

Progressive Rehabilitation and Closure Plan
Red Mountain Infrastructure
Coal Handling and Processing Plant



Title of the project	Red Mountain Infrastructure
Document title	Progressive Rehabilitation and Closure Plan
Version number	V1.0
Document ID number	RMI_PRCP_v1.0
Date of Submission	6 January 2023
Tenure Number(s)	ML70312
EA holder name	Stanmore Mitsui Coal Pty Limited (SMC)
EA holder contact details	Level 32, 22 Creek St, Brisbane City QLD 4000 GPO Box 4000, Brisbane QLD 4001

Contents

INTRODUCTION	1
A: REHABILITATION PLANNING	3
<i>1. Project planning</i>	<i>3</i>
1.1 Project description	3
1.1.1 Geographic location	3
1.1.2 Mining tenements	6
1.1.3 Primary mine features and infrastructure on-site	8
1.1.4 Type of mining operation	9
1.1.5 Proposed duration	9
1.2 Baseline information	9
1.2.1 Site topography	9
1.2.2 Climate	9
1.2.3 Geological setting	11
1.2.4 Site hydrology and fluvial networks	11
1.2.5 Groundwater levels and properties	13
1.2.5 Soil types, properties and productivity	14
1.2.7 Land stability	18
<i>1.2.8 Vegetation communities and ecological data</i>	<i>18</i>
<i>1.2.9 Fauna habitats</i>	<i>27</i>
<i>1.2.10 Pre-mining land use</i>	<i>29</i>
<i>1.2.11 Underlying landholders</i>	<i>31</i>
1.3 Design for closure	31
1.4 Rehabilitation and improvement planning	31
<i>1.4.1 Relevant activities requiring rehabilitation</i>	<i>31</i>
<i>1.4.2 Rehabilitation areas and milestones</i>	<i>32</i>
<i>1.4.3 Existing rehabilitation</i>	<i>34</i>

2. Community consultation	35
2.1 Consultation to date	35
2.2 Community consultation register	36
2.3 Ongoing consultation	40
2.3.1 Consultation objectives, engagement type and frequency	40
2.3.2 Community consultation information sharing	44
2.3.3 Addressing feedback/comments	44
3. Post-mining land uses	45
3.1 Nominated PMLUs	45
3.1.1 Cattle grazing	47
3.1.2 Woodland habitat	50
3.2 Community consultation	55
3.3 Regional planning integration	55
4. Non-use management area	56
4.1 Nominated NUMAs	56
4.2 Management methods	56
4.3 Community consultation	56
4.4 Regional planning integration	57
5. Voids in floodplains	57
6. General rehabilitation practices	58
6.1.1 Hydrogeology	58
6.1.3 Waste characterisation	68
6.1.4 Soil and capping material	76
6.1.5 Landform design	83
6.1.6 Cover design	89
6.1.7 Water management	90
6.1.8 Revegetation	96
6.2 Tailings storage facilities	111
6.3 Voids	112
6.4 Underground mining	112
6.5 Built infrastructure	113

6.5.1 Decommissioning Built infrastructure	114
6.5.2 Water infrastructure	115
6.5.3 Contaminated land assessment	115
6.6 Summary of key rehabilitation and management practices	116
7. Risk Assessment	121
7.1 Identifying, assessing and treating risks	121
7.1.1 Risk methodology	121
7.1 Risk identification	122
7.1.3 Risk analysis, evaluation and relevant treatments	122
7.2 Rehabilitation trials	130
8. Monitoring and maintenance	131
8.1 Milestone monitoring and schedule	131
8.2 Rehabilitation monitoring	133
8.2.1 Reference sites	133
8.2.2 Monitoring schedule	135
8.2.3 Monitoring sites	136
8.2.4 General rehabilitation parameters	136
8.2.5 Cattle grazing rehabilitation parameters	140
8.2.6 Woodland habitat and watercourse rehabilitation parameters	142
8.3 Watercourse monitoring	143
8.3.1 Surface water monitoring	143
8.3.2 Groundwater monitoring	144
8.4 Achieving monitoring across the PRCP schedule	147
8.4.1 Cattle grazing	147
8.5 Maintenance	148
8.6 Data analysis and reporting	148
8.7 Quality assurance and quality control	148
9. References	150
B: Schedule	154
10. PRCP Schedule	153

10.1 Final site design	153
10.2 Reference map	153
10.3 Rehabilitation milestones	156
10.4 Schedule	163

List of Figures

Figure 1: RMI location map	5
Figure 2: RMI tenements.....	6
Figure 3: RMI site map.....	8
Figure 4: Location of New Chum Creek, with 100m vegetated buffer	12
Figure 5: RMI soils map showing soil mapping units within the Mining Lease	17
Figure 6: State Regional Ecosystems and Environmentally Sensitive Area mapping ML70312,	22
Figure 7: RMI Threatened (endangered or vulnerable) wildlife and special least concern animals.....	28
Figure 8: Pre-mining historical aerial image of RMI and surrounding areas.....	30
Figure 9: Schematic illustration of RMI's rehabilitation areas.....	33
Figure 10: RMI post-mining land uses	46
Figure 11: New Chum Creek watercourse (water barrier works delineation)	54
Figure 12: Existing environment hydrogeological Conceptual Site Model illustration	59
Figure 13: FCCMA potentiometric surface and inferred groundwater flow direction.....	60
Figure 14: Post-rehabilitation Conceptual Site Model illustration	62
Figure 15: 1% AEP and 0.1% AEP flood depths (2018)	67
Figure 16: 3D post-mining landform design – 2m contours (view from south-east).....	84
Figure 17: Indicative surface water flow direction – 2m contours (view from south-east)	86
Figure 18: Post-mining contaminated land conceptual site model	92
Figure 19: Typical riparian revegetation plantings zone (BCCA, 2014).....	105
Figure 20: ISO 31000-compliant risk-based approach followed for the RMI PRC Plan	121
Figure 21: RMI recommended watercourse and woodland habitat reference sites	134
Figure 22: Rehabilitation-related surface water and groundwater monitoring locations at RMI	146
Figure 23: Rehabilitation monitoring quality assurance / quality control process.....	149
Figure 24: RMI final site design	154
Figure 25: RMI reference map	155
Figure 26: Water decision tree framework (Adapted from ANZECC/ARMCANZ, 2000).....	171
Figure 27: Red Mountain Infrastructure water data evaluation flow diagram.....	174

List of Tables

Table 1: RMI tenement.....	6
Table 2: Primary mine features and infrastructure at RMI.....	7
Table 3: Moranbah monthly average rainfall for station no. 034038 and station no. 034035.....	10
Table 4: Soil mapping units (SMUs) and Australian Soil Classification (ASC) of soils at RMI	15
Table 5: Chemical properties and productivity potential of soil types found within the RMI area.	16
Table 6: Pre-mining land suitability of SMUs for cattle grazing at RMI (DSITI and DNRM, 2015).	18
Table 7: Regional ecosystems mapped and/or recorded on RMI	20
Table 8: Non-remnant cleared vegetation	
Table 9: Remnant RE 11.5.3	23
Table 10: High value re-growth RE 11.4.8	
Table 11: High value regrowth RE 11 .3.1	24
Table 12: Threatened Ecological Community likelihood of occurrence on RMI.....	26
Table 13: Relevant activities requiring rehabilitation at RMI.	32
Table 14: Rehabilitation areas (RAs), associated PMLUs and relevant activities for RMI	33
Table 15: Rehabilitation milestones for RMI	34
Table 16: RMI community consultation register	37
Table 17: Process to be followed for ongoing community consultation for RMI PRC planning	41
Table 18: RMI EA post-mine land use objectives, indicators and acceptance criteria: cattle grazing	47
Table 19: Draft land suitability rule-set for cattle grazing on rehabilitation at RMI	49
Table 20: Rehabilitated land suitability for stockpiled topsoil	50
Table 21: RMI EA post-mine land use objectives, indicators and acceptance criteria: woodland habitat	51
Table 22: RMI stockpiled topsoil quality, per sample (RMI1 – RMI4).....	79
Table 23: RMI stockpiled topsoil volume	80
Table 24: Potential limitations of topsoil and spoil	81
Table 25: Landform structures for RMI	85
Table 26: Recommended species list and sowing rates for cattle grazing on lighter textured soils	98
Table 27: Woodland habitat material and associated land zones	100
Table 28: Recommended species list and sowing rates for woodland habitat at RA2.....	101
Table 29: Recommended species list and sowing rates for woodland habitat at RA3.....	102
Table 30: The assessable attributes and weightings for deriving the final BioCondition score.....	103
Table 31: Recommended species list and sowing rates for watercourse	106
Table 32: Infrastructure associated with the approved RMI activities.....	114
Table 33: Key rehabilitation activities and rehabilitation milestones for RMI	117
Table 34: SMC risk likelihood table	123
Table 35: SMC risk severity table	123
Table 36: SMC residual risk rating (RRR) heat map.....	124
Table 37: Necessary risk treatments identified to achieve a stable condition for the PMLUs	125
Table 38: Rehabilitation milestones with relevant reporting requirements.....	132
Table 39: Monitoring schedule and measured rehabilitation parameters	135
Table 40: Soil and spoil analysis parameters for RMI's monitoring program.....	137
Table 41: Preferred, intermediate and undesirable pasture species	141
Table 42: Pasture condition assessment table	142
Table 43: RMI surface water sample locations	144
Table 44: Time for achievement of surface requirements and PMLUs rehabilitation milestones	147
Table 45: RMI rehabilitation milestones and milestone criteria	156

Glossary of terms and abbreviations

Key terms and abbreviations, and associated definitions used in this report are listed below.

Term / Abbreviation	Description
3P grasses	Perennial, productive and palatable
AEP	Annual exceedance probability
AMD	Acid and Metalliferous Drainage (AMD). Includes acid/acidic drainage (AD), pH-neutral metalliferous drainage (NMD) and sulphide-derived saline drainage (SD) – and/or any combination of these
AMWU	Australian Manufacturing Workers' Union
ANC	Acid neutralising capacity
ASC	Australian Soil Classification
bcm	Bank cubic meter. One cubic meter of material as it lies in the natural bank state
Biodiversity Act	Biodiversity Act 2004 (Queensland)
BMA	SMC Billiton Mitsubishi Alliance
SMC	Stanmore Mitsui Coal Pty Limited
BOM	Bureau of Meteorology
CCP	Community Consultation Plan
CEC	Cation exchange capacity
CHPP	Coal handling and preparation plant
C-RES	SMC cost-neutral organization. (SMC's community-related Local Buying Program is delivered in a strategic partnership between SMC and C-RES)
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
CSM	Conceptual site model
DAWE	Department of Agriculture, Water and Environment (Australia)
DEM	Digital elevation model
DES	Department of Environment and Science (Queensland) (The Adminstrating Authority)
DM	Dry matter (with reference to vegetation)
DoR	Department of Resources (Queensland) (previously referred to as the Department of Natural Resources, Mines and Energy)
DSI	Detailed site investigation
DSITI	Department of Science, Information Technology and Innovation (Queensland)
DTMR	Department of Transport and Main Roads (Queensland)
EA	Environmental Authority (in terms of the Environmental Protection Act 1994, Queensland)
EC	Electrical conductivity
EIS	Environmental Impact Statement
EMP	Environmental Management Plan

Term / Abbreviation	Description
EP Act	Environmental Protection Act 1994 (Queensland)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Queensland)
ERA	Environmentally relevant activities
ESA	Environmentally sensitive area
ESP	Exchangeable sodium percentage
FCCM	Fort Cooper Coal Measures
FOS	Factor of safety
Interburden	Non-carbonaceous or carbonaceous mine waste located between coal seams. In this report the term 'overburden' shall be used to define overburden and interburden
IRC	Isaac Regional Council
lcm	Loose cubic meter. One cubic meter of material which has been disturbed and has swelled as a result of movement
LGA	Local Government Area
LOA	Life-of-asset
LOD	Land outcomes document
LOM	Life-of-mine
LSA	Land suitability assessment
MIBC	Methyl Isobutyl Carbinol
MEP EIS	Millennium Expansion Project Environmental Impact Statement
MERFP Act	Mineral and Energy Resources (Financial Provisioning) Act 2018 (Queensland)
Mine waste	Material comprising overburden, ± coarse/fine reject (dewatered), ± waste coal. Sometimes called 'mineral waste' or 'mining waste'
ML	Mining Lease
MLES	Matter of local environmental significance
MNES	Matter of national environment significance
MCM	Moranbah Coal Measures
MSES	Matter of state environmental significance
NAF	Non-acid forming
NC Act	Nature Conservation Act 1992 (Queensland)
NEPM	National environment protection measure
NNTT	National Native Title Tribunal - an independent body established under the Native Title Act 1993 in Australia as a special measure for the advancement and protection of Aboriginal and Torres Strait Islander peoples
NUMA	Non-use management area
Overburden	Non-carbonaceous or carbonaceous mineral waste located above (overburden proper) or between (interburden) coal seams. Carbonaceous overburden is generated during mining of non-ore material and may be represented by sedimentary units (non-coal) rich in organic carbon. Carbonaceous overburden does not include coarse reject, seam floor, seam roof or coal partings. Overburden reports to spoils dumps
PAF	Potentially acid forming
PAWC	Plant available water capacity
PMLU	Post-mining land use

Term / Abbreviation	Description
PRC Plan	Progressive Rehabilitation and Closure Plan (in terms of the Environmental Protection Act 1994 (Queensland))
PRCP Guideline	Progressive Rehabilitation and Closure Plan Guideline (November 2019) (DES, Queensland)
PSI	Preliminary site investigation
RA	Rehabilitation area. As defined in the PRCP Guideline: a rehabilitation area, for a post-mine land use, means an area of land in the post-mine land use to which e rehabilitation milestone for the post-mining use relates
RE	Regional ecosystems
Reject	Waste material produced during coal washing, separated from run-of-mine (ROM) coal in the coal handling and preparation plant (CHPP). Can be separated and disposed as fine rejects (tailings) and coarse reject, or co-disposed as mixed plant reject which is a mixture of coarse reject and 'dewatered' fine reject
Remnant coal	In-situ coal that remains exposed on the pit walls (highwall) and/or pit floor. Remnant coal can be ore grade or waste coal. Remnant coal can be fresh, oxidized or coked (heat affected)
ROM	Run-of-mine
RM	Rehabilitation milestone. As defined in the PRCP Guideline: a rehabilitation milestone, for the rehabilitated land, means each significant event or step necessary to rehabilitate the land to a stable condition (section 115 of the EP Act)
RMI	Red Mountain Infrastructure
RMJV	Red Mountain Joint Venture
RRR	Residual risk rating (with reference to the risk assessment)
QLD	Queensland
SEVT	Semi-evergreen vine thicket
SMART	Specific, measurable, achievable, reasonable/relevant, time-specific
SMC	Stanmore Mitsui Coal
SMP	Site Management Plan
SMU	Soil mapping unit
Spoil	Mine waste comprising non-ore (non-ROM) material such as overburden and waste coal. Within this report, unless stated otherwise, spoil is assessed as a whole (bulk material) with no distinction made between carbonaceous and non-carbonaceous overburden
SPR	Source-pathway-receptor
TDS	Total dissolved solids
TEC	Threatened ecological communities
TLO	Train load-out
Waste coal	Sub-economical coal that reports to the spoil dumps as waste. Waste coal can be fresh or oxidised. All oxidised and coked (cindered) coal is waste

INTRODUCTION

This transitional Progressive Rehabilitation and Closure Plan (PRC Plan) has been prepared for Red Mountain Infrastructure (RMI) in accordance with the requirements of the Mineral and Energy Resources (Financial Provisioning) Act 2018 (MERFP Act). This PRC Plan has been developed to meet the requirements of the Environmental Protection Act 1994 (EP Act) and the Progressive Rehabilitation and Closure Plan Guideline (PRCP Guideline) (DES, 2021).

Environmental Authority Holder:	Stanmore SMC
Environmental Authority Number:	EPML00819113 (02 July 2022)
Land description	ML70312

Environmentally relevant activities at RMI are limited to mineral processing and resource recovery, and a transfer facility. They are undertaken under the conditions of the site's Environment Authority (EA) EPML00819113 (Appendix 1). This EA is the land outcome document (LOD) for this transitional PRC Plan.

This PRC Plan comprises two parts:

- Section A: Rehabilitation planning part - providing information about the site, the rehabilitation plans, and evidence and justification to support the development of the proposed PRCP Schedule.
- Section B: PRCP Schedule - including maps of rehabilitation and closure outcomes for the site, and tables of time-based rehabilitation milestones.

This PRC Plan also includes separate Appendices, providing key information and specialist studies used to support development of this plan.

Transitional provisions

Part 27, Chapter 13 of the EP Act sets out the transitional provisions following the commencement of the MERFP Act. In particular, SMC is a 'mining EA holder' for the purposes of the transitional provisions on the basis that, on commencement of the MERFP Act, SMC was "the holder of an environmental authority (EPPR00668513) for a mining activity relating to a mining lease authorising operations" at RMI (section 750, EP Act).

Furthermore, Section 6 of the PRCP Guideline makes provision for "existing EA holders who must transition into the new PRC Plan framework" (DES, 2021). As RMI has an approved EA, the site falls under the ambit of the requirements of a transitional PRC Plan.

Based on the requirements of Section 6 of the PRCP Guideline, the following underpin this PRC Plan:

- A Transition Notice for RMI was issued to the former EA holder BHP Mitsui Coal Pty Limited (BMC) by the Adminstrating Authority, dated 3 December 2020 (Appendix 2). This Transitional Notice required submission of the RMI PRC Plan and PRCP Schedule by 1 December 2021.
- The site's Transitional Notice was issued on 3 December 2020 following two pre-notification meetings held between the Adminstrating Authority and BMC – the first on 26 April 2020, with a follow-up on 26 November 2020. This PRC Plan is based on the key aspects agreed upon by BMC and the

Administrating Authority during these meetings and as documented in the memo provided in Appendix 3.

- In accordance with transitional provisions (Section 750, EP Act), the RMI EA is an approved LOD.
- Prior to the PRC Plan submission, a pre-lodgement meeting between the Administrating Authority and BMC was held on 27 October 2021. This was arranged to discuss the key content of the site's draft plan, aimed at identifying any notable gaps or refinements needing to be addressed prior to the final submission.

Aligned to the above, and the PRCP Guideline requirements¹, the following process for transitioning rehabilitation and closure outcomes from the RMI EA into the site's PRCP Schedule has been followed:

1. Identifying rehabilitation and closure outcomes in the LOD (EA EPML00819113)
2. Identifying post-mine land uses (PMLUs) (non-use management areas are not planned for RMI)
3. Defining rehabilitation areas within the PMLUs
4. Identifying milestones
5. Identifying milestone criteria
6. Identifying when the first milestone must commence and completion dates for the milestones

On 14/02/2022, the Department of Environment and Science (DES, the department) issued an information request to the former EA holder (BMC). The information response was due on the 30/11/2021. On 10/11/2022, SMC requested and extension to the information response. On 11/11/2022 DES approved the information request period EA to 06/01/2023. The PRC Plan and Schedule provided in this application has been revised to include further information requested by DES.

¹ ¹ As per Section 6.4 (Transitioning rehabilitation and closure outcomes into PRCP Schedule) of the PRCP Guideline

A: REHABILITATION PLANNING

1. Project planning

Legislative Requirement

- In accordance with Section 126C(1)(b) and (c)(ii) of the EP Act, the rehabilitation planning part of the PRC Plan must include a description of:
- each resource tenure, including the area of each tenure
- the relevant activities to which the application relates
- the likely duration of the relevant activities

PRCP Guideline

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

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

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

1.1 Project description

1.1.1 Geographic location

RMI is a coal handling and preparation plant (CHPP) constructed entirely on Mining Lease (ML) ML70312. It is located approximately 140km south-west of the city of Mackay, in Central Queensland. The nearest regional centre is Moranbah, which is located approximately 20km to the west.

The RMI ML70312 covers approximately 291 hectares (ha).

The CHPP began construction in 2005, with first coal washed in October 2006. The project was initially a joint venture between Peabody and BMC - this formally commenced in December 2007 with Peabody transferring a 50% interest in ML70312 to BMC, and the EA was amended to split ML70312 into its own project EA. BMC bought Peabody's 50% interest in October 2017. On 3 May 2022, SMC acquired an 80% share in the BMC portfolio. With the change in ownership RMI is a joint venture between Stanmore Resources Limited (80%) and Mitsui Coal Limited (20%).

The CHPP has been designed to process and handle coal from multiple projects and has road access and coal stockpiling facilities to facilitate multiple coal sources. The CHPP currently washes coal from the adjoining SMC Poitrel Mine (to the south of RMI), and Millennium Mine, which is 50:50 joint venture between MetRes and Stanmore Resources (to the north and west) (Figure 1).

Raw coal is transported from the mines to RMI, where it is stockpiled on run-of-mine (ROM) coal stockpiles. Coal is

crushed and then beneficiated through the CHPP, stockpiled on product stockpiles and loaded onto trains to the Hay Point and/or Dalrymple Bay Coal Terminals. The rail loading facilities are also used by the neighbouring Daunia Mine which is owned and operated by BHP Billiton Mitsubishi Alliance (BMA) (to the south-east of RMI) (Figure 1).

The spur line for the CHPP rail loop diverges from the Norwich Park branch of the Aurizon rail network. The spur line crosses New Chum Creek between the Norwich Park Branch and the rail loop. The land for the spur line is leased by Queensland Rail.

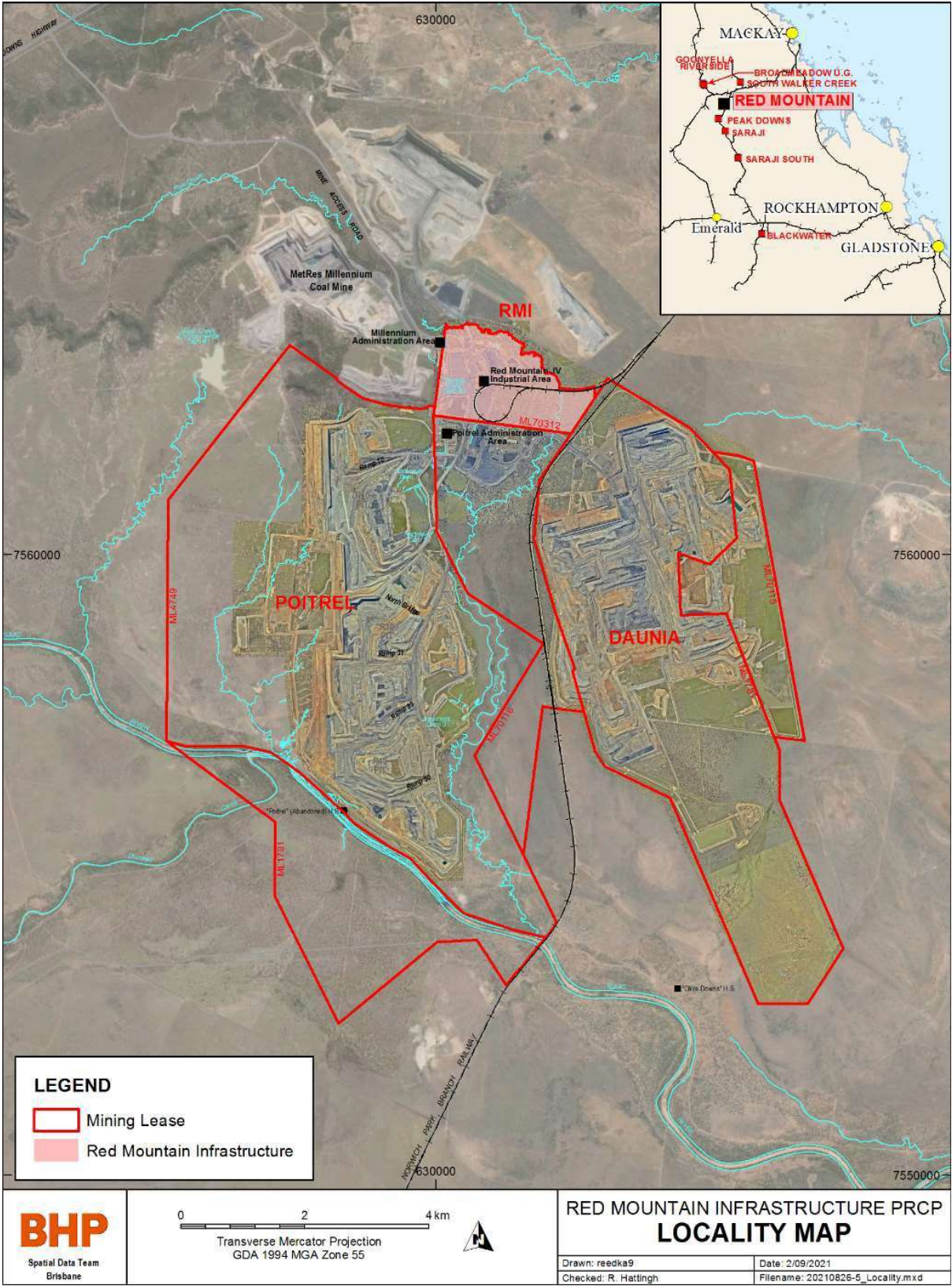


Figure 1: RMI location map

1.1.2 Mining tenements

The RMI mining tenure is ML70312 (Table 1 and Figure 2).

Table 1: RMI tenement

Lease number	Name	Date granted	Land tenures - landholder	Area (ha)
ML70312	Millennium East (Red Mountain CHPP)	16/12/2004	Lot 4 on SP 190266	290.9

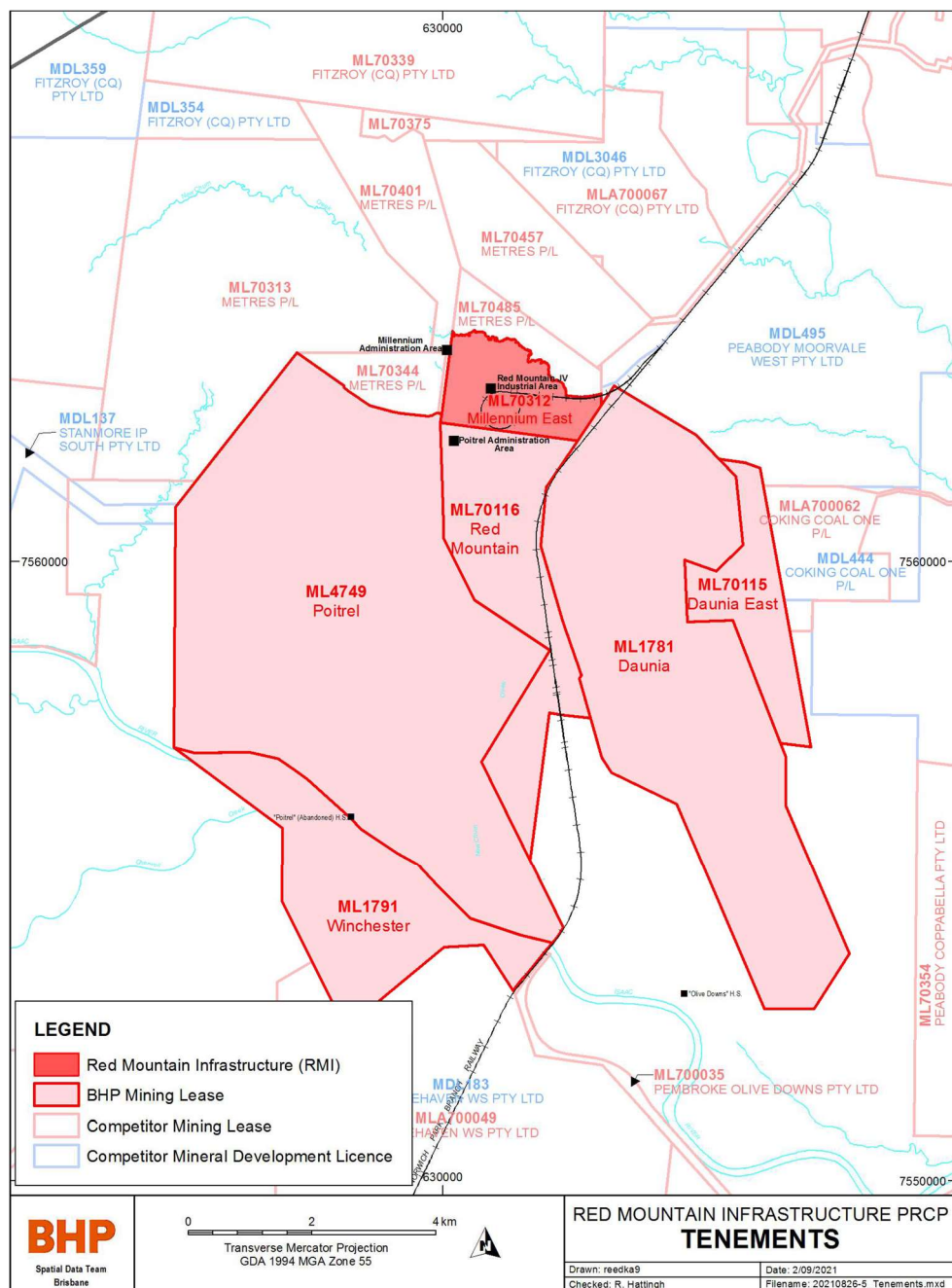


Figure 2: RMI tenements

Table 2: Primary mine features and infrastructure at RMI

Mine domain	Mine feature name
Processing infrastructure	CHPP Conveyors Stackers Hoppers and bins Reclaim tunnel
Processing disturbance	Tailings drying cells
General disturbance	Laydown areas Access roads Haul roads Drains Topsoil stockpiles
Stockpiles	ROM coal stockpile Product coal stockpile Temporary coarse reject stockpile
Dams	Process water dam Environment dam
Rail	Rail loop and spur Loading bin and facilities Conveyors
General infrastructure	Administration and crib buildings Workshop Coal testing lab Fuel, oil and chemical storage Fuel and wash bays Pipes and pumps Power lines Switchyard and substations Communications towers Fences

1.1.3 Primary mine features and infrastructure on-site

The main features and infrastructure approved within the EA for RMI are mining support activities, assummarised in Table 2. A site map is shown in Figure 3.



Figure 3: RMI site map

1.1.4 Type of mining operation

RMI consists of a CHPP and associated infrastructure to process and rail coal from the adjacent coal mining operations. No mining is approved on the tenure.

1.1.5 Proposed duration

The RMI processing infrastructure services the neighbouring SMC owned and operated Poitrel Mine - which is currently planned to operate until 2036. Millennium Mine, which is operated by MetRes, has a contract with RMI to process coal until September 2026 although this can be extended at anytime.

The rail loading facilities and rail line also service the BMA Daunia Mine, which is currently planned to operate until 2051.

1.2 Baseline information

PRCP Guideline (Section 3.1)

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

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

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

1.2.1 Site topography

The regional topography of the Bowen Basin is dominated by flat to gently sloping landforms and low rolling hills. The site's pre-mining topography was generally low relief, dominated by a gently sloping landscape towards the south-east. The average slope across the site was 1.5% with an average elevation of 230RL. The site is influenced by the topography of the surrounding coal operations with Millennium Mine's spoil dumps directly to the north and the west, and Poitrel Mine's spoil dumps to the south-west.

1.2.2 Climate

RMI is located in a semi-arid climatic zone, which is characterised by high summer temperatures, warm dry winters and a distinct wet and dry season. Weather data was collected at the Moranbah Water Treatment Plant

(Station No. 034038) between 1972 and 2012; and since 2012 it has been collected at the Moranbah Airport (Station No.

034035). The Moranbah weather stations are located about 20km west of RMI.

1.2.2.1 Temperature

Maximum average temperatures range from 24°C in June/July to 35°C in December/January, with minimum average temperatures ranging from 9°C in July to 22°C in January.

1.2.2.2 Rainfall

Although rainfall occurs throughout the year, it is more prevalent in the summer months (December, January and February) (Table 3).

Table 3: Moranbah monthly average rainfall for station no. 034038 and station no. 034035

Month	Station no. 034038 (mm)	Station no. 034035 (mm)
January	103.8	88.0
February	100.7	100.5
March	55.4	92.6
April	36.4	23.8
May	34.5	30.1
June	22.1	16.7
July	18	28.0
August	25	9.0
September	9.1	8.3
October	35.7	24.0
November	69.3	38.3
December	103.9	55.3
Annual	614.2	514.6

1.2.2.3 Evaporation

The evaporation rate is highest in the summer months - mean daily rate of 8.2mm in January; and lowest in the cooler months - mean daily rate of 3.6mm in June. The mean monthly rate of evaporation is 78mm. The annual average rate of evaporation is 2,372.5mm, which greatly exceeds the annual rainfall, a characteristic of semi- arid environments.

1.2.2.4 Wind

Wind records for Moranbah for January-April show an easterly predominance of moderate strength (1-20 km/h), with easterlies dominating in May-July with some south-easterly influence. Easterly winds predominate for August-December which tends north to north-easterly from October to December.

1.2.2.5 Long-term climate projections

To undertake impact assessment of future climate on closure, PRC Plans and other hydrologic applications, BMC (now SMC) developed the *Guideline for Climate Change Adaptation in Mine Water Planning and Hydrologic Assessment* (BMC, 2020). This Guideline will assist site practitioner's understand key aspects of the associated quantitative impact assessment towards facilitating design and business decision making. This Guideline was developed based on the latest research and projects completed by CSIRO, Bureau of Meteorology (BOM) and the Queensland Government and is aligned with the latest published projection database and methods including CCS and High Resolution Projection Data.

1.2.3 Geological setting

RMI is within the Bowen Basin and geologically is located on the western margins of the Taroom Trough. The site is situated within the Fort Cooper Coal Measures (FCCM). The FCCM underlie the Rangal Coal Measures, which are the coal measures being mined at neighbouring Daunia, Poitrel and Millennium mines.

The stratigraphy within the site ranges from:

- Later tertiary-quaternary alluvium, characterised as locally red-brown mottled, poorly consolidated sand, silt, clay, minor gravel and high-level alluvial deposits (generally related to present stream valleys but commonly dissected),
- Early Triassic-middle Triassic arenite-mudrock, characterised as lithic sandstone, pebbly lithic sandstone, green to reddish brown mudstone and minor volcanolithic pebble conglomerate [at base],
- Late Permian sedimentary rock, characterised as lithic sandstone, conglomerate, mudstone, carbonaceous shale, coal, tuff and tuffaceous (cherty) mudstone.
- Late Permian arenite-mudrock, characterised as calcareous sandstone and shale, mudstone, coal and concretionary limestone).

The upper 10-15m (approximately) material is weathered. A fault is present within the south-western corner of the lot boundary and several more can be found within 1 km of the site.

1.2.4 Site hydrology and fluvial networks

The RMI lease (ML70312) is located within the catchment of New Chum Creek, which covers an area of approximately 51 km². Also located within the New Chum Creek catchment is the Millennium, Daunia and Poitrel Mines, which include open cut voids, spoil dumps and creek diversions. RMI's lease (~3.2 km²) covers approximately 6% of the New Chum Creek catchment.

New Chum Creek enters the RMI lease from the north-west after running through the Millennium Mine (Figure 4). The northern bank of New Chum Creek forms the approximate alignment of the northern RMI lease boundary with the Millennium Mine, before the creek turns more southerly, crossing the RMI lease to the east of the CHPP and rail loop. In accordance with the EA requirements, a 100m vegetated buffer has been maintained on the RMI side of New Chum Creek, with the approved exceptions of the Millennium Mine haul road and the rail line, which cross the creek using culverts.

New Chum Creek - in the proximity of RMI, is classified as a non-perennial minor watercourse with Strahler Stream Orders of 2 and 3. The Stream Order of New Chum Creek increases from 2 to 3 at the convergence of a former unnamed tributary from the north, which has been covered by the Millennium Mine spoil dump and no longer provides inflows. New Chum Creek remains a Stream Order 3 waterway until it enters the Isaac River (Strahler Stream Order 6)

approximately 8km to the south of RMI. There are no Stream Order 4 or above waterways within or immediately surrounding RMI. There are also no creek diversions within the RMI lease.



Figure 4: Location of New Chum Creek, with 100m vegetated buffer

Upon crossing the southern RMI lease boundary, New Chum Creek flows in a southerly direction through the Poitrel mining leases ML70116 and ML4749 before entering the Isaac River. As part of the Poitrel mining operations, New Chum Creek has been diverted to the east from its original alignment to allow for the open cut operations.

New Chum Creek forms part of the Isaac Northern Tributaries Catchment within the Fitzroy Basin. This area is covered by the environmental values and water quality objectives established for the Fitzroy Basins under the Queensland Environment Protection (Water and Wetland Biodiversity) Policy (2019) within the Isaac River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (Part).

1.2.5 Groundwater levels and properties

A hydrogeological assessment and development of pre- and post-mining hydrogeological conceptual models (CDM Smith, 2021) has been undertaken to support the PRC Plan and is contained in Appendix 4. The hydrogeological information summarised within this PRC Plan is sourced from this assessment.

There are two primary hydrostratigraphic units inferred as occurring within or near the RMI site:

- Alluvial aquifer – associated with New Chum Creek and comprised of relatively coarse (i.e. sandy) alluvium derived from re-worked bedrock material. The alluvial aquifer is not monitored as part of the RMI operations and as such the presence of this aquifer is only inferred based on the topography and geology of the site. It is unknown if the alluvial aquifer is a perched system, or is connected to the regional water table where the regional groundwater system is shallower further to the south (i.e. off-site).
- Fort Cooper Coal Measure Aquifer (FCCMA) – comprises interbedded siltstones, sandstones, minor mudstones, shales and coal measures. It is likely to be a fractured rock aquifer with relatively low primary porosity with the exception of coal measures, which may have a relatively higher primary porosity. The permeability of this aquifer is dependent on the aperture and connectedness of the fracture network. Groundwater flow through the deeper coal seam sections of the aquifer may be dominated by primary porosity in addition to pathways through fractures (secondary porosity). The dual porosity of the FCCMA means that groundwater flow paths are likely to be heterogeneous and may be difficult to accurately predict.

The RMI site is located within the Isaac Groundwater Catchment within the Fitzroy Basin. Table 4 summarises the environmental values of the Isaac Groundwater Catchment from the Queensland Environment Protection (Water and Wetland Biodiversity) Policy (2019) Isaac River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (Part).

The RMI site is also located within the Isaac Connors Groundwater Management Area, which is prescribed under the Water Act (2000) Water Plan (Fitzroy Basin) 2011. The Water Plan's objectives for groundwaters within the management area are for sustainable management to maintain ecological values and enable maintenance and ongoing use of the resource through water allocations and licensing. There is no extraction of groundwater within the RMI lease area.

Groundwater levels in the proximity of RMI are influenced by surrounding mining operations, which include open cut and underground coal mining operations. As operations at RMI do not extract groundwater or include excavations that interact with groundwater, the predominant influence on groundwater levels from RMI operations would be seepage from the operational dams.

Assessment of groundwater levels during the fieldwork undertaken as part of the preparation of this PRC Plan (21 April 2021), recorded the following groundwater levels and changes in groundwater heights since 2015:

- MB3A 218.2 m AHD – decline of around 12 m since 2015
- MB3B 219.6 m AHD – decline of around 5 m since 2015
- MB4 215.4 m AHD – decline of around 2 m since 2015
- MB11A 209.0 m AHD – decline of around 8 m since 2015
- MB11B 211.4 m AHD – decline of around 8 m since 2015

Figure 22 (Section 8.3) shows the location of the existing groundwater monitoring bore network.

Due to the lack of groundwater extraction at RMI, decreases in groundwater heights at RMI are not a result of on-site operations but likely associated with the surrounding mine sites that include dewatering activities as part of the extraction of coal through open cut and underground operations.

Registered groundwater bores within 2km of the site are predominantly associated with 'mine monitoring' with only five existing registered bores classified as 'water supply' and two existing bores as 'unknown' use. Based on the location of the bores and the surrounding mines site landforms, it is anticipated the off-site water supply bores may have been decommissioned/lost as part of surrounding mining operations.

Groundwater quality within the FCCMA, measured through the on-site monitoring bores, indicates the following:

- Average salinity of 1700 – 3700 mg/L
- Slightly basic pH averaging from 7.8 to 8.3

The water quality of the FCCMA is considered suitable for the nominated PMLUs including stock watering of beef cattle, sheep and horses.

1.2.5 Soil types, properties and productivity

1.2.6.1 Soil context

A soil, capping and land suitability assessment for RMI was commissioned by BMC in 2021, including a sampling program of stockpiled topsoil (GTE, 2021 – Appendix 5). A desktop review of available information from the Daunia Mine Environmental Impact Statement (EIS) (BMA, 2008), Millennium Mine EIS (Peabody, 2008) and Poitrel Mine EIS (SKM, 2004) was also undertaken to understand baseline soil types. Soil types have been identified by soil mapping unit (SMU) and Australian Soil Classification System (ASC), as detailed in Table 4 and shown in Figure 5.

Table 4: Soil mapping units (SMUs) and Australian Soil Classification (ASC) of soils at RMI

SMU code	Australian Soil Classification	SMU concept	Area (ha) on project site	Additional notes
A2	Brown Sodosol	Alluvial, sandy hard duplex	186	Hard setting sandy loam duplex soils alongside New Chum Creek often with bleached A2 over hard coarse structured medium yellow clay often heavily mottled. Poplar Box mixed woodlands with associated Brigalow and Blackbutt.
DB4	Brown Vertosol*	Moderately well-structured grey, brown cracking clays	24	Little or no gilgai.
B4	Black Vertosol	Friable Brigalow scrub soil, black cracking clay	76	Deep well-structured black cracking clay with granular surface mulch.
B4v	Black Vertosol	Variant to B4	1	Fine granular non-cracking red / brown Brigalow scrub soil.
DB2	Brown Vertosol	Linear gilgai on dark grey, brown clays	4	Cracking and non-cracking clays. Brigalow, Bauhinia, Poplar Box and Dawson Gum.

* Australian Soil Classification not available for the SMU codes on review. Assessed by GTE based on SMU Code Description and available information.

Disturbance at RMI has occurred in the A2, B4 and B4v SMUs. Topsoil has been stockpiled at five locations, as shown in Figure 5. Three topsoil stockpiles have been sampled (samples RMI1 – RMI4), along with two undisturbed sites (samples RMI5 and RMI6) to the north of New Chum Creek at Millennium Mine. (Stockpiles 4 and 5 were not sampled due to the minimal volumes).

The main properties and productivity data for the sampled topsoils are summarised in Table 5 and Figure 5. Detailed results of the topsoil quality are included in Section 6.1.4 and Appendix 5. The properties of stockpiled topsoils indicate that exchangeable sodium percentage (ESP) is low and potential for dispersion when undisturbed is also low. However, instability may be an issue when topsoil is disturbed and saturated. These same observations were noted in the undisturbed topsoil sample sites. Some minor limitations are also present with nutrient levels in stockpiled soil, however these are also not dissimilar to the undisturbed site samples. This indicates with appropriate management, topsoils will be suitable for rehabilitation at RMI.

Table 5: Chemical properties and productivity potential of soil types found within the RMI area.

Analysis(unit)	Soil samples and associated sampling locations					
	Stockpile 3	Stockpile 2		Stockpile 1	Undisturbed sites	
	RMI1	RMI2	RMI3	RMI4	RMI5	RMI6
Soil pH (H2O)	8.07	7.46	6.79	6.36	7.47	6.10
Soil EC (dS/m)	0.174	0.083	0.183	0.096	0.103	0.034
PAWC (mm)	48 - 60	36 – 60		36 - 60	N/A	N/A
Tot Organic Carbon (%)	1.1	0.85	1.3	1.9	4.2	2.2
CEC (meq/100g)	16	8.7	10	7.4	30	8.1
ESP (%Na/CEC)	0.31	0.30	0.87	0.35	0.54	0.11
Ca/Mg (ratio)	3.2	2.1	3.6	2.7	4.3	3.5
Productivity	Soil properties sufficient to support grasses and native trees					



Figure 5: RMI soils map showing soil mapping units within the Mining Lease

1.2.6.2 Pre-mining land suitability cattle grazing

A desktop assessment was undertaken to determine the pre-mining land suitability classes, according to the DSITI & DNRM (2015) Guidelines for Agricultural Land Evaluation in Queensland, for cattle grazing at RMI (GTE, 2021). The pre-mining land suitability assessment for cattle grazing on RMI, based on the site-specific SMUs (refer to Section 1.2.6.1) is shown in Table 6. The results of the desktop assessment indicated the pre-mining land suitability class for the A2 SMU was 4. All remaining SMUs scored a land suitability class of 2 using the combination of methods where information was available (i.e. SMU B4 only).

Table 6: Pre-mining land suitability of SMUs for cattle grazing at RMI (DSITI and DNRM, 2015).

SMU code	SMU concept	Land Suitability Class (beef cattle grazing)
A2	Alluvial, sandy hard duplex	4
DB4	Moderately well-structured grey, brown cracking clays	2
B4	Friable Brigalow scrub soil, black cracking clay	2
B4v	Variant to B4	2
DB2	Linear gilgai on dark grey, brown clays	2

1.2.7 Land stability

The pre-mining topography is defined by gently undulating plains that drain to the east and south. Pre-mining surface erosion was associated with grazing activities and historically cleared areas. Materials exposed through disturbance and placement in engineered landforms (ROM pad, bunds, etc.) have a propensity to be unstable if not rehabilitated.

1.2.8 Vegetation communities and ecological data

1.2.8.1 Vegetation communities and regional ecosystems

The vegetation communities and regional ecosystems (REs) occurring on RMI have been assessed based on a desktop review of the following databases and previous studies, as well as a rapid field-based vegetation assessment undertaken by SMC in April 2021 (RMI vegetation assessment).

The Queensland Government mapping databases include:

- Regional ecosystem mapping ML 70312 (Regional ecosystem mapping:
<https://www.qld.gov.au/environment/pollution/management/environmental-reports-online>)
- Matters of State Environmental Significance (MSES) ML 70312 (Matter of state significance (MSES):
<https://www.qld.gov.au/environment/pollution/management/environmental-reports-online>)

Maps of environmentally sensitive areas ML 70312 (Maps of environmentally sensitive areas:
<https://environment.des.qld.gov.au/management/maps-of-environmentally-sensitive-areas>)

Results of desktop searches of government databases have been provided in Appendix 6. Other documents referred to include:

- Historical aerial photography (Figure 8)
- Millennium Expansion Project Environmental Impact Statement (MEP EIS) Chapter 13: Nature Conservation (Peabody, 2011)

- Red Mountain Joint Venture Environment Management Plan ML70312 (RMJV EM Plan) (SMC/Peabody, 2014)

Observations from the desktop review include:

- The State mapping is undertaken at a coarser scale and has some inaccuracies. However, it has been reviewed and deemed adequate for the purpose of illustrating the broad extent of regional ecosystems (REs), matters of state significance (MSES) and environmentally sensitive areas (ESAs) on RMI.
- The review of RE mapping in the MEP EIS is of limited value to the RMI PRCP as they were undertaken more than 10 years ago (in 2010) and reduced accuracy associated with coarse-scale mapping of the area associated with RMI.
- The RMJV EM Plan refers to historical flora and fauna surveys being undertaken by Ansar Environmental in 2003. The results of the REs recorded during this assessment listed in the RMJV EM Plan have been considered as part of the desktop assessment, however the historical nature of the survey and the degree of disturbance at RMI since 2003 means this survey is of limited value to the RMI PRCP.

A rapid field-based vegetation assessment was undertaken by BMC in April 2021 (RMI vegetation assessment) to verify the regional ecosystems and vegetation communities occurring in the existing vegetation on ML70312 surrounding the disturbed area on RMI.

The RMI vegetation assessment was undertaken in accordance with the Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland, Version 5.1 (Neldner et al, 2020).

Table 7 lists the REs and associated vegetation communities that were recorded in the RMI vegetation assessment as well as those REs referred to within the MEP EIS and/or the RMJV EM Plan.

Table 7: Regional ecosystems mapped and/or recorded on RMI

Regional ecosystem descriptions	RE code	RE VM status	RE BIOD status	RE map	Field RE	MEP EIS	RMJV EM Plan
Acacia harpophylla and/or Casuarina cristata open forest on alluvial plains	11.3.1	E	E	Yes	Yes	-	-
Eucalyptus populnea woodland on alluvial plains	11.3.2	OC	OC	Yes	-	Yes	-
Eucalyptus tereticornis or E. camaldulensis woodland fringing drainage lines	11.3.25	LC	OC	Yes	-	Yes	-
Eucalyptus-Corymbia grassy or shrubby woodland on Cainozoic clay plains	11.4.2	OC	OC	-	-	-	Yes
Dichanthium spp., Astrebla spp. grassland on Cainozoic clay plains.	11.4.4	LC	OC	-	-	-	Yes
Acacia harpophylla shrubby woodland with Terminalia oblongata on Cainozoic clay plains	11.4.9	E	E	Yes	-	Yes	Yes
Eucalyptus cambageana woodland to open forest with Acacia harpophylla or A. argyrodendron on Cainozoic clay plains	11.4.8	E	E	Yes	Yes	-	-
Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana woodland on Cainozoic sand plains and/or remnant surfaces	11.5.3	LC	NC	Yes	Yes	-	Yes
Eucalyptus crebra and other Eucalyptus and Corymbia spp. woodland on Cainozoic sand plains/remnant surfaces. Plateaux and broad crests with deep red loams	11.5.9	LC	NC	-	Yes	-	Yes

The vegetation communities recorded during the RMI vegetation assessment are described in more detail in Table 8 Table 11.

Regional ecosystem descriptions	RE code	RE VM status	RE BIOD status	RE map	Field RE	MEP EIS	RMJV EM Plan
<i>Corymbia clarksoniana</i> woodland and other <i>Corymbia</i> , <i>Eucalyptus</i> species on Cainozoic sand plains/remnant surfaces.	11.5.12	LC	NC	-	-	-	Yes
<i>Micromyrtus capricornia</i> shrubland on Cainozoic sand plains/remnant surfaces.	11.5.18	OC	OC	-	-	-	Yes
<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> and <i>Eucalyptus thozetiana</i> or <i>E. microcarpa</i> woodland on lower scarp slopes on Cainozoic lateritic duricrust.	11.7.1	LC	OC	-	-	-	
<i>Acacia</i> spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone	11.7.2	LC	NC	-	-	-	Yes
Non-remnant cleared	-	-	-	Yes	Yes	Yes	Yes

Despite the historical disturbance to vegetation on RMI, a mosaic of vegetation communities remain predominantly associated with the riparian corridor of New Chum Creek and associated Quaternary alluvial and Tertiary plains. Figure 6 illustrates the current Queensland government regional ecosystem mapping and the location of the Quaternary vegetation sites surveyed during the RMI vegetation assessment.

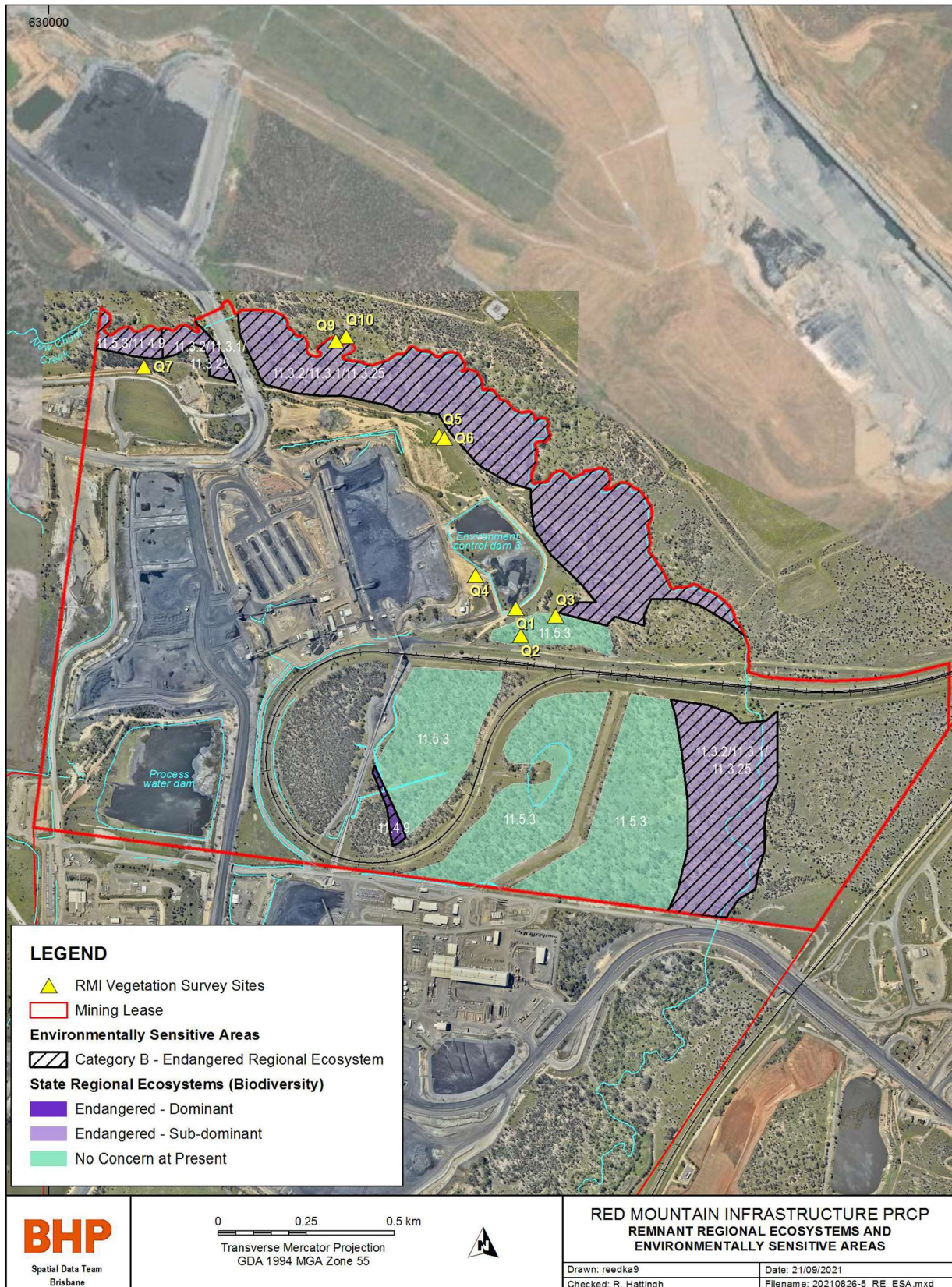


Figure 6: State Regional Ecosystems and Environmentally Sensitive Area mapping ML70312, including sampling location of RMI's 2021 vegetation assessment.

Table 8: Non-remnant cleared vegetation

	Vegetation Community Description Non-remnant cleared mixed exotic pastures and scattered regrowth with <i>Chloris gayana</i> , <i>E. populnea</i> , <i>Acacia salicina</i> on Tertiary clay plains surrounding infrastructure and dams
	RE and Status Non-remnant cleared
	Ecological dominant layer (EDL) Ground
	EDL median height (range) (m) 1m (0.5 – 1.5)m
	EDL estimated cover (%) 80%
	Dominant Species Tree 1 (T1) and Tree 2 (T2) <i>Eucalyptus populnea</i> , <i>A. salicina</i>
	Dominant Species Shrub (S1 and S2) <i>Acacia salicina</i>
	Dominant Species Ground <i>Chloris gayana</i> *, <i>Cenchrus ciliaris</i> *, <i>Megathyrsus maximus</i> *
	Survey Sites Q1, Q4, Q5, Q8

Table 9: Remnant RE 11.5.3

	Vegetation Community Description Remnant RE 11.5.3 <i>Eucalyptus populnea</i> mixed open forest with <i>Lysiphyllum hookeri</i> , <i>Acacia excelsa</i> , <i>Eremophila mitchellii</i> , <i>Ehretia membranifolia</i> and <i>A. salicina</i> on loamy Tertiary plains
	RE and Status RE 11.5.3 remnant
	Ecological dominant layer (EDL) Tree 1
	EDL median height (range) (m) 16m (10-20m)
	EDL estimated cover (%) 35%
	Dominant Species Tree 1 (T1) and Tree 2 (T2) <i>Eucalyptus populnea</i> , <i>Lysiphyllum hookeri</i> , <i>Acacia excelsa</i> , <i>Eremophila mitchellii</i> , <i>Ehretia membranifolia</i> , <i>A. salicina</i>
	Dominant Species Shrub (S1 and S2) <i>Alectryon diversifolius</i> , <i>Breynia oblongifolia</i> ,
	Dominant Species Ground <i>Chrysopogon fallax</i> , <i>Stylosanthes scabra</i> *, <i>Cenchrus ciliaris</i> *, <i>Urochloa mosambicensis</i> *, <i>Harrisia martinii</i> **, <i>Megathyrsus maximus</i> *
	Survey Sites Q2

* indicates a species is exotic

** indicates a species is listed as 'invasive' under *Queensland Biosecurity Act 2014*

Table 10: High value re-growth RE 11.4.8



Vegetation Community Description High Value Regrowth RE 11.4.8 <i>Eucalyptus cambageana</i> forest on Tertiary clay plains
RE and Status RE 11.4.8 High Value Regrowth >15 years
Ecological dominant layer (EDL) Tree 1
EDL median height (range) (m) 11m (6-12m)
EDL estimated cover (%) 70%
Dominant Species Tree 1 (T1) and Tree 2 (T2) <i>Eucalyptus cambageana</i> , <i>Acacia harpophylla</i>
Dominant Species Shrub (S1 and S2) <i>Cassia brewsteri</i> , <i>Alectryon diversifolius</i> , <i>Ehretia membranifolia</i> , <i>Enchylaena tomentosa</i>
Ground 80% litter, Scattered <i>Cenchrus ciliaris</i> *,
Survey Sites Q3, Q6, Q7

Table 11: High value regrowth RE 11 .3.1



Vegetation Community Description High Value Regrowth RE 11.3.1 Mixed <i>Acacia harpophylla</i> forest on Quaternary alluvium and along drainage lines with or without emergent <i>Eucalyptus cambageana</i>
RE and Status RE 11.3.1 High Value Regrowth >15 years
Ecological dominant layer (EDL) Tree 2
EDL median height (range) (m) 8m (3-10m)
EDL estimated cover (%) 30-40%
Dominant Species Tree 1 (T1) and Tree 2 (T2) <i>Eucalyptus cambageana</i> , <i>Acacia harpophylla</i> , <i>Lysiphyllum hookeri</i> , <i>Cassia brewsteri</i> ,
Dominant Species Shrub (S1 and S2) <i>Citis glauca</i> , <i>Carrisa ovata</i>
Ground <i>Megathyrsus maximus</i> *, <i>Aristida sp.</i>
Survey Sites Q9, Q10

1.2.8.2 Environmentally sensitive areas

The desktop review indicated the presence of Category B ESAs on RMI (Figure 6 and Appendix 6). These ESAs are associated with the following mapped regional ecosystems with an Endangered Biodiversity status:

- RE 11.3.1 *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains
- RE 11.4.8 *Eucalyptus cambageana* open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains
- RE 11.4.9 *Acacia harpophylla* shrubby open forest with *Terminalia oblongata* on Cainozoic clay plains

1.2.8.3 Threatened ecological communities

- The desktop review of the Australian Government EPBC Act Protected Matters Search Tool for RMI (Appendix 6) indicated the likely occurrence of the following Endangered Threatened Ecological Communities (TECs) within 1km of RMI:
- Brigalow (*Acacia harpophylla* dominant and co-dominant) Endangered Community (Brigalow TEC)
- Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin (Natural Grassland TEC)
- Poplar Box Grassy Woodland on Alluvial Plains (Poplar Box Grassy Woodland TEC)

Brigalow TEC

The MEP EIS recorded approximately 85.7 ha of the Brigalow TEC across the entire survey area though did not record the Brigalow TEC on the RMI ML70312. The RMJV EM Plan indicates the Brigalow TEC was observed on RMI in association with RE 11.4.8 and 11.4.9.

The RMI vegetation assessment indicated that the majority of the area mapped by the State as containing remnant REs (Figure 6) was observed to be comprised of high value regrowth in association with Endangered Brigalow REs 11.4.8 (Table 10) and RE 11.3.1 (Table 11). Based on the results of the RMI vegetation assessment, the Brigalow TEC is likely to occur on RMI in association with the high value regrowth RE 11.3.1 along New Chum Creek, and is moderately likely to be associated with the high value regrowth RE 11.4.8 due to the dominance of *E. cambageana* in these areas.

Natural Grassland TEC

The MEP EIS indicates that REs associated with potential Natural Grassland TEC were recorded in association with RE 11.9.3; however, it stipulates these areas did not meet the condition thresholds to be considered the community under the EPBC Act. The RMJV EM Plan mentions the potential presence of RE 11.4.4 listed as a constituent RE for the Natural Grasslands TEC; however, this RE 11.4.4 is not mapped on RMI, nor was it recorded during the MEP EIS or the RMI vegetation assessment in 2021.

Given the lack of mapping or records of the constituent grassland REs on RMI, the degree of historical disturbance, as well as the presence of exotic pasture grasses, including but not limited to Buffel grass (*Cenchrus ciliaris*), it is unlikely that the Natural Grassland TEC is present on RMI.

Poplar Box Grassy Woodland TEC

The Poplar Box Grassy Woodland TEC was listed as a TEC under the EPBC Act by the Department of the Environment and Energy in 2019 (DoEE, 2019), after the MEP EIS and RMJV EM Plan were undertaken. The Poplar Box Grassy

Woodland TEC is associated with RE 11.3.2 that has been mapped and previously recorded on RMI for the MEP EIS and RMJV EM Plan. To meet the Poplar Box Grassy Woodland TEC, an area of RE

11.3.2 is required to meet additional key diagnostic characteristics associated with tree canopy cover >10%, tree canopy height >10m, dominance of *Eucalyptus populnea* (Poplar Box) in the canopy, as well having either a <50% perennial vegetation cover in ground layer or ≥ 20 native plant species per patch in the ground layer (DoEE, 2019). Given the high historical disturbance of the vegetation on RMI there is only a moderate chance of the Poplar Box Grassy Woodland TEC occurring.

The likelihood of occurrence of TECs on RMI has been listed in Table 12, based on the results of the desktop assessment and RMI vegetation assessment.

Table 12: Threatened Ecological Community likelihood of occurrence on RMI

Threatened Ecological Community	RE Code	RE Map	Field RE	MEPEIS	RMJVEM Plan	Likelihood of Occurrence on RMI
Brigalow (Acacia harpophylla dominant and co-dominant) Endangered Community (Brigalow TEC)	11.3.1 11.4.9 11.4.8	Yes	Yes	-	Yes	Likely
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin (Natural Grassland TEC)	11.4.4	-	-	-	Yes	Unlikely
Poplar Box Grassy Woodland on Alluvial Plains (Poplar Box Grassy Woodland TEC)	11.3.2	Yes	-	Yes	Yes	Moderate

1.2.8.4 Conservation significant flora species

No conservation significant flora species records were returned from the Queensland Government online wildlife records searches (Appendix 6).

No threatened flora species listed under the EPBC Act were observed within the MEP area during the MEP EIS. The RMJV EM Plan states that a flora survey identified one listed species, the *Cerbera dumicola*, shrub or small tree growing to 4m high, classified as Near threatened under the Nature Conservation (Wildlife) Regulation 1994. Despite the previous record of *Cerbera dumicola*, there are no requirements for consideration of its inclusion in the rehabilitation requirements for RMI as per the EA and/or RMJV EM Plan.

1.2.9 Fauna habitats

1.2.9.1 Fauna species and habitats

The fauna habitat types within the undisturbed area of RMI include the waterway habitat associated with the riparian vegetation along New Chum Creek, as well as adjacent areas of eucalypt woodlands associated with *Eucalyptus populnea* dominated woodlands and/or *Eucalyptus cambageana* regrowth as well as Brigalow (*Acacia harpophylla*) regrowth woodlands. The broad fauna habitats on RMI can be classed as:

- Mixed riparian woodlands
- Eucalypt woodlands with exotic grasses
- Brigalow woodlands with exotic grasses
- Cleared exotic grasslands

The vegetation in areas undisturbed by mining along New Chum Creek and the adjacent plains have been mapped by the Queensland Government as containing core habitat for threatened (Endangered or Vulnerable) wildlife and special least concern animals including, ornamental snake (*Denisonia maculata*) (Vulnerable EPBC Act and NC Act) and essential habitat for the short-beaked echidna (*Tachyglossus aculeatus*) (Appendix 6, Figure 7).

No conservation significant fauna species records were returned from the Queensland Government online wildlife records (Appendix 6). There are no requirements for inclusion of specific fauna habitats attributes in rehabilitation planning for RMI listed in the EA.

The vegetation on RMI associated with the mapped fauna habitat containing habitat for threatened (Endangered or Vulnerable) wildlife and special least concern animals (Appendix 6 and Figure 7) has, however, been considered in PMLU planning and will be maintained as woodland habitat or watercourse vegetation (Section 3.1).



Figure 7: RMI Threatened (endangered or vulnerable) wildlife and special least concern animals

1.2.9.1 Fauna corridors and connectivity

At a regional level the landscape is characterised by a mosaic of cleared land for pastoral uses and mining, natural grasslands and native woodlands. Landscape connectivity in the region is predominantly provided by extant vegetation occurring along riparian corridors of waterway and river systems, providing wildlife movement opportunities.

No state or regional corridors have been mapped on RMI (Appendix 6).

Despite the lack of mapping of State or regional corridors, Condition E6 of the RMI EA recognises the importance of the habitat associated with New Chum Creek by conditioning that *a buffer distance of not less than one hundred (100) metres must be retained on either side of the vegetation along New Chum Creek within Mining Lease 70312 to minimise environmental impacts to regional ecosystems*. Accordingly, the vegetation along New Chum Creek and associated 100m buffer zone has been maintained as a watercourse PMLU along New Chum Creek and woodland habitat within the 100m buffer zone. Areas of disturbance within these areas will be rehabilitated to a watercourse or woodland habitat PMLU (Section 3.1.2 and Section 3.1.2).

1.2.10 Pre-mining land use

The predominant pre-mining and historical land use within and surrounding RMI is associated with cattle grazing (SMC/Peabody, 2014). This has resulted in significant disturbance of native vegetation communities within and surrounding RMI. Figure 8 depicts a historical pre-mining aerial image of RMI and surrounding areas from 1957. The image illustrates the degree of disturbance to vegetation within and surrounding RMI from historical grazingland management prior to mining.

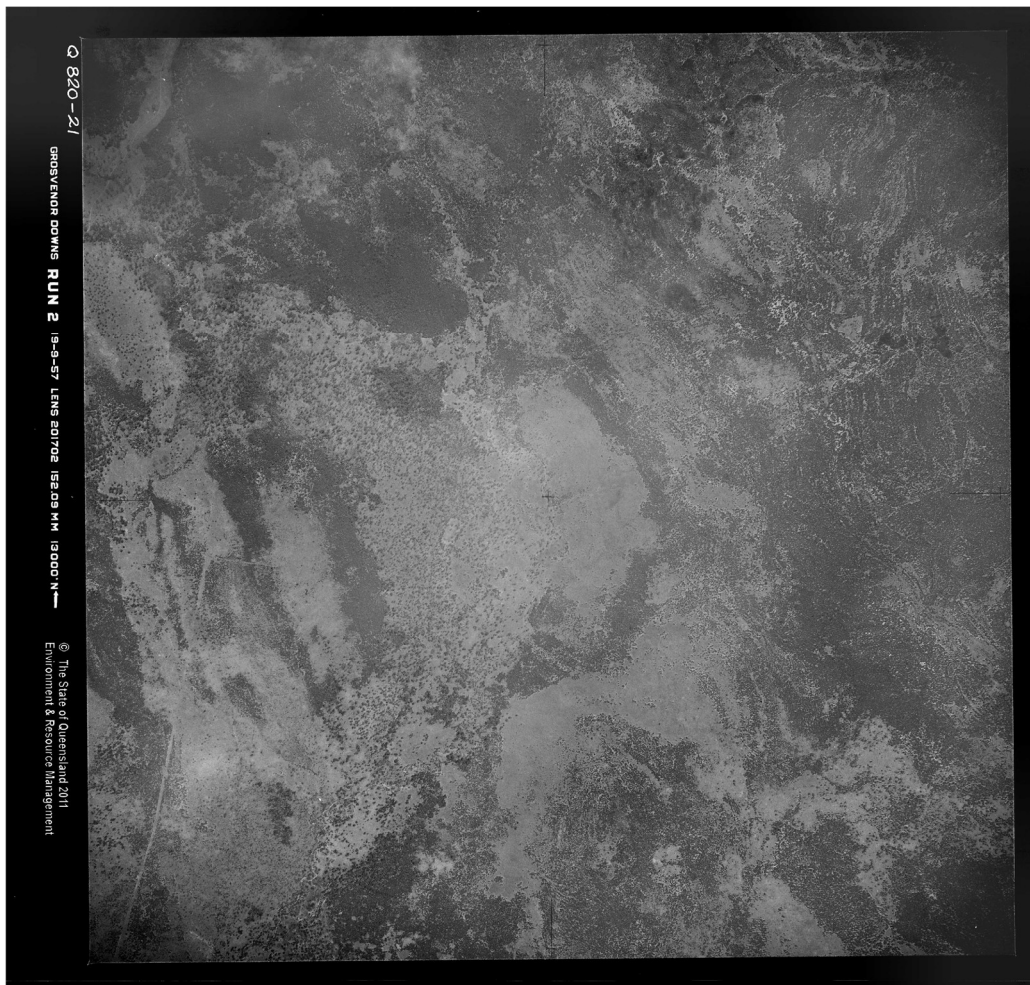


Figure 8: Pre-mining historical aerial image of RMI and surrounding areas-1957 (Grosvenor Downs 1:40,500)

1.2.11 Underlying landholders

The underlying landholder is SMC Pty Limited.

1.3 Design for closure

This PRC Plan has been developed to proactively manage progressive rehabilitation of the RMI site to a stable post-mining land use, aiming to minimise long-term management requirements as well as associated closure costs.

Importantly, a focused *design for closure* underpins all sections of this plan, including:

- Engagement with relevant stakeholders to define suitable PMLUs
- Defining and implementing rehabilitation practices to identify risks that could influence achievement of milestone criteria
- Demonstrating successful rehabilitation through defined site monitoring to develop a feasible PRCP Schedule

1.4 Rehabilitation and improvement planning

Legislative Requirement

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

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

PRC Plan Guideline (Section 3.1)

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

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

1.4.1 Relevant activities requiring rehabilitation

The relevant activities at RMI that will require rehabilitation - including predicted duration and availability for progressive rehabilitation, are provided in Table 13.

Progressive rehabilitation is limited until processing of coal from neighbouring mines is complete. This timing is aligned with the planned completion of coal processing at Poitrel Mine in the PRCP Schedule, with rail and train load-out areas available once train loading of Daunia coal is complete (refer to Section 1.1.5).

Currently there are no agreements in place to retain any infrastructure, but these may be sought in the future if the infrastructure may benefit the PMLU.

Table 13: Relevant activities requiring rehabilitation at RMI.

Relevant activity	Predicted duration	Size (ha)	Availability for progressive rehabilitation
CHPP and associated infrastructure	2021-2036	57	Available once RMI coal processing is complete
Administration, crib and general buildings; workshop; fuel, oil and chemical storage	2021-2039		Required for the rehabilitation operations until the majority of the rehabilitation of the processing areas is complete
Laydown and general areas	2021-2036		Available once RMI coal processing is complete
Roads	2021-2036	17	Available once RMI coal processing is complete
ROM coal stockpile; product coal stockpile	2021-2036	44	Available once RMI coal processing is complete
Tailings drying cells	2021-2036	3	Available once drying is complete
Process water dam, Environment dam, drains	2021-2049	24	Required for water management until rehabilitation of the processing areas is tracking towards achieving surface requirements
Train load-out and associated infrastructure	2021-2051	33	Area associated with RMI coal processing will be available once RMI coal loading is complete, with remaining area available once Daunia coal loading is complete
Rail area	2021-2051		Available once Daunia coal loading is complete
Topsoil stockpiles	2021-2051	5	Areas to be progressively rehabilitated as topsoil is used in other rehabilitation activities

1.4.2 Rehabilitation areas and milestones

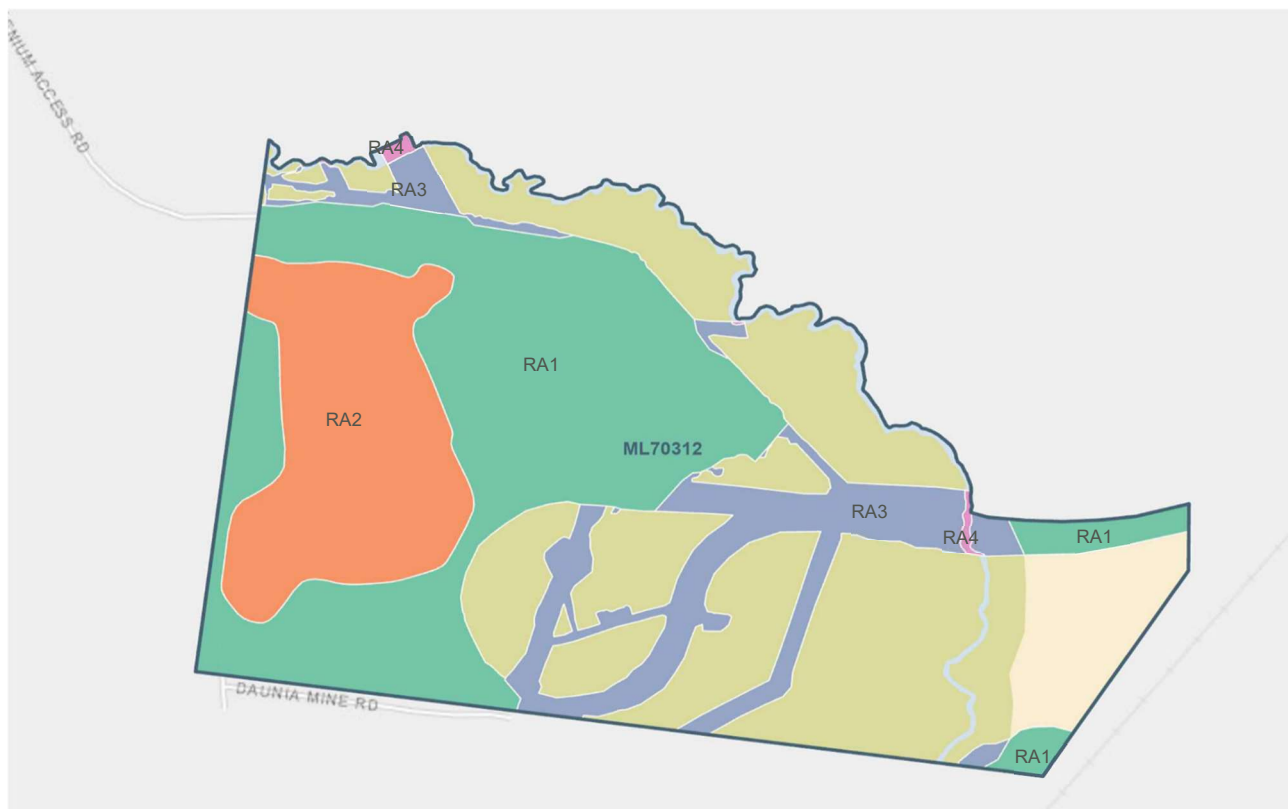
The rehabilitation areas (RA) and rehabilitation milestones (RM) included in the PRCP Schedule for RMI are referred to throughout this PRC Plan.

A RA is defined in the PRCP Guideline (DES, 2021) as an area of land in the post-mine land use to which a rehabilitation milestone for the post-mining use relates, and a RM is each significant event or step necessary to rehabilitate the land to a stable condition (section 112 of the EP Act).

The RMI RAs, as well as the relevant activities associated with each RA, are detailed in Table 14 (and Figure 9).

Table 14: Rehabilitation areas (RAs), associated PMLUs and relevant activities for RMI

Rehabilitation area (RA)	PMLU	Relevant activity
RA1	Cattle grazing	CHPP and associated infrastructure Administration, crib and general buildings Workshop, fuel, oil and chemical storage Laydown and general areas Roads Product coal stockpile Tailings drying cells Process water dam, Environment dam, drains Rail area Train load-out and associated infrastructure Topsoil stockpiles
RA2	Woodland habitat	ROM pad
RA3	Woodland habitat	Road Rail area Train load-out and associated infrastructure Topsoil stockpiles
RA4	Watercourse	Road Rail area

**Figure 9: Schematic illustration of RMI's rehabilitation areas**

The RMs for RMI are detailed in Table 15.

Table 15: Rehabilitation milestones for RMI

Rehabilitation milestone (RM)	
RM1	Infrastructure decommissioning and removal
RM2	Remediation of contaminated land
RM3	Landform development and reshaping
RM4	Surface preparation (cattle grazing)
RM5	Surface preparation (woodland habitat)
RM6	Surface preparation (watercourse)
RM7	Revegetation (cattle grazing)
RM8	Revegetation (woodland habitat)
RM9	Revegetation (watercourse)
RM10	Achievement of surface requirements (cattle grazing)
RM11	Achievement of surface requirements (woodland habitat)
RM12	Achievement of surface requirements (watercourse)
RM13	Achievement of post-mining land use to a stable condition (cattle grazing)
RM14	Achievement of post-mining land use to a stable condition (woodland habitat)
RM15	Achievement of post-mining land use to a stable condition (watercourse)

1.4.3 Existing rehabilitation

There is no rehabilitation on-site as all disturbance is associated with the ongoing coal washing and train load-out activities.

2. Community consultation

Legislative Requirement

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

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

PRCP Guideline (Section 3.5)

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

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

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

2.1 Consultation to date

BMC (the previous EA holder) engaged with DES regarding PMLUs as part of RMI's EA application process in 2019. Engagement with affected landowners for Daunia and Poitrel Mines was undertaken to develop compensation, leasing and agistment agreements, based on the assumption that land disturbed for mining will be rehabilitated to be suitable for its previous use (grazing) after SMC's use of the land has ceased. SMC continues to engage with underlying and neighbouring landholders regularly on land management including lease/license issues; and on operational matters (such as air quality monitoring) as required.

BMC provided two PRC Planning briefings to Isaac Regional Council (IRC) to date (December 2020 and April 2021).

Consultation undertaken by BMC as part of PRC Plan preparation for RMI included:

- a phone call to the IRC CEO, a letter to IRC regarding the RMI PRC Plan, and an invitation for further discussion with Council about their involvement in PRC Plan consultations
- letters to two landowners whose properties are adjacent to RMI, one landowner whose property is not adjacent but accommodates the access road to RMI and two landholders who are affected by or adjacent to Daunia or Poitrel Mines
- a letter to utility owners/operators and the owners of overlapping tenures (gas exploration) within and adjacent to ML 70312, including Aurizon, Queensland Rail, Powerlink and Arrow Energy
- a letter to the owners of adjacent mining operations which include MetRes (Millennium), Poitrel Mine (BMC), Daunia Mine (BMA), Whitehaven Coal, Stanmore Resources and Pembroke Resources
- a letter to the Department of Natural Resources Mines and Energy (DNRME) Deputy Director-General Georesources and Manager Native Title Services and Coal Hub

2.2 Community consultation register

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

- Identification of each community member/stakeholder
- Previous engagements with the community
- Consultation date(s)
- Description of consultation type
- Information provided to the community
- Issues raised/discussed by the community
- How issues have been considered
- Decisions/ outcomes of engagement
- Commitments made by BMC (now SMC)

The stakeholders identified as part of this register are considered as having a genuine, demonstrable and legitimate interest in RMI's ongoing rehabilitation and closure planning.

The community consultation register (Table 16) will be a live instrument for recording future consultation on RMI's PRC Plan. The complete register is provided in Appendix 7.

Table 16: RMI community consultation register

Stakeholders	Details	Interests
Affected stakeholders		
Traditional owners	Barada Barna people were engaged in the management of Aboriginal cultural heritage through a Cultural Heritage Management Plan for RMI, originally developed by the Millennium Coal Mine to achieve its duty of care obligation under the Aboriginal Cultural Heritage Act 2003. Barada Barna people's native title to areas of land within the Isaac, Central Highlands and Mackay LGAs was determined by the Native Title Tribunal in June 2016. Barada Barna People are represented by BBAC. SMC is in regular communication with BBAC.	• Cultural heritage impacts • Impacts on Native Title (e.g. within stock routes or associated with the Isaac River) • Post-mining land use and landform/landscape • Future access to and ownership of land • Environmental management/stewardship • Employment and business opportunities in exploration, environmental management and monitoring, rehabilitation
Adjacent and affected property owners - RMI	There are two landowners whose properties are adjacent to RMI, and one landholder whose property is not adjacent but accommodates the access road to RMI, Daunia Mine and Poitrel Mine. Mavis Downs is located to the east of RMI (and Daunia Mine) and Poitrel Mine is located to the west. The access road to RMI is on a property called Wotonga. SMC has constructive working relationships with all underlying and adjacent landowners.	• Water access – underground and surface water allocations • Environmental management/stewardship • Post-mining land use and landform/land scape • Rehabilitation schedule • Future access to and ownership of land

Stakeholders	Details	Interests
Underlying and adjacent property owners – Daunia and Poitrel Mines	Poitrel Mine and Daunia Mine have compensation agreements with two landowners whose properties are affected by mining. The two properties are Winchester Downs and Olive Downs. Adjacent landholders to Poitrel Mine and Daunia Mine include the owner of Mavis Downs and the former owners of Daunia Mine.	
Utility owners	Aurizon operates the TLO and rail loop which are owned by Queensland Rail and are located on land leased from SMC. Powerlink owns the Daunia overhead and underground power lines. IRC has a road reserve (an unused 'paper road') within the southern part of Daunia Mine. SMC engages with utility owners as required, i.e. issue-specific or transactional engagement.	Impact on assets/asset value Rehabilitation of impacts on assets Service disruptions and mitigations Crossing/interface agreements
Adjacent SMC mine managers and key stakeholders	Poitrel Mine is adjacent to RMI to the south-west, and utilises infrastructure at RMI. Daunia Mine is also adjacent to RMI to the south-east, and utilizes the TLO and rail loop.	- Any impacts on the use of land within overlapping tenures - Water access - CHPP access - TLO and rail loop access - Stakeholder (including employee/contractor) perceptions about closure
Adjacent mining tenure - RMI	MetRes is the operator of Millennium Coal Mine. Millennium Coal Mine re-commenced utilisation of RMI's processing and train load-out facilities in September 2021.	- Access to RMI processing capacity - TLO access - Tailings disposal
Adjacent mining tenures - Poitrel and Daunia Mines	Whitehaven Coal and Stanmore Resources hold tenements to the south and east of Daunia Mine and Poitrel Mine. Pembroke Resources has rights to a rail corridor alongside the existing Norwich Park Branch Line.	- Future land use and ownership - Access to rail corridor land
Overlapping tenure holders	Arrow Energy holds an Authority to Prospect which overlaps RMI and Daunia Mine's MLs.	Future land use and tenure

Stakeholders	Details	Interests
Local Government	SMC has a long established and cooperative relationship with IRC. SMC and IRC meet at least six monthly. BMC previously had three recent briefings with Council regarding PRC Plan requirements (December 2020, April 2021 and November 2021). As noted above, IRC has a road reserve (an unused 'paper road') within the southern part of Daunia Mine and has interests in stock routes such as along the Isaac River.	- Local employment - Stock route (Isaac River) - Effects on Council services and infrastructure - Environmental management - Rehabilitation progress - Post-mining landforms - Management of closure impacts on employment and businesses - Alignment of rehabilitation plans with local/regional planning goals - Economic transformation (towards post-mining) and community sustainability
RMI operators/workforce	Sedgman Pty Ltd has operated RMI since 2007, using a contract workforce.	- Timing of closure - Rehabilitation obligations - Employment continuity - Loss of employment/contracting opportunities at closure
Interested stakeholders		
Stanmore Resources employees and contractors	Stanmore Resources communicates regularly with its personnel through various means. Information on PRC Planning and its relevance to RMI has been provided on-site by managers and through regular communications.	- Job opportunities - Loss of jobs with closure - Closure planning in context with other mining industry changes - e.g. autonomous haulage - Workers' conditions - Sustainability of communities that are dependent on mining
Businesses	SMC's procurement team have relationships with an extensive network of small business suppliers, including Indigenous businesses. As there is no likelihood of RMI's PRC Planning having a significant effect on businesses during the next ten years, business are considered interested rather than affected stakeholders at this point. There is potential to engage Traditional Owners and other Indigenous businesses in e.g. rehabilitation services as part of a broader portfolio-wide or business-wide program.	- Opportunities to participate in supply chain (e.g. exploration, environmental management, rehabilitation) - Economic transformation (towards a post-mining landscape) - Economic and community sustainability - Loss of supply opportunities with closure
Community members and groups	The Moranbah community is the closest to RMI, at approximately 20 kms to the west. Community members and groups in Moranbah and throughout the Bowen Basin have been provided with information about PRC Planning through Community consultation processes.	- Local employment and business opportunities - With closure, loss of jobs and supply opportunities - Community and regional sustainability - Environmental management

Stakeholders	Details	Interests
State government DoR DES Member for Burdekin Office of the Minister for Environment, Great Barrier Reef, Science and the Arts	Corporate Affairs conducts as-needed engagement with Ministers and Members of Parliament, and will provide briefings on PRC Planning as part of regular engagements. DoR's Deputy Director-General Georesources and Director Native Title Services and Coal Hub have been kept informed on PRC Planning.	• Legislative compliance • Resource development • Employment opportunities • Public interest • Environmental management • Economic transformation (towards post-mining) • Financial assurance • Environmental risk management • Future land use and landform

2.3 Ongoing consultation

2.3.1 Consultation objectives, engagement type and frequency

A dedicated Community Consultation Plan (CCP) has been compiled for RMI's PRC planning (Elliot Whiteing, 2021) (Appendix 7). This plan documents the iterative consultation process to be followed to enable ongoing PRCP-related engagement with the relevant stakeholders (Table 17).

Table 17: Process to be followed for ongoing community consultation for RMI PRC planning

Consultation objective	Engage key stakeholders in identifying community objectives and aspirations for post-mining land use and landform, and social value opportunities	
Community member	Engagement type	Proposed consultation frequency
Landowners and lessees within and adjacent to RMI. Traditional owners – Barada Barna People (BBAC) IRC Community members	Advise landowners, lessees, Traditional Owners and IRC in writing when the PRC Plan is approved and provide a copy of the PRC Plan for their information.	Once-off
	- Meet with directly affected and adjacent landholders, BBAC and IRC to provide an update on the PRC Plan and progress with rehabilitation, and invite their inputs and feedback on: - The approved PMLUs and post-mining landforms - Any particular values or opportunities in specific disturbed areas - Rehabilitation methods which would optimise future grazing opportunities, land management or water storage - Shared value initiatives, e.g. infrastructure retention, capacity building, environmental management, research or delivery partnerships - Rehabilitation methods, schedule, and progress towards milestones	As requested, or as agreed with individual representatives/agencies
	- Through meetings with IRC: - Provide an update on the status of the PRC Plans and rehabilitation - Forecast upcoming PRC Plan consultation for other SMC assets - Seek to understand Council's strategic analysis and planning for Isaac LGA and the RMI project area	Bi-annually, or as agreed with IRC
	Meet with the landholder accommodating the road access to RMI, Daunia and Poitrel Mines to consult on the rehabilitation of the road and surrounding areas, and reflect their feedback in ongoing planning requirements.	Two years prior to closure, subsequent consultation to be agreed
	Participate in Council, community or industry-led initiatives which aim to harness social value from mine closure and rehabilitation planning, and/or work towards economic transformation/transition.	As invited
	- In cooperation with BBAC and other First Nations within Isaac LGA, and on a portfolio-wide basis: - Communicate the pipeline of opportunities relating to rehabilitation work and land management	Once-off process

Consultation objective	Engage key stakeholders in identifying community objectives and aspirations for post-mining land use and landform, and social value opportunities	
	- Develop a shared understanding of business capabilities relevant to closure and rehabilitation works - Plan and implement an Indigenous business capability development program to match rehabilitation opportunities, if this is required.	
	Via Smart Transformations Advisory Committee members, and/or PRC Plan-specific workshops or focus groups, seek the involvement of community members and groups in articulating community aspirations for rehabilitation, PMLUs and economic transformation.	Once-off, portfolio-wide process

Engagement objective	Demonstrate transparency regarding SMC's PRCP intentions and timeframes to SMC personnel and local communities	
Community member	Engagement type	Proposed consultation frequency
SMC employees and contractors	Keep the RMI workforce updated (via Coal Connect, a weekly email newsletter to personnel) if there are changes to the PRC Plan.	Ongoing engagement process
Moranbah community members and groups	Using Community Connect (SMC's monthly community newsletter) and community forums such as interagency meetings, partnership meetings and community and business networks, provide community updates on PRC Planning (RMI-specific as relevant and portfolio wide)	Ongoing engagement process
Local businesses and SMC suppliers	Provide information about the pending closure of RMI and potential future supply opportunities as part of closure and rehabilitation.	Two years prior to closure; subsequent consultation to be agreed
Elected representatives and Government agencies	Provide updates via letters and/or meetings on PRC Planning to: - Office of the Minister for Resources (Queensland) - Office of the Minister for Environment, Great Barrier Reef, Science and Youth Affairs (Queensland) - Shadow Minister for Resources - Shadow Minister for Environment, Great Barrier Reef, Science and Youth Affairs Resources - Member for Burdekin (Queensland Parliament) - DES PRCP Team and Business Centre Coal - Director, Native Title Services and Coal Hub, Department of Resources	As requested, or as agreed with individual representatives / agencies

Engagement objective	Demonstrate transparency regarding SMC's PRCP intentions and timeframes to SMC personnel and local communities	
	- Deputy Director-General Georesources, Department of Resources - Assistant Secretary Assessments and Governance Branch, DAWE	

Engagement objective	Cooperate with IRC, utility owners and adjacent mining and energy tenement owners as part of PRC Planning	
Community member	Engagement type	Proposed consultation frequency
Poitrel Mine	Involve internal SMC stakeholders in PRC Planning processes to build capacity for community engagement on PRC Planning issues and support effective delivery of PRC Plans.	Ongoing
Arrow Energy	Write to advise Arrow Energy of any substantive changes to RMI's closure or rehabilitation schedule, and consult with Arrow Energy Holdings regarding their interests in areas of overlapping tenure within RMI.	As requested, or as agreed with company representatives
Queensland Rail and Aurizon	Maintain correspondence with Queensland Rail and Aurizon regarding progressive rehabilitation activities as they affect the Norwich Park Branch Railway, and undertake engagement regarding the decommissioning of the train load-out facility/rail interface.	As requested, or as agreed with individual representatives/agencies
MetRes	Maintain correspondence with MetRes regarding RMI's closure and rehabilitation schedule, including advice regarding closure scheduling in accordance with contractual agreements between SMC and MetRes.	As required, and then two years prior to closure
Other adjacent/nearby mining operations	Advise Whitehaven Coal, Stanmore Resources and Pembroke Resources in writing if there are any substantive changes to the closure and rehabilitation schedule in future iterations of the PRC Plan. At a business level, SMC will participate in industry and research partnerships of relevance to PRC Planning and rehabilitation.	As requested, or as agreed with individual representatives /mining operations
DoR	Provide updates on PRC Planning to the Director Native Title Services and Coal Hub, Rockhampton and the Deputy Director General, Department of Resources, in writing or through regular meetings.	As requested, or as agreed with DoR representatives

3.3.2 Community consultation information sharing

Information to be released as part of ongoing community consultation will include:

- Rationale and scope for PRC Plan and PRCP Schedule
- Approved activities and PMLUs for RMI
- On-site activities and areas of disturbance
- Proposed rehabilitation methods, schedule and milestones

Opportunities for community consultation as part of the PRC Plan’s implementation where required, communication tools could include:

- A holding statement for general enquiries
- Frequently asked questions and answers (FAQs) and a PRC Planning fact sheet available to support consultation activities
- Face-to-face and virtual meetings
- Updates and fact sheets about PRC Planning for SMC assets through Community Connect

2.3.3 Addressing feedback/comments

As noted in the PRCP Guideline (DES, 2021), in addition to the annual return requirements that relate to EAs, if a PRC Plan applies to the activities, the annual return must also include an evaluation of the effectiveness ofthe PRC Plan, including the environmental management carried out under the PRCP Schedule, for the year towhich the annual return relates.

SMC will monitor and report on the progress and outcomes of progressive rehabilitation activities against rehabilitation milestones provided in the PRCP Schedule. This monitoring will aim to demonstrate a successfulrehabilitation trajectory towards achievement of the approved PMLU, and/or to inform corrective action where required, which will be reported as part of annual returns.

Information about rehabilitation progress will also be delivered as part of the consultation methods detailed in Table 17, and any feedback will be considered in subsequent updates of this PRC Plan.

The PRC Plan Community Consultation Register will also be updated as community consultation activities outlined in Table 17 are completed. Feedback recorded in the Community Consultation Register will be considered in framing and detailing future PRC Plan amendments for RMI.

The above is also documented as part of the Community Consultation Register (**Appendix 7**).

Relationship with PRCP Schedule
As a site to which transitional provisions apply, RMI has land outcomes identified in the EA. Consultation with stakeholders commenced at point of acquisition and continued over time. Specific communications were issued prior to submission of the RMI PRC Plan and consultation will continue as per the process documented in the CCP. Achievement of the PMLUs of cattle grazing, woodland habitat and watercourse are in line with consultation completed to date.

3. Post-mining land uses

Legislative Requirement

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

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

PRCP Guideline (Section 3.2)

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

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

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

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

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

Where PMLUs have not been pre-approved, the applicant must include all of the requirements stated in this section.

3.1 Nominated PMLUs

A number of PMLUs are permitted for RMI under the EA (Appendix 1), of which the following three are proposed as PMLUs at RMI once operations cease:

- Cattle grazing
- Woodland habitat
- Watercourse

To inform suitability of PMLU options for RMI, an understanding of pre-mining land use is required. The predominant pre-mining and historical land use within and surrounding RMI is associated with cattle grazing (Section 1.2.9.2). In addition to cattle grazing, areas of woodland habitat and watercourse vegetation have persisted along the riparian area of New Chum Creek and adjacent plains (Figure 8).

The proposed PMLUs have been recommended based on reinstating the pre-mining land uses wherever practical, considering:

- Post-mining landforms
- Available topsoil quantity and quality
- Presence of mapped ecological sensitive areas associated with Endangered regional ecosystems and

mapped habitat for threatened species listed under the EPBC Act or Queensland Nature Conservation Act 1994 (NC Act)

- New Chum Creek watercourse
- Vegetation associated with woodland habitat within a 100m corridor along the New Chum Creek as required under the EA.

The PMLUs are underpinned by rehabilitation objectives that focus on achieving a safe, stable, non-polluting and sustainable post-mining landscape (as defined in the EA).

The relevant EA acceptance criteria for the PMLUs of cattle grazing, woodland habitat and watercourse have been transitioned to the milestone criteria in the PRCP schedule for the final milestone of achieving the PMLU to a stable condition.

Proposed PMLU locations are illustrated in Figure 10 (and the Final Site Design Map in Figure 24).

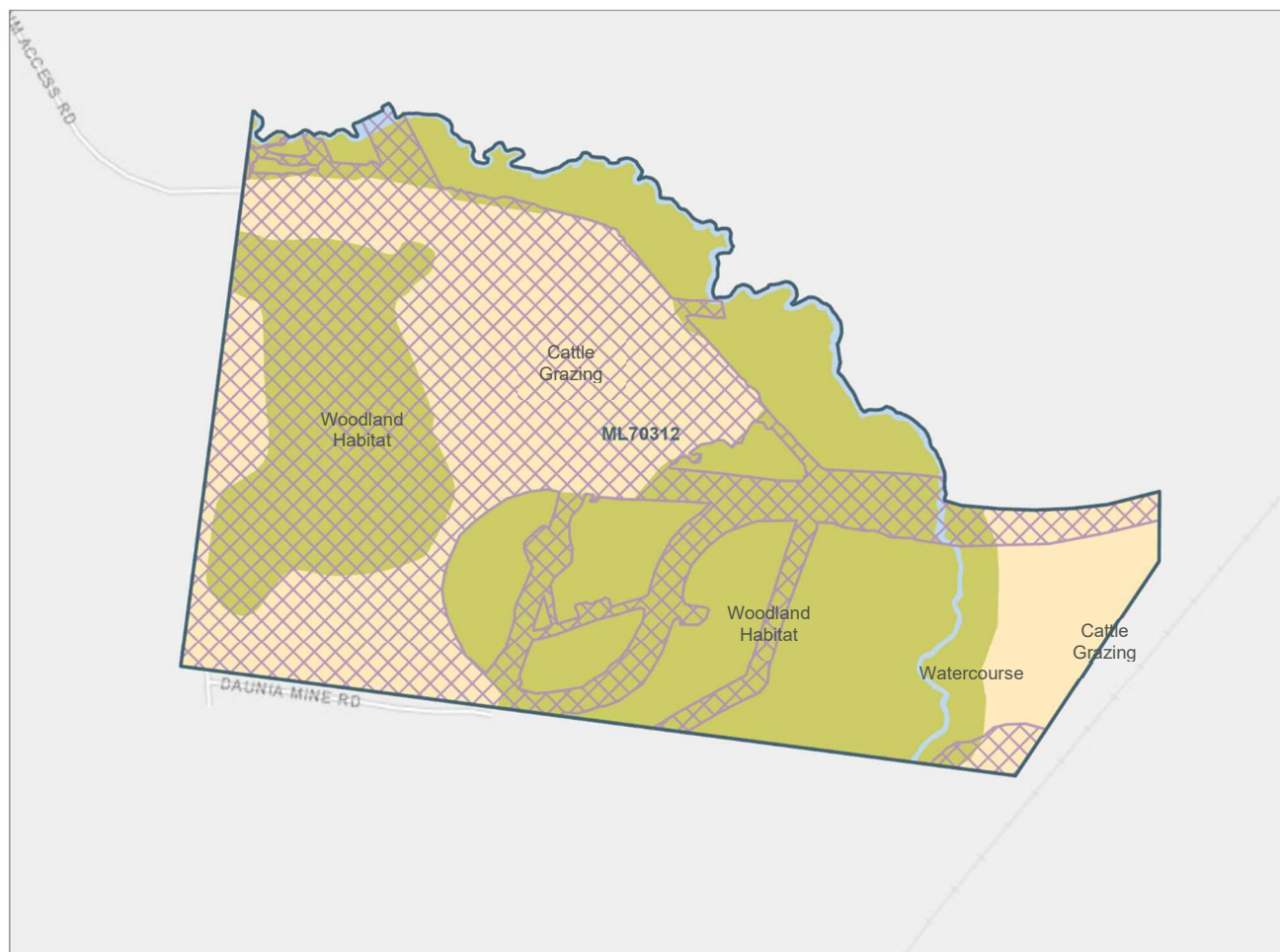


Figure 10: RMI post-mining land uses

3.1.1 Cattle grazing

The EA objectives, indicators and acceptance criteria for the PMLU of cattle grazing are listed in Table 18.

Table 18: RMI EA post-mine land use objectives, indicators and acceptance criteria: cattle grazing

Goal	Objective	Indicator	Acceptance Criteria
Safe to humans and wildlife	Safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use	Hazard assessment	No significant difference
Stable	Rehabilitation is geotechnically stable	Factor of safety	≥1.5

Goal	Objective	Indicator	Acceptance Criteria
	Rehabilitation is erosionally stable	Extent, slope gradient and groundcover	1. Groundcover >50% 2. 70% of slopes ≤20%
Non-polluting	Rainfall runoff from rehabilitation achieves relevant water quality objectives for receiving waters	pH EC Turbidity	Not significantly different to upstream values
	Deep drainage from rehabilitation achieves relevant water quality objectives for groundwater	EC	Not significantly different to: a) the EPP (Water) schedule documents water quality objectives for relevant groundwater chemistry zones; or, b) local water quality objectives developed in accordance with the Queensland Water Quality Guidelines.
Able to sustain an agreed post-mining land use	Rehabilitation is suitable for sustainable cattle grazing	Land suitability assessment for cattle grazing	Land suitability class ≤3 or not different from pre-mining class if ≥4 Assessment completed in accordance with LSA Framework for Open-Cut Coal Mine Rehabilitation 2018. (A rule-set for land suitability assessment of sustainable beef cattle grazing on land rehabilitated after open-cut coal mining in the Bowen Basin Queensland) unless otherwise agreed in writing between the Adminstrating Authority and the environmental authority holder.
		<i>Leucaena</i> stem density	<250 stems >2m height per ha (1 per 40m ²), mean total area

The assessment of pre-mining and post-mining land suitability for cattle grazing on rehabilitated lands, as specified in the EA Acceptance Criteria (Table 18) is based on the '*Rule-set for land suitability assessment of cattle grazing on coal mine rehabilitation*' (Short, 2020) (hereafter referred to as the grazing rule-set).

The grazing rule-set uses land use limitations selected from the comprehensive list provided in the Queensland Land

Evaluation Guidelines based on:

- The target PMLU of sustainable cattle grazing
- The regional-scale of application across the Bowen Basin
- Diagnostic attributes that can be readily correlated to mapping units at potential mapping scales of 1:50,000 and larger

Table 19 provides the grazing rule-set limitations and associated indicators for assessing land suitability class for cattle grazing on rehabilitated land, indicating:

- The Class 1 to Class 2 boundary represents the attribute level at which the limitation starts to affect productivity.
- The Class 3 to Class 4 boundary determines whether rehabilitation is suitable or not and therefore able to sustain an agreed PMLU of grazing as required under the EA (Table 18).

Table 19: Draft land suitability rule-set for cattle grazing on rehabilitation at RMI

Limitation	Indicator	Units	Suitability class				
			1	2	3	4	5
Water availability	PAWC in ERD	mm/0.6d	> 75	75 - 60	< 60 - 45	< 45 - 30	< 30
Nutrient supply	P in 0.1m	mg / kg	> 20	20 - 14	< 14 - 8	< 8 - 4	< 4
	pH in 0.1m	pH units	7.3 – 6.6	< 6.6. – 6.0 or > 7.3 – 8.0	< 6.0 – 5.5 or > 8.0 – 8.5	< 5.5 – 5.0 or > 8.5 – 9.0	< 5.0 or > 9.0
Soil physical factors	Surface soil structure	variable	Fine (peds < 10mm)	Coarse (peds > 10mm)	Surface crust	Very hard setting	Massive
Salinity	EC in ERD	dS/m	< 2	2 - < 4	4 - < 10	10 - < 16	≥ 16
Rockiness	Fragments on surface	%	< 5	5 - 10	10 - 30	30 - 60	> 60
Topography (slope)	Gradient, surface	%	< 5	5 - < 10	10 - < 15	15 - < 20	≥ 20
	Vertical interval, surface	m	Nil ripping furrows	Regular ripping furrows < 0.2m	Regular ripping furrows > 0.2 – 0.4m	Regular ripping furrows > 0.4 – 0.6m	Regular ripping furrows > 0.6m
Water erosion, surface soil	Slope (ESP in 0.1m < 6)	%	< 5	5 - 8	> 8 - 12	> 12 - 18	> 18
	Slope (ESP in 0.1m > 6 - < 14)	%	< 3	3 - 6	> 6 - 10	> 10 - 12	> 12
	Slope (ESP in 0.1m > 14)	%	< 1	1 - 2	> 2 - 4	> 4 - 6	> 6
Sub-soil erosion	ESP at 0.5m	%	< 7	7 - 14	> 14 - 23	> 23 - 34	> 34
Potentially acid forming materials	pH < 4.5	pH units	Not likely to be present within 5m of surface	Not likely to be present within 3m of surface	Not likely to be present within 2m of surface	Present immediately below root zone (0.9 – 0.6m)	Present within root zone (surface 0.6m)

The rehabilitated land suitability according to the grazing rule-set, for the stockpiled topsoil, is shown in Table 20. (More detail on the assessment is provided in Appendix 5). Topsoil samples reported no unsuitable limitations. Topsoil sample RMI4 (Stockpile 1) was assessed as the most suitable for cattle grazing whereas RMI1 (Stockpile 3) and RMI2 (Stockpile 2) were assessed as suitable. Undisturbed sites RMI5 and RMI6 indicate that the site is suitable for cattle grazing.

Table 20: Rehabilitated land suitability for stockpiled topsoil

Suitability class	Soil samples					
	Stockpile 3	Stockpile 2		Stockpile 1	Undisturbed sites	
	RMI1	RMI2	RMI3	RMI4	RMI5	RMI6
	3	3	1	2	1	2

Cattle grazing is proposed for (Figure 10):

The main disturbed areas with lower overall slopes and not associated with the woodland or watercourse areas detailed in Sections 3.1.2 and 3.1.3

- The predominately undisturbed area to the east of New Chum Creek (outside of the 100m buffer zone) given the pre-mining suitability Class 2 associated with SMU DB4 and DB2 (Figure 5)

3.1.2 Woodland habitat

The EA objectives, indicators and acceptance criteria for a PMLU of woodland habitat are listed in Table 21. The EA relevant acceptance criteria have been transitioned to the milestone criteria. Modifications have also been incorporated to include BioCondition milestone criteria. These criteria are presented in the Schedule and are demonstrative of achieving a safe, stable, non-polluting and sustainable post mining land use.

Table 21: RMI EA post-mine land use objectives, indicators and acceptance criteria: woodland habitat

Goal	Objective	Indicator	Criteria
Safe to humans and wildlife	Safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use	Hazard assessment	No significant difference
Stable	Rehabilitation is geotechnically stable	Factor of safety	≥1.5 unless an alternative is justified by an appropriately qualified engineer
	Rehabilitation is erosionally stable	Groundcover (steep slopes, >15%)	As per relevant Bio condition criteria
		Groundcover (lesser slopes, ≤15%)	As per relevant Bio condition criteria
Non-polluting	Rainfall runoff from rehabilitation achieves relevant water quality objectives for receiving waters	pH, EC Turbidity	Not significantly different to upstream values
	Deep drainage from rehabilitation achieves relevant	EC	Not significantly different to the EPP (Water) schedule documents water quality objectives
Goal	Objective	Indicator	Criteria
	water quality objectives for groundwater		for relevant groundwater chemistry zones; or local water quality objectives developed in accordance with the Queensland Water Quality Guidelines.
Able to sustain an agreed post-mining land use	Native woodland habitat characteristics	Species richness	As per relevant Bio condition criteria
		Tree canopy cover	As per relevant Bio condition criteria

EA condition E6 states “A buffer distance of not less than one hundred (100) metres must be retained on either side of the vegetation along New Chum Creek within Mining Lease 70312 to minimise environmental impacts to regional ecosystems except as indicated in Table E2 (Work Areas in Nature Conservation Areas).”

The vegetation in this buffer will be maintained by assigning this area a PMLU of woodland habitat (outside the watercourse PMLU as discussed in Section 3).

Woodland habitat has also been proposed for:

- Undisturbed and disturbed areas within mapped ecologically sensitive areas including (Figure 7):
- Category B ESAs mapped in association with Endangered REs

- Matters of State environmental significance (MSES) associated with mapped habitat for threatened species listed under the EPBC Act or NC Act
- Areas of the post-mining landform associated with the rehabilitated ROM pad due to unsuitable topsoil material (see Section 6.1.3)
- Areas proposed as woodland habitat are shown in Figure 10

3.1.3 Watercourse

A watercourse is defined under the Water Act 2000 as "...a river, creek or other stream, including a stream in the form of an anabranch or a tributary, in which water flows permanently or intermittently, regardless of the frequency of flow events, in a natural channel, whether artificially modified or not; or in an artificial channel that has changed the course of the stream".

A waterway as defined under the Fisheries Act 1994 includes a "river, creek, stream, watercourse or inlet of thesea. This definition includes freshwater and tidal waters, both permanent and ephemeral waterways, and includes drainage features."

New Chum Creek, which has Strahler Stream Orders of 2 and 3 watercourse, enters the lease from the north- west and runs along the northern lease boundary before turning south, to the east of the CHPP and rail loop (Section 1.2.4, Figure 4).

Hence, the proposed PMLU for New Chum Creek is a watercourse (Figure 10). (Lateral limits of the New Chum Creek watercourse PMLU has been mapped to the outer banks using digital terrain modelling taken from Lidar data and aerial imagery current as of 6 July 2021). The disturbance areas of the haul road and railway that traverse New Chum Creek have been allocated to RA4.

The RMI EA provides objectives, indicators and acceptance criteria for a watercourse PMLU, however, these criteria have been developed for rehabilitated creek *diversions*. As the disturbed sections of New Chum Creek on RMI are associated with a *natural watercourse*, more suitable milestone criteria have been developed to

ensure that all disturbed areas are revegetated with trees, shrub and grasses endemic to the area, sufficient to establish a riparian environment and protect bed and banks from erosion. Rehabilitation works will follow:

- Requirements for Riverine Protection Permits and/or exemptions under the Water Act 2000 (Riverine protection permit exemptions requirements, Department of Natural Resources, Mines and Energy, WSS/2013/726, Version 2.01, 13/11/2019).
- Accepted development requirements for operational work (constructing or raising waterway barrier works) under the Fisheries Act 1994 and Planning Act 2016. (The sections of New Chum Creek requiring rehabilitation are listed as amber (moderate impact) and green (low impact) (Figure 11)).



Figure 11: New Chum Creek watercourse (water barrier works delineation)

3.2 Community consultation

Achievement of the PMLUs of cattle grazing, woodland habitat and watercourse are in line with consultation completed to date (refer to Section 2).

3.3 Regional planning integration

The PMLUs at RMI consider the pre-mining land use, adjacent land uses and approved EA conditions. Existing land use in the area is primarily cattle grazing and coal mining.

Under the Isaac Regional Planning Scheme (February, 2021), RMI is located in a *rural* zone, which includes uses such as grazing, farming, forestry, tourism and extractive industries. Land use performance outcomes for this rural zone include ensuring development:

- ‘(a) is consistent with the rural character of the locality;
- (b) supports the primary rural function of the zone;
- (c) protects rural, natural and scenic values of the locality; and
- (d) includes boundary realignments where used to align with mining or petroleum tenements’.

In addition, the Queensland Government, via its Mackay, Isaac and Whitsunday Regional Plan (February, 2012), maps RMI in a *regional landscape and rural production area*, which includes land used for agriculture, water catchment, traditional uses, conservation areas and native forests.

The defined uses for both of these plans are consistent with the PMLUs proposed for RMI.

Relationship with PRCP Schedule
The proposed PMLUs for RMI are consistent with pre-mining land use, adjacent land uses and approved EA conditions. The PMLU extents consider the post-mining landform, available topsoil, existing vegetation and ecological sensitive areas. The EA acceptance criteria for cattle grazing and woodland are transitioned to the milestone criteria for achieving these PMLUs. Milestone criteria for the New Chum Creek watercourse has been defined in terms of potential requirements for Riverine Protection Permits and/or exemptions, and water barrier works delineations, aiming to ensure that all disturbed areas are revegetated with trees, shrub and grasses endemic to the area, sufficient to re-establish a riparian environment and protect bed and banks from erosion.

4. Non-use management area

Legislative Requirement

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

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

PRCP Guideline (Section 3.3)

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

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

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

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

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

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

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

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

4.1 Nominated NUMAs

No non-use management areas (NUMAs) are nominated for RMI.

4.2 Management methods

Not applicable. There are no NUMAs planned for RMI.

4.3 Community consultation

Not applicable. There are no NUMAs planned for RMI.

4.4 Regional planning integration

Not applicable. There are no NUMAs planned for RMI.

Relationship with PRCP Schedule
Not relevant as there are no NUMAs planned at RMI.

5. Voids in floodplains

Legislative Requirement

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

PRCP Guideline (Section 3.4)

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

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

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

Not applicable. RMI is a CHPP and does include the excavation of any voids.

Relationship with PRCP Schedule
Not relevant as there are no voids planned at RMI.

6. Rehabilitation and management methodology

Legislative Requirement

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.*
- *For each proposed non-use management area, state the proposed methodology for achieving best practice management of the area to support the management milestones under the proposed PRCP Schedule for the area.*

PRCP Guideline (Section 3.6.1)

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

6.1 General rehabilitation practices

6.1.1 Hydrogeology

PRCP Guideline (Section 3.6.1)

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

The approved RMI activities include the operation of a CHPP, water dams, tailings drying cells, ROM and product coal pads, rail load-out and other associated surface infrastructure/activities. The RMI operations do not include: voids or underground workings used for the extraction of resources, permanent disposal of regulated wastes such as tailings or other materials, or on-site groundwater extraction/dewatering activities. Therefore, the RMI site has a low potential to adversely impact on groundwater aquifers. Based on the low potential for adverse risks to groundwater, the hydrogeological assessments completed as part of the development of the PRC Plan included review of existing information and development of Hydrogeological Conceptual Site Models (CSMs). Numerical groundwater modelling has not been required or undertaken.

As detailed in Section 1.2.5 there are two primary hydrostratigraphic units occurring at the area in which the RMI site is located:

- Inferred alluvial aquifer associated with New Chum Creek
- Fort Cooper Coal Measure Aquifer (FCCMA) located within interbedded siltstones, sandstones, minor mudstones, shales and coal measures

A hydrogeological CSM for the existing operational environment is shown in Figure 12.

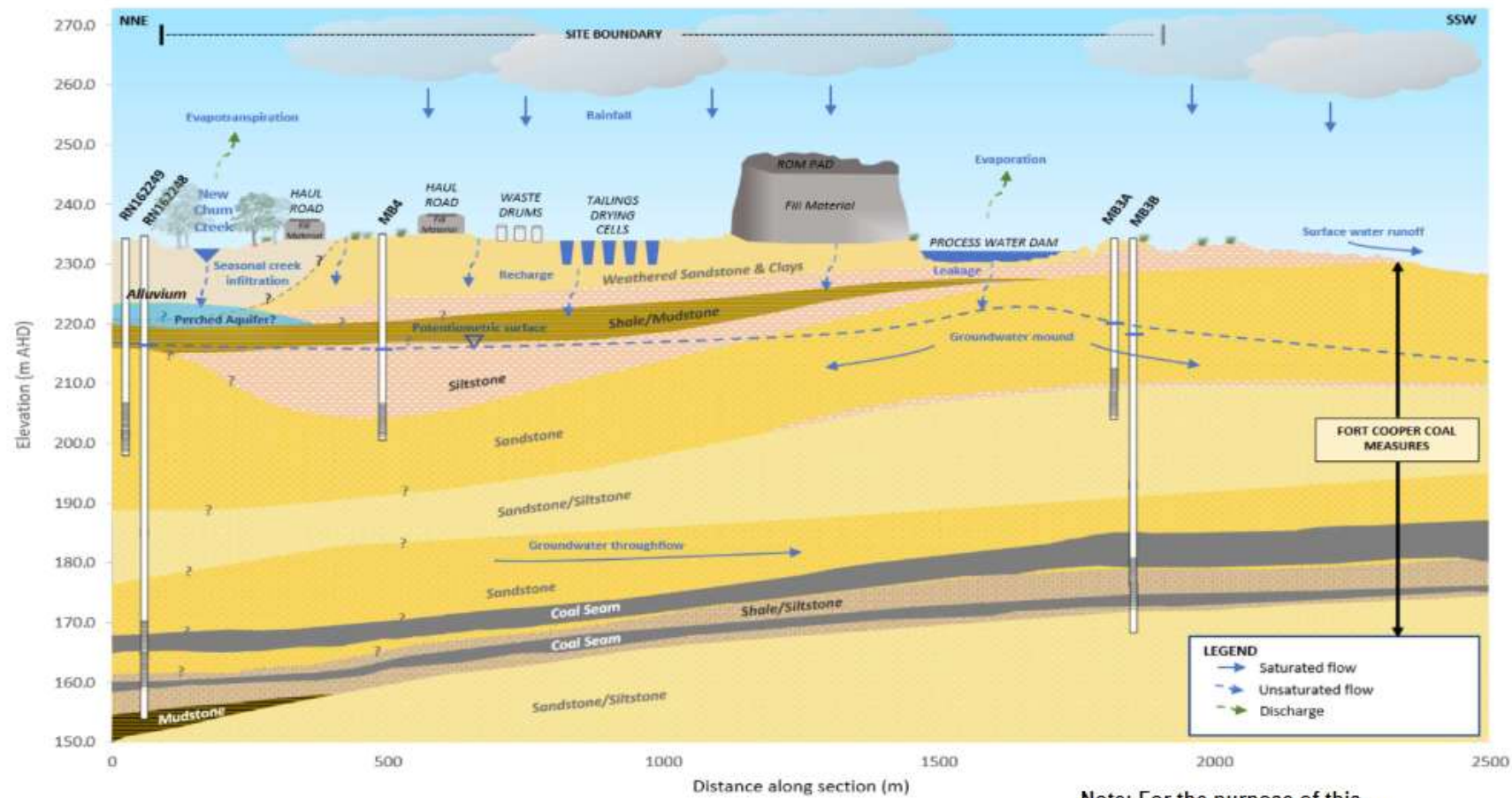


Figure 12: Existing environment hydrogeological Conceptual Site Model illustration

There are no known monitoring or extraction bores located within the alluvial aquifer within the proximity of the RMI site. The bore logs for existing bores identify a shale mudstone unit approximately 15m below ground surface in the proximity of New Chum Creek, which may act as an aquitard resulting in perched groundwater within the alluvium. Recharge of the alluvial aquifer would occur through infiltration during flows within the ephemeral drainage lines and rainfall. Groundwater movement within the alluvial aquifer would follow the alluvium/paleo channels associated with New Chum Creek to the south of the site.

The FCCMA is the primary aquifer within the proximity of the RMI site and is monitored through five on-site monitoring bores. Groundwater flow through the deeper coal seam sections of the aquifer may be dominated by primary porosity through a porous media, while in other sections of the aquifer, groundwater flow would be expected to follow secondary porosity pathways through fracture networks. The dual porosity of the FCCMA means that groundwater flow paths are likely to be heterogeneous and may be challenging to accurately predict.

Recharge of the FCCMA at RMI is expected to be primarily through: rainfall; flows within the ephemeral drainage lines; and on-site storage structures (dams and tailing drying cells) during operations.

Groundwater flows within the FCCMA are generally heading in a southerly direction, with some potential local deviation due to groundwater mounding below the process water dam. A potentiometric surface for the FCCMA and inferred flow directions are shown in Figure 13.

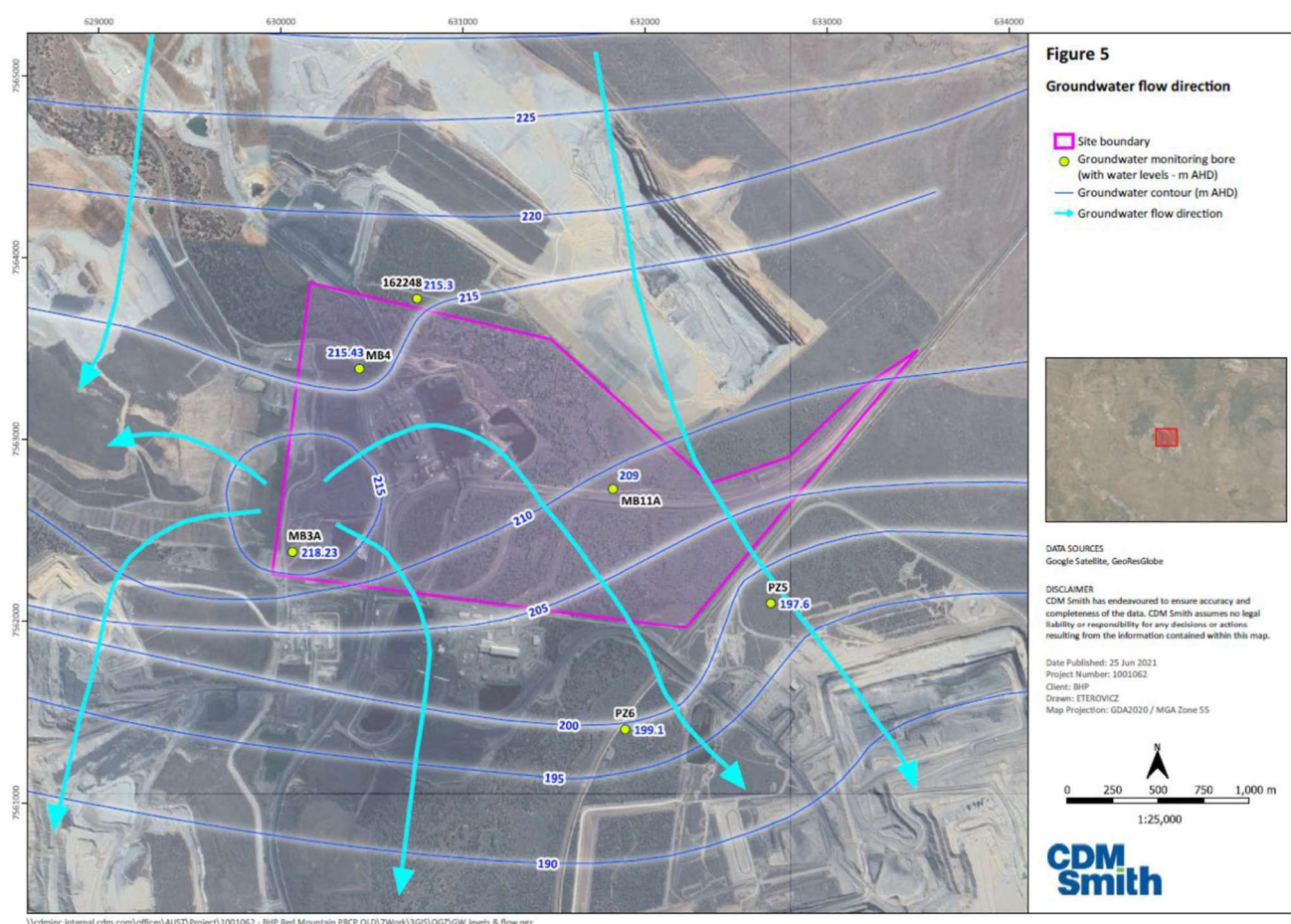


Figure 13: FCCMA potentiometric surface and inferred groundwater flow direction

Groundwater velocity within the FCCMA is highly uncertain due to a lack of site-specific hydraulic parameter data (hydraulic conductivity and effective porosity) and dual porosity of the aquifer. Based on: an inferred hydraulic gradient of 0.003 across the site; an effective porosity of 0.1; and a hydraulic conductivity of 0.1 m/d, the expected groundwater velocity would be in the order of 1 m/year. Groundwater flow through the sandstone

and siltstone units would likely have a lower effective porosity and lower hydraulic conductivity, but considering this is conceptually a fractured rock unit, higher groundwater velocities may be expected. Ultimately the velocity of groundwater in the siltstone and sandstone will depend on the frequency and interconnectivity of these fractures, as there is likely to be limited groundwater movement through the matrix of the rock.

Groundwater is predicted to discharge from the site via through flow in the FCCMA and more regionally via discharge to open cut mining operations to the south of the site including the Daunia and Poitrel pits that intersect the water table. Future changes to surrounding mining operations, including the commencement of underground operations at Millennium and potential future cessation of some mining activities to the south, has the potential to influence future groundwater flow directions, heights and quality. As the influence of surrounding mining operations on groundwater are outside of the control RMI and the potential for adverse impacts to groundwater post closure from RMI are limited, the cumulative hydrogeological impacts from surrounding minesites are not considered further as part of this PRC Plan.

As detailed in Section 1.2.5 the groundwater quality within the FCCMA, measured through the on-site monitoring bores indicates the groundwater is suitable for beneficial use of stock watering for beef cattle, sheep and horses. Although there are currently no groundwater extraction bores located within the immediate vicinity of RMI, groundwater is used within the region to support grazing activities.

Any residual land contamination will be investigated at closure and remediated/managed as appropriate to minimise the potential for any on-going unacceptable risk to groundwater quality. Upon completion of operations at RMI, rehabilitation works will include the removal of coal and carbonaceous materials before backfilling the dams and tailings drying cells to form a free draining surface across the site. Rehabilitation works will also include the removal of the on-site Millennium haul road and rail line culverts that cross New Chum Creek, which will return flow and flood conditions within the creek to a state similar to pre-operational conditions. Therefore, rehabilitation works will return the on-site mechanisms for groundwater recharge to a condition similar to pre-operations. Any groundwater mounding caused by seepage from the water holding structures and any increased recharge resulting from flooding caused by the culverts will be removed by the rehabilitation works.

The post-mining landform presents a low potential for adverse risks to hydrogeological and hydro-geochemical conditions and will not alter the hydrostratigraphic units. The final landform does not include water holding structures, voids/underground workings, and/or encapsulated carbonaceous wastes and removes artificial impediments to New Chum Creek flows. A post-rehabilitation hydrogeological CSM is illustrated in Figure 14.

SMC

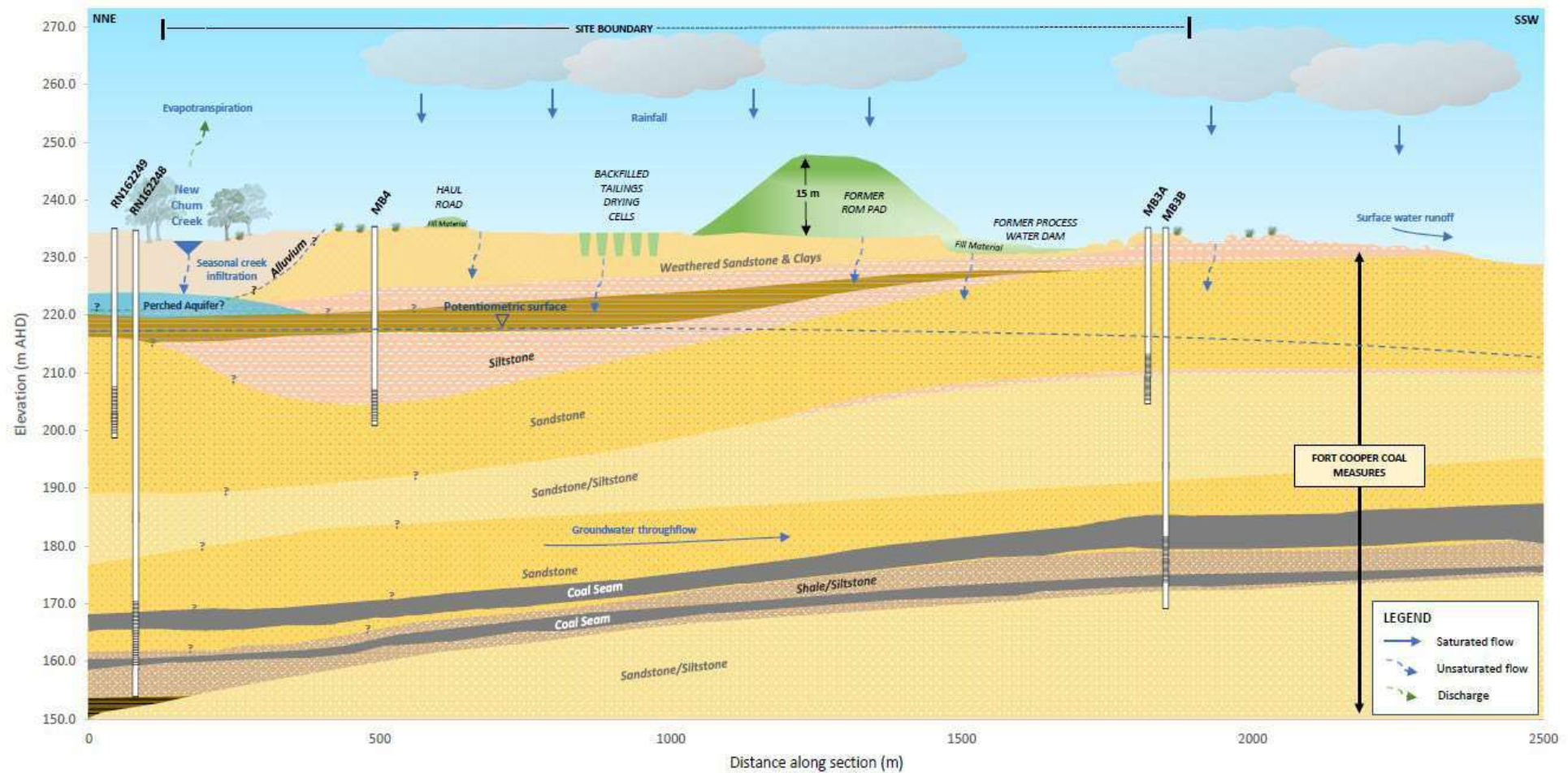


Figure 14: Post-rehabilitation Conceptual Site Model illustration

Note: For the purpose of this conceptualisation, the vertical/horizontal scale ratio magnifies the height of structures by approximately 10 times

Relationship with PRCP Schedule

As the RMI operations do not extract groundwater from the site, do not have any voids or underground workings, and the final landform will be free draining, the site is not anticipated to have a detrimental impact to the hydrogeological environment. Therefore, no rehabilitation activities are required to restore or manage groundwater aquifers. The risks associated with hydrogeology at RMI have been assessed to be low.

The information in this section is relevant to the highlighted RAs and RMs in the PRCP schedule:														
RA1				RA2				RA3				RA4		
RM1	RM2	RM3	RM4	RM5	RM6	RM7	RM8	RM9	RM10	RM11	RM12	RM13	RM14	RM15
The following Milestone Criteria will demonstrate achievement of the RMs :														
RM1	a) Services disconnected b) Built and service infrastructure demolished and removed (except where agreed in writing by the post-mining land owner/holder) c) Concrete, bitumen and aggregate removed d) Rubbish removed e) No more than 10% visible coaly and carbonaceous mineral waste on surface f) Dried tailings removed g) Water and sediment within dams removed h) Creek crossing culverts removed													
RM2	a) Contaminated land investigation completed by a suitably qualified person in accordance with the National Environment Protection (Assessment of Site Contamination) Measures and the Queensland Environmental Protection Act (1994) b) In the event that residual contamination has been identified and presents a potential unacceptable risk to the nominated PMLUs or environmental values, remediation works and/or implementation of management controls will be undertaken c) Where ongoing management of residual contamination is deemed appropriate, a draft Site Management Plan will be prepared for the administering authority's consideration													
RM3	a) Tailings drying cells backfill completed b) Dams backfill completed c) Haul road and rail base material removed within 100m of New Chum Creek, and disturbed bed and banks returned to a profile similar to the pre-disturbance condition in accordance with associated riverine and/or operation works permits or associated exemptions (RA3, RA4) d) Landforms reshaped with maximum 10% slopes (RA1, RA2, RA3) e) Landform reshaped to be free-draining and consistent with surrounding topography													

RM13	a) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use b) Groundcover >50% c) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 d) Deep drainage from the area is not significantly different to EC levels as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27, of: - the EPP (Water) schedule documents water quality objectives for relevant groundwater chemistry zones; or - local water quality objectives developed in accordance with the Queensland Water Quality Guidelines e) Land suitability class ≤ 3, or not different from pre-mining class if ≥ 4, as per Table 20 of the Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023. The assessment is to be conducted by an appropriately qualified person¹ and completed in accordance with LSA Framework for Open-Cut Coal Mine Rehabilitation 2018 (A rule-set for land suitability assessment of sustainable beef cattle grazing on land rehabilitated after open-cut coal mining in the Bowen Basin Queensland, unless otherwise agreed in writing between the administering authority and the environmental authority holder For RM13(e), if the land suitability class is assessed as being not different from pre-mining class if ≥ 4 for all or a portion of a rehabilitation area, an assessment of reference sites⁵ must be carried out to determine if the limitation/s resulting in the class of ≥ 4 is consistent with that of reference sites. f) Certification by an appropriately qualified person¹ that pasture meets a pasture condition rating ≤ 3, based on the Pasture Condition Assessment Table as per Stocktake: Balancing Supply and Demand (https://futurebeef.com.au/workshops/sustainable-grazing/stocktake-balancing-supply-demand/), as provided in Table 27 of the Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023 ⁵Reference site: representative undisturbed grazing land adjacent to the disturbance area
RM14	a) A BioCondition assessment is completed by an appropriately qualified person using the methodology outlined in the Queensland Herbarium's BioCondition Assessment Manual version 2.2 and modified in accordance with section 6.1.8 Revegetation of the planning part and displayed in Table 30: The assessable attributes and weightings for deriving the final BioCondition score b) For RA2, the BioCondition assessment required by RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.5.3 c) For RA3, the BioCondition assessment required by criterion RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.4.9 d) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use e) Rehabilitation of RA2 is assessed as geotechnically stable by an appropriately qualified person¹ with FoS ≥ 1.5, unless an alternative is justified by an appropriately qualified engineer f) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 g) Deep drainage from the area is not significantly different to EC levels as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27, of: - the EPP (Water) schedule documents water quality objectives for relevant groundwater chemistry zones; or - local water quality objectives developed in accordance with the Queensland Water Quality Guidelines

6.1.2 Flooding

PRCP Guideline (Section 3.6.1)

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

The approved activities at RMI do not include any voids, underground workings, diversions, significant spoil dumps or permanent tailings disposal areas that could significantly impact flood hydrology. Rehabilitation of the site will also include:

- Demolition and removal of all CHPP infrastructure
- Decommissioning/backfilling of all dams and tailings drying cells
- Removal of carbonaceous coal materials including tailings, rejects and surface materials
- Removal of culverts associated with the Millennium Mine haul road and the rail line
- Re-contouring of the disturbed surfaces to render the landform free draining and suitable for rehabilitation/revegetation to support the nominated PMLUs.

Due to the low potential for flooding risks to the final landform, a RMI-specific PRC Plan rehabilitation flood model has not been developed. To assist with the interpretation of potential flooding risks, flood modelling (Engeny Water Management (2018)) completed for the Poitrel Mine's existing landforms, which included the culverts on New Chum Creek (to be removed as part of the rehabilitation works), has been utilised.

The 2018 creek flood modelling for 1% AEP and 0.1% AEP (Figure 15) indicated the following for New Chum Creek:

- The 1% AEP flood depth model indicated a flood depth up to 3m within the alignment of New Chum Creek and the up-stream side of culverts on New Chum Creek as it passes under the: haul road from the Millennium Mine; on-site rail loop; and Poitrel Mine Road to the south of RMI. There is little to no flood intrusion into the operational areas or dams.
- The 0.1% AEP flood depth model indicated a flood depth of up to 5m within the alignment of New Chum Creek and the up-stream side of culverts on New Chum Creek as it passes under the: haul road from the Millennium Mine; on-site rail loop; and Poitrel Mine Road to the south of RMI. Within the operational areas, flood waters associated with extreme events are up to 1.5m depth in the environment dam and up to 1m depth surrounding the product stockpile pad. The flood waters within operational areas are a result of restricted flows through the culvert and flooding of the Millennium haul road which directs flood waters into the operational areas.

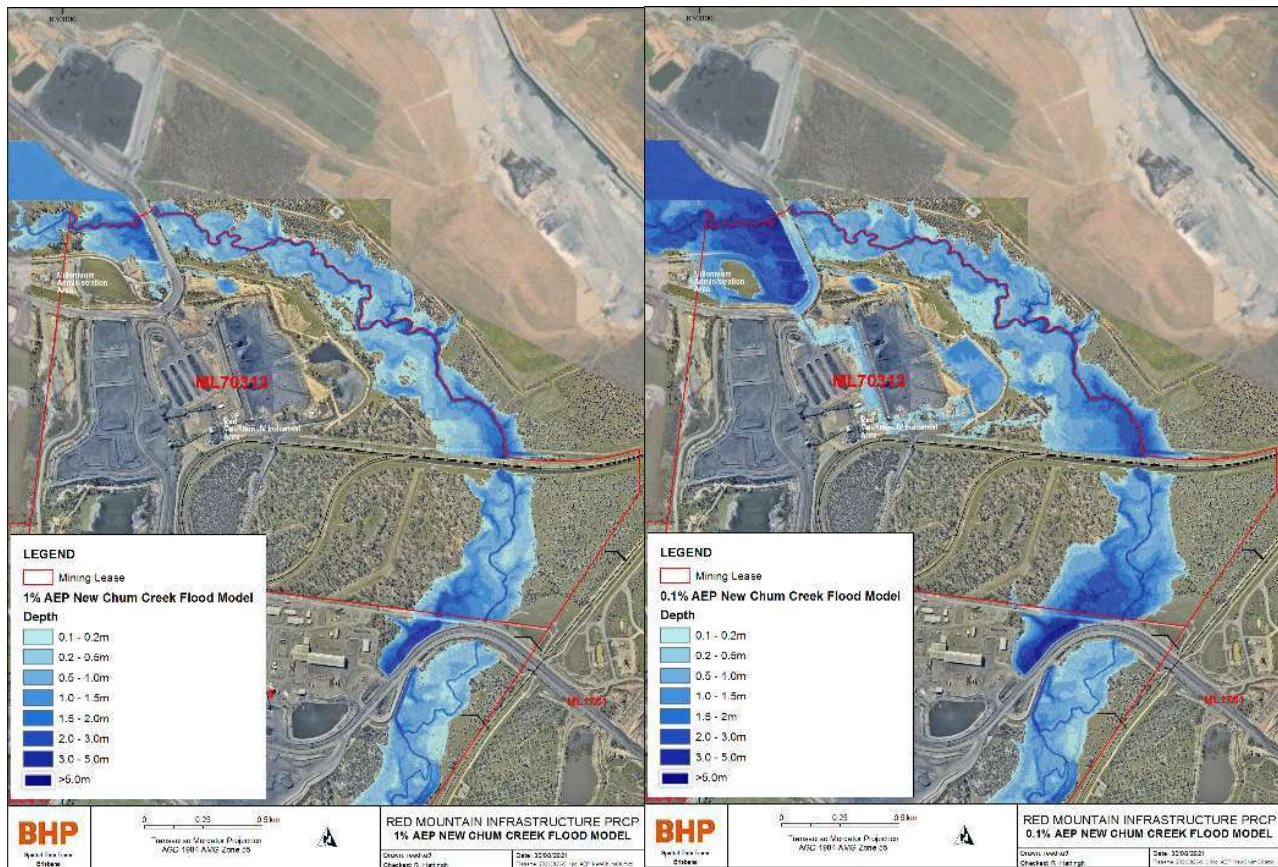


Figure 15: 1% AEP and 0.1% AEP flood depths (2018)

RMI rehabilitation activities will include the removal of the on-site culverts under the Millennium Mine haul road and the rail line (including fill materials from within the 100m New Chum Creek Buffer, see Section 6.1.5). This rehabilitation work will restore the flood hydrology at these culverts to a condition which is consistent with the pre-operational/natural environment. The reduction of the flood heights through the removal of the on-site culverts will minimise the potential for flood waters to enter the RMI rehabilitated areas and upstream off-site mine site landforms. Flood hydrology downstream of RMI will continue to be influenced by the off-site Poitrel Mine Road culvert, Poitrel Mine's diversions of New Chum Creek and the down-stream mine site landforms. Rehabilitation of these down-stream landforms, will be considered as part of the PRC plans for these mine sites, noting the closure and rehabilitation timing of the RMI site is currently tied to the closure of these down-stream mines.

Relationship with PRCP Schedule

The final RMI landform will remove on-site culverts and associated fill material from New Chum Creek, and restore flood hydrology at these locations to a condition similar to pre-development. Flood risks associated with the final landforms have been assessed to be low.

The information in this section is relevant to the highlighted **RAs** and **RMs** in the PRCP schedule:

RA1				RA2				RA3				RA4			
RM1	RM2	RM3	RM4	RM5	RM6	RM7	RM8	RM9	RM10	RM11	RM12	RM13	RM14	RM15	

The following **Milestone Criteria** will demonstrate achievement of the **RMs**:

RM1	Creek crossing culverts removed
RM3	a) Tailings drying cells backfill completed b) Dams backfill completed c) Haul road and rail base material removed within 100m of New Chum Creek, and disturbed bed and banks returned to a profile similar to the pre-disturbance condition in accordance with associated riverine and/or operation works permits or associated exemptions (RA3, RA4) d) Landforms reshaped with maximum 10% slopes (RA1, RA2, RA3) e) Landform reshaped to be free-draining and consistent with surrounding topography

6.1.3 Waste characterisation

PRCP Guideline (Section 3.6.1)

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

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

A dedicated Environmental Geochemical Characterisation and Risk Assessment of Mineral Waste was undertaken to inform this PRC Plan (Appendix 8).

6.1.3.1 Background

Current activities of relevance to this waste characterisation report comprise:

- Short-term storage of ROM coal on the ROM pad (ROM coal awaiting processing at the CHPP)
- ROM coal processing at the CHPP. The CHPP produces two mineral waste types:
- Coarse reject: sent off-site for disposal. A small proportion of coarse rejects have been used at RMI for bunds at the ROM pad, product coal stockpile and haul roads
- Tailings (see below)
- Short-term storage of tailings within in-ground tailings drying cells (to 'dewater' the tailings), prior to being excavated after approximately 3-4 days and sent off-site for disposal
- Short-term storage of product coal on the product coal stockpile, awaiting off-site transport by rail
- Water management and sediment control utilising two dams:
- Process water dam (PWD): collecting surface water run-off and sediment from the western side of the site and providing water for use in the CHPP and dust control on-site. The PWD is also an authorised water release point, subject to water release conditions as stipulated in the EA
- Environment dam (ED): collecting surface water run-off and sediment from the eastern side of the site, and transferring water to the PWD. The ED is also an authorised water release point, subject to water release conditions as stipulated in the EA

At the cessation of operations coaly and carbonaceous mineral waste (e.g. remnant coal on the ROM pad, remnant tailings in the tailings drying cells, sediment in the dams) will be excavated, removed off-site and disposed into mine spoil at Poitrel Mine. For the purposes (and in the context of) rehabilitation and closure of mineral waste facilities, the only mineral waste remaining on-site in significant quantities will be the ROM pad base and haul roads, portion of which will be used to fill/cap/cover other site facilities as necessary (subject to a contaminated land assessment being undertaken prior to earthworks).

Historical documentation suggests that clean, unweathered, Permian-age waste from Poitrel Mine was used to construct the ROM pad extension (RMJV, 2014), while no information is available to confirm the source for the construction material for the original ROM pad base or haul roads. For the purpose of this assessment, it is assumed that waste for the construction of the original ROM pad and haul roads was sourced from the neighbouring mines (Poitrel and/or Millennium Mine).

No samples have been collected from within the ROM pad, however the SMC Coal Geochemical Database contains detailed geochemical data for overburden/interburden material from Poitrel Mine (and other Rangal Coal Measures sites), which is considered representative of ROM pad and haul road bulk material. Note that the Millennium mine is adjacent to Poitrel Mine, with mining occurring within the same formations as those mined at Poitrel Mine. It is very unlikely that geochemical properties of materials mined from the two sites would be different in any significant way.

In this context the geochemical characteristics and potential hazards associated with mineral waste material on-site are discussed by type:

- General spoil – assumed to comprise a mix of weathered and fresh sandstone, siltstone, mudstone and sedimentary materials within the ROM pad base, haul roads, and also provides the base material for the site. However, to introduce a level of conservatism in the risk assessment we have assumed that a small proportion (5%) of this waste may be comprising carbonaceous spoil
- Coaly and carbonaceous material – comprises coal, tailings, coarse rejects and dam sediment. These are the surface materials currently on the ROM pad, product coal stockpile, tailings drying cells, etc. This material is not expected to be remaining on-site following remediation in any material quantity

6.1.3.2 Geochemical characteristics of spoil

Environmental geochemical data for overburden and interburden (spoil) from Poitrel Mine (215 samples) has been used as proxies to infer the geochemical and physical properties of the ROM pad base and haul roads at RMI. Key results are summarised in the sections below.

Potential for acid and metalliferous drainage (AMD)

Spoil, representing the ROM pad base and haul roads, is expected to generate pH-neutral to alkaline contact water (run-off and seepage). Available geochemical data shows the following:

- The total sulphur (S) concentration of this material is very low, with a maximum total S concentration of 0.18% (90th percentile = 0.03%). As such, and combined with generally moderate to high acid neutralising capacity (ANC) values (median 29 kilograms of sulphuric acid per tonne of rock [kg H₂SO₄/t]), all samples but two were classed as non-acid forming (NAF). Two samples (out of 215 samples) had an uncertain (UC) classification and have been conservatively sub-classified as 'uncertain – potentially acid forming' [UC(PAF)]
- Total metal and metalloid concentrations are generally very low compared to average element abundance in soil in the earth's crust
- Soluble multi-element results indicate that leachate from spoil material is expected to contain low concentrations of soluble metals and metalloids

Based on the results, non-carbonaceous overburden has a negligible potential to generate acid/acidic drainage (AD) and/or neutral metalliferous drainage (NMD). Due to the very low total S (and negligible sulphide) concentrations, the potential for Saline Drainage (SD) (sulphate-derived salinity from sulphide oxidation) is also negligible.

Potential for saline drainage (SD) from salt dissolution

Spoil has electrical conductivity (EC1:5) values ranging from 85 to 493 microSiemens per centimetre (µS/cm), with median and 90th percentile values of 271 and 377 µS/cm, respectively. On this basis, spoil in the ROM pad base and haul roads is expected to generate low-salinity contact water (run-off and seepage) [oxidative and non-oxidative salinity].

Sodality potential

Spoil samples had relatively low cation exchange capacity (CEC) values and high exchangeable sodium percentage

(ESP) values, resulting in all samples being classified as 'strongly sodic' with potential for dispersion. Emerson Aggregate Class testing found all samples to be dispersive (Class 3) or likely to suffer from 'some dispersion'

(Class 2). As such spoil materials are inferred to be sodic with potential for dispersion.

6.1.3.3 Geochemical characteristics of coaly and carbonaceous mineral waste

Environmental geochemical data for 102 coaly and carbonaceous samples from RMI, representing tailings and coarse rejects, coal collected from the CHPP, drill-hole core from Poitrel Mine representing general spoil, and in-situ surface samples, were collected and tested to support this project. Key results are summarised in the sections below.

Potential for acid and metalliferous drainage (AMD)

Coaly and carbonaceous material, represented by surface materials currently on the ROM pad, product coal stockpile pad, dam sediments, coarse rejects from the CHPP and tailings from the tailings drying cells and CHPP, are expected to generate pH-neutral to alkaline contact water (run-off and seepage).

These materials have a wide total S distribution – particularly the tailings samples, which have a 90th percentile total S of 1.25% (75th percentile = 1.01 %). The other coaly and carbonaceous types (e.g. coal, rejects, surface and sediment materials at RMI) have lower total S values (generally), with a combined 75th percentile total S value of 0.36 %. The sulphide concentration of coaly and carbonaceous materials was relatively low – typically about 35-40 % of the total S concentration.

Based on the results, about 80 % of samples were classified as NAF, and 11% classified as NAF-S (i.e. NAF with total S >1%). The remaining 9 % of samples were classified as potentially acid forming – low capacity (PAF- LC) – indicating that the large majority of coaly and carbonaceous materials (as bulk materials) have low potential to generate acid/acidity.

Total metal and metalloid concentrations are very low compared to average element abundance in soil in the earth's crust. A small number of samples were enriched with respect to one or more of Mo, S and/or Te. The level of 'enrichment' displayed from a relatively small number of samples is not cause for concern.

Soluble multi-element results indicate that leachate from coaly and carbonaceous material is expected to contain low concentrations of soluble metals and metalloids – similar to spoil materials.

While total S concentrations are higher (generally) than spoil materials, the total S concentration of coaly and carbonaceous materials is still relatively low (median = 0.28%; 75th percentile = 0.51%, which is consistent with the 75th percentile total S concentration for coal from the PTM coal quality database). Due to the low total S concentrations, the potential for Saline Drainage (sulphate-derived salinity from sulphide oxidation) is also low.

Coaly and carbonaceous material (as a bulk material) is considered to have *a low potential to generate AMD*.

Potential for saline drainage (SD) from salt dissolution

Excluding surface and sediment materials sampled in April 2021 (Gp4 materials), all other coaly and carbonaceous materials have relatively low EC1:5 values, with median and 90th percentile values of 224 and 468 µS/cm, respectively. The Gp4 surface samples had a very wide range of EC1:5 values, ranging from 434 to 2080 µS/cm, with no clear distinction between the various surface sample types. The higher salinity/EC values observed in some surface (and dam sediment) coaly and carbonaceous samples were consistent with the brackish salinity/EC observed in dam water from

the ED and PWD, and thus may be associated with accumulation of salts from evaporation of water used for dust suppression.

On this basis, most coaly and carbonaceous material has the potential to generate relatively low-salinity contact water (run-off and seepage), however some surface material may be more saline due to ongoing surface evaporation processes.

Sodicity potential

Coaly and carbonaceous materials were not assessed for sodicity and dispersion potential as these materials will be removed from site and disposed at PTM. Remnant coaly and carbonaceous materials do not report to final landform surfaces (or near-surfaces) and are not directly used as revegetation and rehabilitation materials.

6.1.3.4 Geochemical Source-Pathway-Receptor (SPR) assessment

A source hazard geochemical assessment was applied to the two source material groups/types. The source hazard score is a formula devised by the authors that takes into account the propensity (ability) to generate AMD, the AMD capacity (severity) and the quantity (volume/tonnage) of AMD that could be produced. For general spoil the AMD source hazard score was 'Highly Unlikely'. For coaly and/or carbonaceous material the AMD source hazard score was 'Unlikely'. When combined, the AMD hazard score for the final landform (i.e. rehabilitated site) at closure is Highly Unlikely and the likelihood for AMD generation from the final landform is also 'Highly Unlikely'.

The majority of the existing coaly and carbonaceous source material will be removed during decommissioning and rehabilitation, therefore there will not be a 'source' at closure. Despite the 'Unlikely' AMD source hazard posed by this material, there may be potential for 'land contamination' beneath existing coaly and/or carbonaceous storage facilities. To manage this potential hazard, a contaminated land detailed site investigation will be undertaken at the end of the operational life RMI to guide the final excavation depth to mitigate and manage potential contamination.

A conceptual environmental geochemical model (source-pathway-receptor (SPR) model (CDM Smith, 2021) for RMI (within the mining lease) identified potential environmental receptors and likely pathways to those receptors. The nearest surface water feature is New Chum Creek, located at the site boundary (the creek forms the northern and eastern boundary). The nearest groundwater receptor was the unconfined aquifer below the site. Outside of the mining lease, the nearest homestead is located over 7 km from RMI and, as such, its consideration as a receptor is implausible.

The risk assessment considered the potential AMD and SD (non-oxidative) risks posed by the final landform (rehabilitated ROM pad, haul roads, CHPP area etc. and limited amounts of diffused remnant coaly / carbonaceous waste) to the above receptors, with respect to likelihood of impacting the receptor and severity of impact. The risk rating is 'Low'.

The 'Low' risk rating was assigned with consideration for the following key aspects:

- Source materials hazard: The ROM Pad base is comprised predominantly of non-carbonaceous overburden/interburden with an assumed small proportion of coaly and carbonaceous material. Non-carbonaceous overburden/interburden from Tertiary/ Permian-age material in the Bowen Basin is widely recognised as posing a low AMD risk. Operational placement and rehandling of the waste during rehabilitation and reshaping will ensure extensive co-mingling of all waste types. All materials have low

EC values, with release of (non-oxidative) salinity rated as a low-hazard. The low total S and excess ANC of the waste results in a 'Highly Unlikely' hazard score for AMD generation (refer above)

- Pathways: The closest surface water receptor is located greater than 100m away from the final reshaped ROM pad. The water table occurs approximately 20m below the site surface within the unconfined FCCM. Coaly and/or carbonaceous waste facilities (e.g. tailings drying cells) will not be left on-site. It is unlikely that any AMD or saline drainage will report to surface water or groundwater pathways
- Receptors: Receptors identified in this qualitative assessment include ephemeral creeks, the unconfined groundwater aquifer and people living in the homesteads near the project area, of which there are no homesteads located within several kilometers of the site. Due to the geochemical nature of the materials remaining on-site, the likelihood of undiluted salinity or AMD (if any) to reach and impact on surface water or groundwater receptors has been rated highly unlikely
- The overall rating of the source assessment showed that the risk rating for AMD or salinity to impact receptors is Low:
- Hazards ('Highly Unlikely' for AMD generation and 'Highly Unlikely' for ability to release significant salinity)
- Pathways ('Unlikely' to 'Highly Unlikely' for AMD and SD to report to surface water or groundwater pathways)
- Receptors ('Highly Unlikely' for pathways to connect receptors to sources of AMD)

6.1.3.5 Management measures

The assessment has found that the environmental risks posed by mineral wastes currently on-site at RMI and likely to be present at closure are low. As such, no specific AMD management measures (e.g. compaction, segregation, special handling, alkaline amendment or capping systems) are required to manage mineral wastematerials during rehabilitation and closure – other than the measures detailed in the PRCP.

It is noted that coaly and carbonaceous mineral waste is planned to be excavated/removed off-site to neighbouring Poitrel Mine for disposal during decommissioning – leaving the bulk ROM pad base and haul roadsto be used for backfilling tailing drying cells and dams, and general site cover material if required. Final rehabilitation requirements will also be supported by a contaminated land detailed site investigation undertakenat the end of the RMI operational life.

Relationship with PRCP Schedule

Environmental risks posed by the mine waste associated with the mining-related activities are low. As such, no specific rehabilitation measures are required to manage geochemical risks (e.g. compaction, segregation, special handling, alkaline amendment or capping systems).

The information in this section is relevant to the highlighted RAs and RM s in the PRCP schedule:														
RA1				RA2				RA3				RA4		
RM1	RM2	RM3	RM4	RM5	RM6	RM7	RM8	RM9	RM10	RM11	RM12	RM13	RM14	RM15

The following Milestone Criteria will demonstrate achievement of the RMs :	
RM1	a) Services disconnected b) Built and service infrastructure demolished and removed (except where agreed in writing by the post-mining land owner/holder) c) Concrete, bitumen and aggregate removed d) Rubbish removed e) No more than 10% visible coaly and carbonaceous mineral waste on surface f) Dried tailings removed g) Water and sediment within dams removed h) Creek crossing culverts removed
RM2	a) Contaminated land investigation completed by a suitably qualified person in accordance with the National Environment Protection (Assessment of Site Contamination) Measures and the Queensland Environmental Protection Act (1994) b) In the event that residual contamination has been identified and presents a potential unacceptable risk to the nominated PMLUs or environmental values, remediation works and/or implementation of management controls will be undertaken c) Where ongoing management of residual contamination is deemed appropriate, a draft Site Management Plan will be prepared for the administering authority's consideration
RM13	a) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use b) Groundcover >50% c) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 d) Deep drainage from the area is not significantly different to EC levels as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27, of: • the EPP (Water) schedule documents water quality objectives for relevant groundwater chemistry zones; or • local water quality objectives developed in accordance with the Queensland Water Quality Guidelines e) Land suitability class ≤ 3, or not different from pre-mining class if ≥ 4, as per Table 20 of the Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023. The assessment is to be conducted by an appropriately qualified person¹ and completed in accordance with LSA Framework for Open-Cut Coal Mine Rehabilitation 2018 (A rule-set for land suitability assessment of sustainable beef cattle grazing on land rehabilitated after open-cut coal mining in the Bowen Basin Queensland, unless otherwise agreed in writing between the administering authority and the environmental authority holder For RM13(e), if the land suitability class is assessed as being not different from pre-mining class if ≥ 4 for all or a portion of a rehabilitation area, an assessment of reference sites⁵ must be carried out to determine if the limitation/s resulting in the class of ≥ 4 is consistent with that of reference sites. f) Certification by an appropriately qualified person¹ that pasture meets a pasture condition rating ≤ 3, based on the Pasture Condition Assessment Table as per Stocktake: Balancing Supply and Demand (https://futurebeef.com.au/workshops/sustainable-grazing/stocktake-balancing-supply-demand/), as provided in Table 27 of the Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023 ⁵Reference site: representative undisturbed grazing land adjacent to the disturbance area

RM14	a) A BioCondition assessment is completed by an appropriately qualified person using the methodology outlined in the Queensland Herbarium's BioCondition Assessment Manual version 2.2 and modified in accordance with section 6.1.8 Revegetation of the planning part and displayed in Table 30: The assessable attributes and weightings for deriving the final BioCondition score b) For RA2, the BioCondition assessment required by RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.5.3 c) For RA3, the BioCondition assessment required by criterion RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.4.9 d) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use e) Rehabilitation of RA2 is assessed as geotechnically stable by an appropriately qualified person¹ with FoS$\geq$1.5, unless an alternative is justified by an appropriately qualified engineer f) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 g) Deep drainage from the area is not significantly different to EC levels as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27, of: - the EPP (Water) schedule documents water quality objectives for relevant groundwater chemistry zones; or - local water quality objectives developed in accordance with the Queensland Water Quality Guidelines
------	---

6.1.4 Soil and capping material

PRCP Guideline (Section 3.6.1)

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

A preliminary assessment of soils at RMI was undertaken to inform this PRC Plan (GTE, 2021 – Appendix 5).

6.1.4.1 PMLU requirements

The assessment of soil and capping materials supports the proposed PMLUs of cattle grazing, woodland habitat and watercourse at RMI.

Cattle grazing

The function of the surface for cattle grazing is to support germination and establishment of the pasture seedmix, characterised by:

- Sufficient water availability and nutrients for pasture
- Soil structure that does not limit infiltration
- Soil salinity within tolerable ranges for pasture species

- Reduced rockiness to encourage vegetation growth
- ESP that is non-sodic to limit piping and tunnel erosion potential
- No AMD materials or areas of low concentrations of diffuse AMD waste
- The stockpiled topsoil indicated negligible to moderate limitations to supporting cattle grazing (GTE, 2021). These limitations are associated with soil physical condition and can be managed with amelioration, as detailed in Sections 6.1.3.2 and 6.1.3.3.

Woodland habitat and watercourse

The function of the surface for woodland habitat and watercourse is to support a seed mix of native species, and includes:

- Providing sufficient water availability and nutrients for native grasses, shrubs and trees
- Soil structure that does not limit infiltration
- Soil salinity within tolerable ranges for salt tolerant native species
- Rock to increase erosion resistance and encourage root pathways for deep rooted species
- ESP that is non-sodic to limit piping and tunnel erosion potential
- No AMD materials or areas of low concentrations of diffuse AMD waste

The establishment of native vegetation using spoil is found to have several advantages over a typical topsoil approach (Carroll and Tucker, 2000, Carroll *et al*, 2000, Spargo and Doley, 2016, Kopittke *et al*, 2004, Davis *etal*, 1998, Erskine and Fletcher, 2013). Challenges associated with using topsoil for native vegetation on engineered landforms include:

- Topsoil contains a natural seedbank with higher proportions of invasive species, making it difficult to establish native grasses, shrubs and trees due to competition
- Topsoil structure is often incompatible as a cover with many wastes and spoils in engineered landforms. Poor cohesion between layers can result in excessive erosion of surface soils and limited root penetration for deep rooted species
- Excessive erosion rates on topsoil covered landforms removes planted seed and natural seedbank into sediment control structures
- Topsoil structure can often limit effectiveness of surface roughness (cross ripping) as they do not contain sufficient competent rock or non-dispersive clays to maintain surface treatment to limit erosion

Based on the limitations of using topsoil on slopes and engineered landforms to support native vegetation, seed in the woodland and watercourse PMLU areas will be directly sowed into ameliorated spoil or subsoil material. The waste characterisation data for RMI (Section 6.1.3) indicates subsoil and spoil at RMI is:

- pH-neutral to alkaline (7.0 – 9.0)
- Low concentrations of soluble metals and metalloids

- Negligible potential to generate acid drainage, neutral metalliferous drainage or saline drainage (from sulphide oxidation)
- Non-saline (85 to 493 $\mu\text{S}/\text{cm}$)
- Expected to be sodic with potential for dispersion

Soil chemistry and physical characteristics are therefore suitable for use as the surface material for woodland habitat and watercourse with appropriate amelioration. Further sampling of spoil and subsoils will be undertaken prior to rehabilitation activities to determine the amelioration treatment required to enhance the success of rehabilitation of these materials.

6.1.4.2 Topsoil management

Quality and quantity

Major topsoil stockpiles at RMI have been sampled to understand quality and suitability as a surface soil for cattle grazing (Figure 5) (GTE, 2021). The topsoil samples have presented limitations including dispersion and nutrient levels; however, they also indicate that they are suitable for re-use as a surface soil for a cattle grazing PMLU with appropriate amelioration and management. A summary of the stockpiled topsoil qualities and ratings is provided in Table 22.

Table 22: RMI stockpiled topsoil quality, per sample (RMI1 – RMI4)

Analysis (unit)	Stockpile 3	Stockpile 2		Stockpile 1
	RMI1	RMI2	RMI3	RMI4
Soil pH (H2O)	8.07	7.46	6.79	6.36
pH Rating	Moderate alkaline	Mildly alkaline	Neutral	Slightly acidic
Soil EC (dS/m)	0.174	0.083	0.183	0.096
EC Rating	Moderate	Low	Moderate	Low
Soil Cl [mg/kg])	111	53	117	61
Cl Rating	Very low	Very low	Very low	Very low
CEC (meq/100g)	16	8.7	10	7.4
CEC Rating	Moderate	Low	Low	Low
ESP (%Na/CEC)	0.31	0.30	0.87	0.35
ESP Rating	Non-sodic	Non-sodic	Non-sodic	Non-sodic
Ca/Mg (ratio)	3.2	2.1	3.6	2.7
Ca/Mg Rating	Very high	Very high	Very high	Very high
Zinc (mg/kg)	1.7	<0.5	0.93	0.80
Zinc Rating	Moderate	Low to very low	Moderate	Moderate
Mn (mg/kg)	8.2	8.6	16	20
Mn Rating	Moderate	Moderate	Moderate	Moderate
Copper (mg/kg)	1.2	0.66	1.0	0.73
Copper rating	Moderate	Moderate	Moderate	Moderate
Total Organic Carbon (%)	1.1	0.85	1.3	1.9
TOC Rating	Low	Low	Low	Moderate
P (mg/kg) (Colwell)	12	13	22	16
P Rating	Moderate	Moderate	High	Moderate
Total Nitrogen (%)	0.07	0.05	0.08	0.09
TN Rating	Low	Low	Low	Low

Analysis (unit)	Stockpile 3	Stockpile 2		Stockpile 1
	RMI1	RMI2	RMI3	RMI4
C/N (Ratio)	16	19	16	17
C/N Rating	Moderate to high	High	Moderate to high	High
EAT (No.)	2	5	5	5
EAT Rating	Slaking and some dispersion	Dispersion observed in aggregate/water suspension	Dispersion observed in aggregate/water suspension	Dispersion observed in aggregate/water suspension

The volume of available topsoil in stockpiles is shown in Table 23.

Topsoil placement depth across cattle grazing areas at RMI is recommended at a minimum placement depth of 100mm (GTE, 2021). At this placement depth, 95,000m³ of topsoil would be required for the rehabilitation of the cattle grazing areas. However, there is sufficient topsoil stockpiled at RMI to apply 150mm of topsoil over the disturbed areas with a PMLU of cattle grazing.

Table 23: RMI stockpiled topsoil volume

Volume (m3)	Topsoil stockpile					Total
	1	2	3	4	5	
	85,472	49,686	6,924	1,515	1,381	144,978

6.1.4.3 Amelioration

Before rehabilitation activity is undertaken at RMI, soils, subsoils and spoil will require a detailed assessment by an appropriately qualified person to determine amelioration requirements. An amelioration program will be developed to address the potential limitations listed in Table 24 (GTE, 2021).

Table 24: Potential limitations of topsoil and spoil

Material	Potential limitations
Stockpile 1	• Dispersion may occur when saturated and disturbed • Nitrate levels low • Sulfate levels low • CEC levels low
Stockpile 2	• Dispersion may occur when saturated and disturbed • Nitrate levels low • Sulfate levels low • CEC levels low • Macro nutrients low, K, Na,

Material	Potential limitations
Stockpile 3	• Slaking and some dispersion • pH >8 • Nitrate levels low • Sulfate levels low • CEC levels low • Macro nutrients low Na
Stockpile 4	• Limitations not expected to differ from stockpiles 1 - 3
Stockpile 5	• Limitations not expected to differ from stockpiles 1 - 3
Spoil	• Slaking and dispersion • pH >8 • Nitrate levels low • CEC levels low • Organic carbon low

6.1.4.4 Surface treatment

For cattle grazing areas, topsoil shall be recovered from the topsoil stockpiles and placed an average of 150mm over the target PMLU area.

For cattle grazing and woodland habitat, seedbed preparation of the surface will focus on ensuring good contact between the soil and the seed, and creating a friable seedbed. This will include ripping prior to sowing of seed.

Relationship with PRCP Schedule

The geochemical assessment on spoil, soil survey and topsoil management methodologies ensure that there is suitable quantity and quality of growth media available to support the PMLUs of cattle grazing, woodland habitat and watercourse.

The information in this section is relevant to the highlighted RAs and RMs in the PRCP schedule:

RA1				RA2				RA3				RA4			
RM1	RM2	RM3	RM4	RM5	RM6	RM7	RM8	RM9	RM10	RM11	RM12	RM13	RM14	RM15	

The following Milestone Criteria will demonstrate achievement of the RMs:	
RM4	a) Topsoil is placed at an average thickness of 150mm b) An assessment of soil and growth media characteristics is completed by an appropriately qualified person¹, and amelioration and other treatments required identified c) Ameliorant and physical treatments are applied as identified in RM4(b) with the aim of achieving the following primary growth media target criteria²: 1. Surface pH 6 - 9.5 2. Salinity (EC1:5) <0.75 3. Sodicity (ESP) <6 - Total N >1,000 5. Available P >10 6. Available K >200 7. Organic Carbon >1 d) Rip across contour ¹Appropriately qualified person: a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relating to the subject matter using the relevant protocols, standards, methods or literature ²Target primary growth media criteria are provided as a post-ameliorant target. Initial soil analysis values may be outside of the displayed ranges.
RM5	a) An assessment of growth media characteristics is completed by an appropriately qualified person¹, and amelioration and other treatments required to achieve the following target primary growth media criteria² 1. Surface pH 6 – 9.5 2. Salinity (EC1:5) <0.753 3. Sodicity (ESP) <6 4. Total N >1,000 5. Available P >10 6. Available K >200 7. Organic Carbon >1 b) Ameliorant and physical treatments are applied as identified in RM5(a)d) c) Rip across contour. ¹Appropriately qualified person: a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relating to the subject matter using the relevant protocols, standards, methods or literature ²Target primary growth media criteria are provided as a post-ameliorant target. Initial soil analysis values may be outside of the displayed ranges
RM6	a) An assessment of growth media characteristics is completed by an appropriately qualified person¹, and amelioration and other treatments required identified b) Ameliorant and physical treatments are applied as identified in RM6(a) c) Sediment and erosion controls established in accordance with associated riverine and/or operation works permits or associated exemptions

6.1.5 Landform design

PRCP Guideline (Section 3.6.1)

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

Landform design considers the landform development and reshape of all relevant activity areas after the removal of infrastructure and wastes, and prior to placement of topsoil and seed.

6.1.5.1 3D design

The overall site slopes from approximately 240RL on the western lease boundary to 220RL in the south-east corner where New Chum Creek exits the ML. The average slope across the site is about 1.5%. The remaining ROM pad is located on the west side of the lease and rises to 247RL.

The 3D post-mining landform design with 2m contours is shown in Figure 16.

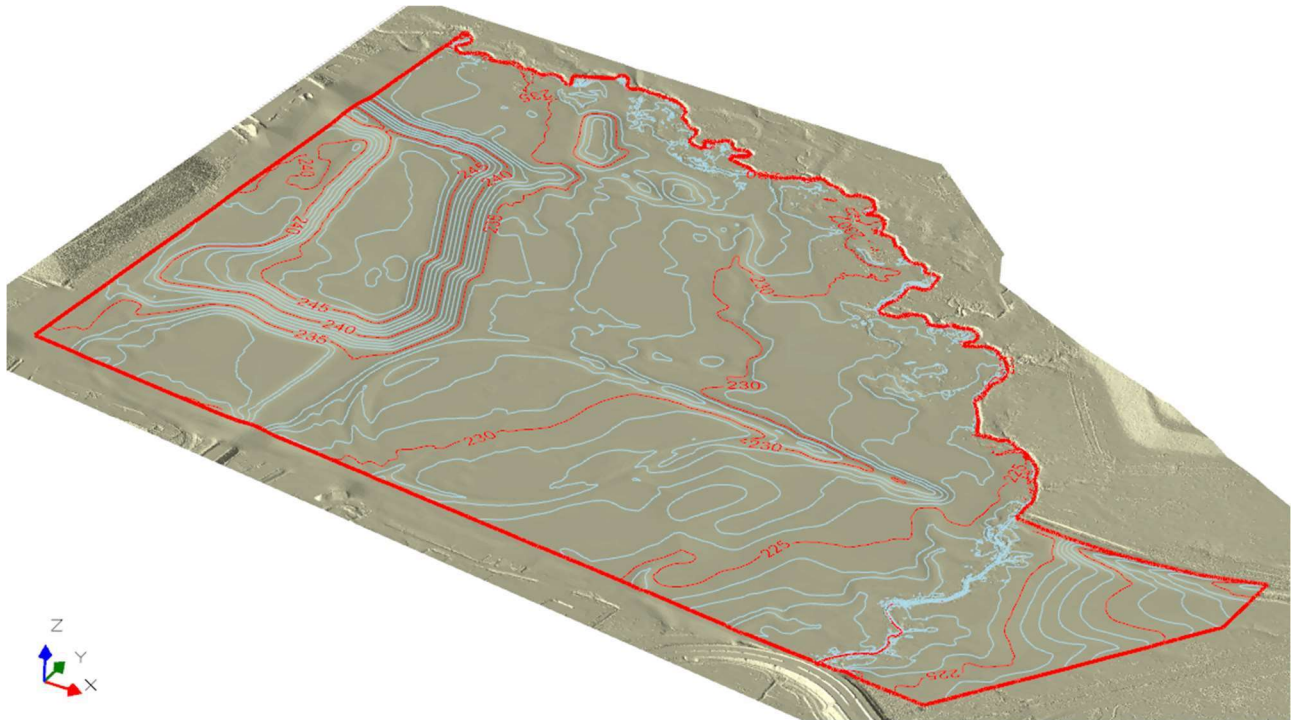


Figure 16: 3D post-mining landform design – 2m contours (view from south-east)

6.1.5.2 Method of determining landform design

Landform structures

The relevant activities and areas (Section 1.4.1) considered when determining the landform design are detailed in Table 25.

Table 25: Landform structures for RMI

Landform structure	Footprint area (ha)	Landform design and rehabilitation
Infrastructure and general areas – CHPP and associated infrastructure, administration, workshop, laydown areas, roads, drains, rail area, train load-out and associated infrastructure	113	Area will be reshaped to be free-draining with lower-gradient slopes of maximum 10%, and blended in with surrounding area
Coal stockpiles	35	After removal of visible coal (no more than 10% visible coaly and carbonaceous mineral waste on surface), the remaining footprint area will be reshaped to be free-draining with lower-gradient slopes of maximum 10%, and blended in with surrounding area
Tailings drying cells	3	After removal of dried tailings residue, the cells will be backfilled with spoil from the ROM pad or haul road base to be free-draining Area will be reshaped and blended in with surrounding area
Water dams	18	After dam water and sediment is removed, the dam walls will be dozed back over the dam footprint and additional backfill from the coal stockpile base or haul road base will be placed in the area to make free-draining Area will be reshaped and blended in with surrounding area
Topsoil stockpiles	5	After topsoil stockpiles have been depleted, area will be reshaped to be free-draining and blended in with surrounding area if required

Removal of infrastructure (Section 6.5) and contaminated land requirements (Section 6.5.3) will be completed where required, prior to reshaping of the final landform. After reshaping of the final landform, topsoil is spread over the required areas (Section 6.1.4) and revegetated (Section 6.1.8).

Key considerations

RMI is surrounded by coal mines with Poitrel Mine to the south-west, Millennium Mine to the north and the west, and Daunia Mine to the south and east. Landforms at these sites range up to 80m in height.

At closure, over 80% of the RMI landform will be similar to the pre-mining topography, with a small proportion of land higher than pre-mining levels. These areas are of minimal height and include the reshaped ROM pad, plus minor areas of haul roads and the rail loop. The site will be free-draining, with over 70% of the site having a final slope of <3%.

When considering RMI in the broader context with the surrounding area, it does not present any impact or risk to the surrounding land uses, sensitive receptors (nearest receptor is >6.5km), local and regional topography, or visual amenity.

Landform runoff

The landform at closure will be free-draining and water-shedding. The surface water flow is shown in Figure 17. The main water flow from the original CHPP area and north of the rail line, is to the east, with the majority of the water entering New Chum Creek downstream of the Millennium mining operation. The water from the west side of the lease flows south into the Poitrel Mine lease. The water south of the rail line flows to the south-east towards New Chum Creek.

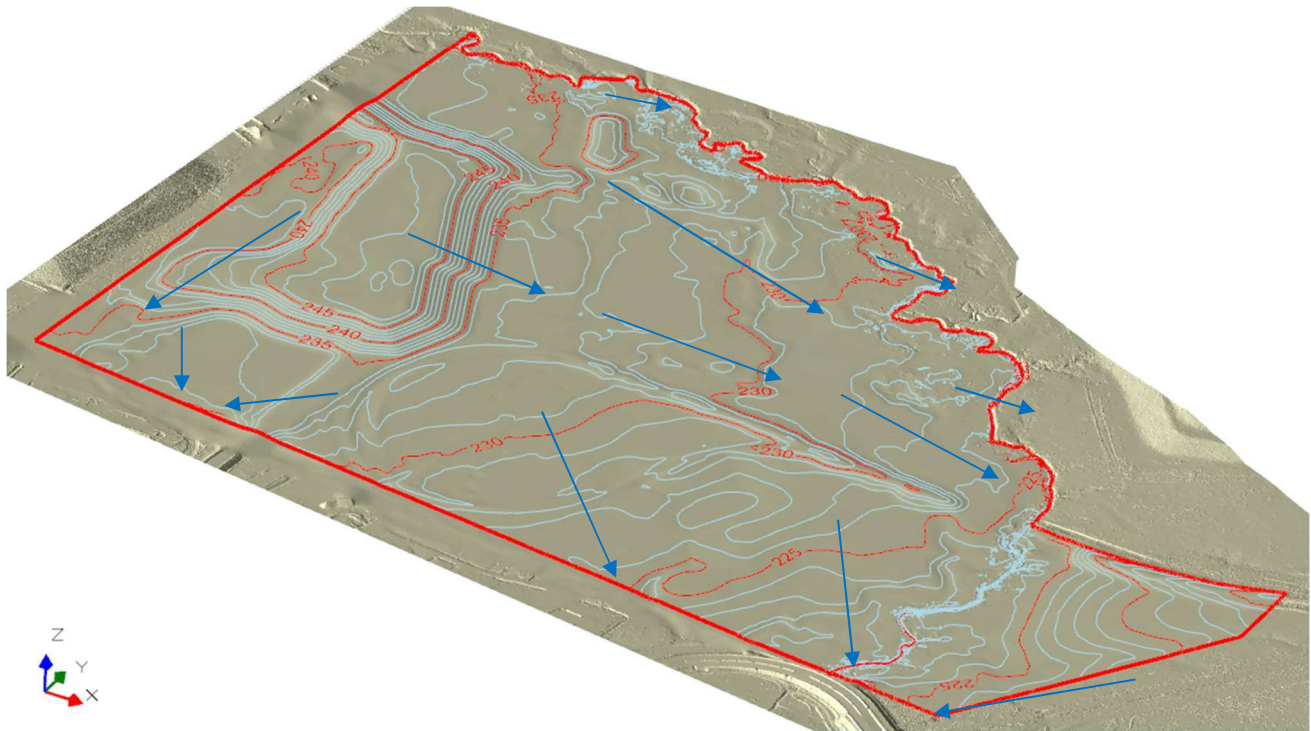


Figure 17: Indicative surface water flow direction – 2m contours (view from south-east)

Materials

The rehabilitation of RMI requires:

- Spoil from the ROM pad and haul roads to fill the tailings drying cells and dams to make free-draining
- Topsoil for disturbed areas to be rehabilitated to a PMLU of cattle grazing (Section 3.1.1)

Waste placement

Dried tailings will be removed from the tailings drying cells and visible coal will be removed from coal stockpiles and disposed of at Poitrel Mine (no more than 10% visible coaly and carbonaceous mineral waste remaining on surface). Further material will be removed from disturbed areas or additional material placed over areas, if identified as part of the spoil assessment (Section 6.1.3) or contamination assessment (Section 6.5.3).

Hydrological and hydrogeological assessments

The final landform will restore the hydrological site conditions to a state similar to that present pre-development of the CHPP by:

- Backfilling and reshaping to be free-draining
- Removal of the on-site culverts and associated fill material from within New Chum Creek

A desktop assessment of potential flood risks to the final landform and surrounding land uses (Section 6.1.2), identified a

low potential for adverse risks.

As the site does not include voids, underground workings, deep areas of fill, permanent disposal of carbonaceous wastes, or disturbance of the hydrostratigraphic units which support the alluvial or FCCM aquifers, the potential impacts from the RMI final landforms to hydrogeology have been assessed to be low (Section 6.1.1).

Specific landform requirements

There are no specific landform requirements.

Long-term landform stability

The landform stability risk is considered low due to:

- The landform being free-draining
- 40% of the site is undisturbed
- Over 80% is similar to the pre-mining topography
- 70% of the site has a final slope of <3%
- ROM pad averages approximately 10m above pre-mining levels and will be reshaped to maximum 10% slopes, which are lower-gradient slopes for rehabilitation in the Bowen Basin
- The remaining haul roads and rail loop range to a maximum height of 4m above pre-mining levels and will be reshaped to maximum 10% slopes
- Soil, subsoils and spoil will be assessed to determine any additional treatment to promote revegetation suitable for the PMLU and limit dispersion potential (Section 6.1.4).

Method of construction

The only 'constructed' landforms on the site are the ROM pad, haul roads and rail loop. The ROM pad and haulroads were dumped by haul trucks and are compacted and stable.

Quality assurance / quality control

The proposed actions referenced in Table 25 are the key controls that will be put in place to manage the landform risks associated with achieving the PMLUs. Quality assurance and quality control activities are built into all necessary execution and verification activities of these controls. Monitoring and reporting processes verify controls and ensure that controls are executed effectively (Section 8).

Trial methodology

As the landform design is low risk, no trial methodology is proposed.

Limitations and assumptions

The final contaminated land assessment (Section 6.5.3) will identify if additional material needs to be remediated, or removed from site, or managed. This is covered in the rehabilitation schedule through rehabilitation milestone RM2.

All 'constructed' landforms are compacted, therefore no further settling is expected.

Relationship with PRCP Schedule

Over 80% of the landform is similar to the pre-mining topography, with 70% of the site having a final slope of <3%. Areas higher than the pre-mining levels are minimal height and will be reshaped with 10% maximum slopes. All disturbance areas will be reshaped to be free-draining and blended in with the surrounding topography. The landform is therefore suited to the pre-mining and surrounding land uses of cattle grazing, woodland habitat and watercourse.

The risk associated with landform failure is low.

The information in this section is relevant to the highlighted **RAs** and **RM**s in the PRCP schedule:

RA1				RA2				RA3				RA4			
RM1	RM2	RM3	RM4	RM5	RM6	RM7	RM8	RM9	RM10	RM11	RM12	RM13	RM14	RM15	

The following Milestone Criteria will demonstrate achievement of the RMs :	
RM3	- Tailings drying cells backfill completed - Dams backfill completed - Haul road and rail base material removed within 100m of New Chum Creek, and disturbed bed and banks returned to a profile similar to the pre-disturbance condition in accordance with associated riverine and/or operation works permits or associated exemptions (RA3, RA4) - Landforms reshaped with maximum 10% slopes (RA1, RA2, RA3) - Landform reshaped to be free-draining and consistent with surrounding topography
RM14	a) A BioCondition assessment is completed by an appropriately qualified person using the methodology outlined in the Queensland Herbarium's BioCondition Assessment Manual version 2.2 and modified in accordance with section 6.1.8 Revegetation of the planning part and displayed in Table 30: The assessable attributes and weightings for deriving the final BioCondition score b) For RA2, the BioCondition assessment required by RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.5.3 c) For RA3, the BioCondition assessment required by criterion RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.4.9 d) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use e) Rehabilitation of RA2 is assessed as geotechnically stable by an appropriately qualified person¹ with FoS$\geq$1.5, unless an alternative is justified by an appropriately qualified engineer f) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 g) Deep drainage from the area is not significantly different to EC levels as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27, of: - the EPP (Water) schedule documents water quality objectives for relevant groundwater chemistry zones; or - local water quality objectives developed in accordance with the Queensland Water Quality Guidelines

6.1.6 Cover design

PRCP Guideline (Section 3.6.1)

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

The cover design should include:

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

The waste characterisation (Section 6.1.3) and potential contaminants (Section 6.1.7) showed there is a low

environmental risk associated with any material remaining on-site, and no cover designs are required.

Relationship with PRCP Schedule

The waste characterisation (Section 6.1.3) and potential contaminants (Section 6.1.7) showed there is a low environmental risk associated with any material remaining on-site, and no cover designs are required.

6.1.7 Water management

PRCP Guideline (Section 3.6.1)

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

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

The management of water resources during CHPP operations at RMI includes the following:

- Supply of water used within the CHPP from a mixture of sources including:
- Poitrel Mine via the Braeside Pipeline
- Poitrel Mine site water via a pipeline
- Millennium Mine from the Southern Void or Western Dam via pipeline
- Runoff from the Millennium Mine Mountain Dump captured in the process water dam via overland flow
- Sunwater/Burdekin Water pipeline scheme
- The capture and storage of water within the following two on-site dams:
- Environment dam (full design capacity of 72ML), which is used to collect and store runoff from the CHPP infrastructure area and to transfer water to the process water dam
- Process water dam (full design capacity of 297ML), which is used to store, recycle and supply process water to the CHPP
- Two release points from the on-site dams are permitted for conditional release of water to New Chum Creek under the site's EA, noting that since the operation of the site by BMC (commencing in 2018), no releases of water from the dams have occurred
- Maintenance of a vegetated buffer zone of 100m along New Chum Creek with the only exceptions being the Millennium Mine haul road and the rail line crossings
- Bunding/surface drains that provide segregation of mine affected water and runoff from undisturbed areas

- Sampling and assessment of water quality within the process water dam, environment dam, New Chum Creek and the groundwater as outlined in the EA, to assist in the identification of potential releases of contaminants into the environment

The final landform for RMI (Section 6.1.5) includes: the removal of all above ground infrastructure; removal of carbonaceous and coal material (no more than 10% visible coaly and carbonaceous mineral waste remaining on surface); decommissioning of the dams; removal of the culverts and associated fill material within New Chum Creek; and reshaping the landform to be free draining. The final landform does not include: voids; underground workings, deep areas of fill material, permanent containment of tailings or other carbonaceous wastes; or landforms containing AMD materials. Also at the completion of operations, contaminated land investigations are to be undertaken and any identified contaminated material that presents an unacceptable risk to the proposed PMLUs or environmental values will be remediated and/or managed.

A Preliminary Site Investigation (PSI) (Appendix 9) undertaken in accordance with the National Environment Protection (Assessment of Site Contamination) Measure (1999: Rev 2013) (ASC NEPM), was undertaken as part of the development of the RMI PRC Plan. The PSI was undertaken to identify existing potential contamination land risks associated with the operation of the CHPP that could impact on the PMLUs and surrounding environmental values at closure. Figure 18 illustrates the Contaminated Land Conceptual Site Model (CSM) for the RMI site at closure

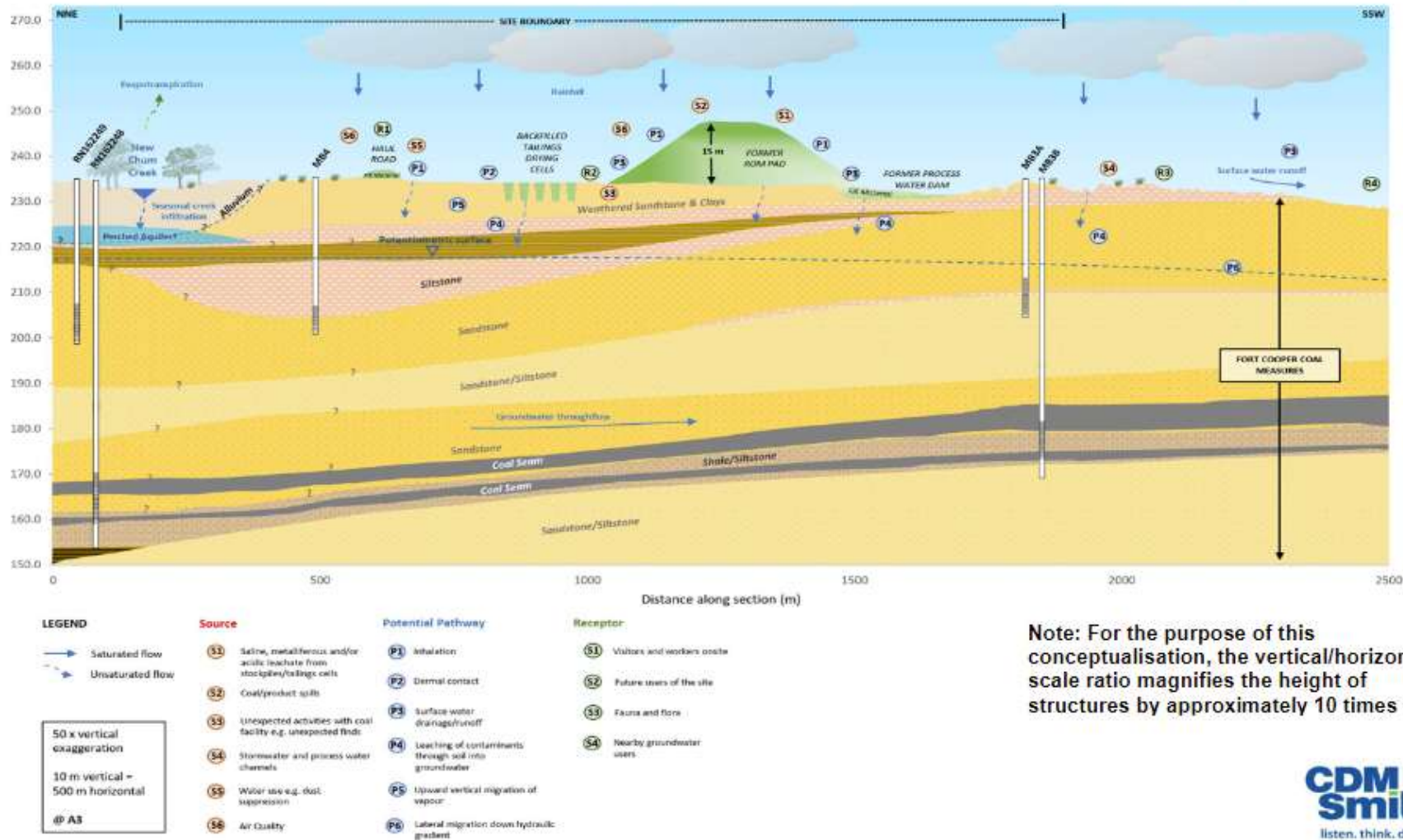


Figure 18: Post-mining contaminated land conceptual site model

6.1.7.1 Potential contaminants

The PSI (Appendix 9), through the review of available information, site monitoring data and a site inspection, did not confirm the presence of any areas of existing contamination that have the potential to impact on the nominated PMLUs or environmental values. As a conservative measure, noting the on-going nature of operations at RMI and absence of a targeted Detailed Site Investigation, the PSI identified the following potential contaminants:

- Hazardous materials stored and utilised as part of the CHPP operations including:
 - petroleum hydrocarbons (diesel, oils, greases)
 - alcohols/solvents (Methyl Isobutyl Carbinol (MIBC))
 - flocculants
 - coolants/transmission fluids associated with maintenance works
 - waste oils and other fluids
- Leachate from carbonaceous materials processed on-site and seepage from the water storage dams and tailings drying cells including:
 - metals
 - salinity/sulfates
 - acids/alkalis
 - ammonium nitrate
 - particulate matter
- Disturbed soils and imported fill material from adjacent sites including:
 - metals
 - salinity/sulfates
 - acids/alkalis
 - particulate matter

6.1.7.2 Source, pathway and fate

The assessment of the carbonaceous wastes and fill materials used on-site has identified a low potential for impacts to the nominated PMLUs and environmental values (Section 6.1.3). Therefore, the identified primary sources, such as coal and carbonaceous materials (tailings/rejects), imported overburden fill materials from adjacent sites, and disturbed soils are not considered likely to cause contamination of the site resulting from the material's geochemical properties.

Therefore, upon removal of the coal/carbonaceous materials off-site and there vegetation of the disturbed areas, exposure pathways to water resources are considered incomplete and unlikely to require management beyond what is proposed as part of the RMs.

All stored hazardous materials (primary sources) are to be removed as part of rehabilitation of the site. Therefore, any residual contaminant sources at closure associated with hazardous materials storage during operations, will be restricted

to secondary sources such as contaminant plumes within the soil and groundwater beneath the site. A contaminated land investigation will be undertaken as part of the rehabilitation of the site to assess the potential for any residual contamination to impact on the proposed PMLUs and environmental values. This investigation, undertaken after the completion of site operations, will identify any contamination that will require remediation and/or management as part of the site rehabilitation works. Should contamination be identified that requires on-going management to enable the site to be utilised for the nominated PMLUs or to protect environmental values, a draft Site Management Plan (SMP) under the provisions of the Environmental Protection Act (1994), will be prepared and submitted to the administering authority for consideration and will inform the rehabilitation of the site, where appropriate. Any on-going water management requirements will also be detailed within the draft SMP, if required.

6.1.7.3 On-going water management requirements

Based on the current condition of the RMI site and the nominated RMs, on-going water management including infiltration and seepage intervention, diversions, dewatering requirements and treatment of water, is not envisaged to be required. The nominated rehabilitation milestone (RM2) and associated milestone criteria include the completion of contaminated land investigations and where appropriate, remediation and/or management based on the condition of the site at the time of closure. These rehabilitation commitments provide the appropriate controls should site conditions change during the operations to facilitate the implementation of any appropriate on-going water management controls.

Relationship with PRCP Schedule

The final landform at RMI will be free draining and is not anticipated to require any on-going water management. A contaminated land investigation will be undertaken at the completion of operations and prior to the reshaping of the landform to assess the area for potential sources of contamination that could impact environmental values. Where required remediation and management of any identified contamination will be undertaken to minimise the potential for adverse impacts to water resources.

The information in this section is relevant to the highlighted **RAs** and **RMs** in the PRCP schedule:

RA1				RA2				RA3				RA4			
RM1	RM2	RM3	RM4	RM5	RM6	RM7	RM8	RM9	RM10	RM11	RM12	RM13	RM14	RM15	

The following Milestone Criteria will demonstrate achievement of the RMs :	
RM2	a) Contaminated land investigation completed by a suitably qualified person in accordance with the National Environment Protection (Assessment of Site Contamination) Measures and the Queensland Environmental Protection Act (1994) b) In the event that residual contamination has been identified and presents a potential unacceptable risk to the nominated PMLUs or environmental values, remediation works and/or implementation of management controls will be undertaken c) Where ongoing management of residual contamination is deemed appropriate, a draft Site Management Plan will be prepared for the administering authority's consideration
RM13	a) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use b) Groundcover >50% c) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 d) Deep drainage from the area is not significantly different to EC levels as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27, of: • the EPP (Water) schedule documents water quality objectives for relevant groundwater chemistry zones; or • local water quality objectives developed in accordance with the Queensland Water Quality Guidelines e) Land suitability class ≤ 3, or not different from pre-mining class if ≥ 4, as per Table 20 of the Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023. The assessment is to be conducted by an appropriately qualified person¹ and completed in accordance with LSA Framework for Open-Cut Coal Mine Rehabilitation 2018 (A rule-set for land suitability assessment of sustainable beef cattle grazing on land rehabilitated after open-cut coal mining in the Bowen Basin Queensland, unless otherwise agreed in writing between the administering authority and the environmental authority holder For RM13(e), if the land suitability class is assessed as being not different from pre-mining class if ≥ 4 for all or a portion of a rehabilitation area, an assessment of reference sites⁵ must be carried out to determine if the limitation/s resulting in the class of ≥ 4 is consistent with that of reference sites. f) Certification by an appropriately qualified person¹ that pasture meets a pasture condition rating ≤ 3, based on the Pasture Condition Assessment Table as per Stocktake: Balancing Supply and Demand (https://futurebeef.com.au/workshops/sustainable-grazing/stocktake-balancing-supply-demand/), as provided in Table 27 of the Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023 ⁵Reference site: representative undisturbed grazing land adjacent to the disturbance area

RM14	a) A BioCondition assessment is completed by an appropriately qualified person using the methodology outlined in the Queensland Herbarium's BioCondition Assessment Manual version 2.2 and modified in accordance with section 6.1.8 Revegetation of the planning part and displayed in Table 30: The assessable attributes and weightings for deriving the final BioCondition score b) For RA2, the BioCondition assessment required by RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.5.3 c) For RA3, the BioCondition assessment required by criterion RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.4.9 d) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use e) Rehabilitation of RA2 is assessed as geotechnically stable by an appropriately qualified person¹ with FoS$\geq$1.5, unless an alternative is justified by an appropriately qualified engineer f) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 g) Deep drainage from the area is not significantly different to EC levels as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27, of: the EPP (Water) schedule documents water quality objectives for relevant groundwater chemistry zones; or local water quality objectives developed in accordance with the Queensland Water Quality Guidelines
RM15	a) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use b) Groundcover³ on banks >80% c) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 d) Riparian vegetation consisting of an over-storey, under-storey and groundcover, comparable to an established watercourse reference site⁶ ⁶Watercourse reference site: representative undisturbed grazing land adjacent to the disturbance areas

6.1.8 Revegetation

PRCP Guideline (Section 3.6.1)

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

The rehabilitation planning part must include details of the site preparation required for rehabilitation activities.

6.1.8.1 Revegetation objectives

6.1.8.2 Seed provenance

The provenance (where the seed came from) is considered important for both native tree and pasture species. Attention will be given to sourcing seed as locally as possible from natural populations. (Although these local provenance boundary locations may differ between species, attention will be given to ensuring that seed should at least be obtained from the Brigalow Belt north bioregion).

6.1.8.3 Purity

Information related to seed quality will be obtained from the seed supplier prior to purchase. This would include:

- Genus, species (and sub-species for *Eucalypt spp.*) and seed lot number
- Collection location
- Collection date
- Seeds of other plants, i.e. inclusion of other species seeds
- Important weed seeds, i.e. inclusion of weed seeds, and
- Purity (%)
- Germination (%) (test current within 12 months)
- Percentage of pure live seeds (purity % x germination %)

6.1.8.4 Cattle grazing revegetation

Growth media

The growth media for cattle grazing utilises the available stockpiled topsoil resources at RMI, spread at an average depth of 150mm. The available topsoil quality and quantity is discussed in detail in Section 6.1.4.

The available topsoils range from clay loams to loams which will suit pasture species for clays and lighter textured soils (GTE, 2021).

Topsoils will be ameliorated prior to seeding, as recommended by an appropriately qualified person (Section 6.1.4).

Pasture species

The pasture species mix for a PMLU of cattle grazing is based on a combination of species recorded during baseline surveys as well as those preferred, palatable and productive (3P) exotic and native pasture species suitable for pasture establishment on either clay or lighter textured soils.

Both the native and exotic pasture species have been recommended using 3P grasses cognisant of grazing best management practices. A productive pasture will have a high percentage of 3P grasses and a high frequency of legumes and a low number of weeds.

Table 26 lists the recommended pasture species and recommended sowing rates for a PMLU of cattle grazing. Species availability may fluctuate from year to year and unavailable species are to be substituted with other species listed in this table. All pasture seed mixes would include 5 kg/ha of Shirohie millet (*Echinochloa esculenta*) or similar as a cover crop to protect soils from erosion.

No sowing or use of *Leucaena* is proposed at RMI, and *Leucaena* detected anywhere on the rehabilitation areas will be required to be controlled in accordance with weed management activities.

Table 26: Recommended species list and sowing rates for cattle grazing on lighter textured soils

Common Name	Scientific Name	Sowing Rate (kg/ha)	Comment
Rhodes grass	<i>Chloris gayana</i> cvv. <i>Callide</i> *	4 ^c	3P grass
	cvv. Katambora*	4 ^c	3P grass
Green panic	<i>Megathyrsus maximus</i> *	2 ^c	3P grass
Black spear	<i>Heteropogon contortus</i>	6	Black spear grass
Stylo ^s	<i>Stylosanthes scabra</i> *	2	Legume requires specific rhizobium inoculum strain CB1650
Wynn cassias	<i>Chamaecrista rotundifolia</i>	2	Legume will inoculate naturally but a Group M strain is recommended
Cover crop	(e.g. <i>Echinochloa esculenta</i> *)	5	Cover crop for soil protection
Total		25	

* exotic species.

c assumes seed is coated. If not coated, use half prescribed rate.

s must be sown within 28 days of inoculation.

Pasture establishment

Pasture seed mixes will be targeted for planting between September and March. Seed quality will be ascertained prior to planting to ensure highest potential for seed strike and vegetation establishment. A friable or crumbly seed bed will be created by ripping on contour followed by direct planting of seed using agricultural equipment. Seeding can be applied by a drum seeder on small dozer or via a fertiliser spreader attached to tractor. Seeding can be followed by light till either with a tractor pulled tiller or ripper on a grader to better turn the soil for soil seed contact.

Scientific evidence supports the use of groundcover to reduce the erosion risk in coal mine rehabilitation, with 50% being a conservative target for slope gradients less than 20% (Sheridan *et al*, 1998; Loch 2000; Carroll, and Tucker 2000, Carroll *et al*, 2000). Note: Groundcover refers to anything in contact with the soil surface, e.g. vegetation, rocks, stones, sticks, leaves, grass, hay, etc.

Rehabilitation monitoring will assess the condition of the pasture and guide ongoing maintenance and management of pastures on rehabilitated lands (further detail on monitoring is provided in Section 8).

6.1.8.5 Woodland habitat revegetation

Woodland habitat is proposed for a number of rehabilitation areas at RMI, as shown in Figure 25, including the ROM pad (RA2) and the disturbed areas within the New Chum Creek 100m buffer zone (RA3).

Reference sites will be established for the purpose of monitoring woodland habitat once rehabilitation commences (Section 8).

Revegetation species consider the characteristics of the likely underlying spoil or subsoil material as it relates to the corresponding land zone under the regional ecosystem framework (Wilson & Taylor, 2012). Land zones are categories that describe the major geologies and associated landforms and geomorphic processes of the State of Queensland. The differences between land zones result in marked differences in the function of ecosystems and their associated biodiversity and this is due in part to the effects that geology (lithology, structure, alteration) has on landform, and hydrology and landscape processes (geomorphology and soil formation) (Wilson & Taylor, 2012).

Growth media

The approach to revegetating woodland habitats is based on direct seeding woodland species into subsoils and spoil, ameliorated to provide a suitable growth media for development of native tree and shrub and grass species, as recommended in Section 6.1.4.

The land zones associated with the subsoil and spoil materials of the woodland habitat PMLU areas (Section 6.1.4), and those corresponding with the regional ecosystems recorded during baseline surveys, are listed in Table 27.

Table 27: Woodland habitat material and associated land zones

Rehabilitation and baseline survey areas	Underlying waste material	Land zone	Land zone description
RA2	Tertiary sediments	4	Tertiary-early Quaternary clay plains
	Weathered Permian waste	9	Fine grained sedimentary rocks
	Unweathered Permian waste	9 and 10	LZ9 Fine grained sedimentary rocks LZ10 Coarse grained sedimentary rocks
RA3	Tertiary sediments	4	Tertiary-early Quaternary clay plains
Baseline surveys	N/A	3	Recent Quaternary alluvial systems
		4	Tertiary-early Quaternary clay plains

Rehabilitation and baseline survey areas	Underlying waste material	Land zone	Land zone description
		5	Tertiary-early Quaternary loamy and sandy plains and plateaus
		7	Cainozoic duricrusts

Subsoils and spoil will be ameliorated prior to seeding, as recommended by an appropriately qualified person, and may include fertilisers, organic matter and gypsum to meet RM5 milestone criteria (Section 6.1.4).

Woodland habitat species

Rehabilitation and vegetation monitoring reports from the nearby Poitrel mine site (Biodiversity Assessment and Management Pty Ltd, 2018) (Ecological Australia, 2017) indicate that the majority of woodland habitat species are akin to RE 11.5.3 and 11.4.9 for RA2 and RA3 respectively. This provides a degree of confidence that the proposed species will establish successfully on site. However, creation of a native ecosystem is more likely to achieve successful rehabilitation to a sustainable ecosystem that has habitat values. As such, the species selection has been expanded from a restrictive RE species list to include as many species as possible from the relevant broad vegetation groups. The relevant BVGs for RE 11.4.9 and RE 11.5.3 are BVG 25a and 17b respectively.

A BioCondition assessment completed by an appropriately qualified person using the methodology outlined in the Queensland Herbarium's BioCondition Assessment will be undertaken to verify that the achievement of the woodland habitat. It is noted that the RMI PRCP woodland habitat species selection is based on BVGs however BioCondition monitoring assessment described by the Queensland Herbarium is based on undisturbed regional ecosystems. As such, RE 11.5.3 and RE 11.4.9 are used for the purposes of establishing PRCP milestone completion criteria as these are the target RE's based pre-mining and reference site ecological investigations.

The total recommended seeding rates for upper-story tree species is 5kg/ha, mid and lower story tree and shrub species 5kg/ha, and ground cover 5kg/ha.

All woodland planting will include the addition of a cover crop *Echinochloa esculenta* (Millet), seeded at 5kg/ha to establish a vegetative cover to protect soils from erosion. Selection of seeds must be based on species outlined in Tables 28 and 29 with a species richness that results achievement of the respective BVG BioCondition requirements.

Table 28: Recommended species list and sowing rates for woodland habitat at RA2.

BVG	Upper-storey tree species	Mid and lower story tree and shrub species	Ground Cover
25a	<i>Eucalyptus thozetiana</i>	<i>Flindersia dissosperma</i>	<i>Paspalidium caespitosum</i>
	<i>Eucalyptus cambageana</i>	<i>Alphitonia excelsa</i>	<i>P. distans</i> ,
	<i>Eucalyptus crebra</i>	<i>Terminalia oblongata</i>	<i>Sporobolus caroli</i>
	<i>Acacia harpophylla</i>	<i>Acacia rhodoxylon</i>	<i>S. scabridus</i>
	<i>Acacia cambagei</i>	<i>Apophyllum anomalum</i>	<i>Enteropogon acicularis</i> ,
	<i>Casuarina cristata</i>	<i>Enchylaena tomentosa</i>	<i>Ancistrachne uncinulata</i>
		<i>Ehretia membranifolia</i>	<i>Cyperus gracilis</i>
		<i>Santalum lanceolatum</i>	<i>Cymbopogon refractus</i>
		<i>Eremophila mitchellii</i> ,	<i>Eragrostis lacunaria</i>
		<i>Alectryon diversifolius</i>	<i>Aristida personata</i>
		<i>Eremophila mitchellii</i>	<i>Eriochloa pseudoacrotricha</i>
		<i>Carissa ovata</i>	<i>Enchylaena tomentosa</i>
		<i>Geijera parviflora</i>	<i>Abutilon oxycarpum</i>
		<i>Grevillea parallela</i>	<i>Brunoniella australis</i>
		<i>Melaleuca tamariscina</i>	<i>Capparis lasiantha</i>
		<i>Alectryon oleifolius</i>	<i>Nyssanthus erecta</i>
			<i>Einadia nutans</i> ,
			<i>Commelina diffusa</i>
			<i>Evolvulus alsinoides</i>

Table 29: Recommended species list and sowing rates for woodland habitat at RA3

BVG	Upper-storey tree species	Mid and lower story tree and shrub species	Ground Cover
17b	<i>Eucalyptus populnea</i>	<i>Lysiphyllum hookeri</i> or <i>L. carronii</i>	<i>Chrysopogon fallax</i>
	<i>Eucalyptus melanophloia</i>	<i>Eremophila mitchellii</i>	<i>Eragrostis lacunaria</i>
	<i>Corymbia clarksoniana</i>	<i>Acacia excelsa</i>	<i>Fimbristylis dichotoma</i>
	<i>Eucalyptus crebra</i>	<i>Cassia brewsteri</i>	<i>Themeda triandra</i>
	<i>Corymbia dallachiana</i>	<i>Erythroxylum australe</i>	<i>Enteropogon acicularis</i>
	<i>Eucalyptus melanophloia</i>	<i>Alphitonia excelsa</i>	<i>Heteropogon contortus</i>
	<i>Eucalyptus brownii</i>	<i>Dodonaea viscosa</i>	<i>Cymbopogon refractus</i>
		<i>Senna artemisioides</i>	<i>Panicum effusum</i>
		<i>Carissa lanceolata</i>	<i>Aristida calycina</i>
		<i>Geijera parviflora</i>	<i>Evolvulus alsinoides</i>
		<i>Archidendropsis basaltica</i>	<i>Brunoniella australis</i> ,
		<i>Ventilago viminalis</i>	<i>Euphorbia drummondii</i>
		<i>Flindersia dissosperma</i>	<i>Rhynchosia minima</i>
		<i>Carissa ovata</i>	<i>Sida hackettiana</i>
		<i>Capparis lasiantha</i>	<i>Alternanthera micrantha</i>
			<i>Eremophila debilis</i>
			<i>Abutilon oxycarpum</i>
			<i>Melhania oblongifolia</i>

Assessable attributes and weightings for deriving the final BioCondition score.

Assessable attributes and weightings for deriving the final BioCondition score is outlined in Table 30. Proposed rehabilitation completion criteria for which incorporates BioCondition scoring is outlined below:

- For RA2, the BioCondition assessment required by RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.5.3.
- For RA3, the BioCondition assessment required by RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.4.9.

Table 30: The assessable attributes and weightings for deriving the final BioCondition score.

	Attribute	Weighting (%)
Site-based condition attributes	Tree canopy height	5
	Recruitment of canopy species	5
	Tree canopy cover (%)	5
	Shrub layer cover (%)	5
	Coarse woody debris	5
	Native plant species richness for four lifeforms	20
	Non-native plant cover	10
	Native perennial grass cover	5
	Litter cover	5
Landscape attributes (fragmented subregions)	Size of patch	10
	Context	5
	Connectivity	5
Total		80

Scarification

In most cases, *Acacia* spp. seeds have a hard coat which is impermeable to water and germination will not normally occur unless some sort of pre-treatment is conducted. In nature this hard coat leads to seed dormancy until it is broken down over time or by the heat of bushfire. Approximately half of the hard-coated *Acacia* spp. seeds should be scarified prior to sowing. This will allow scarified seeds to imbibe and germinate. By only scarifying half of the seeds additional reserve are maintained in the soil seed bank. Seed scarification can be required from the supplier prior to delivery however needs to be sown as soon as possible after scarification.

Woodland habitat establishment

Woodland habitat should be sown in the warmer months of the year from September to March or November to January, when the probability of rainfall is highest. A seed bed will be created by ripping on the contour followed by direct planting by a drum seeder on small dozer or via a fertiliser spreader attached to tractor. Seeding can be followed by light till either with a tractor pulled tiller or ripper on a grader to better turn the soil for soil seed contact.

6.1.8.6 Watercourse revegetation

Reference sites are yet to be established at RMI, though they will be established for the purpose of monitoring watercourse vegetation (Section 8).

Growth media

The approach to revegetating the watercourse area is based on direct seeding watercourse species onto the reshaped subsoil formed to create the New Chum Creek watercourse bed and banks.

The underlying subsoils of New Chum Creek are associated with natural Quaternary alluvium. The subsoils in the disturbed areas will be ameliorated, as recommended by an appropriately qualified person, and may include fertilisers, organic matter and gypsum (Section 6.1.4).

Watercourse revegetation species

The vegetation in the New Chum Creek watercourse is associated with riparian vegetation which includes species adapted to upper-, mid- and lower banks (revegetation zones) as illustrated in Figure 19. This includes riparian vegetation comprising upper-storey, under-storey and groundcover. The revegetation species have considered the characteristics of the regional ecosystems recorded during baseline surveys associated with New Chum Creek (Section 1.2.8) as well as the underlying Quaternary alluvium subsoil.

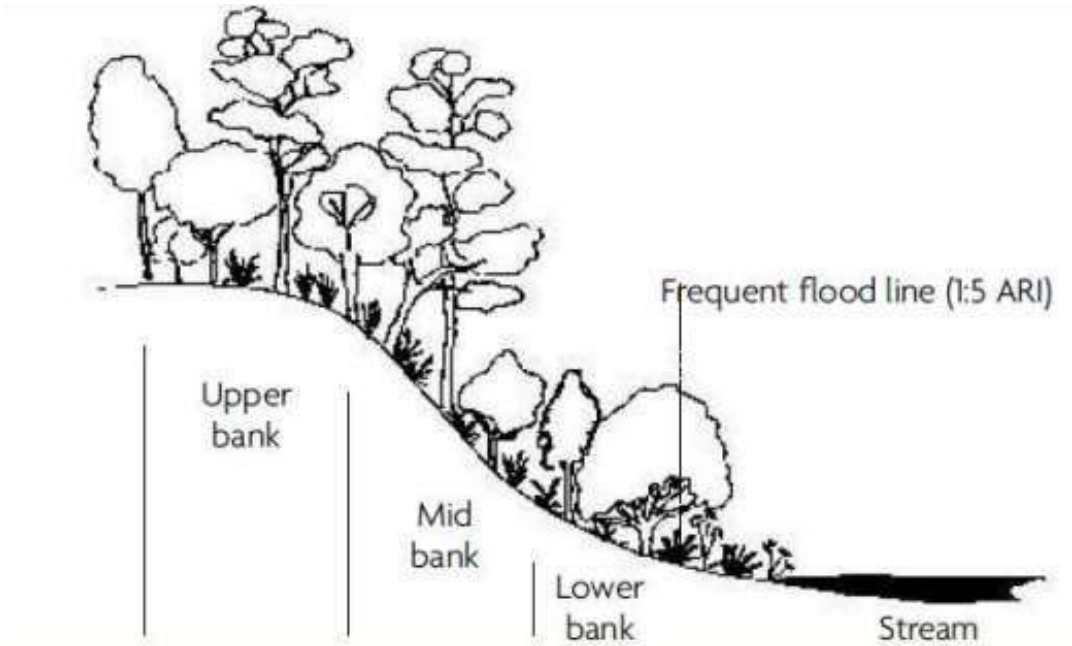


Figure 19: Typical riparian revegetation plantings zone (BCCA, 2014).

The recommended vegetation species for each revegetation zone considers the preferred vegetation structure representative of each zone. The recommended revegetation species and sowing rates are listed in Table 30. The total recommended seeding rates for upper bank is 5kg/ha, mid bank 5kg/ha, and lower bank 5kg/ha.

All watercourse planting will include the addition of a cover crop (e.g. *Echinochloa esculenta* (Millet)), seeded at 5kg/ha to establish a vegetative cover to protect soils from erosion.

Table 31: Recommended species list and sowing rates for watercourse

Regional Eco-systems	Upper bank	Rate kg/ ha	Mid-bank	Rate kg/ ha	Lower bank	Rate kg/ ha
11.3.1 11.3.2 11.3.25	<i>Eucalyptus camaldulensis</i>	1	<i>Callistemon viminalis</i>	1	<i>Carex inversa</i>	1
	<i>Eucalyptus cambageana</i>	1	<i>Melaleuca bracteata</i>	1	<i>Lomandra longifolia</i>	3
	<i>Eucalyptus melanophloia</i>	0.5	<i>Acacia salicina</i>	1	<i>Eleocharis pallens</i>	1
	<i>Eucalyptus populnea</i>	1	<i>Acacia harpophylla</i>	1	<i>Bothriochloa bladhii</i>	1
	<i>Acacia salicina</i>	0.5	<i>Lysiphyllum hookeri</i>	0.5	<i>Dichanthiumsericeum</i>	1
	<i>Acacia harpophylla</i>	0.5	<i>Cassia brewsteri</i>	0.5		
	<i>Bothriochloa bladhii</i>	1	<i>Bothriochloa bladhii</i>	1		
	<i>Dichanthiumsericeum</i>	1	<i>Dichanthiumsericeum</i>	1		
	Cover crop (e.g. <i>Echinochloa esculenta*</i>)	5	Cover crop (e.g. <i>Echinochloa esculenta*</i>)	5	Cover crop (e.g. <i>Echinochloa esculenta*</i>)	5
Combined total required		10		10		10

Watercourse vegetation establishment

It is recommended hydromulching/hydroseeding, or similar, is used to establish watercourse vegetation.

Hydromulching/hydroseeding, or similar, involves spraying a mixture of the seed, amelioration and organic matter onto the prepared rehabilitation surface to ensure effective seed-to-soil contact to foster revegetation and prevent soil erosion. Supplementary tube stock planting may be required for certain species, dependent on the performance outcomes of hydromulching/hydroseeding, or similar.

The cover crop will establish quickly on the exposed subsoil surfaces and work to provide a root system that will stabilise the subsoil and prevent erosion until new seedlings have established. The roots also create pores in the surface to allow water to penetrate the ground, conserving water and reducing overland flow on the surface.

Irrigation

Irrigation may be required during the construction phase depending on growth, season and weather conditions. It is recommended the direct seeding (hydromulch/hydroseeding application) be watered as follows:

- Weekly during the first 6 weeks of establishment (depending on season and weather conditions)
- Followed by fortnightly watering for a further six weeks (depending on season and weather conditions)
- When necessary as until practical completion to achieve milestone criteria.

Each watering event shall deliver irrigation quality water. If rainfall occurs, irrigation shall not be performed.

Relationship with PRCP Schedule														
The revegetation approach for RMI focuses on selection and establishment of suitable species based on the growth media and vegetation communities and associated BVGs on RMI and surrounding areas. The selected species will best support achievement of the surface requirements and PMLU outcomes of cattle grazing, woodland habitat and watercourse.														

The information in this section is relevant to the highlighted RAs and RM s in the PRCP schedule:														
RA1				RA2				RA3				RA4		
RM1	RM2	RM3	RM4	RM5	RM6	RM7	RM8	RM9	RM10	RM11	RM12	RM13	RM14	RM15

The following Milestone Criteria will demonstrate achievement of the RMs:

RM7	a) Completed seeding in accordance with recommended pasture mix (grasses, cover crop and legumes), and seeding rates (up to 25kg/ha) as listed in Table 26 as per Progressive Rehabilitation and Closure Plan - Red Mountain Infrastructure, Version 1.0, 6 January 2023
RM8	a) Target primary growth media criteria listed in RM5(a) are achieved based on representative samples determined by an appropriately qualified person. b) Completed seeding using a selection of species outlined in: - RA2: Table 28 of the Progressive Rehabilitation and Closure Plan - Red Mountain Infrastructure, Version 1.0, 6 January 2023 - RA3: Table 29 of the Progressive Rehabilitation and Closure Plan - Red Mountain Infrastructure, Version 1.0, 6 January 2023 c) Seeding must be completed to achieve species richness required by the BioCondition scores outlined in RM14(a) RM14(b) for RA1 and RA2 respectively d) Completed seeding as per recommended sowing rates for individual species where possible and total recommended seeding rates for dominant tree species (5kg/ha), mid-storey species (5kg/ha), and groundcover species (5kg/ha) plus 5kg/ha of suitable cover crop (e.g. Echinochloa esculenta).
RM9	a) Completed seeding in accordance with recommended species as listed in Table 30 of the Progressive Rehabilitation and Closure Plan - Red Mountain Infrastructure, Version 1.0, 6 January 2023 b) Completed seeding as per the recommended sowing rates for individual species where possible and total recommended seeding rates for upper bank (5kg/ha), mid bank (5kg/ha), and lower bank (5kg/ha) plus 5kg/ha of suitable cover crop (e.g. Echinochloa esculenta) as per Table 31 of the Progressive Rehabilitation and Closure Plan - Red Mountain Infrastructure, Version 1.0, 6 January 2023
RM10	a) Pasture condition rating ≤ 3, based on the Pasture Condition Assessment Table as per Stocktake: Balancing Supply and Demand (https://futurebeef.com.au/workshops/sustainable-grazing/stocktake-balancing-supply-demand/), as provided in Table 27 of the Progressive Rehabilitation and Closure Plan - Red Mountain Infrastructure, Version 1.0, 6 January 2023, including: - Preferred pasture species (3P grasses²) diversity ≥ 2 species - Preferred pasture (3P) % DM yield 10-60% - Annual grass DM yield % $< 70\%$ - Undesirable grasses and other weeds % DM yield $< 80\%$ - Crown cover (3P grasses²) – at worst, moderate to low density and some plants dead ²3P grasses: native and naturalised exotic grass species that are perennial, palatable, and productive plants to stock
RM11	a) Total invasive⁴ plant cover is $\leq 10\%$ ⁴Invasive plants: as listed under the Queensland Biosecurity Act 2014
RM12	a) Revegetation species presence on upper banks, mid-banks and lower banks representative of sown seed mix as detailed in RM9 b) Groundcover³ is $> 80\%$ on banks c) Total invasive⁴ plant cover is $\leq 10\%$

RM13	a) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use b) Groundcover >50% c) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 d) Deep drainage from the area is not significantly different to EC levels as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27, of: • the EPP (Water) schedule documents water quality objectives for relevant groundwater chemistry zones; or • local water quality objectives developed in accordance with the Queensland Water Quality Guidelines e) Land suitability class ≤ 3, or not different from pre-mining class if ≥ 4, as per Table 20 of the Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023. The assessment is to be conducted by an appropriately qualified person and completed in accordance with LSA Framework for Open-Cut Coal Mine Rehabilitation 2018 (A rule-set for land suitability assessment of sustainable beef cattle grazing on land rehabilitated after open-cut coal mining in the Bowen Basin Queensland, unless otherwise agreed in writing between the administering authority and the environmental authority holder For RM13(e), if the land suitability class is assessed as being not different from pre-mining class if ≥ 4 for all or a portion of a rehabilitation area, an assessment of reference sites⁵ must be carried out to determine if the limitation/s resulting in the class of ≥ 4 is consistent with that of reference sites. f) Certification by an appropriately qualified person that pasture meets a pasture condition rating ≤ 3, based on the Pasture Condition Assessment Table as per Stocktake: Balancing Supply and Demand (https://futurebeef.com.au/workshops/sustainable-grazing/stocktake-balancing-supply-demand/), as provided in Table 27 of the Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023
RM14	a) A BioCondition assessment is completed by an appropriately qualified person using the methodology outlined in the Queensland Herbarium's BioCondition Assessment Manual version 2.2 and modified in accordance with section 6.1.8 Revegetation of the planning part and displayed in Table 30: The assessable attributes and weightings for deriving the final BioCondition score b) For RA2, the BioCondition assessment required by RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.5.3 c) For RA3, the BioCondition assessment required by criterion RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.4.9. d) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use e) Rehabilitation of RA2 is assessed as geotechnically stable by an appropriately qualified person¹ with $FoS \geq 1.5$, unless an alternative is justified by an appropriately qualified engineer f) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 g) Deep drainage from the area is not significantly different to EC levels as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 of: • the EPP (Water) schedule documents water quality objectives for relevant groundwater chemistry zones; or • local water quality objectives developed in accordance with the Queensland Water Quality Guidelines

RM15	a) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use b) Groundcover on banks >80% c) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 d) Riparian vegetation consisting of an over-storey, under-storey and groundcover, comparable to an established watercourse reference site (Watercourse reference site: representative undisturbed grazing land adjacent to the disturbance areas)
------	---

6.2 Tailings storage facilities

PRCP Guideline (Section 3.6.2)

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

The design for a TSF must include relevant elements:

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

Tailings are temporarily stored in five tailings drying cells at RMI. The solids from these cells are excavated within a few days of deposition and co-disposed in spoil dumps off-site, including the neighbouring Poitrel and Millennium mining operations. The decant water is returned for re-use in the CHPP.

No permanent tailings storage facilities will remain on-site with decommissioning of the tailings drying cells toinclude:

- Removal and disposal of any residue tailings
- Contaminated land assessment
- Backfill to make the area free-draining

Relationship with PRCP Schedule

The decommissioning of the tailings drying cells is included in the RMs and relevant criteria developed.

6.3 Voids

There are no voids on-site at RMI, so this section is not applicable.

PRCP Guideline (Section 3.6.3)

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

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

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

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

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

Relationship with PRCP Schedule

Not relevant as there are no voids planned at RMI.

6.4 Underground mining

PRCP Guideline (Section 3.6.4)

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

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

There is no underground mining so this section is not applicable.

Relationship with PRCP Schedule

PRCP Guideline (Section 3.6.5)

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

The rehabilitation planning part must include:

- h) Identification of infrastructure that will be decommissioned and the methods for decommissioning.*
- i) A description of infrastructure that will remain post rehabilitation and the identification of ongoing maintenance requirements.*
- j) Evidence of agreement for any infrastructure that will have ownership transferred.*

6.5 Built infrastructure

In accordance with EA condition E9, 'all infrastructure constructed by, or for the EA holder during the approved activities - including water storage structures, must be removed from the site prior to surrender, except where agreed in writing by the post-mining land owner/holder'. However, the EA further notes that this is not applicable where the landowner/landholder is also the environmental authority holder, which is the case for RMI.

Table 31 details the infrastructure associated with the approved activities at RMI. This infrastructure will be decommissioned and removed from site prior to surrender, except for any fencing required to support the PMLUs. Priority will be to salvage or recycle any infrastructure, over demolition and disposal. Amendments may be sought if the infrastructure is assessed in the future as being beneficial to the PMLU, as agreed in writing with the post-mining landowner/land holder.

The neighbouring Daunia mining operation utilises the RMI train load-out facilities and rail line. The timing of the decommissioning and removal of the infrastructure required to service only the RMI operation is based on the proposed timing of the Poitrel Mine operation. However, the timing for decommissioning and removal of the conveyor from Daunia Mine, train load-out facilities (and associated services to operate) and rail line, is based on the proposed completion of the Daunia Mine.

Further detail on the rehabilitation stages after decommissioning of the infrastructure, such as landform reshape, surface preparation, revegetation and monitoring are covered in the relevant sections of this PRCP.

Table 32: Infrastructure associated with the approved RMI activities

Infrastructure	
Built infrastructure	Steel, concrete and brick buildings
	CHPP Conveyors Stackers Hoppers Reject bin Reclaim tunnel Administration and crib buildings Workshop Coal testing lab Fuel, oil and chemical storage Fences
	Rail and train load-out related infrastructure
	Train loading bin and facilities (utilised by RMI and Daunia) Daunia conveyor Rail loop and spur
	Supporting services Pipes and pumps Power lines Switchyard and substations Communications towers
Water infrastructure	Process water dam Environment dam Drains

6.5.1 Decommissioning Built infrastructure

Decommissioning of the built infrastructure with no beneficial post-mining re-use will include:

- Disconnect services
- Dismantle power feeds, water and communication-related feeder lines
- Demolish and remove built and service-related infrastructure through salvage or recycling activities, or demolish and dispose of off-site
- Demolish and remove concrete, bitumen and aggregate, and dispose off-site
- Remove demolition-related waste products and rubbish and dispose off-site

6.5.2 Water infrastructure

6.5.3 Contaminated land assessment

In accordance with the EA conditions E7, F1, and F41, contaminants must not be released in a manner that constitutes serious environmental harm, and spillage of any wastes, contaminants or other materials must be cleaned up as quickly as practicable, stored in accordance with relevant standards and handled in a way that prevents environmental harm.

A contaminated land assessment will be undertaken in accordance with the National Environment Protection (Assessment of Site Contamination) Measure or equivalent in place at the time of investigation at completion of the operation of the CHPP and prior rehabilitation-related surface preparation and revegetation. The contaminated land investigation will assess the site for potential contamination that has the potential to adversely impact nominated PMLUs and/or environmental values. In the event that land contamination is identified, the potential risks will be assessed and, where required, remediation will be undertaken and/or a SMP developed to allow the mining lease area to be safely utilised for the nominated PMLUs.

Relationship with PRCP Schedule
The EA requires all infrastructure constructed for the approved activities, to be removed from the site prior to surrender and any spills and releases to be cleaned up and the area remediated. A contaminated land assessment will be undertaken at the completion of operations and prior to final landform development and shaping. Where required, remediation and/or management of any identified contamination that has the potential to present unacceptable risks to the nominated PMLU or environmental values will be undertaken. Upon completion of the contaminated land investigation and, where required remediation and/or management, risks associated with contaminated land will be low.

The information in this section is relevant to the highlighted **RAs** and **RMs** in the PRCP schedule:

RA1				RA2				RA3				RA4			
RM1	RM2	RM3	RM4	RM5	RM6	RM7	RM8	RM9	RM10	RM11	RM12	RM13	RM14	RM15	

The following **Milestone Criteria** will demonstrate achievement of the **RMs**:

RM1	a) Services disconnected b) Built and service infrastructure demolished and removed (except where agreed in writing by the post-mining land owner/holder) c) Concrete, bitumen and aggregate removed d) Rubbish removed e) No more than 10% visible coaly and carbonaceous mineral waste on surface f) Water and sediment within dams removed g) Creek crossing culverts removed
RM2	a) Contaminated land investigation completed by a suitably qualified person in accordance with the National Environment Protection (Assessment of Site Contamination) Measures and the Queensland Environmental Protection Act (1994) b) In the event that residual contamination has been identified and presents a potential unacceptable risk to the nominated PMLUs or environmental values, remediation works and/or implementation of management controls will be undertaken c) Where ongoing management of residual contamination is deemed appropriate, a draft Site Management Plan will be prepared for the administering authority's consideration

6.6 Summary of key rehabilitation and management practices

The key rehabilitation activities for each relevant activity at RMI is shown in Table 32. The rehabilitation activities drive achievement of the RMI rehabilitation milestones and inform the associated PRCP Schedule.

Table 33: Key rehabilitation activities and rehabilitation milestones for RMI

Rehabilitation area	Relevant activities	Area (ha)	Rehabilitation activities (to drive achievement of Rehabilitation Milestones)	Rehabilitation timing	Rehabilitation milestones
RA1	CHPP and associated infrastructure Administration, crib and general buildings Workshop; fuel, oil and chemical storage Laydown and general areas Roads Product coal stockpile Tailings drying cells Dams and drains Rail area and associated train loading infrastructure Topsoil stockpiles	96	• Disconnect services • Demolish and remove built and service infrastructure • Remove concrete, bitumen and aggregate • Remove rubbish • Remove visible coal and dried tailings • Remove dam water and sediment • Undertake assessment for contaminated land and, where appropriate, remediate impacted areas, and/or implement management controls and/or develop a SMP • Backfill tailings drying cells and dams with material from the ROM pad and/or haul road base • Reshape the landform to be free-draining with maximum 10% slopes, and blend in with the surrounding topography • Spread topsoil to an average thickness of 150mm • Assess soil characteristics to determine ameliorant and other treatment requirements • Apply ameliorants and other treatments • Rip across contour • Seed • Undertake monitoring and maintenance to demonstrate achievement of a cattle grazing PMLU	• 51 ha of the main industrial, product coal stockpile and drying cells area is available once RMI coal processing is complete in 2036 • 9ha associated with administration areas and workshop is available once the majority of the rehabilitation of the main area is complete in 2039 • 24ha associated with the dams and drains is available once rehabilitation of the processing areas is tracking towards achieving surface requirements in 2049 • 12ha associated with the rail area is available once Daunia coal loading is complete in 2051	RM1 RM2 RM3 RM4 RM7 RM10 RM13

Rehabilitation area	Relevant activities	Area (ha)	Rehabilitation activities (to drive achievement of Rehabilitation Milestones)	Rehabilitation timing	Rehabilitation milestones
RA2	ROM pad	44	• Disconnect services • Demolish and remove built and service infrastructure • Remove concrete, bitumen and aggregate • Remove rubbish • Remove visible coal • Undertake assessment for contaminated land and, where appropriate, remediate impacted areas, and/or implement management controls and/or develop a SMP • Reshape the landform to be free-draining with maximum 10% slopes • Assess spoil characteristics to determine ameliorant and other treatment requirements • Apply ameliorants and other treatments • Rip across contour • Seed • Undertake monitoring and maintenance to demonstrate achievement of a woodland habitat PMLU	Available once RMI coal processing is complete in 2036	RM1 RM2 RM3 RM5 RM8 RM11 RM14

Rehabilitation area	Relevant activities	Area (ha)	Rehabilitation activities (to drive achievement of Rehabilitation Milestones)	Rehabilitation timing	Rehabilitation milestones
RA3	Roads Rail area and associated train loading infrastructure Topsoil stockpiles	33	• Disconnect services • Demolish and remove built and service infrastructure • Remove concrete, bitumen and aggregate • Remove rubbish • Undertake assessment for contaminated land and, where appropriate, remediate impacted areas, and/or implement management controls and/or develop a SMP • Remove road and rail line base material and culverts to re-establish pre-mining levels within 100m of New Chum Creek • Reshape the landform to be free-draining with maximum 10% slopes, and blend in with the surrounding topography • Assess surface material characteristics to determine ameliorant and other treatment requirements • Apply ameliorants and other treatment • Rip across contour • Seed • Undertake monitoring and maintenance to demonstrate achievement of a woodland habitat PMLU	5ha available once RMI coal processing is complete in 2036 28ha available once Daunia coal loading is complete in 2051	RM1 RM2 RM3 RM5 RM8 RM11 RM14

Rehabilitation area	Relevant activities	Area (ha)	Rehabilitation activities (to drive achievement of Rehabilitation Milestones)	Rehabilitation timing	Rehabilitation milestones
RA4	Road Rail area	0.9	• Disconnect services • Demolish and remove built and service infrastructure • Remove concrete, bitumen and aggregate • Remove rubbish • Remove road and rail line base material and culverts to re-establish New Chum Creek according to terms of Riverine Protection Permits and/or exemptions, and waterway barrier works programs • Undertake assessment for contaminated land and, where appropriate, remediate impacted areas, and/or implement management controls and/or develop a SMP • Assess surface material characteristics to determine ameliorant and other treatment requirements • Apply ameliorants and other treatment • Seed • Undertake monitoring and maintenance to demonstrate achievement of a watercourse PMLU	0.5ha available once RMI coal processing is complete in 2036 0.4ha available once Daunia coal loading is complete in 2051	RM1 RM2 RM3 RM6 RM9 RM12 RM15

7. Risk Assessment

Legislative Requirement

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 the risks.

7.1 Identifying, assessing and treating risks

PRCP Guideline (Section 3.7)

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

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

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

7.1.1 Risk methodology

A risk-based approach to the RMI PRC Planning has been undertaken in term of the method described in Figure 20.

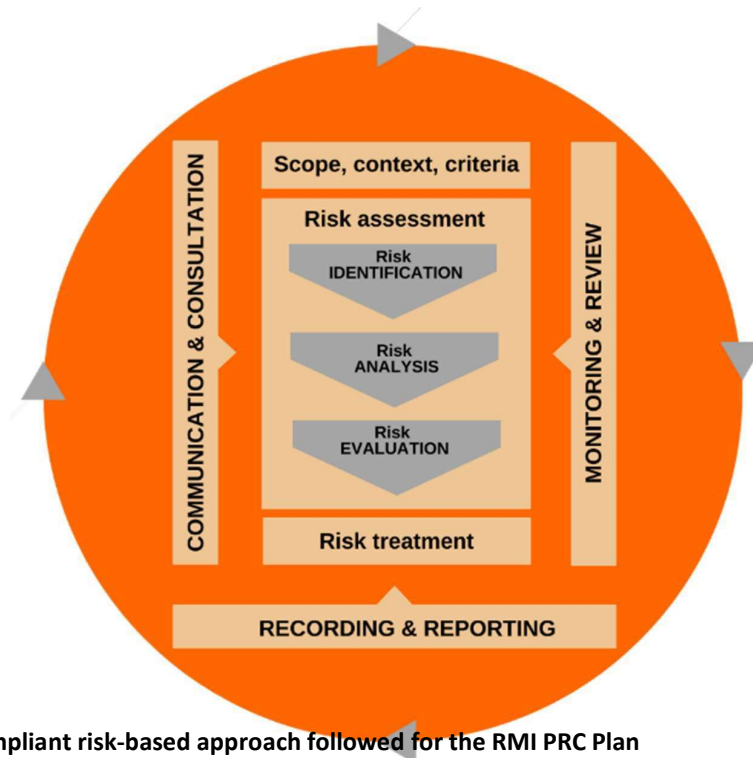


Figure 20: ISO 31000-compliant risk-based approach followed for the RMI PRC Plan

7.1 Risk identification

The risk event - a stable condition for land described as a post-mining land use not being achieved - was assessed per ISO 31000 methodology described in Figure 20 above (the full risk assessment is included in (Appendix 10), where stable condition is defined as per section 111A of the EP Act:

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

For RMI the PMLUs being assessed are cattle grazing, woodland habitat and watercourse (Section 3).

A number of scenarios were identified in the risk identification process related to a stable condition for the land described as the PMLUs not being achieved:

- Landform failure
- Alteration of hydrogeological conditions
- Alteration of surface water systems
- Alteration of flood hydrology
- Insufficient, inadequate or inappropriate soil and capping material required for rehabilitation activities
- Insufficient identification and management of waste characterisation
- Inadequate and/or inappropriate cover design (not applicable for RMI and therefore not assessed further)
- Inadequate and/or inappropriate revegetation
- Failure of TSF rehabilitation (not applicable for RMI and therefore not assessed further)
- Stability failure of rehabilitated void (not applicable for RMI and therefore not assessed further)
- Stability failure of underground mine workings (not applicable for RMI and therefore not assessed further)
- Deterioration of built infrastructure conditions

7.1.3 Risk analysis, evaluation and relevant treatments

The table included in Appendix 10 provides the full detail of risk analysis, risk evaluation and risk treatment for these scenarios. Worst case outcomes were assessed for each scenario, preventative and mitigating controls identified and from there a residual risk rating was calculated. The SMC likelihood and severity tables, as well as the outcomes of the residual risk rating (RRR) heat map ratings matrix are provided in Table 33, Table 34 and Table 35 respectively.

Table 34 SMC risk likelihood table

Likelihood Table			
Uncertainty	Frequency	Likelihood Factor	Guidance
Highly Likely	Likely to occur within a 1 year period	3	Event is expected to occur >80% of the time during a 5 year planning cycle
Likely	Likely to occur within a 1 - 5 year period	1	Event is expected to occur 60% to 80% of the time during a 5 year planning cycle
Probable	Likely to occur within a 5 - 20 year period	0.3	Event is expected to occur 30% to 60% of the time during a 5 year planning cycle

Likelihood Table			
Uncertainty	Frequency	Likelihood Factor	Guidance
Unlikely	Likely to occur within a 20 - 50 year period	0.1	Event is expected to occur 10% to 30% of the time during a 5 year planning cycle
Highly Unlikely	Not likely to occur within a 50 year period	0.03	Event is expected to occur <10% of the time during a 5 year planning cycle

Table 35: SMC risk severity table

Severity Table		
Severity Level	Descriptor	Severity Factor
5	Severe impact to the environment and where recovery of ecosystem function takes 10 years or more	1000
4	Serious impact to the environment, where recovery of ecosystem function takes between 3 and up to 10 years	300
3	Substantial impact to the environment, where recovery of ecosystem function takes between 1 and up to 3 years	100
2	Measureable but limited impact to the environment, where recovery of ecosystem function takes less than 1 year	30
1	Minor, temporary impact to the environment, where the ecosystem recovers with little intervention	10

Table 36: SMC residual risk rating (RRR) heat map

			Severity Level	S1	S2	S3	S4	S5
			Severity Factor	10	30	100	300	1000
Likelihood	Likelihood	Likelihood Factor	Timeframe	Residual Risk Calculation (with controls in place and effective)				
	Highly Likely	3	Within 1 year	30	90	300	900	3000
	Likely	1	Within 1-5 years	10	30	100	300	1000
	Probable	0.3	Within 5-20 years	3	10	30	90	300
	Unlikely	0.1	Within 20-50 years	1	3	10	30	100
	Highly Unlikely	0.03	Within 50 years	0.3	1	3	10	30

With controls in place and implemented effectively, the RRR for the identified risk scenarios of this risk event is deemed to be low (RRR of 3).

The risk treatments for each scenario that are necessary for achieving a stable condition for the land described as the PMLUs are shown below in Table 36.

Table 37: Necessary risk treatments identified to achieve a stable condition for the PMLUs

Aspect	Risk treatment
Risk event: 1. Landform failure	
Reasons for selecting treatment option	Greatest chance of stable condition being achieved considering the majority of the final landform is similar to pre-mining landform
Responsibility for plan: - Approval - Implementation	Mine Planning Operations
Proposed actions	Minimise slope angles Surface cover of vegetation to provide erosion resistance Rehabilitation monitoring and maintenance
Resource requirements	Available material inventory Equipment capabilities Survey Rehabilitation monitoring data
Performance measures and constraints	Tracking against completion criteria
Reporting and monitoring	Rehabilitation monitoring
Risk timing and scheduling	From commencement of rehabilitation activities to final achievement of PMLU
Risk event: 2. Alteration of hydrogeological conditions	
Reasons for selecting treatment option	Low potential for AMD issues Hydrogeological conceptual model indicates GDE's, if present, are associated with Alluvium and not regional aquifer that could be impacted by tailings drying cells and dams No voids, dams, permanent disposal of tailings, all infrastructure removed from site and contaminated land investigation/remediation/management at completion of operations
Responsibility for plan: - Approval - Implementation	EA Holder Execution Team
Proposed actions	Maintenance of existing monitoring bore network Monitoring at defined frequency

Aspect	Risk treatment
Resource requirements	Monitoring bores maintained and monitoring undertaken
Performance measures and constraints	Groundwater closure criteria
Reporting and monitoring	Monitoring at defined frequency Reporting under existing EA requirements
Risk timing and scheduling	Bi-annually
Risk event: 3. Alteration of surface water systems	
Reasons for selecting treatment option	No permanent disposal of tailings on-site No voids or underground workings Low AMD potential identified No alteration of the alignment of drainage lines or creeks required All infrastructure removed at completion of operations
Responsibility for plan: Approval Implementation	EA Holder Execution Team
Proposed actions	Monitoring of surface water flows when available
Resource requirements	Collection and analysis of samples
Performance measures and constraints	Surface water closure criteria and WQO
Reporting and monitoring	Monitoring when surface water flows are available Reporting under existing EA requirements
Risk timing and scheduling	During run off events
Risk event: 4. Contaminated land impacting on environmental receptors, rehabilitation and attainment of PMLUs at RMI	
Reasons for selecting treatment option	Contaminated land investigations will be completed at closure and hazardous material removed
Responsibility for plan: Approval Implementation	EA Holder Execution Team
Proposed actions	Contaminated land investigation at time of closure and surface water and groundwater monitoring to demonstrate risks are managed

Aspect	Risk treatment
Resource requirements	Suitably Qualified Consultant to undertake contaminated land investigation at closure and collection of surface water and groundwater samples
Performance measures and constraints	Attainment of surface water and groundwater closure criteria
Reporting and monitoring	Contaminated land investigation report and reporting of water quality as per EA
Risk timing and scheduling	Contaminated land Investigation at closure and water sampling as per PRCP monitoring program
Risk event: 5. Flooding influences on rehabilitation and RMI final landforms	
Reasons for selecting treatment option	Landforms to be removed out of the New Chum Creek alignment, any interaction of the landforms with flooding would require in the order of a 0.1% AEP scale event
Responsibility for plan: Approval Implementation	EA Holder Execution Team
Proposed actions	Inspection of rehabilitation areas and immediate surrounds post any flooding event that results in inundation
Resource requirements	N/A
Performance measures and constraints	No damage to infrastructure as a result of changes to flood regime or change to flood extent
Reporting and monitoring	Inspection post any extreme flood events
Risk timing and scheduling	Post extreme flood events
Risk event: 6. Rehabilitated landforms resulting in alteration of flood hydrology upstream and downstream	
Reasons for selecting treatment option	Raised landforms (haul road and rail line) and associated culverts to be removed out of the New Chum Creek 100m buffer zone. Peak flows to be returned to pre-operational conditions, reducing upstream flooding potential. Downstream mining lease also operated by BMC
Responsibility for plan: Approval Implementation	EA Holder Execution Team
Proposed actions	Inspection of rehabilitation areas and immediate surrounds post any flooding event that results in inundation

Aspect	Risk treatment
Resource requirements	N/A
Performance measures and constraints	No damage to infrastructure as a result of changes to flood regime or change to flood extent
Reporting and monitoring	Inspection post any extreme flood events Reporting under existing EA requirements
Risk timing and scheduling	Post extreme flood events
Risk event: 7. Insufficient, inadequate or inappropriate soil/spoil and capping material required for rehabilitation activities	
Reasons for selecting treatment option	Enables utilisation of site resources for greatest chance of stable condition being achieved
Responsibility for plan: Approval Implementation	Environment Operations
Proposed actions	Management of topsoil application during rehabilitation Topsoil, subsoil and spoil assessment by suitably qualified person to determine ameliorant and fertiliser requirements Rehabilitation monitoring
Resource requirements	Topsoil inventory Survey Rehabilitation monitoring data
Performance measures and constraints	Tracking against completion criteria
Reporting and monitoring	Rehabilitation monitoring
Risk timing and scheduling	From assessment of topsoil, subsoil and spoil to final achievement of PMLU
Risk event: 8. Insufficient identification and management of waste characterisation	
Reasons for selecting treatment option	The environmental risk posed by the mine waste is low: The vast majority of the spoil remaining on site (ROM pad and backfill material) has negligible potential for AMD; conservatively it has been assumed that 95% of the waste is non-carbonaceous with negligible AMD potential and that 5% is carbonaceous with low potential to generate AMD
Responsibility for plan: Approval	EA Holder Mine Planning Team

Aspect	Risk treatment
Implementation	Environment Team Execution Team
Proposed actions	Waste characterisation during operations if additional inert waste is used for major constructions (i.e. expanding ROM pad) Prioritise use of tertiary, weathered and non-carbonaceous material for backfill (i.e. avoid utilizing bulk carbonaceous waste, if discrete areas are identified during reshaping and re-handling)
Resource requirements	Data from waste characterisation
Performance measures and constraints	Tracking against milestone criteria
Reporting and monitoring	Rehabilitation monitoring
Risk timing and scheduling	From planning of bulk sample activities to final achievement of PMLU
Risk event: 9. Inadequate and/or inappropriate revegetation	
Reasons for selecting treatment option	Proposed revegetation seed mix is aligned to growth media, landforms and PMLUs. Revegetation species have been selected based those species known to occur within the surrounding environment as well as those species that have performed successfully on similar landforms, growth media and PMLUs at other sites.
Responsibility for plan: Approval Implementation	Environment Operations
Proposed actions	Management of topsoil application during rehabilitation Topsoil, subsoil and spoil assessment by suitably qualified person to determine ameliorant and fertiliser requirements Rehabilitation monitoring
Resource requirements	Rehabilitation monitoring data
Performance measures and constraints	Tracking against completion criteria
Reporting and monitoring	Rehabilitation monitoring
Risk timing and scheduling	From assessment of topsoil, subsoil and spoil to final achievement of PMLU
Risk event: 10. Deterioration of built infrastructure land conditions	
Reasons for selecting treatment option	Remediation of any contamination to occur during operations, no contamination expected to be remediated during rehabilitation
Responsibility for plan:	Environment

Aspect	Risk treatment
Approval Implementation	Operations
Proposed actions	Undertake a preliminary contaminated land assessment prior to the completion of the approved activities, conduct a detailed site investigation and develop remediation plan if required Rehabilitation monitoring
Resource requirements	Rehabilitation monitoring data
Performance measures and constraints	Tracking against completion criteria
Reporting and monitoring	Rehabilitation monitoring
Risk timing and scheduling	From commencement of activities to final achievement of PMLU

Relationship with PRCP Schedule

A risk-based approach has been adopted to develop the milestones in the PRCP Schedule. This is primarily driven by a residual risk rating. Should a risk event materialise, the additional proposed actions identified in this risk section will be implemented and, where necessary, adjusted accordingly (in line with the risk treatment identified in this section).

7.2 Rehabilitation trials

PRCP Guideline (Section 3.7.1)

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

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

The information requirements in this section will apply to all applicants, whether or not they are an existing

The rehabilitation outcomes are considered low risk and no rehabilitation trials will be conducted.

8. Monitoring and maintenance

PRCP Guideline (Section 3.8)

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

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

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

8.1 Milestone monitoring and schedule

The RMs and associated milestone criteria for RMI are detailed in Section 10.3. To demonstrate achievement of the RMs, as they relate to achieving the PMLUs of cattle grazing, woodland habitat and watercourse, a combination of the following approaches will be used:

- Rehabilitation reporting requirements (RM1 to RM9)
- Ongoing rehabilitation monitoring (RM10 to RM15), comprising of desktop and field-based assessments and associated reporting

These approaches are detailed in Table 38.

Table 38: Rehabilitation milestones with relevant reporting requirements

Milestone reference	Rehabilitation milestone	Reporting requirements
RM1	Infrastructure decommissioning and removal	Undertake visual inspections Document inspections
RM2	Remediation and/or management of contaminated land	Documentation by a suitably qualified person confirming the land does not present an unacceptable risk to proposed future land uses or the environment
RM3	Landform development and reshaping	Survey/LiDAR of landform Analyse final landform against design Documentation of riverine and/or operation works permits or associated exemptions
RM4	Surface preparation (cattle grazing)	Survey/LiDAR of surface and extent after topsoil is placed Document topsoil depth

Milestone reference	Rehabilitation milestone	Reporting requirements
		Document soil assessment Document soil ameliorants and physical treatments applied
RM5	Surface preparation (woodland habitat)	Document spoil/subsoil assessment Document ameliorants and physical treatments applied
RM6	Surface preparation (watercourse)	Documentation of riverine and/or operation works permits or associated exemptions Document subsoil assessment Document ameliorants and physical treatments applied
RM7	Revegetation (cattle grazing)	Document seed mix, purity information, planting timing, planting rates and areas
RM8	Revegetation (woodland habitat)	Document seed mix, purity information, planting timing, planting rates and areas
RM9	Revegetation (watercourse)	Document seed mix, purity information, planting timing, planting rates and areas
RM10	Achievement of surface requirements (cattle grazing)	Undertake rehabilitation monitoring as per Sections 8.2 - 8.5
RM11	Achievement of surface requirements (woodland habitat)	Undertake rehabilitation monitoring as per Sections 8.2 - 8.5
RM12	Achievement of surface requirements (watercourse)	Undertake rehabilitation monitoring as per Sections 8.2 - 8.5
RM13	Achievement of post-mining land use to a stable condition (cattle grazing)	Undertake rehabilitation monitoring as per Sections 8.2 - 8.5
RM14	Achievement of post-mining land use to a stable condition (woodland habitat)	Undertake rehabilitation monitoring as per Sections 8.2 - 8.5
RM15	Achievement of post-mining land use to a stable condition (watercourse)	Undertake rehabilitation monitoring as per Sections 8.2 - 8.5

8.2 Rehabilitation monitoring

8.2.1 Reference sites

Condition E5 i) of the EA requires the identification of at least a minimum of three reference and three rehabilitation-sites. The recommended reference sites (Figure 21) include one site for watercourse vegetation -upstream from any disturbance; and two sites for woodland habitat. The exact location of the reference sites may vary due to site conditions when establishing in the field; however, the reference sites will be established in representative areas of the target PMLU vegetation communities and regional ecosystems. These sites will be used to assess the performance of impacts of seasonal and/or climatic variability on rehabilitation.

No reference sites will be included in the rehabilitation monitoring program for cattle grazing as the performance is based on standard methods for assessing pasture condition consistent with industry guidelines (unless identified as being required as per RM13(e)) (Stocktake: Balancing Supply and Demand https://futurebeef.com.au/workshops/sustainable-grazing/stocktake-balancing-supply-demand/_)

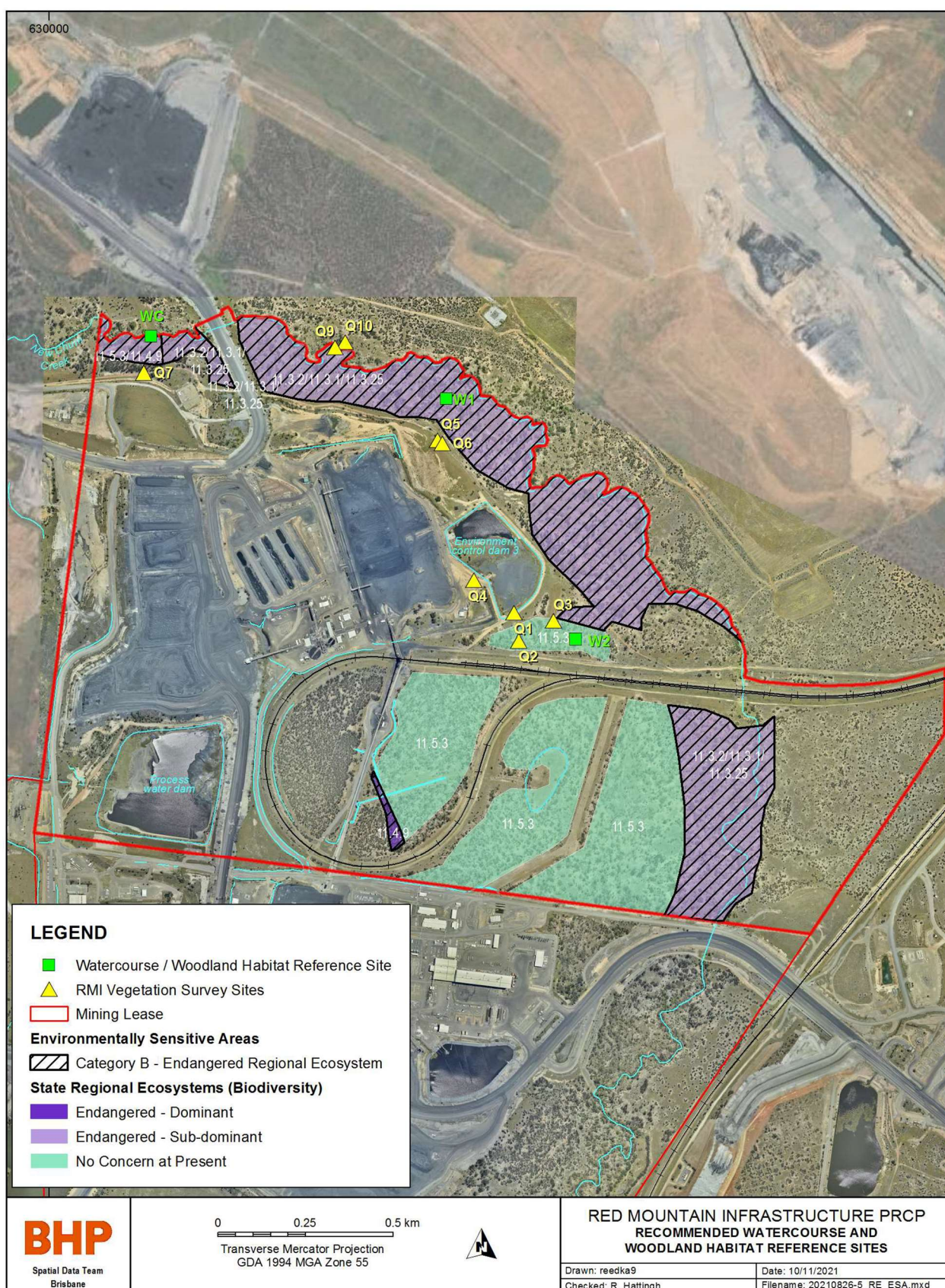


Figure 21: RMI recommended watercourse and woodland habitat reference sites

8.2.2 Monitoring schedule

The rehabilitation monitoring program has been designed to demonstrate achievement of surface requirements (RM10 - RM12) and PMLU to a stable condition (RM13 - RM15). The monitoring program follows a phased approach (Year 0, Year 1, Year 2 and every four years thereafter) to ensure greater accuracy and efficiency in data collection and analysis over time.

The ongoing and consistent phased approach of the monitoring program ensures that there is continual monitoring of rehabilitation parameters against milestone criteria up to the point of surrender of the EA. Table 38 shows how the monitoring schedule progresses over time (from Year 0) and the rehabilitation parameters monitored during each phase. This allows assessment of the performance and trajectory of the rehabilitation against milestone criteria and accounts for the influence of seasonal variations and extreme weather events over time.

Table 39: Monitoring schedule and measured rehabilitation parameters

Rehabilitation parameters	Monitoring schedule				
	Year 0	Year 1	Year 2	Year 6	Year 10+ (4 yearly thereafter)
All PMLUs					
Landform and erosion	Yes	Yes	Yes	Yes	Yes
Soil and spoil	Yes	X	Yes	Yes	Yes
Groundcover	Yes	□	Yes	Yes	Yes
Invasive plants	Yes	□	Yes	Yes	Yes
Cattle grazing					
Pasture species Richness	Yes	Yes	Yes	Yes	Yes
Pasture yield	X	X	Yes	Yes	Yes
Pasture condition	X	X	Yes	Yes	Yes
Grazing Land Suitability Assessment	X	X	X	Yes	Yes
Woodland habitat and watercourse vegetation					
Species richness	Yes	Yes	Yes	Yes	Yes
Tree density and basal area	X	X	Yes	Yes	Yes
Tree canopy and shrub cover	X	X	Yes	Yes	Yes
Recruitment	X	X	Yes	Yes	Yes

8.2.3 Monitoring sites

Permanent rehabilitation monitoring sites will be established at the start of the rehabilitation monitoring program (Year 0). The permanent sites will be assessed during all phases of rehabilitation monitoring.

The permanent field monitoring sites are selected prior to commencing any field monitoring work and are selected using the following criteria:

- Representative of rehabilitation slope
- Located in a lower slope position to capture maximum hydrologic and erosion processes
- Accessibility (vehicle access preferred)
- Located on mining lease or SMC owned land
- Low risk of site being disturbed by mining activity in the future
- At least one permanent rehabilitation monitoring site will be established in each RA.

8.2.4 General rehabilitation parameters

8.2.4.1 Landform and erosion

Landform and erosion are assessed as part of all monitoring phases.

Prior to commencing the field monitoring work, a desktop assessment using LiDAR data and aerial imagery will be completed to:

- Develop a Digital Elevation Model (DEM) to assess the rehabilitated slope against the landform design (Year 0)
- Identify new areas of potential erosion for field validation

Field-based erosion monitoring will be conducted at the permanent monitoring sites as well as any new areas identified in the desktop assessment.

The field survey involves establishing an erosion monitoring transect by running a 50m tape perpendicular to the slope and across the erosional activity identified during the LiDAR analysis.

8.2.4.2 Soil and spoil

Soil profile pits or cores within the rehabilitated areas will be established at the permanent rehabilitation monitoring sites during Year 0 monitoring. The parameters detailed in Table 39 are monitored during Year 0, Year 2, and every four years thereafter. Surface sampling refers to the layer at 0 – 10cm; and sub-surface sampling refers to layers at 10 – 30cm, 30 – 60cm and 90 – 100cm.

Table 40: Soil and spoil analysis parameters for RMI's monitoring program

Category	Analyte	Purpose of analyte	Depth		Monitoring phase	
			Surface	Sub-surface	Year 0	Year 2 (and every 4-years thereafter)
Acidity / alkalinity	pH	Identify anomalies that may affect plant growth and sustainability.	Yes	Yes	Yes	Yes
Salinity	EC	Identify leaching profile. High salinity can lead to poor vegetation germination and establishment, reduced plant growth and vigour.	Yes	Yes	Yes	Yes
	Chloride	Identify leaching profile. High chloride can lead to poor vegetation germination and establishment, reduced plant growth and vigour.	Yes	Yes	Yes	Yes

Category	Analyte	Purpose of analyte	Depth	Monitoring phase	
			Sub-surface	Year 0	Year 2 (and every 4-years thereafter)
Exchangeable cations	Cation exchange capacity (CEC)	Major factor in soil fertility. Controls soil stability, nutrient availability and buffers soil's chemical properties.	Yes	Yes	Yes
	Exchangeable cations	Exchangeable Calcium is linked to soil stability. High levels of exchangeable Magnesium can cause clay dispersion, instability when wet and hard setting.	Yes	Yes	Yes
	Exchangeable Sodium Percentage (ESP)	ESP is a measure of the dominance of sodium ions on the soil's cation exchange complex. Sodicity in soils can lead to slaking and dispersion which impact soil structure and stability.	Yes	Yes	Yes
Organic matter	Organic carbon	An indicator of soil nutrient stores and a contributor to improvements in soil structure. Changes through time in organic carbon are a key indicator of rehabilitation success.	X	Yes	Yes
Major elements	Total Nitrogen	Indicator of soil nutrient store and is also a major plant nutrient.	X	Yes	Yes
	Extractable Phosphorous (Colwell method)	Indicator of Phosphorous readily available to plants.	X	Yes	Yes
	Total Phosphorous	Indicator of total store of Phosphorous, some of which is readily available. Key indicator of potential for long-term success or failure of rehabilitation.	X	Yes	Yes
	Potassium	Important plant nutrient.	X	Yes	Yes
	Total Sulphur	Indicator of potential for Acid and Metalliferous Drainage processes.	X	Yes	Yes

Category	Analyte	Purpose of analyte	Depth		Monitoring phase	
			Surface	Sub-surface	Year 0	Year 2 (and every 4-years thereafter)
	Sulphate	Important plant nutrient, and can be an indicator of potential Acid and Metalliferous Drainage processes.	Yes	X	Yes	Yes
	Calcium	Important plant nutrient.	Yes	X	Yes	Yes
	Magnesium	Important plant nutrient.	Yes	X	Yes	Yes
Trace elements	Manganese	Trace element with minor importance for vegetation success.	Yes	X	Yes	Yes
	Iron	Trace element with minor importance for vegetation success.	Yes	X	Yes	Yes
	Zinc	Trace element important for vegetation success.	Yes	X	Yes	Yes
	Copper	Trace element important for vegetation success.	Yes	X	Yes	Yes
Metals	-	Metals that have been identified as occurring at elevated levels during material characterisation analysis should be tested during monitoring.	Yes	Yes	Yes	Yes
Physical parameters	Particle size (PSA)	Soil texture strongly affects water entry and storage. Soil texture will impact erosion and vegetation success, and should be considered when planning species mixes for planting.	Yes	Yes	Yes	X
	Emerson aggregate test	Indicator of clay dispersion. Should be interpreted in conjunction with ESP and EC data.	Yes	Yes	Yes	X
Field Analysis	Soil profile characteristics	Horizon depths, Field colour, Field texture, Structure, Root density and depth, Soil plant available water capacity (PAWC – initial only)	Yes	Yes	Yes	X

8.2.4.3 Groundcover

Groundcover is assessed at the permanent rehabilitation monitoring sites as part of all monitoring phases.

Groundcover type is recorded as either live cover (species recorded), standing dry cover, litter, rock, coal, fallen woody debris or bare ground, and percent cover calculated.

8.2.4.4 Invasive plants

An invasive plant is a prohibited or restricted matter under the *Queensland Biosecurity Act 2014*, and is defined as *a species that has, or is likely to have an adverse impact on a biosecurity consideration because of the introduction, spread or increase in population size of the species in an area*. A complete list of invasive plant species is outlined in schedule 4 of the *Biosecurity Regulations 2016*.

Invasive plants are assessed at the permanent rehabilitation monitoring sites as part of all monitoring phases.

The presence and percent cover of invasive plants, calculated as a percentage of the total vegetation cover, is recorded at each site.

8.2.5 Cattle grazing rehabilitation parameters

8.2.5.1 Pasture species richness

Pasture species richness is assessed at the permanent rehabilitation monitoring sites as part of all monitoring phases.

Species richness is classified into the number of preferred pasture species (identified as perennial grasses that are productive and palatable to stock) (3P), intermediate pasture species, undesirable and annual species occurring within the pasture including but not limited to those listed in Table 41.

Table 41: Preferred, intermediate and undesirable pasture species

Preferred species		Other intermediate species		Other undesirable species	
Scientific name	Common name	Scientific name	Common name	Scientific name	Common name
Cenchrus ciliaris*	Buffel Grass	Bothriochloa decipiens	Pitted Bluegrass	Aristida spp.	Wire Grasses
Heteropogon contortus	Black Spear Grass	Cynodon dactylon	Green Couch	Sporobolus spp.	Native Rat's Tail Grasses
Dichanthium sericeum	Queensland Bluegrass	Cymbopogon refractus	Barbwire Grass	Chloris divaricata	Slender Chloris
Chloris gayana cvv. Callide*	Rhodes grass				
Megathyrsus maximus *	Green panic				
Stylosanthes scabra*	Stylo				
Chamaecrista rotundifolia	Wynn cassias				

8.2.5.2 Pasture yield

Pasture yield and quality is assessed at the permanent rehabilitation monitoring sites from Year 2. This allows at least two seasons after seeding for pasture species to establish.

Pasture yield is assessed using percentage dry matter (DM) yield in kg/ha for preferred pasture species as well as the proportion of dry matter yield for annual grasses and undesirable grasses or weeds.

8.2.5.3 Pasture condition

Pasture condition is assessed at the permanent rehabilitation monitoring sites from Year 2. This allows at least two seasons after seeding for pasture species to establish. Pasture condition is assessed using preferred species diversity (Table 40), pasture health and pasture yield. Pasture condition ratings and criteria are shown in Table 41.

Table 42: Pasture condition assessment table

Condition rating	Condition indicators				
	Preferred pasture species		Annual grass % DM yield	Undesirable grasses and other weeds % DM yield	Preferred pasture species diversity
	% DM yield	Crown cover			
1	> 80 %	Dense and plants healthy	< 20 %	< 20 %	> 5 species
2	60 – 80 %	High to moderate density and some plants unhealthy	20 – 40 %	20 – 30 %	3 – 5 species
3	10 – 60 %	Moderate to low density and some plants dead	40 – 70 %	30 – 80 %	2 – 3 Species
4	< 10 %	Sparse and many plants dead	> 70 %	> 80 %	8 or 1 species

8.2.5.4 Grazing land suitability assessment

A land suitability assessment according to the grazing rule-set (refer to Section 3.1.1) is undertaken to track achievement of a PMLU of cattle grazing for the first time in Year 6, to ensure vegetation has had time to establish. If the rehabilitation fails to meet the completion criteria, another assessment will be undertaken during the next scheduled monitoring.

8.2.6 Woodland habitat and watercourse rehabilitation parameters

8.2.6.1 BioCondition assessment

BioCondition assessment is completed by an appropriately qualified person using the methodology outlined

in the Queensland Herbarium's BioCondition Assessment Manual version 2.2 and modified in accordance with section

6.1.8 Revegetation

If vegetation composition across the rehabilitation appears to have a high degree of spatial variability, it is likely that the monitoring site may not capture a representative species richness for canopy species (trees). In this case, it may be necessary to establish additional vegetation assessment sites across the rehabilitation – these will be identified and included in the monitoring program as rehabilitation monitoring proceeds over time.

8.3 Watercourse monitoring

Water quality monitoring will be undertaken in accordance with the DES Monitoring and Sampling Manual: Environmental Protection (Water) Policy, Brisbane: Department of Environment and Science Government (2018).

8.3.1 Surface water monitoring

As New Chum Creek is ephemeral and does not support base flows, the collection of surface water samples and assessment of surface water quality representative of discharges to receiving environments cannot be undertaken on a fixed schedule. Due to the temporal nature of the surface waters within the ephemeral drainagelines, rehabilitation-related surface water monitoring will need to be undertaken opportunistically during surfacewater runoff events.

Opportunistic surface water monitoring will be undertaken for the analytes listed in the EA conditions post-establishment of RM3, until the nominated PMLUs are achieved (Table 43 - RM13, RM14 and RM15).

The location of the surface water monitoring points for this opportunistic monitoring are illustrated in Figure 22 and summarised in Table 43. Other monitoring locations may be deemed necessary by BMC to demonstrate attainment of the milestone criteria – these will be identified and included in the monitoring program as rehabilitation monitoring proceeds over time.

Table 43: RMI surface water sample locations

Sample location	Approximate Easting/Northing	Description
RMISW01	E: 630183 N: 7563638	Upstream adjacent to lease boundary within New Chum Creek.
RMISW02	E: 631705 N: 7563046	Upstream from where surface water runoff from the majority of the rehabilitated operational areas discharges into New Chum Creek. Noting the presence of the Millennium Mine to the north of New Chum Creek, this location with sample location RMISW03 will assist with understanding the quality of surface water discharges from the RMI rehabilitated area.

Sample location	Approximate Easting/Northing	Description
RMISW03	E:631900 N: 7562898	Downstream from where surface water runoff from the majority of the rehabilitated operational areas discharges into New Chum Creek. Noting the presence of the Millennium Mine to the north of New Chum Creek, this location with sample location RMISW02 will assist with understanding the quality of surface water discharges from the RMI rehabilitated area
RMISW04	E:631910.38 N:7562017	Downstream lease boundary in New Chum Creek.

The surface water indicators and acceptance criteria detailed in Table E1 (Rehabilitation Requirements) of the EA have been adopted for the purpose of this PRC Plan. Surface water monitoring will be undertaken for pH, EC and turbidity and the milestone criteria will be 'not significantly different to upstream values'. To assist with the application of SMART principles for the evaluation of surface water results, Appendix 11 outlines the approach and statistical parameters to be adopted for determining *significantly different* at RMI.

8.3.2 Groundwater monitoring

Groundwater monitoring will be undertaken on the five existing monitoring bores (MB3A, MB3B, MB04, MB11A and MB11B - Figure 22) and any additional monitoring bores deemed required by BMC to evaluate the site's groundwater condition. Where required, these bores may be decommissioned and re-installed to allow final landform establishment.

Groundwater monitoring will be undertaken bi-annually with one monitoring event representative of the dry season and one monitoring event representative of the wet season each year. Groundwater monitoring will be continued for a minimum of five years from the time of final landform establishment. After five years of groundwater monitoring results indicating compliance with the monitoring plan and attainment of the milestone criteria, a review of the groundwater data will be undertaken by an appropriately qualified person to determine the need for (or not) further monitoring. Groundwater

monitoring, where required to demonstrate compliance with the milestone criteria, will be undertaken for the total monitoring duration nominated in Table 43 for the establishment of the PMLUs (RM13, RM14 and RM15).

The groundwater indicator (EC) and acceptance criteria detailed in Table E1 (Rehabilitation Requirements) of the EA have been adopted for the purpose of this PRC Plan.



Figure 22: Rehabilitation-related surface water and groundwater monitoring locations at RMI

8.4 Achieving monitoring across the PRCP schedule

As mentioned in Section 8.1, RM1 to RM9 will be subject to ongoing reporting requirements to ensure achievement of the associated milestone criteria. The timing of the rehabilitation milestones specific to *achievement of surface requirements* (RM10 – RM12) and *achievement of PMLUs* (RM13 – RM15), are listed in Table 44 and detailed in the section that follows.

Table 44: Time for achievement of surface requirements and PMLUs rehabilitation milestones

Rehabilitation milestone reference	Rehabilitation milestone	Milestone achievement timeline after revegetation (in PRCP schedule)
RM10	Achievement of surface requirements (cattle grazing)	10 years
RM11	Achievement of surface requirements (woodland habitat)	15 years
RM12	Achievement of surface requirements (watercourse)	15 years
RM13	Achievement of post-mining land use to a stable condition (cattle grazing)	15 years
RM14	Achievement of post-mining land use to a stable condition (woodland habitat)	20 years
RM15	Achievement of post-mining land use to a stable condition (watercourse)	20 years

8.4.1 Cattle grazing

Achievement of surface requirements for cattle grazing RM10, is proposed within a 10-year timeframe from revegetation. There are a number of factors which can influence the successful establishment of pastures on post-mined land including soils and landform, soil management and amelioration, species selection, sowing rates, and sowing timing plus rainfall. The revegetation plan has considered these elements, and allows a period up to 10-years to achieve RM10 for seasonal rainfall variation to successfully establish a pasture suitable for a PMLU of cattle grazing at RMI.

Achievement of PMLU to a stable condition for cattle grazing RM13, is proposed within a 15-year timeframe from initial revegetation. This includes the 10 years allowed for achieving RM10, plus an additional 5 years for achievement of RM13 (15 years). This will allow for sufficient time to demonstrate the ongoing sustainability of the PMLU for cattle grazing through additional rehabilitation monitoring data associated with landform, erosion, soils, vegetation, pastures, and surface water (Section 8.2.5).

8.4.2 Woodland habitat and watercourse

Achievement of surface requirements for woodland habitat RM11 and watercourse RM12 is proposed within a 15-year timeframe from revegetation. This allows for comparability to reference sites whereby rehabilitation will require development of multiple tree layers (canopy and shrub) as well as evidence of recruitment comparable to reference sites which would not be possible in <15 years.

Achievement of post-mining land use to a stable condition for woodland habitat RM14 and watercourse RM15 is proposed within a 20-year timeframe from revegetation. This includes the 15 years allowed for achieving RM11 and

RM12, plus an additional 5 years for achievement of RM14 and RM15. This allows for initial establishment and successional process, and senescence of *Acacia* and other pioneer species as well as natural recruitment to occur.

8.5 Maintenance

Maintenance will be implemented when monitoring identifies issues with the rehabilitation, or milestone criteria are not being met. In order to select the most appropriate remedial actions, the likely cause would be assessed. Contributing factors may be related to:

- Climatic conditions (i.e. droughts)
- Weed presence
- Poor drainage design
- Insufficient vegetation cover
- Influence of adjacent land use
- Soil type

Required rehabilitation actions are to be entered into BMC's work management system for actioning.

8.6 Data analysis and reporting

Rehabilitation monitoring data will be collected and analysed by an appropriately qualified person and assessed against the milestone criteria. The data will be analysed to identify changes and trends, as well as map the trajectory of rehabilitation to identify whether it is on track to achieve the milestone criteria or requires remedial actions or maintenance.

The rehabilitation data will be stored and processed within internal geospatial and document management systems.

8.7 Quality assurance and quality control

The quality assurance and quality control process to be followed as part of RMI ongoing rehabilitation monitoring is illustrated in Figure 23. The process provides for initial execution of the rehabilitation in accordance with the rehabilitation measures, followed by verification of how this execution was undertaken (again, according to these measures). Based on the verification outcomes, allowance is made for implementation of corrective action and/or maintenance, as needed (Section 8.5). The rehabilitated areas as well as corrected and/or maintenance areas then undergo further rehabilitation monitoring; and subsequent execution of the rehabilitation measures. This process allows for a repetitive execution-verification-monitoring QA/QC approach, to ensure rehabilitation areas progress on a trajectory towards achievement of milestone criteria and eventual certification.



Figure 23: Rehabilitation monitoring quality assurance / quality control process

Relationship with PRCP Schedule

SMC's rehabilitation monitoring program is designed to track rehabilitation performance over time to identify compliance to milestone criteria, identify remedial and maintenance actions, as well as ensure continuous improvement in rehabilitation methodologies.

9. References

The following references have been used to support development of the PRC Plan:

- SMC Coal (August 2020): Guideline for Climate Change Adaptation in Mine Water Planning and Hydrological Assessments – SMC Queensland. Ref. no. CTD-WTR-GLD-001
- SMC/Peabody (2014): Red Mountain Joint Venture Environment Management Plan ML70312. Brisbane, Australia
- BMA (2008): Daunia Mine Environmental Impact Statement
- Burnett Catchment Care Association (BCCA) (2014): North Burnett Riparian Revegetation Guidelines. Burnett River, Queensland
- Carroll, C and Tucker, A (2000): Effects of pasture cover on soil erosion and water quality on central Queensland coal mine rehabilitation, Tropical Grasslands, vol. 34, pp 254-262
- CDM Smith (2021): Hydrogeological Conceptual Site Model – Red Mountain Infrastructure Coal Handling and Preparation Plant, Coppabella, Queensland. 30 August 2021
- CDM Smith (2021): Preliminary Site Investigation (PSI) Red Mountain Infrastructure Coal Handling and Preparation Plant, Poitrel Mine Road, Coppabella, QLD, 4741
- Carroll, C. and Tucker, A. (2000): Effects of pasture cover on soil erosion and water quality on central Queensland coal mine rehabilitation, Tropical Grasslands, vol. 34, pp 254-262.
- Carroll, C, Merton, L and Burger, P. (2000): Impact of vegetative cover and slope on runoff, erosion, and water quality for field plots on a range of soil and spoil materials on central Queensland coal mines, Australian Journal of Soil Research, vol. 38, pp.313-327
- Davis MA, Wrage KJ, Reich PB (1998): Competition between tree seedlings and herbaceous vegetation: support for a theory of resource supply and demand. Journal of Ecology 86, 652-661
- Department of the Environment and Energy (DoEE) (2019): Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains. Canberra: Department of the Environment and Energy.
- Department of Environment and Science (2018): Monitoring and Sampling Manual: Environmental Protection (Water) Policy
- Engeny Water Management (2018): Poitrel Mine Flood Study
- Erskine, P.D. and Fletcher, A.T. (2013): Novel ecosystems created by coal mines in central Queensland's Bowen Basin, Ecological Processes, 2:33
- Isaac Groundwater Catchment from the Queensland Environment Protection (Water and Wetland Biodiversity) Policy (2019): Isaac River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (Part)

- Isaac Regional Council Planning Scheme (February 2021)
- Isbell, R.F. (1996): The Australian Soil Classification. CSIRO Publishing, Melbourne
- Kopittke, G., Mulligan, D, Grigg, A. and Kirsch, B. (2004): Development of reconstructed soils and vegetation communities at a central Queensland coal mine: a preliminary investigation of twelve years of monitoring, SuperSoil 2004: 3rd Australian New Zealand Soils Conference, 5 – 9 December 2004, University of Sydney, Australia
- Loch, R (2000): Effects of vegetation cover on runoff and erosion under simulated rain and overland flow on a rehabilitated site on the Meandu Mine, Tarong, Queensland, Australian Journal of Soil Research, vol.38, pp 299-312
- McCann, R. (2021): Soil and Capping Study for Transitional PRCP for the Red Mountain Infrastructure Project, GT Environmental Pty Ltd
- McDonald RC, Isbell RF (1990): Location in 'Australian soil and land survey handbook: field handbook (2nd edn). (Eds RC McDonald, RF Isbell, JG Speight, J Walker and MS Hopkins) (Inkata Press: Melbourne) pp. 5-7
- National Environment Protection Council (NEPC) (1999): National Environment Protection (Assessment of Site Contamination) Measure (Rev: 2013)
- Peabody (2008): Millennium Mine Environmental Impact Statement
- Queensland Department of Environment and Science (March 2021): Progressive Rehabilitation and Closure Plan Guideline, Queensland Government, Brisbane
- Queensland Department of Minerals and Energy (1995): Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland – Land Suitability Assessment Techniques. Environmental Protection Agency, Brisbane
- Queensland Department of Local Government and Planning (February 2012): Mackay, Isaac and Whitsunday Regional Plan
- Queensland Department of Primary Industries, Land Resources Bulletin QV91001
- Queensland Environment Protection (Water and Wetland Biodiversity) Policy (2019) Isaac River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (Part)
- Red Mountain Infrastructure Joint Venture RMIJV (2017): Topsoil Management Plan
- Red Mountain Infrastructure Joint Venture RMIJV (2014): CHPP Environmental Management Plan, RMJV_EM Plan August 2014 Final.pdf
- Sheridan, G., Loch, R., Carroll, C., Willgoose, G., Short, M. and Grabski, A. (1998): Post-mining landscape parameters for erosion and water quality control, ACARP Project Numbers C4011 and C5009, Australian Coal Research Limited, Brisbane
- Shields, P.G. and Williams, B.M. (1991): Land resources survey and evaluation of the Kilcummin area,

Queensland, Queensland Department of Primary Industries, Land Resources Bulletin QV91001

- Short, T. (2020): A rule-set for land suitability assessment of sustainable beef cattle grazing on land rehabilitated after open-cut coal mining in the Bowen Basin, Queensland Highlands Environmental, Emerald
- SKM (2004): Poitrel Mine Environmental Impact Assessment
- Spargo, A. and Doley, D. (2016): Selective coal mine overburden treatment with topsoil and compost to optimise pasture or native vegetation establishment. *Journal of Environmental Management* 182 342-350.
- Davis MA, Wragg KJ, Reich PB (1998) Competition between tree seedlings and herbaceous vegetation: support for a theory of resource supply and demand. *Journal of Ecology* 86, 652-661
- Wilson, P.R. & Taylor, P.M. (2012): Land Zones of Queensland, Queensland Herbarium, Queensland Department of Science, Information Technology, Innovation and the Arts, Brisbane

B: PRCP SCHEDULE

10. PRCP Schedule

Legislative Requirement

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

- k) describe the area of each resource tenure either a post-mining land use or non-use management area, and*
- l) for each post-mining land use state:

 - i. each rehabilitation milestone required to achieve a stable condition, and*
 - ii. when each rehabilitation milestone is to be achieved, and**
- m) for each non-use management area state:

 - i. each management milestone, and*
 - ii. when each management milestone is to be achieved, and**
- n) include maps showing the land mentioned in (a), (b) and (c).*

10.1 Final site design

The final site design for RMI, including maximum disturbance, tenure boundaries and the PMLUs, is shown in Figure 24.

10.2 Reference map

The RMI reference map showing the rehabilitation areas is shown in Figure 25.

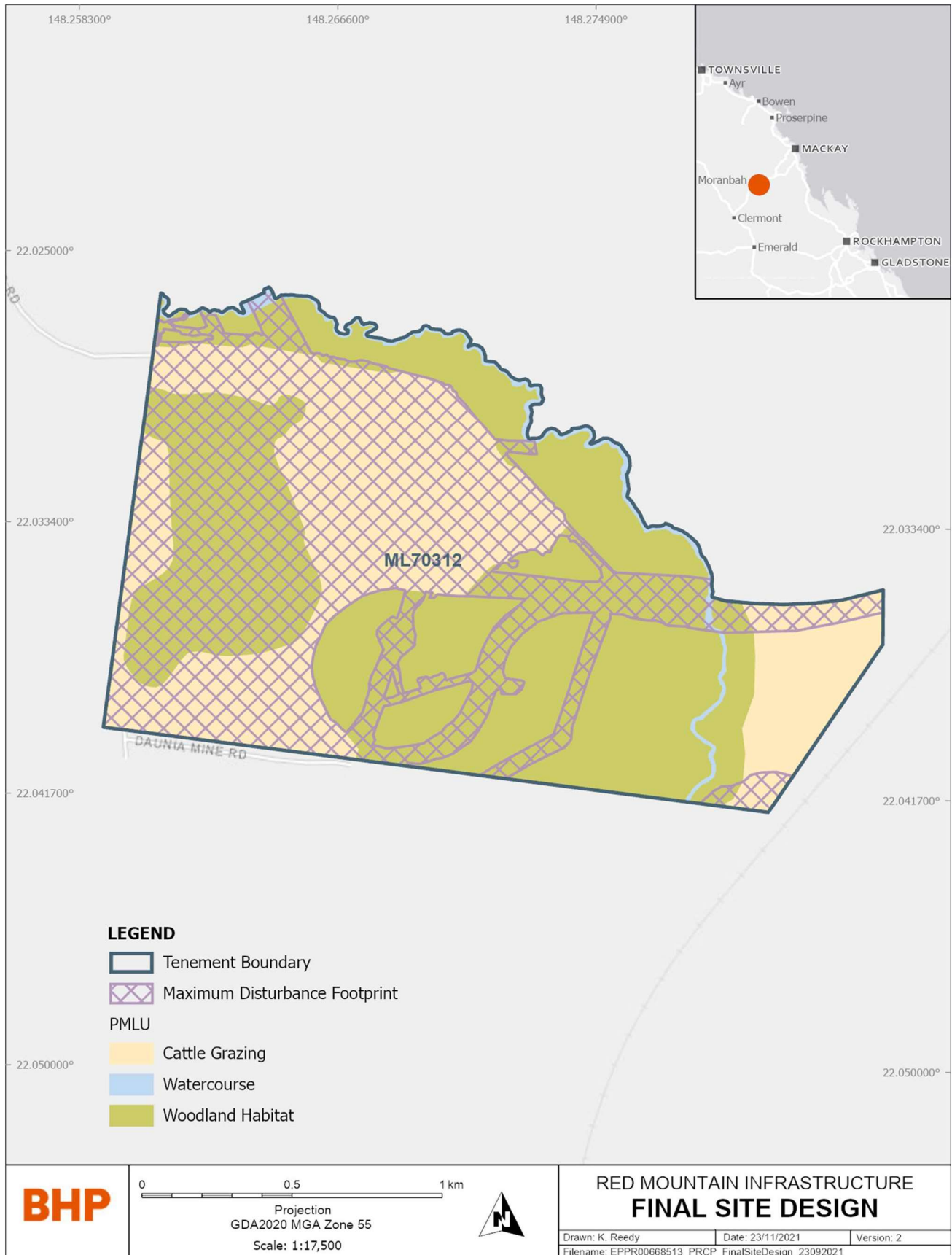


Figure 24: RMI final site design

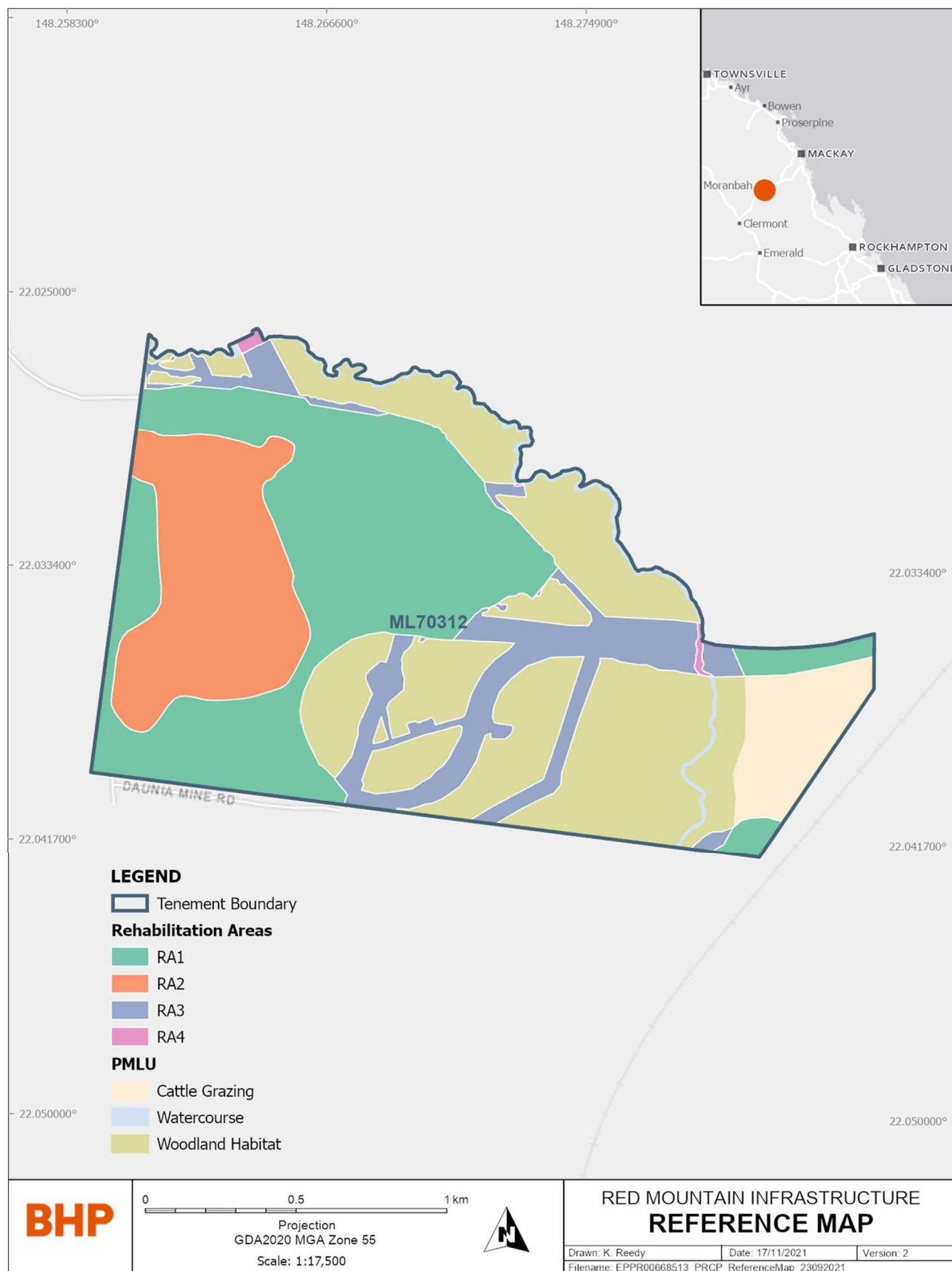


Figure 25: RMI reference map

10.3 Rehabilitation milestones

The rehabilitation milestones and milestone criteria for RMI are shown in Table 45.

Table 45: RMI rehabilitation milestones and milestone criteria

Milestone Reference	Rehabilitation milestone	Milestone criteria
RM1	Infrastructure decommissioning and removal	a) Services disconnected b) Built and service infrastructure demolished and removed (except where agreed in writing by the post-mining land owner/holder) c) Concrete, bitumen and aggregate removed d) Rubbish removed e) No more than 10% visible coaly and carbonaceous mineral waste on surface f) Water and sediment within dams removed g) Creek crossing culverts removed
RM2	Remediation and/or management of contaminated land	a) Contaminated land investigation completed by a suitably qualified person in accordance with the National Environment Protection (Assessment of Site Contamination) Measures and the Queensland Environmental Protection Act (1994) b) In the event that residual contamination has been identified and presents a potential unacceptable risk to the nominated PMLUs or environmental values, remediation works and/or implementation of management controls will be undertaken c) Where ongoing management of residual contamination is deemed appropriate, a draft Site Management Plan will be prepared for the administering authority's consideration
RM3	Landform development and reshaping	a) Tailings drying cells backfill completed b) Dams backfill completed c) Haul road and rail base material removed within 100m of New Chum Creek, and disturbed bed and banks returned to a profile similar to the pre-disturbance condition in accordance with associated riverine and/or operation works permits or associated exemptions (RA3, RA4) d) Landforms reshaped with maximum 10% slopes (RA1, RA2, RA3) e) Landform reshaped to be free-draining and consistent with surrounding topography

Milestone Reference	Rehabilitation milestone	Milestone criteria
RM4	Surface preparation (cattle grazing)	a) Topsoil is placed at an average thickness of 150mm b) An assessment of soil and growth media characteristics is completed by an appropriately qualified person¹, and amelioration and other treatments required identified c) Ameliorant and physical treatments are applied as identified in RM4(b) with the aim of achieving the following primary growth media target criteria²: 1. Surface pH 6 - 9.5 2. Salinity (EC1:5) <0.75 3. Sodicity (ESP) <6 - Total N >1,000 5. Available P >10 6. Available K >200 7. Organic Carbon >1 d) Rip across contour ¹Appropriately qualified person: a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relating to the subject matter using the relevant protocols, standards, methods or literature ²Target primary growth media criteria are provided as a post-ameliorant target. Initial soil analysis values may be outside of the displayed ranges.
RM5	Surface preparation (woodland habitat)	a) An assessment of growth media characteristics is completed by an appropriately qualified person¹, and amelioration and other treatments required to achieve the following target primary growth media criteria² 1. Surface pH 6 – 9.5 2. Salinity (EC1:5) <0.753 3. Sodicity (ESP) <6 4. Total N >1,000 5. Available P >10 6. Available K >200 7. Organic Carbon >1 b) Ameliorant and physical treatments are applied as identified in RM5(a) c) Rip across contour. ¹Appropriately qualified person: a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relating to the subject matter using the relevant protocols, standards, methods or literature ²Target primary growth media criteria are provided as a post-ameliorant target. Initial soil analysis values may be outside of the displayed ranges
RM6	Surface preparation (watercourse)	a) An assessment of growth media characteristics is completed by an appropriately qualified person¹, and amelioration and other treatments required identified b) Ameliorant and physical treatments are applied as identified in RM6(a) c) Sediment and erosion controls established in accordance with associated riverine and/or operation works permits or associated exemptions

Milestone Reference	Rehabilitation milestone	Milestone criteria
RM7	Revegetation (cattle grazing)	a) Completed seeding in accordance with recommended pasture mix (grasses, cover crop and legumes), and seeding rates (up to 25kg/ha) as listed in Table 26 as per Progressive Rehabilitation and Closure Plan - Red Mountain Infrastructure, Version 1.0, 6 January 2023
RM8	Revegetation (woodland habitat)	a) Target primary growth media criteria listed in RM5(a) are achieved based on a number of representative samples determined by an appropriately qualified person¹ b) Completed seeding using a selection of species outlined in: • RA2: Table 28 of the Progressive Rehabilitation and Closure Plan - Red Mountain Infrastructure, Version 1.0, 6 January 2023 • RA3: Table 29 of the Progressive Rehabilitation and Closure Plan - Red Mountain Infrastructure, Version 1.0, 6 January 2023 c) Seeding must be completed to achieve species richness required by the BioCondition scores outlined in RM14(b) and RM14(c) for RA2 and RA3 respectively. d) Completed seeding as per recommended sowing rates for individual species where possible and total recommended seeding rates for dominant tree species (5kg/ha), mid-storey species (5kg/ha), and groundcover species (5kg/ha) plus 5kg/ha of suitable cover crop (e.g. <i>Echinochloa esculenta</i>).

Milestone Reference	Rehabilitation milestone	Milestone criteria
RM9	Revegetation (watercourse)	a) Completed seeding in accordance with recommended species as listed in Table 30 of the Progressive Rehabilitation and Closure Plan - Red Mountain Infrastructure, Version 1.0, 6 January 2023 b) Completed seeding as per the recommended sowing rates for individual species where possible and total recommended seeding rates for upper bank (5kg/ha), mid bank (5kg/ha), and lower bank (5kg/ha) plus 5kg/ha of suitable cover crop (e.g. <i>Echinochloa esculenta</i>) as per Table 32 of the Progressive Rehabilitation and Closure Plan - Red Mountain Infrastructure, Version 1.0, 6 January 2023
RM10	Achievement of surface requirements (cattle grazing)	a) Pasture condition rating ≤ 3, based on the Pasture Condition Assessment Table as per Stocktake: Balancing Supply and Demand (https://futurebeef.com.au/workshops/sustainable-grazing/stocktake-balancing-supply-demand/), as provided in Table 27 of the Progressive Rehabilitation and Closure Plan - Red Mountain Infrastructure, Version 1.0, 6 January 2023, including: • Preferred pasture species (3P grasses²) diversity ≥ 2 species • Preferred pasture (3P) % DM yield 10-60% • Annual grass DM yield % $< 70\%$ • Undesirable grasses and other weeds % DM yield $< 80\%$ • Crown cover (3P grasses²) – at worst, moderate to low density and some plants dead ²3P grasses: native and naturalised exotic grass species that are perennial, palatable, and productive plants to stock
RM11	Achievement of surface requirements (woodland habitat)	a) Total invasive⁴ plant cover is $\leq 10\%$ ⁴Invasive plants: as listed under the Queensland Biosecurity Act 2014
RM12	Achievement of surface requirements (watercourse)	a) Revegetation species presence on upper banks, mid-banks and lower banks representative of sown seed mix as detailed in RM9 b) Groundcover³ is $> 80\%$ on banks c) Total invasive⁴ plant cover is $\leq 10\%$

Milestone Reference	Rehabilitation milestone	Milestone criteria
RM13	Achievement of post-mining land use to a stable condition (cattle grazing)	a) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use b) Groundcover >50% c) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 d) Deep drainage from the area is not significantly different to EC levels as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27, of: • the EPP (Water) schedule documents water quality objectives for relevant groundwater chemistry zones; or • local water quality objectives developed in accordance with the Queensland Water Quality Guidelines e) Land suitability class ≤ 3, or not different from pre-mining class if ≥ 4, as per Table 20 of the Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023. The assessment is to be conducted by an appropriately qualified person¹ and completed in accordance with LSA Framework for Open-Cut Coal Mine Rehabilitation 2018 (A rule-set for land suitability assessment of sustainable beef cattle grazing on land rehabilitated after open-cut coal mining in the Bowen Basin Queensland, unless otherwise agreed in writing between the administering authority and the environmental authority holder For RM13(e), if the land suitability class is assessed as being not different from pre-mining class if ≥ 4 for all or a portion of a rehabilitation area, an assessment of reference sites⁵ must be carried out to determine if the limitation/s resulting in the class of ≥ 4 is consistent with that of reference sites. f) Certification by an appropriately qualified person¹ that pasture meets a pasture condition rating ≤ 3, based on the Pasture Condition Assessment Table as per Stocktake: Balancing Supply and Demand (https://futurebeef.com.au/workshops/sustainable-grazing/stocktake-balancing-supply-demand/), as provided in Table 27 of the Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023 ⁵Reference site: representative undisturbed grazing land adjacent to the disturbance area

RM14	Achievement of post-mining land use to a stable	a) A BioCondition assessment is completed by an appropriately qualified person using the methodology outlined in the Queensland Herbarium's BioCondition Assessment Manual version 2.2 and modified in accordance with section 6.1.8 Revegetation of the planning part and displayed in Table 30: The assessable attributes and weightings for deriving the final BioCondition score b) For RA2, the BioCondition assessment required by RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.5.3 c) For RA3, the BioCondition assessment required by criterion RM14 demonstrates achievement of 50% of total maximum BioCondition score of undisturbed regional ecosystem 11.4.9 d) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use e) Rehabilitation of RA2 is assessed as geotechnically stable by an appropriately qualified person¹ with FoS$\geq$1.5, unless an alternative is justified by an appropriately qualified engineer f) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 g) Deep drainage from the area is not significantly different to EC levels as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27, of: - the EPP (Water) schedule documents water quality objectives for relevant groundwater chemistry zones; or - local water quality objectives developed in accordance with the Queensland Water Quality Guidelines
------	---	---

Milestone Reference	Rehabilitation milestone	Milestone criteria
RM15	Achievement of post-mining land use to a stable condition (watercourse)	a) A hazard assessment has been completed by an appropriately qualified person¹ to confirm safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use b) Groundcover on banks >80% c) Rainfall runoff from rehabilitation is not significantly different to upstream values for the following: pH, EC and turbidity as per Progressive Rehabilitation and Closure Plan – Red Mountain Infrastructure, Version 1.0, 6 January 2023, Appendix 11, Figure 27 d) Riparian vegetation consisting of an over-storey, under-storey and groundcover, comparable to an established watercourse reference site (Watercourse reference site: representative undisturbed grazing land adjacent to the disturbance areas)

B: PRCP Schedule

10 Schedule

The schedule is based on the land being rehabilitated as soon as practicable after the land becomes available, as required under section 126D(4) of the EP Act. For RMI, areas become progressively available once the coal processing is complete, with final land becoming available once train loading has ended.

Rehabilitation milestones RM1 – RM9 will be completed in the same time period for each RA, while completion of RM10 – RM15 is dependent on varying weather seasonality and undesirable weather periods. Achievement of rehabilitation milestones RM10 – RM15 will be demonstrated prior to the scheduled date if possible.

The proposed PRCP Schedule is provided on the following pages.

SMC

Post-mining land uses (PMLU)											
Rehabilitation area				RA1							
Relevant activities				Infrastructure, offices, laydown, roads, product coal stockpile, drying cells, dams, rail, topsoil stockpiles							
Total rehabilitation area size (ha)				96							
Commencement of first milestone: RM1				10/12/2036							
PMLU				Cattle Grazing							
Date area is available	10/12/36	10/12/39		10/12/49	10/12/51						
Cumulative area available (ha)	51	60		84	96						
Milestone completed by	10/12/39	10/12/42	10/12/49	10/12/52	10/12/54	10/12/57	10/12/62	10/12/64	10/12/67	10/12/69	
Milestone Reference	Cumulative area achieved (ha)										
RM1	51	60		84	96						
RM2	51	60		84	96						
RM3	51	60		84	96						
RM4	51	60		84	96						
RM7	51	60		84	96						
RM10			51	60			84	96			
RM13					51	60			84	96	

SMC

Post-mining land uses (PMLU)										
Rehabilitation area				RA2						
Relevant activities				ROM Pad						
Total rehabilitation area size (ha)				44						
Commencement of first milestone: RM1				10/12/2036						
PMLU				Woodland Habitat						
Date area is available	10/12/36									
Cumulative area available (ha)	44									
Milestone completed by	10/12/39	10/12/54	10/12/54	10/12/59						
Milestone Reference	Cumulative area achieved (ha)									
RM1	44									
RM2	44									
RM3	44									
RM5	44									
RM8		44								
RM11			44							
RM14				44						

SMC

Post-mining land uses (PMLU)										
Rehabilitation area				RA3						
Relevant activities				Rail, roads, topsoil stockpiles						
Total rehabilitation area size (ha)				33						
Commencement of first milestone: RM1				10/12/2036						
PMLU				Woodland Habitat						
Date area is available	10/12/36	10/12/51								
Cumulative area available (ha)	5	33								
Milestone completed by	10/12/39	10/12/54	10/12/59	10/12/69	10/12/74					
Milestone Reference	Cumulative area achieved (ha)									
RM1	5	33								
RM2	5	33								
RM3	5	33								
RM5	5	33								
RM8	5	33								
RM11		5		33						
RM14			5		33					

Post-mining land uses (PMLU)										
Rehabilitation area			RA4							
Relevant activities			Rail, roads							
Total rehabilitation area size (ha)			0.9							
Commencement of first milestone: RM1			10/12/2036							
PMLU			Water course							
Date area is available	10/12/36	10/12/51								
Cumulative area available (ha)	0.5	0.9								
Milestone completed by	10/12/39	10/12/54	10/12/59	10/12/69	10/12/74					
Milestone Reference	Cumulative area achieved (ha)									
RM1	0.5	0.9								
RM2	0.5	0.9								
RM3	0.5	0.9								
RM6	0.5	0.9								
RM9	0.5	0.9								
RM12		0.5		0.9						
RM15			0.5		0.9					

C: APPENDICES

Appendix 1: Red Mountain Infrastructure Environmental Authority EA (EPML00819113) (15 November 2019)

Appendix 2: Queensland Department of Environment and Science (3 December 2020): ProgressiveRehabilitation and Closure Plan Transition Notice. Ref. EPML00819113

Appendix 3: SMC (26 November 2020): Progressive Rehabilitation and Closure Plan BMC Red MountainInfrastructure - DES Pre-Notification Memo

Appendix 4: CDM Smith (30 August 2021): Hydrogeological Conceptual Site Model - Red MountainInfrastructure Coal Handling and Preparation Plant, Poitrel Mine Road, Coppabella, QLD, 4741

Appendix 5: GE Environmental (6 August 2021): Soil and Capping Study for Transitional PRCP for the RedMountain Infrastructure Project

Appendix 6: Queensland Government Department of Environment and Science Databases (Related toVegetation and Regional Ecosystems)

Appendix 7: Elliot Whiteing (November 2021): Red Mountain Infrastructure PRCP Community Consultation Planand Community Consultation Register

Appendix 8: SMC (12 September 2021): Red Mountain Infrastructure Progressive Rehabilitation and ClosurePlan Environmental Geochemical Characterisation and Risk Assessment of Mineral Waste

Appendix 9: CDM Smith (31 August 2021): Preliminary Site Investigation (PSI) Red Mountain InfrastructureCoal Handling and Preparation Plant, Poitrel Mine Road, Coppabella, QLD, 4741

Appendix 10: Red Mountain Infrastructure PRCP Risk Assessment MatrixAppendix 11: Approach to evaluating water milestone criteria

APPENDIX 10

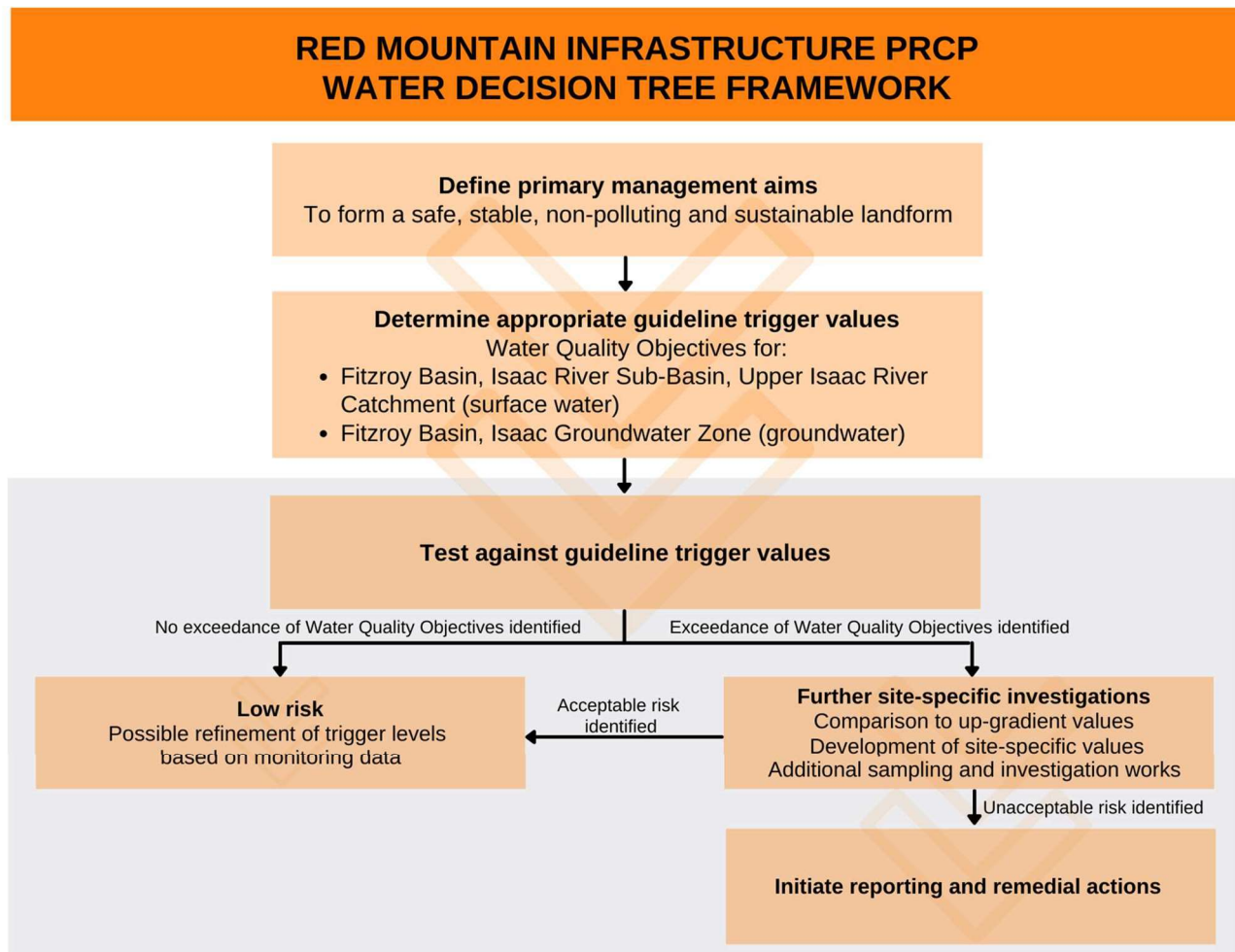
Red Mountain Infrastructure Risk Assessment
Progressive Rehabilitation and Closure Plan

Risk Event* (Unplanned/unwanted event)	Scenario #	Scenario	Causes (related to risk event)	Impact Description*	MFL Basis* (Absolute worst case scenario, with no controls in place)	Highest MFL Level	Mitigating Controls	Severity Impact Description* (taking into account the effectiveness of existing mitigating controls)	Highest Severity	Severity Factor	Preventative Controls	Likelihood Basis* (chance of the impact at the severity which is being used in the calculation of the RRR, taking into account the effectiveness of existing preventative)	Likelihood	Likelihood*	RRR
Stable condition (safe, stable, non-polluting and sustainable) for land described as a post-mining land (reference PMLU table E1 - cattle grazing, woodland habitat, water course) use is not achieved	1	Landform failure (Reshape of landform - 70% < 3% slope, free-draining)	1. Erosion instability 2. Geotechnical instability 3. Differential settlement (backfilled dams and drying cells) 4. Insufficient surface cover to maintain PMLU 5. Flooding and/or extreme weather events	- Erosion (including New Chum Creek) - Sediment transport - Topsoil loss - Failure of vegetation - Slumping and settlement - Mass movement of landform - Exposure of less desirable materials in the dump or backfill	Erosion 2x40m section of the creek impacted Take a year to remediate	2	- Monitoring of landform stability and rehabilitation success to be undertaken post operations to confirm stability and identify requirements for rectification works.	Monitoring identifies any failure and limits the time before repairs are scheduled.	1	10	- Minimise slope gradients of landform structures - Landform structures reshaped to be free-draining and blended in with surrounding area - Surface cover including vegetation to provide erosion resistance - Rehabilitation associated with New Chum Creek will include re-profiling of the landform consistent with surrounding bed and banks and revegetation with riparian species in accordance with riverine protection permits and/or operational works permits as required.	With all controls in place including ongoing monitoring and maintenance would mean that landform failure on a large scale for this landform is unlikely	Unlikely	0.1	1
Stable condition (safe, stable, non-polluting and sustainable) for land described as a post-mining land (reference PMLU table E1 - cattle grazing, woodland habitat, water course) use is not achieved	2	Alteration of hydrogeological conditions	1. Release of contaminants to groundwater 2. Change in groundwater recharge and discharge characteristics resulting in changes to the hydrogeological system (As there are no voids/underground workings or groundwater extraction on site, RMI closure landforms will not include significant influences on groundwater levels)	- Groundwater chemistry altered rendering it not suitable for extraction and use within PMLU - Degradation of stygofauna ecosystems, if present - Degradation of terrestrial and aquatic groundwater dependant ecosystems (GDEs) - Groundwater quality not supporting the establishment/maintenance of Environmental Values and Water Quality Objectives for the basins in which the site is located	Changes to the quality of groundwater aquifers that render water within the aquifers unsuitable for stock watering and maintenance of ecosystems. Groundwater treatment unlikely to be a feasible to return groundwater quality to condition similar to pre-impact in a MFL scenario. If this occurred: a Site Management Plan (prepared under the EP Act) may be required to manage groundwater impacts in the impacted area; landforms/rehabilitation designs may need to be altered; and existing groundwater bores may need to be relocated. Implementation of the SMP, design and implementation of landforms/rehabilitation and relocation of bores likely to take 1 to 3 years. Natural attenuation of groundwater impacts likely to take >10years.	3	- Assessment and remediation of impacted material, where appropriate - Development and approval of a Site Management Plan to assist with on-going management and restriction to future land use activities where appropriate - Implementation of management controls and monitoring programs outlined in an approved Site Management Plan - Re-establishment of impacted ecosystems and rehabilitation landforms - Decommissioning of impacted extraction wells and re-instatement in suitable location	Degradation of groundwater quality. Regional groundwater likely to report to surrounding mining voids acting as a sink (low risk receptor). Low AMD risks identified. Rehabilitated landforms will not be dominant influence on groundwater elevations. GDE's, if present, would be associated with the Alluvial perched aquifer which is not known to be beneath the operational areas of the site. Restriction to future site use could include: no groundwater extraction for stock watering, no construction of dams or other landforms that could increase generation of leachate, maintenance of cover material used to prevent complete exposure pathways; and restriction of rehabilitation species used to minimise potential uptake and bioaccumulation. This will not prevent attainment of PMLUs associated with grazing or woodland. Site Management Plan and other controls could be implemented within 1-3 years.	2	30	- All imported hazardous materials are to be stored and used in accordance with relevant standards and removed from site on completion of the processing works - At the completion of operations, all hazardous materials and infrastructure that have the potential to release contaminants to groundwater will be removed from site - Contaminated land investigation to be undertaken at the completion of operations to identify contamination that has the potential to cause impacts to groundwater - Implementation of remediation and/or management plans as required to reduce potential groundwater impact risks - Dams and tailing drying cells to be backfilled and contoured to minimise standing water and generation of leachate - Groundwater and ecosystem monitoring to be undertaken in accordance with EA conditions	Low potential for AMD issues identified. Existing monitoring data has not confirmed the presence of groundwater impacts that would currently impact future land uses or the receiving environments. GDEs if present would be associated with the alluvial aquifer beneath New Chum Creek, which is assumed to be perched and unlikely to be recharged by the regional aquifer (CDM Smith 2021).	Unlikely	0.1	3
Stable condition (safe, stable, non-polluting and sustainable) for land described as a post-mining land (reference PMLU table E1 - cattle grazing, woodland habitat, water course) use is not achieved	3	Alteration of surface water systems	1. Release of contaminants to surface water resources 2. Changes to alignments and ecosystems of drainage lines and creek 3. Changes to hydraulic flows 4. Changes to flood patterns/distribution 5. Alteration of surface water infiltration rates 6. Surface water flows over unvegetated/disturbed soils where rehabilitation has not re-established 7. Overland discharges from neighbouring landforms and rehabilitated areas	- Surface water chemistry altered rendering it not suitable for PMLU - Degradation of ecosystems and land uses connected to surface water flows and floodplains on and down gradient of the mine - Sedimentation of downstream surface water drainage lines resulting in changes to their hydraulic properties and impacting ecosystems - Surface water quality not supporting the establishment/maintenance of Environmental Values and Water Quality Objectives for the basins in which the mine is located - Accelerated erosion rates from surface water flows in disturbed areas and degraded ecosystems - Reduction in rehabilitation success rates due to reduced surface water quality - Alteration of soil properties associated with contaminants carried by surface waters, including erodability and geotechnical qualities	Changes to the quality and quantity of surface waters that render it not suitable for proposed final land use of grazing or results in degradation of ecosystems. If this occurred additional remediation, alteration of final landforms, or implementation of a Site Management Plan may be required. Alteration of landforms and implementation of Site Management Plan likely to take 1-3 years, and re-establishment of ecosystems and rehabilitation likely to take 3-5 years in MFL scenario.	3	- Surface water monitoring data to be collected in accordance with the EA. If impacts are identified, further investigations will be undertaken to determine appropriate remedial measures - Any loss of hazardous contaminants that cause contaminated land/environmental harm will be reported and investigated as appropriate - Remedial works will be undertaken where releases from site result in impacts to surface waters, which may include alteration of the landforms, implementation of a Site Management Plan, implementation of additional controls/measures that reduce the potential for surface water impacts and/or re-establishment of impacted ecosystems where appropriate	Low potential for AMD risks. Final landform does not include voids, waste dumps with AMD risks, tailing disposals or significant landforms with the potential for erosion. 100m buffer to the creek to be reinstated at the existing creek crossings. Rectification works to resolve factors contributing to surface water impacts likely to take less than 1 year.	2	30	- All imported hazardous materials to be stored and used in accordance with relevant standards and removed from site on completion of operations - Dams and drying cells will be backfilled / free draining - Surface water monitoring to be undertaken in accordance with EA conditions - 100 m buffer bordering New Chum Creek to remain and culverts associated with the haul road and rail to be removed from buffer - Monitoring of surrounding ecosystems will be undertaken in accordance with EA conditions - A contaminated land investigation will be undertaken at the completion of operations and remediation works undertaken as appropriate - Rehabilitation of disturbed areas will be undertaken as soon as practical after the completion of operations	AMD very low risk, final landform low risk and any infrastructure with potential to cause contamination and are to be removed at the completion of works. Culverts to be removed and creek alignments to be reinstated.	Unlikely	0.1	3
Stable condition (safe, stable, non-polluting and sustainable) for land described as a post-mining land (reference PMLU table E1 - cattle grazing, woodland habitat, water course) use is not achieved	4	Contaminated land impacting on environmental receptors, rehabilitation and attainment of PMLUs at RMI	Discharges and accumulation of hazardous contaminants from operational activities.	- Contaminants present within soil or water that present an unacceptable risk to the environment or PMLU - Failure of revegetation - Failure to attain closure criteria - Regulatory enforcement action - Active remediation and ongoing management requirement - Indefinite reduction in site suitability and/or contaminated land management MFL scenario potentially could include contamination that is not viable to remediate and requires indefinite on-going management. Remediation/installation of management measures (including capping, redesign of landforms and reinstatement of rehabilitation) could take between 5 to 10 years.	- Impact to surrounding and receiving ecosystems - Failure of landforms - Failure of revegetation - Failure to attain closure criteria - Regulatory enforcement action - Active remediation and ongoing management requirement - Indefinite reduction in site suitability and/or contaminated land management MFL scenario potentially could include contamination that is not viable to remediate and requires indefinite on-going management. Remediation/installation of management measures (including capping, redesign of landforms and reinstatement of rehabilitation) could take between 5 to 10 years.	3	- Cleaning up of spills upon identification - Investigate and remediate contamination incidents - Implement a Site Management Plan to manage impacts - Restrict site usage - Undertake ongoing monitoring to manage contaminated land risks	Investigation and remediation/management of contamination upon identification will reduce the risk of potential impacts. Contaminated land impacts that present an unacceptable risk to the environment or PMLU could be reasonably remediated/managed within 1 to 3 years.	3	100	- All hazardous materials including tailings and operational materials to be removed at closure - Contaminated land investigation to be undertaken at closure and areas of contamination remediated and/or managed as appropriate - On-going surface water and groundwater monitoring will provide an indication of contamination	The contaminated land investigation and remediation/management works will render the site suitable for the intended PMLUs and reduce the potential for any environmental harm. With operational sources of hazardous materials and all tailings removed from site, the likelihood of contaminated land impacts preventing attainment of closure criteria is highly unlikely.	Highly Unlikely	0.03	3

SMC

Risk Event* (Unplanned/unwanted event)	Scenario #	Scenario	Causes (related to risk event)	Impact Description*	MFL Basis* (Absolute worst case scenario, with no controls in place)	Highest MFL Level	Mitigating Controls	Severity Impact Description* (taking into account the effectiveness of existing mitigating controls)	Highest Severity	Severity Factor	Preventative Controls	Likelihood Basis* (chance of the impact at the severity which is being used in the calculation of the RRR, taking into account the effectiveness of existing preventative)	Likelihood	Likelihood*	RRR
Stable condition (safe, stable, non-polluting and sustainable) for land described as a post-mining land (reference PMLU table E1 - cattle grazing, woodland habitat, water course) use is not achieved	5	Flooding influences on rehabilitation and RMI final landforms	1. Water inundation of landforms 2. Saturation of materials within landforms 3. Velocities of floodwaters on rehabilitated landforms	- Reduction in geotechnical stability of landforms causing failure of the landforms - Activation of dispersive materials resulting in accelerated erosion and sedimentation - Mobilisation of any contaminants contained within the landforms and impacts to downstream water and groundwater quality - Alteration of terrestrial ecology through introduction of weeds, sedimentation, or damage to select rehabilitation species - Erosion of landforms due to increased velocities of flood waters - Introduction of weeds and impacts to rehabilitation vegetation establishment	MFL Scenario: Failure of landforms potentially resulting in: accelerated mobilisation of material; physical and ecological damage; spreading of weeds; failure of rehabilitation; failure to meet closure criteria and PRC plan schedules; damage to transport infrastructure; increased flooding of upstream catchments and damage to infrastructure/property. Landform failure, resulting in mobilisation of sediment could impact on-site and downstream watercourses through sediment deposition which in-turn impacts stream hydraulics and ecosystems. Rectification works could require re-establishment of the landform, watercourse rectification works and re-establishment of vegetation and ecosystems both on and off site. Conservative estimate of time required would be 3-5 years however absolute worst case scenario would be 5-10 years.	3	- Assessment of landform failure and required rectification works upon safe access to site immediately after the flood event. Assessment to include identification of measures that would limit potential for on-going impacts. - Re-engineering of landforms to mitigate future failures followed by re-construction of landforms, and rehabilitation works. - Assessment of downstream impacts and undertake remediation/rehabilitation as required to re-establish drainage line hydraulics and ecosystems in liaison with the administering authority.	Mitigation controls do not reduce Highest Severity	3	100	- Removal of all BMC infrastructure, decommissioning of dams and removal of tailings and other contaminated material where required for disposal off site - Re-establishment of landforms that are safe and stable with slopes ≤10% and at least 100m from New Chum Creek - Re-shaping of the ROM pad to reduce batter grades or implementation of other measures that stabilise the landform, where appropriate - Removal of the Millennium haul road and rail line fill material and culvert from the 100m New Chum Creek buffer zone - Fill dams and tailing drying cells to form free draining surface - Establishment of vegetation suitable for the environment and reduces erosion risks - Undertake monitoring for potential landform risks and undertake rectification works to attain PRC plan closure criteria	Preventative controls include returning rehabilitated landforms to a condition that is consistent with the pre-operational setting and will not include dams, voids or other structures that have a higher potential of failure during flood events. Therefore, the likelihood of the impacts associated with landform and rehabilitation failures due to flooding, is highly unlikely and not expected to occur within a 50 year period.	Highly Unlikely	0.03	3
Stable condition (safe, stable, non-polluting and sustainable) for land described as a post-mining land (reference PMLU table E1 - cattle grazing, woodland habitat, water course) use is not achieved	6	Rehabilitated landforms resulting in alteration of flood hydrology upstream and downstream	1. Changes to drainage network hydraulics. 2. Artificial landforms reducing or increasing flood extent and changing velocities/flows. 3. Changes to vegetation cover and soil type which alter runoff and infiltration rates.	Final landforms that reduce the capacity of floodplains, concentrate flows or alter hydraulics of drainage lines have the potential to alter flood regimes by changing flood extents/depths, velocities, durations and frequency. This scenario considers impacts to surrounding areas that could result from altered flood regimes including: - Increasing/decreasing of flood extents, frequency and severity - Degradation of floodplain ecosystems - Degradation of ecosystems which were not previously subject to flooding due to water inundation - Infrastructure damage - Impacts to surrounding mine site landforms from increased flood heights or flood velocities - Health and safety risks to on-site and off-site land users associated with increased flood heights, velocities and frequency	MFL scenario could include: flooding of surrounding mine voids; degradation of the geotechnical stability or damage to rehabilitation on surrounding landforms including waste dumps and diversions; damage to infrastructure or property on surrounding properties; product delivery interruptions passing through surrounding transport corridors; stock loss on grazing areas; health and safety risks to transport corridor users; damage to ecosystems; and damage to creek lines/hydraulics. Rectification works likely to take 1 to 3 years.	3	Due to the off-site nature of the impacts, which occur during significant flood events, available mitigating controls at the time of the impact are limited due to safety and accessibility restrictions. After flooding has receded, landform design and alteration could be undertaken to reduce possible future events.	Mitigation controls do not reduce Highest Severity	3	100	- Removal of all BMC infrastructure, decommissioning of dams and removal of tailings and other contaminated material for disposal off site. - Removal of culverts associated with haul roads/rail/access roads over New Chum Creek and within the buffer 100m zone to reinstate to a condition similar to pre-operational landform. - Establishment of landforms that are safe and stable - Undertake monitoring and maintenance works where required to maintain landforms.	With preventative controls implemented, identified impacts associated with alteration of flood hydrology are highly unlikely and not expected to occur within a 50 year period.	Highly Unlikely	0.03	3
Stable condition (safe, stable, non-polluting and sustainable) for land described as a post-mining land (reference PMLU table E1 - cattle grazing, woodland habitat, water course) use is not achieved	7	Insufficient, inadequate or inappropriate soil and capping material required for rehabilitation activities	1. Poor soil fertility 2. Unstable material (erosive, dispersive, saline materials) 3. Weed infestation 4. Disturbance by fauna (movement, burrowing, etc.) 5. Potential insufficient placement depth and surface treatment 6. Incorrect soil characterisation and amelioration requirements 7. Insufficient topsoil quantity 8. Inappropriate topsoil stockpiling and management	- Erosion - Sediment transport - Topsoil loss - Failure of vegetation (poor vegetation growth or incorrect vegetation affecting PMLU) - Saline run off from process areas into New Chum Creek	Total failure of vegetation in rehabilitation areas.	3	- Monitoring of soil and spoil profile and landform stability and rehabilitation success to be undertaken post operations to confirm stability and identify requirements for rectification works. - Repair erosion areas, retest soil and revegetate.	Monitoring identifies any failure and limits the time before repairs are scheduled.	1	10	- Initial topsoil survey, mapping and material balancing - Review the topsoil material balance periodically during operations to ensure sufficient volumes for the rehabilitation needs. - Undertake rehabilitation planning and preparation in accordance with the specific requirements for soil, seed and management for a grazing and woodland habitat PMLU - Management of topsoil stockpiles and application during rehabilitation. - Topsoil assessment by suitably qualified person to determine ameliorant and fertiliser requirements.	With all controls in place including ongoing monitoring and maintenance would mean that insufficient, inadequate or inappropriate soil for use on rehabilitation is unlikely	Unlikely	0.1	1
Stable condition (safe, stable, non-polluting and sustainable) for land described as a post-mining land (reference PMLU table E1 - cattle grazing, woodland habitat, water course) use is not achieved	8	Insufficient identification and management of waste characterisation	1. Poor material characterisation 2. Geochemistry not correctly defined for materials stored in permanent landforms 3. Inappropriate placement of adverse material 4. Poor landform execution 5. Inappropriate management strategy 6. Generation and release of AMD from coal processing waste and / or coal during operation accumulating in GW, SW, soils 7. Contaminants (including drying cells)	- Release of contaminants to surface and groundwater from rehabilitated landforms. - Vegetation failure - Water cannot be used by end user (human and ecosystem) - Erosion	Significant quantities of carbonaceous interburden/overburden in ROM pad leading to vegetation failure and impact to water.	3	- Monitoring of soil and spoil profile and landform stability and rehabilitation success to be undertaken post operations to confirm stability and identify requirements for rectification works.	Monitoring identifies any failure and limits the time before repairs are scheduled.	1	10	- Material characterisation during operations if additional infill is required for the ROM pad - Remove and / or cover undesirable materials and redo rehabilitation	With all controls in place including ongoing monitoring and maintenance would mean that insufficient, inadequate or inappropriate soil for use on rehabilitation is unlikely	Unlikely	0.1	1
Stable condition (safe, stable, non-polluting and sustainable) for land described as a post-mining land (reference PMLU table E1 - cattle grazing, woodland habitat, water course) use is not achieved	9	Inadequate and/or inappropriate revegetation	1. Unfavourable climatic conditions and/or weather events 2. Incorrect species mix 3. Poor seed quality 4. Weed contaminated seed 5. Poor quality topsoil or seed bed preparation 6. Erosion 7. Land contaminants	- Exposed soils due to poor vegetation establishment and growth, resulting in enhanced erosion rates. - Increased weed establishment and growth. - Reduction in land capability of PMLU (woodland habitat and/or grazing) - reduced availability of land for woodland habitat and / or grazing (erosion), as well as inhibited growth of preferred species - Need for ongoing corrective action - soil sampling and analysis, amelioration and re-vegetation.	Total failure of vegetation in rehabilitation areas.	3	- Monitoring of landform stability and rehabilitation success to be undertaken post operations to confirm stability and identify requirements for rectification works. - Repair erosion areas, retest soil, review seed mix and revegetate - Rehabilitation monitoring of revegetated native species and pasture species presence and abundance	Monitoring identifies any failure and limits the time before repairs are scheduled.	1	10	- Topsoil assessment by suitably qualified person to determine ameliorant and fertiliser requirements. - Management of seed selection and quality. - Plant at optimal time of year. - Revegetation species aligned to growth media, landforms and PMLU	With all controls in place, including revegetating with species aligned to growth media, landforms and PMLUs, as well as monitoring and maintenance activities, would mean that total failure of revegetation is unlikely.	Unlikely	0.1	1
Stable condition (safe, stable, non-polluting and sustainable) for land described as a post-mining land (reference PMLU table E1 - cattle grazing, woodland habitat, water course) use is not achieved	10	Deterioration of built infrastructure conditions	1. Potential soil contamination around mine industrial areas	- Reduced soil fertility to support PMLU land capability (woodland habitat and grazing). - Potential contamination of surface water runoff affecting integrity of local catchments.		1	- Undertake a preliminary contaminated land assessment prior to the completion of the approved activities, identify if any areas require a further Detailed Site Investigation and remediation plan developed if required. - Conduct ongoing maintenance		1	10	- Clean up and remediate contamination during operational period. - Undertake PSI contaminated land assessment post mining to identify any areas requiring further DSI	With all controls in place including ongoing monitoring and maintenance would mean that deterioration of built infrastructure is unlikely	Unlikely	0.1	1

For the purpose of the PRCP Schedule, the application of the nominated water milestone criteria will follow the decision tree framework approach outlined in Section 3.3 of the ANZECC/ARMCANZ 2000 Water Quality Guidelines (ANZECC/ARMCANZ (2000): Water Quality Guidelines (Section 3.3 Physical and Chemical Stressors) as shown below in Figure 26.



Source: Adapted from Figure 3.3 ANZECC/ARMCANZ 2000 Volume 1

Figure 26: Water decision tree framework (Adapted from ANZECC/ARMCANZ, 2000)

To evaluate compliance with the water quality related milestone criteria and to assist with the application of SMART principles, the following three step water data evaluation process will be undertaken.

Data Evaluation Step 1

This step will compare receiving environment/down gradient water monitoring results against the EPP Water Quality Objectives (WQOs) for the following:

- For surface water, the for the Fitzroy Basin, Isaac River Sub-Basin, Upper Isaac River Catchment; and
- For groundwater, the Fitzroy Basin, Isaac Groundwater Zone.

Sampling of surface waters will need to be undertaken opportunistically as outlined in Section 8.3.1. Should climatic conditions over extended periods prevent the collection of surface water samples due to insufficient flows at the nominated receiving environment sample locations, the site will not be in breach of the milestone criteria, as no significant surface water discharges would have occurred.

Surface water quality variability within the temporal waters is anticipated due to factors outside of the control of BMC, such as: weather patterns; upstream land user activities; frequency/magnitude of surface water flows; and condition of groundcover up gradient and within the catchment. Therefore, further evaluation of collected surface water data may be required in the form of Step 2 outlined below.

Groundwater monitoring is to be undertaken at the frequency and methodologies outlined within Section 8 of the PRC plan for the EA rehabilitation acceptance criteria of electrical conductivity. Where groundwater monitoring results indicate an exceedance of the WQO, further evaluation of the collected data may be required in the form of Step 2 outlined below.

Data Evaluation Step 2

This step will compare the independent populations of the receiving and background/up gradient environments. The evaluation will be undertaken through statistical evaluation to determine if the mean results of the independent populations are significantly different. For the purpose of determining significantly different, the following statistical approach shall apply:

- Independent Populations: up gradient mean and down gradient mean (over a maximum monitoring period of five years, sample locations shown in Figure 22).
- Null Hypothesis: up gradient mean = down gradient mean.
- Alternative Hypothesis: up gradient mean $\neq$ down gradient mean.
- Significance level: 0.1
- The statistical method to be utilised will account for the sample population size and the distribution of the data.

Where Data Evaluation Step 2 identifies a potentially significant difference between the up gradient mean and down gradient mean results, further evaluation may be deemed required in the form of Step 3 outlined below.

Data Evaluation Step 3

In accordance with the ANZECC/ARMCANZ water decision tree framework and the preferential approach to the derivation of site-specific toxicant guideline values, Step 3 includes additional investigation and development of site-specific criteria where a statistically significant difference between up gradient mean and down gradient environment sample locations is identified.

The development of surface water site-specific criteria will be undertaken using the Commonwealth of Australia guidance: Assessing and managing water quality in temporary waters¹². The development of groundwater site-specific criteria will be undertaken using the latest version of the Queensland Water Quality Guidelines.

The aim of Step 3 is to take into consideration the specific environment in which the site is located including a more thorough investigation of the receptors and potential risks associated with any identified exceedance. This step will require suitable data sets and to be undertaken by appropriately qualified persons.

Figure 27 provides a flow diagram of the approach to surface water data evaluation.

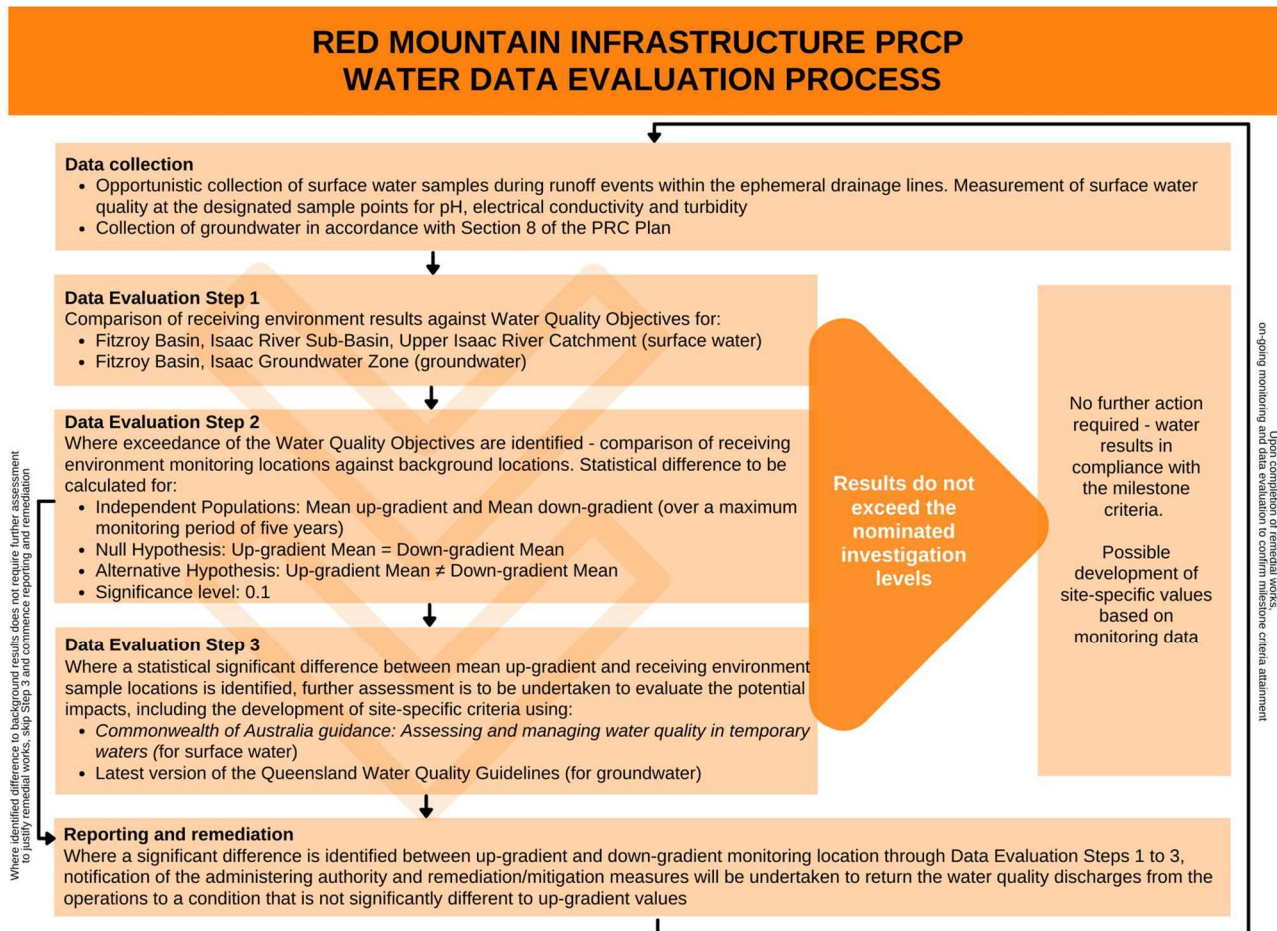


Figure 27: Red Mountain Infrastructure water data evaluation flow diagram