenance intervention to ensure completion criteria is achieved.

Monitoring programs that assist in demonstrating the achievement of success criteria for rehabilitation and closure activities, are listed below:

- Biodiversity (vegetation and fauna);
- Land Capability (ability to achieve end land use);
- Water Quality (surface and groundwater);
- Final Landform (safety and stability); and
- Emissions (air quality).

Table 3-53 identifies which monitoring sites will address the different monitoring program categories.

Table 3-53 Rehabilitation and Closure Monitoring Sites

Monitoring Site Details		Monitoring Programs				
Monitoring Site ID	Reference or Rehabilitation	Biodiversity	Land Capability	Water Quality	Final Landform	Emissions
PRC_MS_1	Reference	✓	✓			
PRC_MS_2	Reference	✓	✓			
PRC_MS_3	Reference	✓	✓			
PRC_MS_4	Reference	✓	✓			
MP1	Reference			✓		
MP2	Reference			✓		
MP3	Reference			✓		
MP4	Reference			✓		
MBBE0001	Reference			✓		
MBBE0007	Reference			✓		
AQMS1	Reference					✓
AQMS2	Rehabilitation					✓
RA1_1	Rehabilitation	✓	✓		✓	
RA1_2	Rehabilitation	✓	✓		✓	
RA1_3	Rehabilitation	✓	✓		✓	
RA1_4	Rehabilitation	✓	✓		✓	
RA1_5	Rehabilitation	✓	✓		✓	
RA1_6	Rehabilitation	✓	✓		✓	
RA1_7	Rehabilitation	✓	✓		✓	
RA2_1	Rehabilitation	✓	✓			
RA2_2	Rehabilitation	✓	✓			
RA2_3	Rehabilitation	✓	✓			
RA3_1	Rehabilitation			✓		
RA3_2	Rehabilitation			✓		
RA3_3	Rehabilitation			✓		
RA3_4	Rehabilitation			✓		
RA3_5	Rehabilitation			✓		
RA3_6	Rehabilitation			✓		
RA3_7	Rehabilitation			✓		
RA3_8	Rehabilitation			✓		
RA4_1	Rehabilitation	✓	✓			

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Monitoring Site Details		Monitoring Programs				
RA4_2	Rehabilitation	✓	✓			
RA4_3	Rehabilitation	✓	✓			
RA5_1	Rehabilitation	✓	✓			
RA6_1	Rehabilitation				✓	
RA6_2	Rehabilitation				✓	
RA6_3	Rehabilitation				✓	

A detailed description of each monitoring program listed above is provided in **Sections 3.7.2.1** to **3.7.2.5**.

3.7.2.1 Biodiversity

Biodiversity is managed using the BME Biodiversity Management Plan (BMP), the BME Weed and Pest Management Plan, the BME Species Management Plan (SMP) and the BME Protected Plant Impact Management Plan (PPIMP). As these documents are regularly reviewed and updated during operations, they will also be adjusted to account for post-closure consideration outline in this PRCP closer during the review process conducted just prior to the cessation to mining.

Biodiversity monitoring involves the assessment of parameters such as perennial pasture biomass, fauna habitat and diversity, weeds/pests and disease/insect tolerance.

In accordance with the BMP, SMP and PPIMP, monitoring will consist of both visual (field-based assessments) and Geographic Information System (GIS) (remote sensing) technologies. Vegetation and fauna related monitoring will include perennial pasture biomass, conservation significant species or communities, weeds and pests and disease or insect attack.

Table 3-54 describes the methodologies and standards that will be used to monitor biodiversity parameters throughout rehabilitation and closure activities at BME. Biodiversity monitoring will demonstrate that **RM5, RM6, RM7** (low-intensity grazing) and the relevant PMLU completion criteria have been achieved.

Contingency strategies will be implemented if monitoring data indicates milestone criteria are not being met. For vegetation, contingency strategies may involve the application of additional seed and or fertiliser, surface ripping, weed and or pest control, erosion and sediment control infrastructure, irrigation or refinement of pasture species mix.

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Table 3-54 Biodiversity Monitoring

Monitoring Purpose	Parameter	Monitoring Site ID	Methodology	Frequency	
				Pre-Closure	Post Closure
Biodiversity	Perennial pasture biomass	PRC_MS_1 PRC_MS_2	▪ Determine proportion of organic groundcover, density and diversity of perennial, palatable and productive (3P) pasture species.	6 Monthly	Annual
	Conservation significant species or communities	PRC_MS_3 RA1_1 RA1_2 RA1_3 RA1_4 RA1_5 RA1_6	▪ As per BME Biodiversity Management Plan – Assessment by an AQP. ▪ As per BME Species Management Plan - A appropriately qualified fauna spotter-catcher will monitor the presence of native fauna species and their breeding places during clearing events. The spotter must be on site for all works to ensure that avoidance and mitigation measures are employed, and the animal breeding places are clearly flagged so avoidance measures can be taken. ▪ Update animal breeding place electronic register. ▪ As per BME Protected Plant Impact Management Plan - Assessment by an AQP. ▪ Monitoring will be scheduled towards the end of the wet season each year (late February – April) but will be dependent on local seasonal conditions. This will ensure that monitoring occurs in the period of greatest plant growth and after the known flowering period.	BMP - Annual SMP – during earthwork activities. PPIMP - Annual	Annual
	Fauna Habitat and Diversity	RA1_7 RA2_1 RA2_2 RA2_3	▪ Incidental sightings. ▪ Rapid Visual Monitoring – Habitat Complexity. ▪ Photographic Monitoring. ▪ As per Biodiversity Management Plan. ▪ As per Species Management Plan.	6 Monthly	Annual
	Weeds and Pests	RA4_1 RA4_2	▪ Rapid Visual Monitoring (recorded as sparse, moderately abundant or abundant). ▪ Disturbance Photographic Monitoring. ▪ Global Positioning System (GPS) location recorded.	6 Monthly	Annual
	Disease or insect attack	RA4_3 RA5_1	▪ Visual Monitoring. ▪ Photographic Monitoring.	6 Monthly	Annual

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3.7.2.2 Land Capability

As stated in the *Guideline for Agricultural Land Evaluation in Queensland* (State Department of Queensland 2015), agriculture is a core component of the economic prosperity of Queensland, therefore, to maintain its productive capacity, it is essential to protect agricultural land.

The productive capacity of agricultural land is determined by its soil characteristics (such as quality, erodibility and contamination). Soil and waste material will be managed through the Topsoil Management Plan (TMP) and the MWMP respectively.

Land capability monitoring will enable soil characterisation in rehabilitated areas, to establish if an area is suitable for a specific land use once mining has ceased. For BME, the end land use is low-intensity grazing (Land Class 4 (IV)).

Post-mine land capability classifications for disturbance areas are set out in Table G1 of EA0002465 As a reference, the definitions of "land class", according to the *Guideline for Agricultural Land Evaluation in Queensland* (State Department of Queensland 2015), are provided below:

- **Class I - Land suitable for all agricultural and pastoral uses:**
  - Suited to a wide range of crops and is highly productive.
  - Presents no limitations to use of machinery or choice of implements.
  - Wind and water erosion hazard are low even under intensive cultivation.
- **Class II - Land suitable for all agricultural uses but with slight restrictions to use for cultivation in one or more of the following categories:**
  - Land has some minor limitation to the choice of crops, and/or slight restrictions to productivity.
  - Land has some minor impediment to the use of cultivation machinery, which limits the choice of implements, or restricts the conditions for successful operation.
  - Land is used for cultivated cropping that requires simple conservation practices to reduce soil loss to an acceptable level. These include agronomic practices such as contour working, strip cropping and stubble mulching.
- **Class III - Land suitable for all agricultural uses but with moderate restrictions to use for cultivation in one or more of the following categories:**
  - Land has moderate limitations to the choice of crops and/or moderate restrictions to productivity.
  - Land has moderate impediment to the use of cultivation machinery, which limits the choice of implements, or restricts the conditions for successful operation.
  - Land is used for cultivated cropping that requires intensive conservation practices to reduce soil loss to an acceptable level. These include contour banking systems and intensive residue management involving specialised machinery.
- **Class IV - Land primarily suited to pastoral use but which may be safely used for occasional cultivation with careful management. Limitations arise from one of the following categories:**
  - Land is such that the choice of crops is severely restricted, and/or existing conditions severely limit productivity under cropping.
  - Land has severe impediment to the use of cultivation machinery, which limits the choice of implements, or severely restricts the conditions for successful operation.
  - Land cannot be used safely for permanent cultivation. If cropped, a pasture phase must be the major component of the cropping program to limit soil loss to an acceptable level.
- **Class V - Land that in all other characteristics would be arable but has limitations that, unless removed, make cultivation impractical and/or economic – examples include swampy land that may be drained, or land that contains surface rock that could be removed at a cost.**
- **Class VI - Land that is not suitable for cultivation but is well suited to pastoral use and on which pasture improvement involving the use of machinery is practicable.**

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- **Class VII - Land that 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.**

- **Class VIII - Land that has such severe limitations that it is unsuited for either cultivation or grazing.**

Land capability will be monitored via field-based assessments (i.e., BME's Erosion and Sediment Control Plan), third-party assessments, laboratory analysis of soil parameters as well as utilising GIS and remote sensing technologies. Key parameters for land class monitoring include soil quality, erosion, contamination and the presence of weeds and pests.

Table 3-55 describes the methodologies and standards that will be used to monitor land capability parameters throughout rehabilitation and closure activities at BME. Land Capability monitoring will demonstrate that **RM2, RM4, RM6, RM7** and the relevant PMLU completion criteria have been achieved.

Contingency strategies will be implemented if monitoring data indicates milestone criteria are not being met. For land capability, contingency strategies may involve recommendations for spoil or soil amelioration / fertilisation, fencing off areas, installation of additional erosion and sediment control infrastructure, soil treatment technologies (i.e., treatment of contamination), weed control or pest management.

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Table 3-55 Land Capability Monitoring

Monitoring Purpose	Parameter	Monitoring Site ID	Methodology	Frequency	
				Pre-Closure	Post Closure
Land Capability	Productivity / Grazing	PRC_MS_1 PRC_MS_2	▪ Pasture Productivity Assessment by AQP.	6 Monthly	Annual
	Soil Quality	PRC_MS_3 RA1_1 RA1_2 RA1_3 RA1_4	▪ The National Committee on Soil and Terrain's Australian Soil and Land Survey Field Handbook (3rd Edition, 2009). ▪ 2 x 250g samples at start and end of transects (combine to form composite sample). ▪ Soil Analysis at National Association of Testing Authorities (NATA) accredited laboratory (plant available water capacity (PAWC), nutrient deficiency, physical factors, salinity, rockiness, micro-relief, pH, exchangeable sodium percent (ESP), wetness, flooding).	Prior to the rehabilitation of an area.	Annual
	Soil Contamination	RA1_5 RA1_6 RA1_7 RA2_1 RA2_2 RA2_3 RA4_1 RA4_2 RA4_3 RA5_1	▪ AQP to conduct sampling and testing as per AS 4482.1—2005: Guide to the investigation and sampling of sites with potentially contaminated soil. ▪ AQP to prepare investigation report, to determine if contamination exists, including remediation works required to remediate any contaminated land. ▪ AQP to issue a site suitability statement, indicating the land is not contaminated.	Prior to the rehabilitation of an area.	Prior to relinquishment of land to be used as grazing.

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3.7.2.3 Water

Water related matters are managed as part of the ongoing BME Water Management Plan (WMP), Groundwater Management Plan (GMMP), the Receiving Environment Monitoring Program (REMP) and Erosion and Sediment Control Plan (ESCP) during operations. As these documents are regularly reviewed and updated during operations, they will also be adjusted to account for post-closure consideration outline in this PRCP closer during the review process conducted just prior to the cessation to mining.

Water monitoring is required to confirm that water contained within (or leaving) the ML (i.e., residual void water or sediment dams to remain post closure as per the existing landholder agreement) does not have the potential to contaminate the surrounding environment or waterways, impact other users and is safe to humans and animals. Monitoring specific to rehabilitation and closure activities will involve field-based assessments, sampling of surface and groundwaters, water balance studies and geochemical modelling.

Table 3-55 and **Table 3-56** describes the methodologies and standards that will be used to monitor void, surface and groundwater parameters throughout rehabilitation and closure activities at BME. Water monitoring will demonstrate that **RM2, RM6, RM7, RM8** and the relevant PMLU completion criteria have been achieved.

Contingency strategies will be implemented if monitoring data indicates milestone criteria are not being met. In relation to surface water, contingency strategies may involve increased sampling regime until results return to a reliable range (within WQO Guidelines), temporary exclusion of an area to cattle (i.e., fencing), removal or encapsulation of AMD material, installation of erosion and sediment control infrastructure or consultation with an AQP to review the water infrastructure design and implement recommendations as required.

In the instance that groundwater monitoring indicates a deviation from milestone criteria, a geochemical investigation will be undertaken and BME will assess results with an AQP, so that remedial action can be taken if necessary.

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Table 3-56 Water Monitoring

Monitoring Purpose	Parameter	Monitoring Site ID	Methodology	Frequency	
				Pre-Closure	Post Closure
Surface Water	Quality - residual southern void water or sediment dams / residual farm dams left at closure	MP1/GS1 MP2 MP3/GS2 MP4	▪ Sampling in accordance with methods prescribed in the latest edition of the administering authority's Monitoring and Sampling Manual. ▪ Sampling and testing of void water and sediment dams to ensure trigger limits are not exceeded (including in situ pH, EC, turbidity; selected total and dissolved metals; hydrocarbons, total petroleum hydrocarbons, and nutrients). ▪ Annual testing of the full suite of dissolved metals. ▪ Samples sent to a NATA accredited laboratory for analysis ▪ Visual inspections prior to each wet season, and immediately before and after significant rainfall events.	Annual and during significant creek flow events	Annual
	AMD	MP1/GS1 MP2 MP3/GS2 MP4 MBBE0001 MBBE0007 RA1_1 RA1_2 RA1_3 RA1_4 RA1_5 RA1_6 RA1_7 RA6_1	▪ As per the BME Water Management Plan (WMP) – dam and receiving environment monitoring for signs of saline/acid rock drainage. ▪ As per the BME Material Waste Management Plan (MWMP).	Quarterly	Annual

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		RA6_2 RA6_3			
	Quality (Receiving Waters)	MP1/GS1 MP2 MP3/GS2 MP4	▪ Visual inspection of receiving waters. ▪ As per the BME Receiving Environment Monitoring Program (REMP). ▪ Samples sent to a NATA accredited laboratory for analysis.	Commencement of release and thereafter weekly during release	NA
	Surface Flow	NA – whole of site assessment	▪ Hydrological survey (i.e., Light Detection and Radar (LiDAR). ▪ Drainage and runoff assessments to identify and rectify converging flow paths. ▪ Flood modelling.	Triennial Annual	Annual
Groundwater	Quality	MBBE0001 MBBE0007	▪ Monitoring and sampling of groundwater conducted in line with the latest edition of the administering authority's Monitoring and Sampling Manual. ▪ Sampling and testing to ensure water quality limits are not exceeded (including insitu pH, EC and suspended solids, metals/metalloids and hydrocarbons, total petroleum hydrocarbons). ▪ Samples sent to a NATA accredited laboratory for analysis. ▪ Geochemical Modelling.	Quarterly EC and pH 6 Monthly for remaining analytes	Annual
	Level	MBBE0001 MBBE0007	• Measure via piezometers.	Quarterly	Annual
	Void hydrology	RA6_1 RA6_2 RA6_3 MBBE0001 MBBE0007	• AQP to conduct long term water balance study that includes groundwater assessment.	Annual	Annual

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3.7.2.4 Final Landform

At BME, the final landform will be managed through the medium and long-term Mine Plan, Topsoil Management Plan (TMP), the Material Waste Management Plan (MWMP), Residual Void (Southern Void) Design and Closure Plan, the Rehabilitation Management Plan (RMP) and Rehabilitation Monitoring Program.

Final landform monitoring is required to confirm that the final landform is constructed according to the Registered Professional Engineer's of Queensland (RPEQ's) 'as built' landform design specifications.

Monitoring will consist of both visual (field-based assessments) and GIS (remote sensing) technologies (such as LiDAR) to ensure the final landform is safe, stable, in line with community member expectations and intended final land use (PMLU) as well as other requirements mandated through EA0002465.

Table 3-57 describes the methodologies and standards that will be used to monitor final landform parameters throughout rehabilitation and closure activities at BME. Final landform monitoring will demonstrate that **RM1, RM3, RM4, RM6, RM7** and the relevant PMLU completion criteria have been achieved.

Contingency strategies will be implemented if monitoring data indicates milestone criteria are not being met. If required, contingency strategies may involve reprofiling if not consistent with 'as built' landform specifications (i.e., slopes, length), revegetation or revision of seed mix, removal or the installation of erosion and sediment control infrastructure or review from a geotechnical engineer.

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Table 3-57 Final Landform Monitoring

Monitoring Purpose	Parameter	Monitoring Site ID	Methodology	Frequency	
				Pre-Closure	Post Closure
Visual Amenity	Profile	RA1_1 RA1_2 RA1_3	▪ Visual inspection to ensure infrastructure is removed. ▪ LiDAR survey (control points, slope gradient, slope length) as specified in EA0002465. ▪ Generation of 'as constructed' digital terrain models and/or plans.	6 Monthly	Annual
Health and Safety	Stability (i.e., subsidence)	RA1_4 RA1_5 RA1_6 RA1_7 RA6_1 RA6_2 RA6_3	▪ Visual Inspections. ▪ Geotechnical stability monitoring (LiDAR) by AQP - regular measurements using georeferenced image-processing software to detect movement in pit and water storage infrastructure walls. ▪ Periodic surveys undertaken so that all constructed surfaces can be suitably measured and compared with previous survey to determine placed volumes, constructed landform, identification of drainage structures, constructed roads and differences in landforms between survey events (settlement etc). ▪ Compliance assessment by RPEQ to establish compliance with the 'as built' landform specifications.	Daily 6 Monthly 6 Monthly Annual	Annual
	Safety / Unauthorised Access	NA – whole of site assessment	▪ Visual inspection ▪ Remote camera ▪ Inspect integrity of infrastructure (i.e., fencing or earthen bunds) installed to restrict access to people or wildlife/cattle.	Ongoing	Annual
	Erosion	NA – whole of site assessment	▪ In-field visual observations. ▪ Monitor the progression of erosion features as per Australian Soil and Land Survey - Field Handbook. 3rd ed (2009) – as per BME Rehabilitation Monitoring Program ▪ Quantified Sediment deposition. ▪ GPS location recorded. ▪ Photographic Monitoring.	6 Monthly	Annual

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3.7.2.5 Emissions

BME has implemented an Air Quality Monitoring and Management Plan as required by EA0002465 (**Attachment A**). As management plans are regularly reviewed and updated during operations, they will also be adjusted to account for post-closure consideration outline in this PRCP closer during the review process conducted just prior to the cessation to mining.

Emissions monitoring involves the assessment of parameters that may be impacted by climate (such as the generation of dust emissions from exposed surfaces attributed to unsuccessful rehabilitation, drought and or fire). Monitoring will consist of both visual (field-based assessments), utilisation of dust monitors as well as tracking climate data (such as El Nino – Southern Oscillation (ENSO)) that may impede rehabilitation and closure efforts at BME.

Table 3-58 describes the methodologies and standards that will be to monitor emission related parameters throughout rehabilitation and closure activities at BME. Emission monitoring will demonstrate that **RM6, RM7** and the relevant PMLU completion criteria have been achieved.

Contingency strategies will be implemented if monitoring data indicates milestone criteria are not being met. If dust monitoring indicates an exceedance of the relevant limits in Condition B2 of EA0002465, then an investigation must be undertaken to determine whether the exceedance is due to emissions from the mining activity. Other contingency strategies may involve, increased dust monitoring regime, installation of additional erosion and sediment control infrastructure, spray mulching (to assist in binding the surface of dumps in times of drought) or irrigation.

For poor drought or fire resistance, contingency strategies may include additional earthworks to establish larger fire breaks, refinement of pasture species mix (i.e., with higher drought tolerance) or planned burns in consultation with the landholder and local Queensland Fire and Emergency Service (QFES).

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Table 3-58 Emissions Monitoring

Monitoring Purpose	Parameter	Monitoring Site ID	Methodology	Frequency	
				Pre-Closure	Post Closure
Climate	Resilience to Fire	NA – whole of site assessment	▪ As per Rehabilitation Monitoring Program. ▪ Mine Emergency Services Department to monitor the Mine's fire break and other Mine infrastructure areas to evaluate the potential for fire – the assessment shall consider weather, fuel loads (live or dead vegetation in an area), topography, weed invasion, drought, canopy gaps (drying of soils and fuel loads), clearing and the encroachment of more intensive land uses. ▪ Bushfire Assessment conducted by an AQP. ▪ Visual records. ▪ Assessment of climate data (i.e., weather forecasts, El Nino – Southern Oscillation (ENSO)).	Annual	Annual
	Resilience to Drought	NA – whole of site assessment	▪ As per Rehabilitation Monitoring Program. ▪ Monitored via a subscription to the Queensland Government's - Drought Assessment Report of the general Mine area which allows for an assessment of the impacts of rainfall on components of the grazing system, in particular pasture growth.	Annual	Annual
	Air Quality – dust deposition, PM10 and PM2.5 monitoring	AQMS1 AQMS2 AQMS3 AQMS4 AQMS5 AQMS6	▪ Dust deposition monitoring to ensure EA0002465 Condition B2(a) is met in accordance with most recent version of Australian Standard AS3580.10.1 Methods for sampling and analysis of ambient air—Determination of particulate matter—Deposited matter – Gravimetric method. ▪ PM10 monitoring to ensure EA0002465 Condition B2(b) is met in accordance with most recent version of either: i. Australian Standard AS3580.9.6 Methods for sampling and analysis of ambient air — Determination of suspended particulate matter — PM10 high volume sampler with size-selective inlet – Gravimetric method; or ii. Australian Standard AS3580.9.9 Methods for sampling and analysis of ambient air— Determination of suspended particulate matter— PM10 low volume sampler—Gravimetric method; or iii. Australian Standard AS3580.9.11 Methods for sampling and analysis of ambient air— Determination of suspended particulate matter— PM10 beta attenuation monitors. ▪ PM2.5 monitoring to ensure EA0002465 Condition B2(c) is met in accordance with most recent version of either: - AS/NZS3580.9.10 Methods for sampling and analysis of ambient air— Determination of suspended particulate matter—PM (sub)2.5(/sub) low volume sampler—Gravimetric method; or - AS/NZS3580.9.12 (2013): Determination of suspended particulate matter – PM2.5 beta attenuation monitors.	Continuous monitoring	Continuous monitoring

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3.7.3 Monitoring, Reporting and Review

3.7.3.1 Schedule

The monitoring schedule for rehabilitation milestones is provided in **Table 3-59**.

3.7.3.2 Timing and Frequency

As per condition G15 of EA0002465, a Rehabilitation Monitoring Program must be developed and implemented by an appropriately qualified person for the life of the EA (**Attachment A**). Monitoring associated with the PRC Plan will be conducted by an AQP at locations indicated throughout **Section 3.7.2**.

Reference and rehabilitation sites will be monitored during the same survey, at the same time every year to avoid seasonal variations. This will ensure the collection of relevant, statistically valid data, that is repeatable year on year, to enable statistically valid conclusions as established under the rehabilitation program.

As required by condition G16 of EA0002465, the Rehabilitation Monitoring Program will occur across a multitude of monitoring locations of sufficient spatial and temporal replication, at intervals no greater than thirty-six (36) months from the commencement of the mining activities.

The culmination of multi-year monitoring will allow comparison trends to be detected to determine if they are trending towards performance criteria of PMLUs. In the event that monitoring results indicate a trend away from PMLU objectives (i.e., rehabilitation milestones), contingency strategies described in **Sections 3.7.2.1** to **3.7.2.5** will be implemented accordingly.

3.7.3.3 Reporting and Review Process

In accordance with condition G17 of EA0002465 (**Attachment A**), the Rehabilitation Monitoring Program is required to contain the following:

- How the rehabilitation objectives in the Rehabilitation Management Plan required by Condition G4 are being met;
- If the rehabilitation objectives are not being met, the corrective actions to be taken;
- A statistical analysis of how areas of rehabilitation compare to reference sites;
- A statistical analysis of how areas of rehabilitation are meeting the requirements of Condition G11;
- The sampling and monitoring intensity used in the Rehabilitation Monitoring Program required by Condition G15; and
- Justification of the sampling and monitoring intensity used in the Rehabilitation Monitoring Program required by Condition G15.

Rehabilitation monitoring will be documented in the Annual Rehabilitation Monitoring Program Progress Report.

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Table 3-59 Schedule of Monitoring, Reporting and Review for Rehabilitation Milestones

Milestone Reference	Rehabilitation Milestone	Milestone Criteria	Monitoring and validation methodology	Frequency	Reporting and Review Requirement
RM1	Infrastructure Decommissioning and Removal	g) All services disconnected h) All buildings demolished and removed	Landform Monitoring as per **Table 3-57**.	As per **Table 3-57**	A report will be compiled of the infrastructure removed and disposal process.
RM2	Remediation of Contaminated Land	a) An AQP has completed a contaminated land investigation. b) Contaminated materials removed and appropriately disposed of. c) Onsite remediation of hydrocarbon contaminated soils completed. d) Certification from an AQP that all measures required by the contaminated land investigation report(s) are implemented.	Land Capability Monitoring as per **Table 3-55**. Water Monitoring as per **Table 3-56.**	As per **Table 3-55**. As per **Table 3-56.**	A report will be compiled by an AQP to certify that the land is not contaminated.
RM3	Landform Development and Reshaping/Reprofiling (Additional Details on Milestone Criteria may be found in Part A of the PRCP)	**Out of Pit Dumps:** a) All major earthworks completed. b) Geotechnically stable. c) Contoured and graded drains. d) Geotechnically stable back-filled pits. e) Outer slopes and inner slopes draining away from void. **Southern Void Water Storage:** j) Minimal void area and volume based on economic, engineering, k) Pit waters are contained such that they do not impact or interact surface or groundwater.	Final Landform Monitoring as per **Table 3-57**.	As per **Table 3-57**.	Formal sign off from internal AQP and earthworks supervisor that landform reshaping and contouring have been done as per landform design specifications (including survey and geotechnical monitoring results).

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RM4	Surface Preparation (topsoil)	a) Placement of 0.3m of topsoil. b) An assessment of soil health and suitability has been completed by an appropriately qualified person to confirm soil is suitable for target vegetation establishment.	Land Capability Monitoring as per **Table 3-55**. Final Landform Monitoring as per **Table 3-57**.	As per **Table 3-55**. As per **Table 3-57**.	Formal sign off from internal AQP and earthworks supervisor that surface has been suitably prepared for rehabilitation (including topsoil volumes, depth and details of installed erosion and sediment control infrastructure).
RM5	Revegetation (seeding)	a) Native or introduced pasture grass seed species used to control erosion at 20-25 kg/ha. b) Groundcover is 60% perennial pasture biomass for consecutive years.	Biodiversity Monitoring as per **Table 3-54**.	As per **Table 3-54**.	Formal sign off from internal AQP and earthworks supervisor that area has been revegetated (including seed mix, application method, any amelioration undertaken).
RM6	Achievement of Surface Requirements	a) Soil nutrient concentrations, nutrient cycling and vegetation diversity and cover comparable to reference sites. b) Establishment of a mix of perennial grasses suitable for grazing in the area.	Biodiversity Monitoring as per **Table 3-54**. Land Capability Monitoring as per **Table 3-55**. Water Monitoring as per **Table 3-56**. Final Landform Monitoring as per **Table 3-57**. Emissions Monitoring as per **Table 3-58**.	As per **Table 3-54**. As per **Table 3-55**. As per **Table 3-56**. As per **Table 3-57**. As per **Table 3-58**.	A progressive certification report (or final rehabilitation report as part of the requirements of an application to surrender an EA) will be compiled and submitted to DES.
RM7	Achievement of PMLU to a stable condition (low density grazing) (Additional Details on Milestone Criteria may be found in Part A of the PRCP)	a) Certification from an AQP that the area has achieved stable condition including: b) Maximum erosion rate. c) Groundcover. d) Surface water quality. e) Groundwater level and quality. f) No unsuitable contamination. g) Land Class 4 for grazing. h) Less than 5% of declared weeds (excluding Parthenium weed)	Biodiversity Monitoring as per **Table 3-54**. Land Capability Monitoring as per **Table 3-55.** Water Monitoring as per **Table 3-56**. Final Landform Monitoring as per **Table 3-57**.	As per **Table 3-54**. As per **Table 3-55.** As per **Table 3-56**. As per **Table 3-57**.	A final rehabilitation report as part of the requirements of an application to surrender an EA will be compiled and submitted to DES.

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RM8	Achievement of PMLU to a stable condition (water storage for livestock watering)	a) Water Quality meets the relevant Water Quality Objectives (WQO) Guidelines.	Water Monitoring as per **Table 3-56**. Final Landform Monitoring as per **Table 3-57**.	As per **Table 3-56**. As per **Table 3-57**.	A final rehabilitation report as part of the requirements of an application to surrender an EA will be compiled and submitted to DES.

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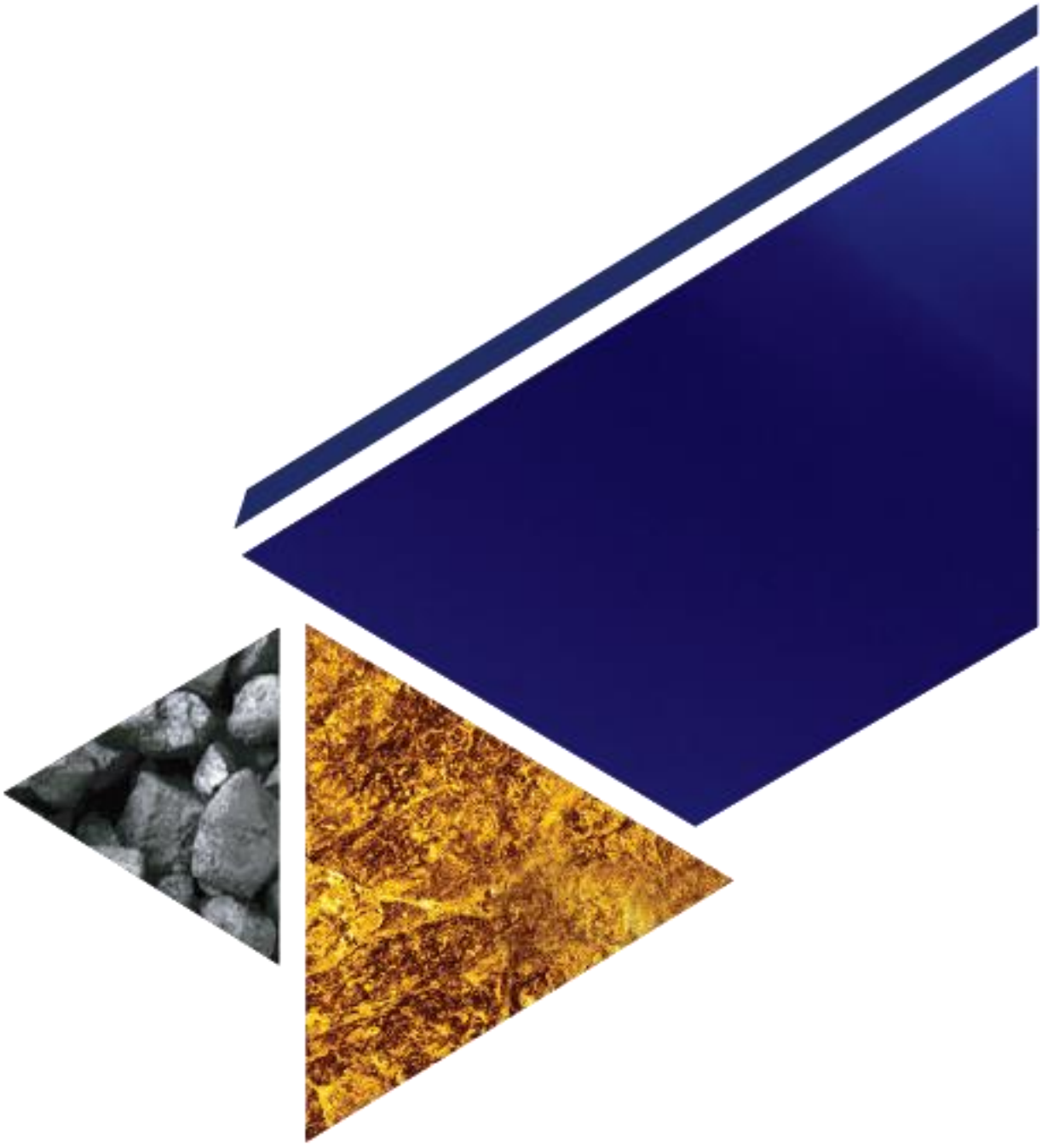
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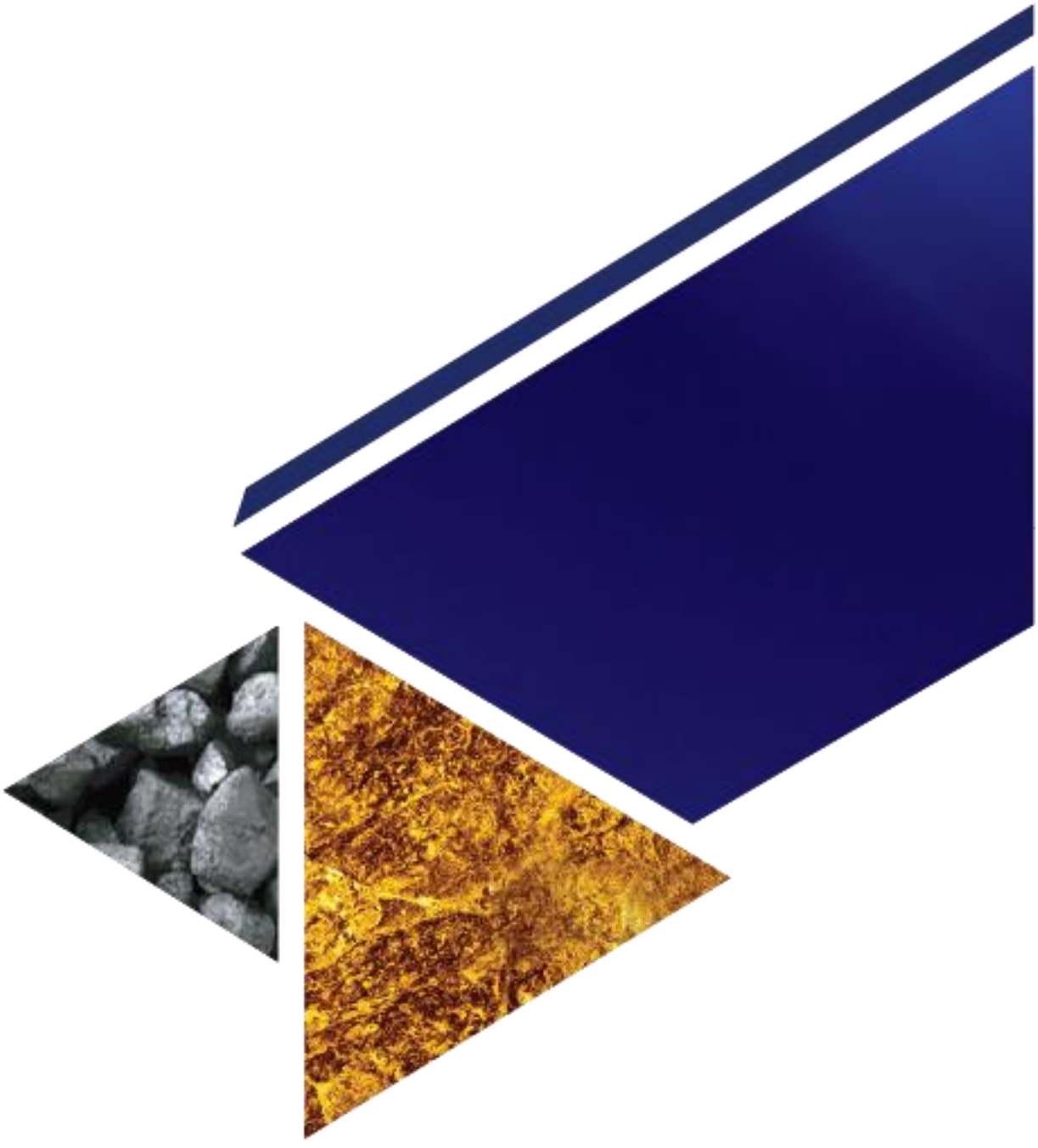
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4 Appendices and Attachments



Appendix A: Important Information about this Document



IMPORTANT INFORMATION ABOUT THIS DOCUMENT

1. Our Client

This report has been produced by or on behalf of RPM Advisory Services Pty Ltd ("RPM") solely for Coking Coal One Pty Ltd a wholly owned subsidiary of Bowen Coking Coal Limited (the "Client").

2. Client Use

The Client's use and disclosure of this report is subject to the terms and conditions of the engaging Agreement under which RPM prepared the report.

3. Notice to Third Parties

RPM prepared this report for the Client only. If you are not the Client:

- *RPM has prepared this report having regard to the particular needs and interests of the Client, and in accordance with the Client's instructions and in accordance with the terms and conditions of its engagement. It did not draft this report having regard to any other person's particular needs or interests. Your needs and interests may be distinctly different to the Client's needs and interests, and the report may not be sufficient, fit or appropriate for your purposes.*
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4. Independence

RPM provides advisory services to the mining and finance sectors. Within its core expertise it provides independent technical reviews, resource evaluation, mining engineering, environmental assessments and mine valuation services to the resources and financial services industries.

RPM have independently assessed the subject of the report (the "Project") by reviewing pertinent data, which may include Resources, Reserves, existing approvals, licences and permits, manpower requirements and the life of mine plans relating to productivity, production, operating costs and capital expenditures. All opinions, findings and conclusions expressed in this report are those of RPM and specialist advisors.

Drafts of this report were provided to the Client, but only for the purpose of confirming the accuracy of factual material and the reasonableness of assumptions relied upon in this report.

RPM has been paid, and has agreed to be paid, professional fees for the preparation of this report. The remuneration for this report is not dependent upon the findings of this report. RPM does not have any economic or beneficial interest (present or contingent), in the Project, in securities of the companies associated with the Project or the Client

5. Inputs, subsequent changes and no duty to update

RPM has created this report using data and information provided by or on behalf of the Client. Unless specifically stated otherwise, RPM has not independently verified that data and information. RPM accepts no liability for the accuracy or completeness of that data and information, even if that data and information has been incorporated into or relied upon in creating this report (or parts of it).

The conclusions and opinions contained in this report apply as at the date of the report. Events (including changes to any of the data and information that RPM used in preparing the report) may have occurred since that date which may impact on those conclusions and opinions and make them unreliable. RPM is under no duty to update the report upon the occurrence of any such event, though it reserves the right to do so.

6. Inherent Mining Risks

Mining is carried out in an environment where not all events are predictable.

Whilst an effective management team can identify the known risks and take measures to manage and mitigate those risks, there is still the possibility for unexpected and unpredictable events to occur. It is not possible therefore to totally remove all risks or state with certainty that an event that may have a material impact on the operation of a mine, will not occur.

The ability of any person to achieve forward-looking production and economic targets is dependent on numerous factors that are beyond RPM's control and that RPM cannot anticipate. These factors include, but are not limited to, site-specific mining and geological conditions, management and personnel capabilities, availability of funding to properly operate and capitalize the operation, variations in cost elements and market conditions, developing and operating the mine in an efficient manner, unforeseen changes in legislation and new industry developments. Any of these factors may substantially alter the performance of any mining operation.

7. Limitations and Exclusions

RPM 's report is based on data, information reports, plans and tabulations, as applicable, provided by Client or on behalf of the Client. The Client has not advised RPM of any material change, or event likely to cause material change, to the operations or forecasts since the date of assets inspections.

The work undertaken for this report is that required for a technical review of the information, coupled with such inspections as RPM considered appropriate to prepare this report.

Unless otherwise stated specifically in writing, the report specifically excludes all aspects of legal issues, commercial and financing matters, land titles and agreements, except such aspects as may directly influence technical, operational or cost issues and where applicable to the JORC Code guidelines.

RPM has specifically excluded making any comments on the competitive position of the relevant assets compared with other similar and competing producers around the world. RPM strongly advises that any potential investors make their own comprehensive assessment of the competitive position of the relevant assets in the market.

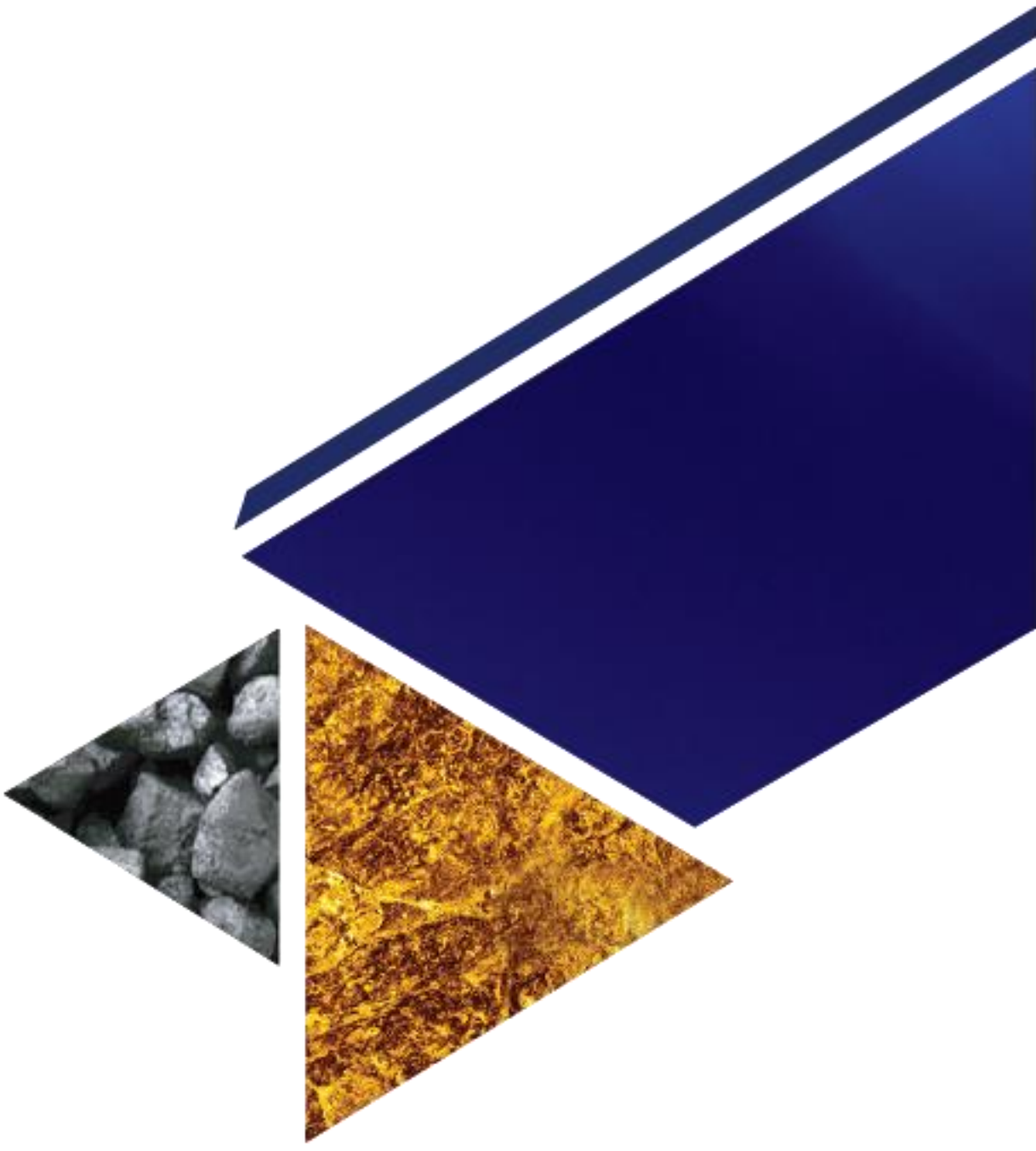
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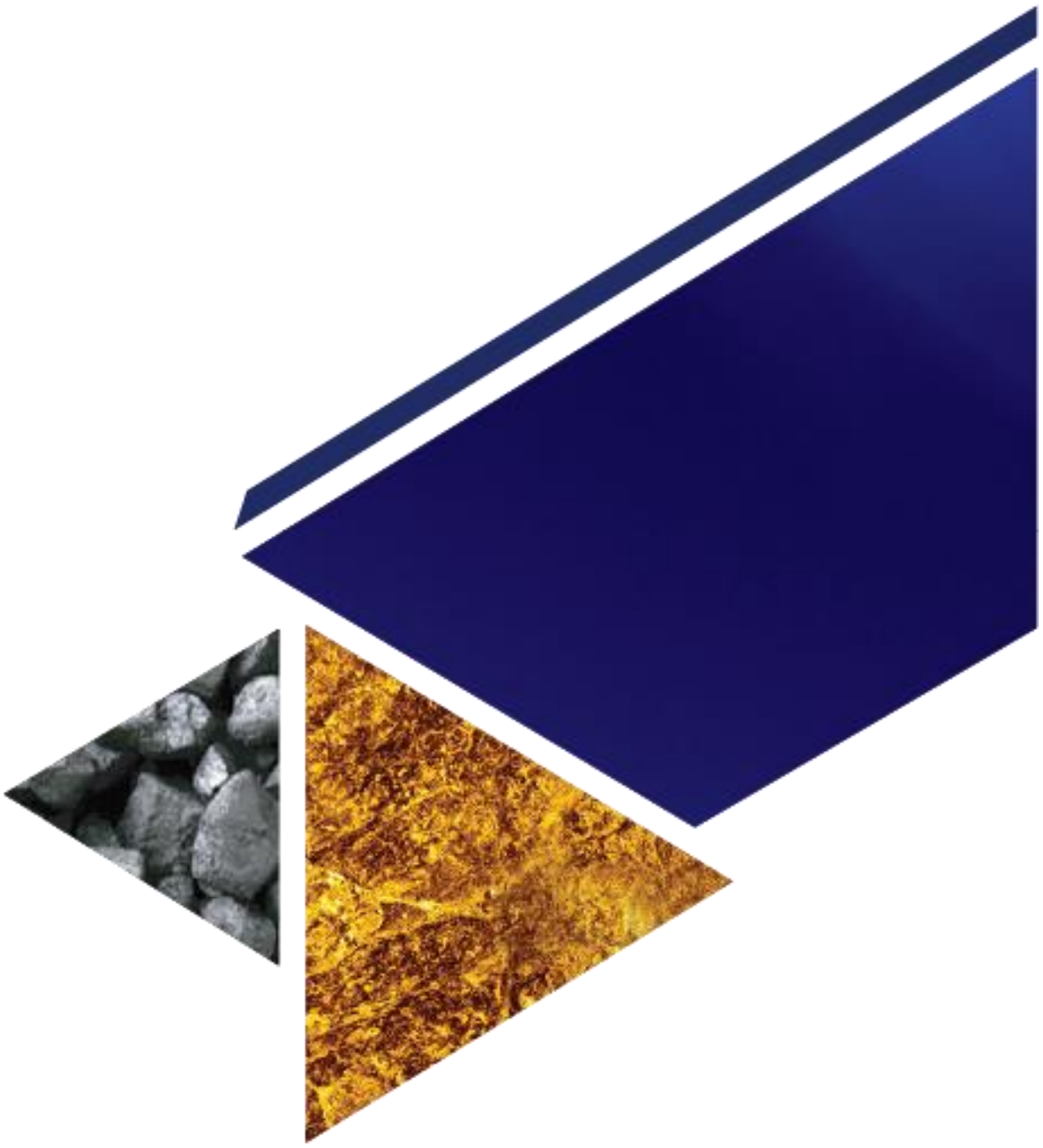
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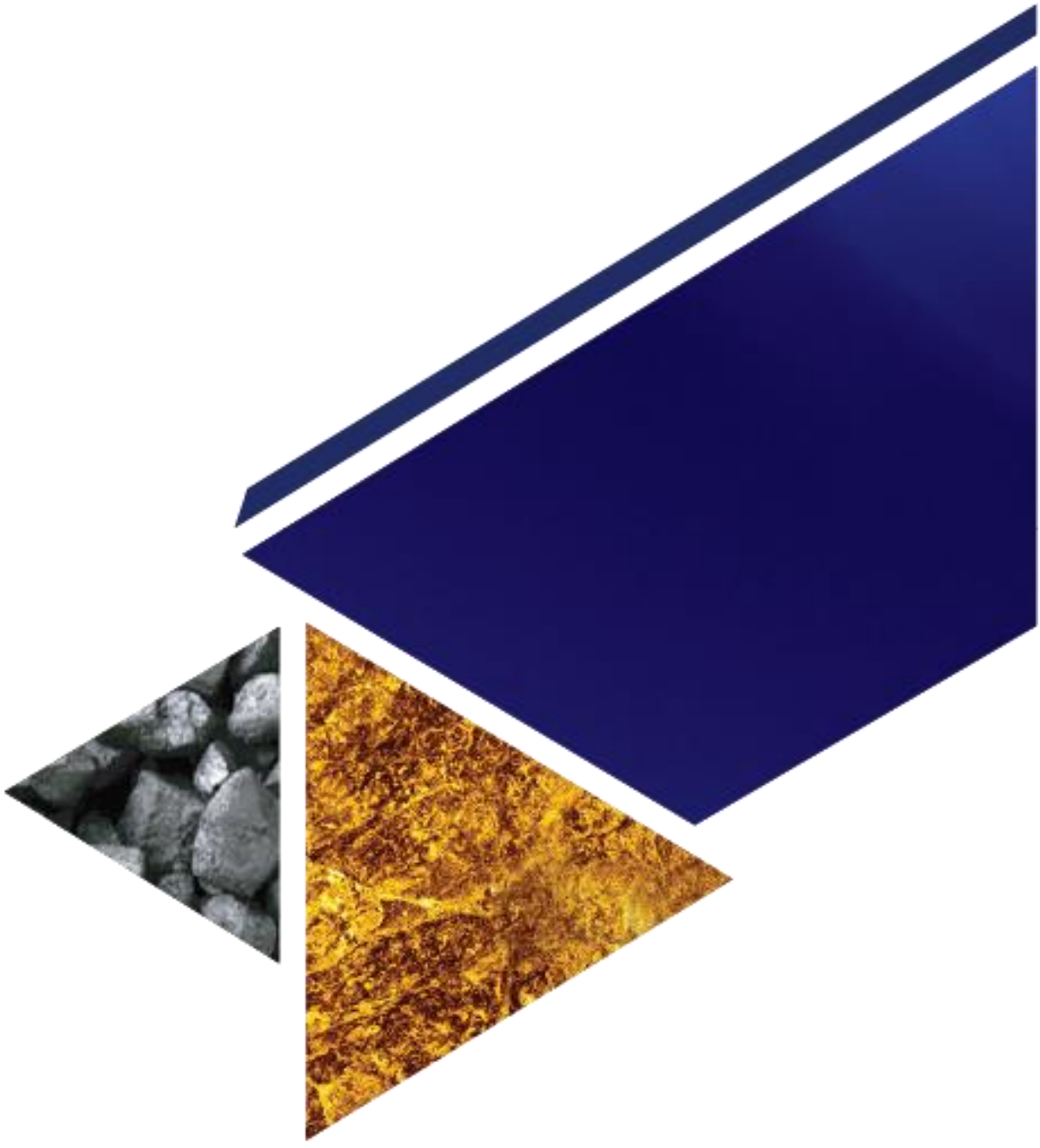
Attachment A: Broadmeadow East EA002465 (CCO)



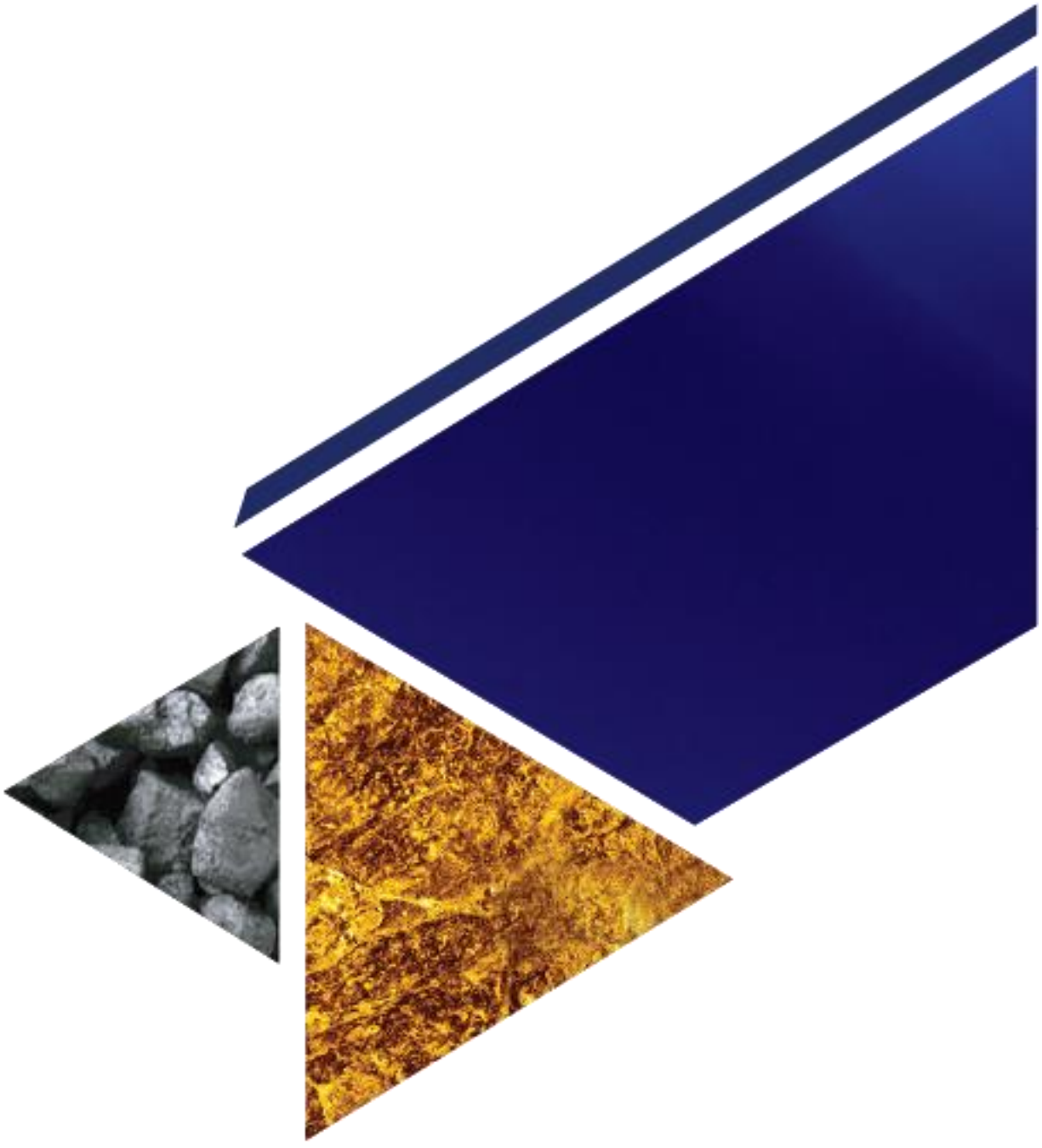
Attachment B: PRCP Schedule



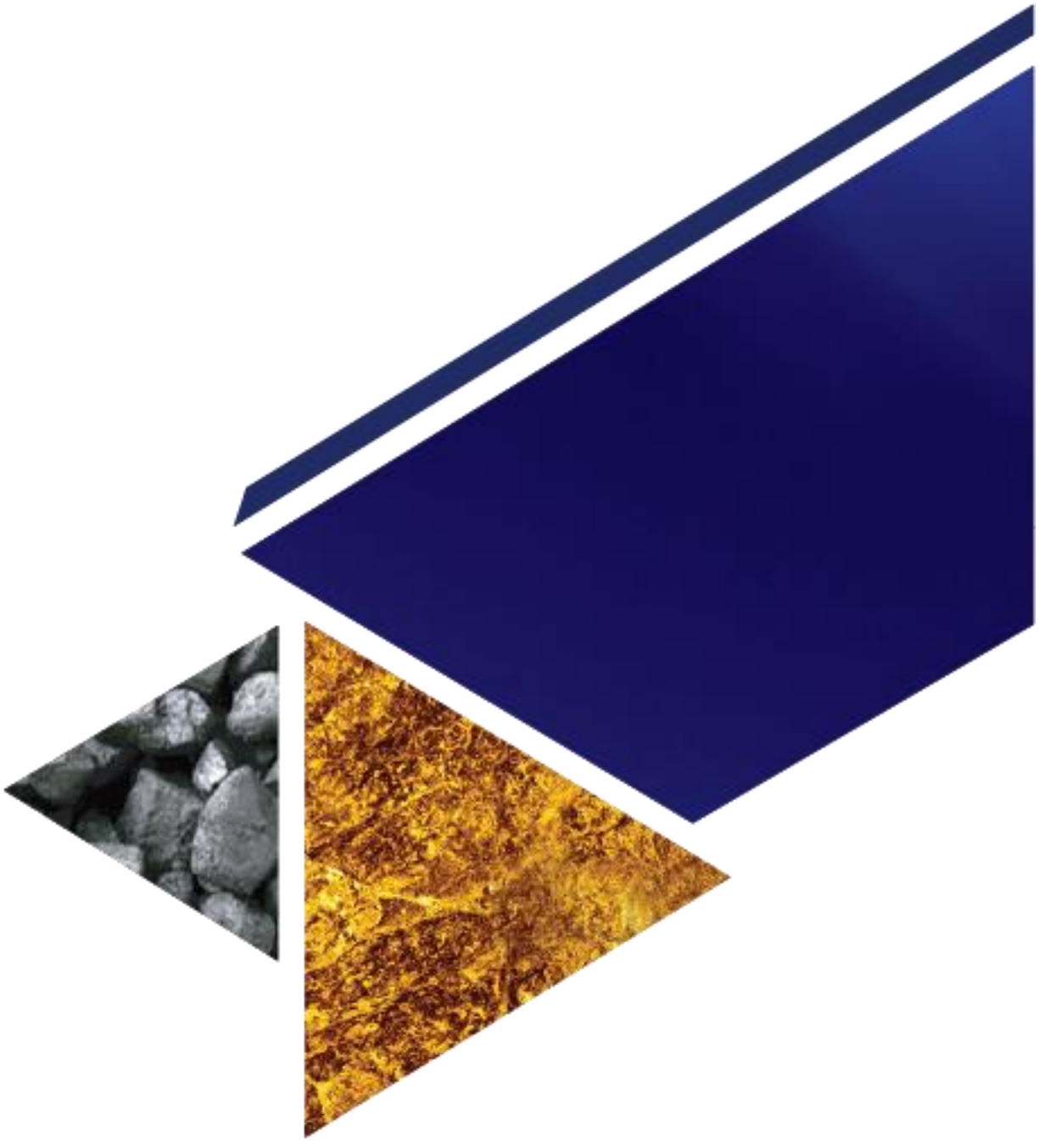
Attachment C: Spatial Information Submission



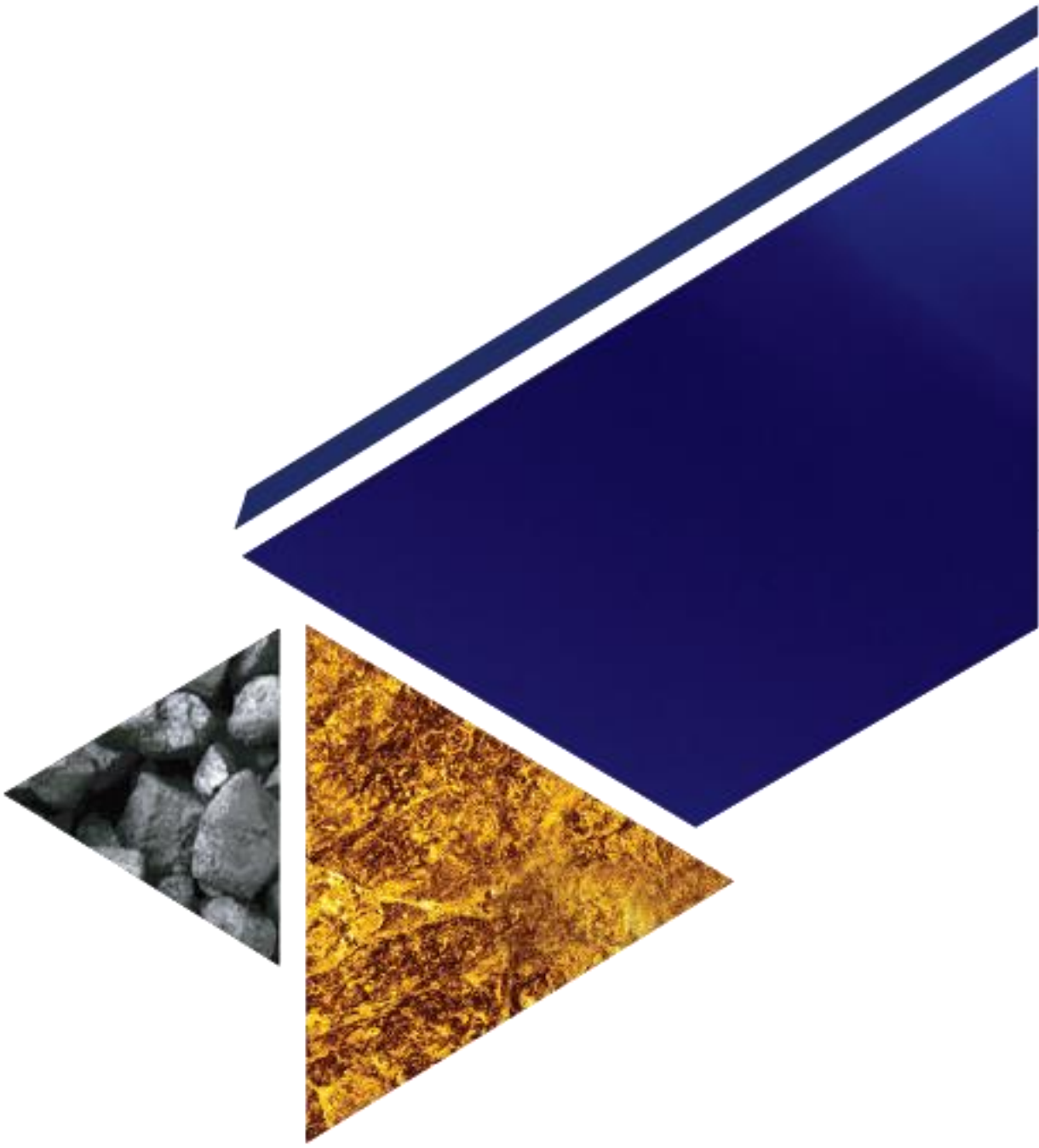
Attachment D: PRCP Hydrogeological Assessment



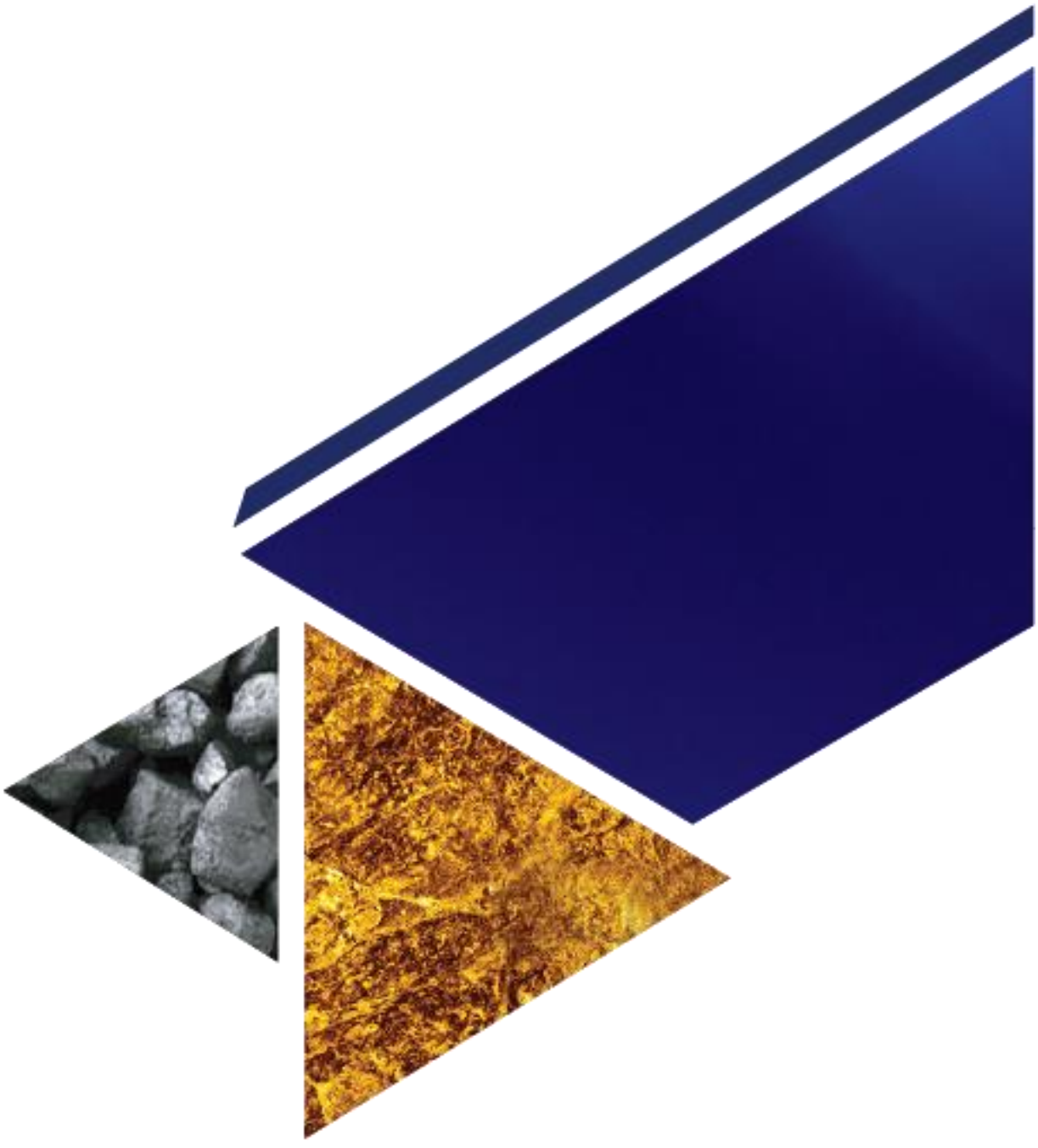
Attachment E: Final Landform Flood Assessment



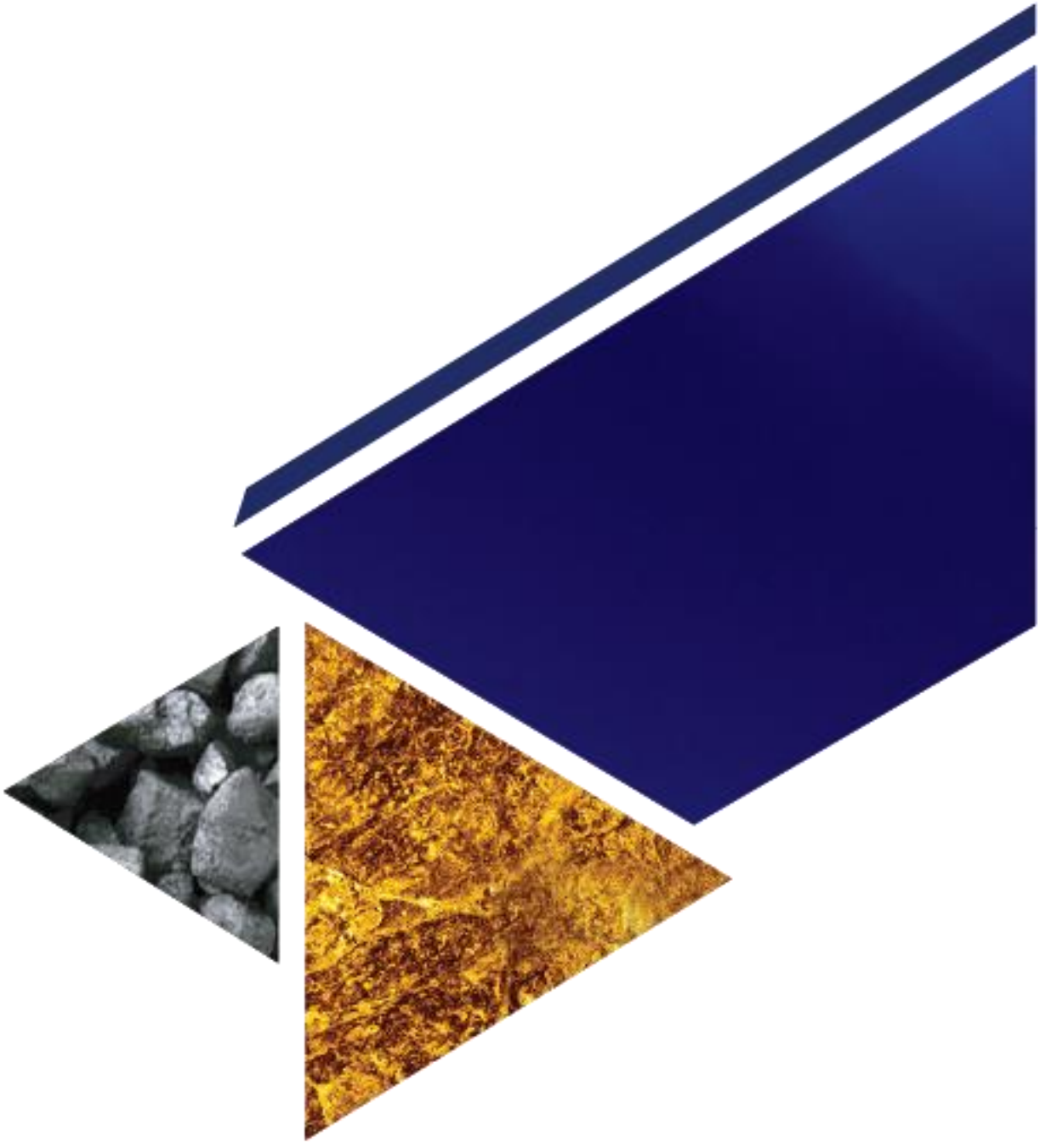
Attachment F: Final Void Water Balance Assessment



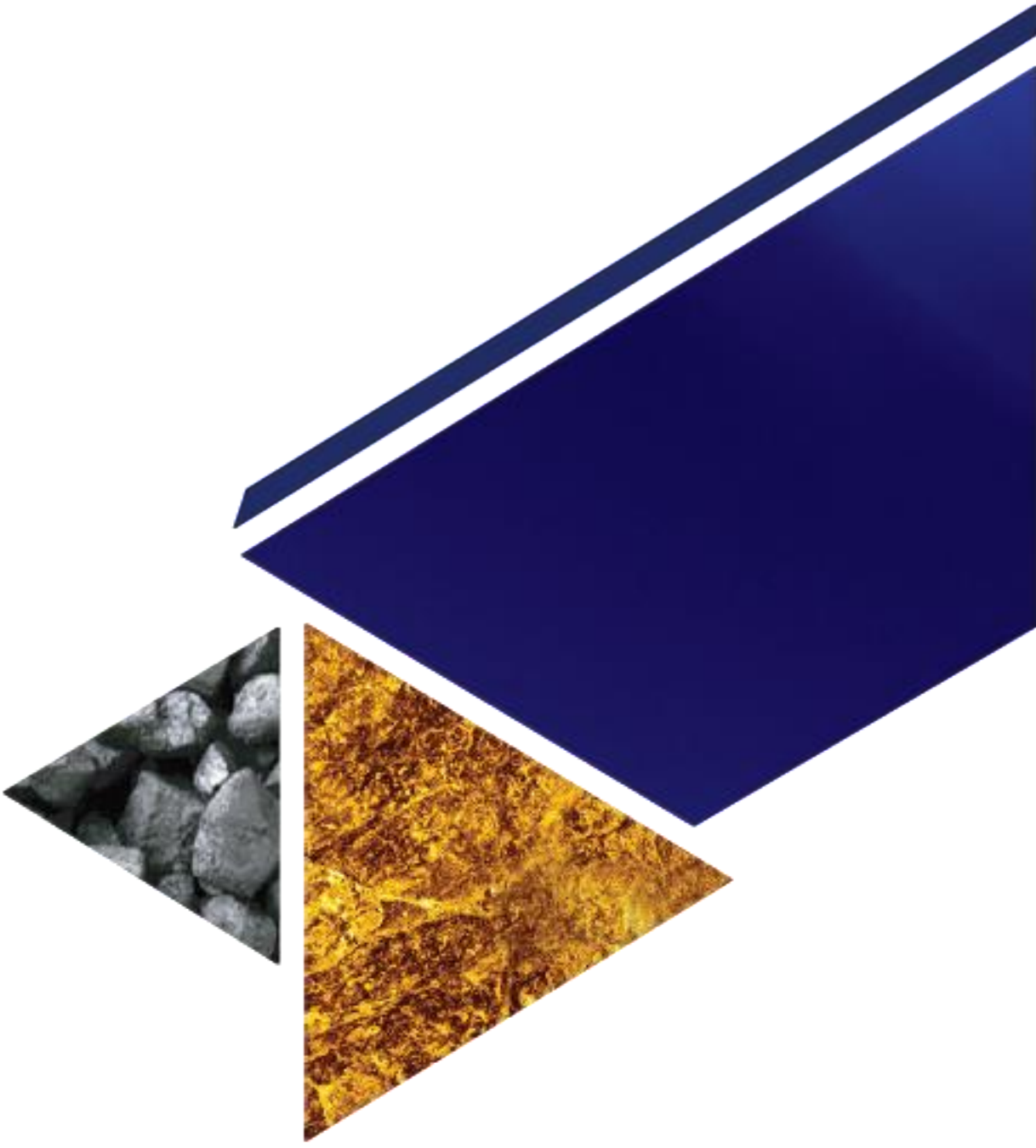
Attachment G: Mine Material and Stability Assessment



Attachment H: Erodibility Testing and Erosion Modelling



Attachment I: Risk Assessment and Treatment Plan





– END OF REPORT –

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