Whitehaven

Blackwater Mine

PROGRESSIVE REHABILITATION AND CLOSURE PLAN

Date: 16 October 2026

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1 Cover Page

As required by the Department of Environment, Tourism, Science and Innovation (DETSI) Application form '*Submission of a progressive rehabilitation and closure plan'* (ESR/2019/4957, Version 4.06, 05 November 2025), the following information is provided as a cover page to this Progressive Rehabilitation and Closure Plan (PRCP).

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Glossary of terms and abbreviations

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

Abbreviation	Description
3D	Three-dimensional
3P grasses	Native and naturalised exotic grass species that are preferred, palatable and perennial, (3P) plants to stock
Administering authority	As at the time of this PRC Plan submission, this is the Department of Environment, Tourism, Science and Innovation (Queensland)
AEP	Annual exceedance probability
AHD	Australian height datum
AMD	Acid and Metalliferous Drainage
ANC	Acid neutralising capacity
AQP	Appropriately qualified person (AQP): Means a person who has professional qualifications, training, skills and experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods or literature.
ARR	Australian Rainfall and Runoff
ASC	Australian Soil Classification
BioCondition	Refers to the BioCondition Assessment Manual (Eyre, T.J., Kelly, A.L, Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J. and Franks, A.J. (2015)) and *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland*. Assessment Manual. Version 2.2 (Queensland Herbarium, Department of Science, Information Technology, Innovation and Arts, Brisbane) or later versions thereof.
BOM	Bureau of Meteorology
BMA	BHP Mitsubishi Alliance - BM Alliance Coal Operations Pty Ltd (BMA)
BWM	Blackwater Mine
CCP	Community Consultation Plan
CEC	Cation exchange capacity
CHPP	Coal handling and preparation plant
CHRC	Central Highlands Regional Council
Closure Landform Design Report	Means a technical, AQP prepared and peer reviewed report that incorporates all relevant structures*, includes detailed landform designs, and is certified as being safe, erosionally and structurally stable, and appropriate for the PMLU, having regard to the material properties and local conditions as they apply to geotechnical and erosional stability risk. The currency of the report must be maintained, and the report updated and recertified as often as necessary, to ensure that the relevant structures will achieve a stable condition that can be sustained.

Abbreviation	Description
	**see relevant structures definition below for BWM specific relevant structures*
Contaminants	Can be a gas, liquid or solid; or an odour; or an organism (whether alive or dead), including a virus; or energy, including noise, heat, radioactivity and electromagnetic radiation; or a combination of contaminants.
Contaminated Land Auditor	A contaminated land auditor is responsible for auditing the work of the suitably qualified person (SQP) by evaluating and certifying site investigation and validation reports and drafting the site management plans that are submitted for a decision on a land contamination matter.
CQRP	Central Queensland Regional Plan 2013
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
CSM	Conceptual site model
DAP	Diammonium phosphate
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DEM	Digital elevation model
DES	Department of Environment and Science (Queensland) (the administrating authority between December 2017 to December 2023)
DESI	Department of Environment, Science and Innovation (Queensland) (the administrating authority between December 2023 to November 2024)
DETSI	Department of Environment, Tourism, Science and Innovation (Queensland) (the current administrating authority as of November 2024)
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
EMR	Queensland Environmental Management Register
EP Act	*Environmental Protection Act 1994* (Queensland)
EP Regulation	*Environmental Protection Regulation 2019* (Queensland)

Abbreviation	Description
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPP	*Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (Queensland)
ERA	Environmentally relevant activities (in terms of the *Environmental Protection Act 1994*, Queensland)
ERC	Estimated Rehabilitation Cost
ESA	Environmentally sensitive area
ESP	Exchangeable sodium percentage
FoS	Factor of safety
FRREMP	Fitzroy Basin Regional Receiving Environment Monitoring Program
GDE	Groundwater Dependant Ecosystem
GMA	Groundwater Management Zone
Groundcover	Means anything in contact with the soil surface including live cover, standing dry cover, organic litter (including leaves, hay, woody debris) or rocks.
Growth media	Soil and soil-like material that will support the final vegetation cover. This includes the topsoil and subsoil where these materials are applied independently. Where the topsoil is incorporated into the underlying subsoil/spoil, topsoil refers to the depth of incorporation, and the remaining depth is regarded as subsoil. The total depth of growth media is nominally considered to be the effective plant root zone
Gully	A gully is a channel excavated by water, more than 0.3 m deep.
ha	hectare = 10,000 m^2
IA	Improvement area *"…for a NUMA, means an area of land in the NUMA to which a management milestone for the NUMA relates"* (PRCP Guideline, 2024)
IDC	Index of Diversion Condition
Independent AQP	Is an AQP who is a third party, being independent of the PRCP schedule holder, and has not previously provided advice on the matter the subject of the review.
Independently peer reviewed	Means an AQP who is a third-party to the PRCP schedule holder and the AQP whose report is being reviewed and substantiated. The peer reviewer's documentation provided must contain sufficient detail to allow for further independent technical review and substantiation and provide and justify site-specific performance (SMART) criteria, if required.
IPD	In-pit dump
LEM	Landform Evolution Model
LGA	Local Government Area
LOD	Land outcome document

Abbreviation	Description
LSA	Land suitability assessment
MERFP Act	*Mineral and Energy Resources (Financial Provisioning) Act 2018* (Queensland)
MIA	Mine infrastructure area
MIBC	Methyl isobutyl carbinol
Milestone criteria	*"…for a management milestone or a rehabilitation milestone, means a requirement that must be met to achieve the milestone"* (PRCP Guideline, 2024)
Mine waste	Material comprising overburden, ± tailings, ± rejects, ± waste coal. Sometimes called 'mineral waste' or 'mining waste'
ML	Mining Lease
MM	Management milestone *"…for a NUMA, means each significant event or step necessary to achieve best practice management of the area and to minimise risks to the environment (section 112 of the EP Act)"* (PRCP Guideline, 2024)
MSES	Matters of state environmental significance
NAF	Non-acid forming
NATA	National Association of Testing Authorities
NC Act	*Nature Conservation Act 1992* (Queensland)
NMD	Neutral and metalliferous drainage
NUMA	Non-use management area
OOPD	Out-of-pit dump
Overburden	Mineral (mining) waste located above coal seams
PAF	Potentially acid-forming. Means material with either a Net Acid Producing Potential of greater than 5 kg of H_2SO_4/tonne or a Net Acid Generation oxidation pH of less than 4.5 (pH unit).
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
PMF	Probable maximum flood
PMLU	Post-mining land use *"…for land, means the purpose for which the land will be used after all environmentally relevant activities carried out on the land have ended (section 112 of the EP 1994)"* (PRCP Guideline, 2024)
PRC Plan	Progressive Rehabilitation and Closure Plan *"…for land the subject of an ineligible mining activity, means a progressive rehabilitation and closure plan for the land that consists of two parts – 1) the rehabilitation planning part – PRC Plan, and 2) the approved part - PRCP Schedule that includes milestones and conditions"* (PRCP Guideline, 2024)

Abbreviation	Description
PRCP Guideline	Progressive Rehabilitation and Closure Plan Guideline (2024) (DES, Queensland)
Product coal	Coal produced from the CHPP after being washed/processed. Coal that is ready for sale
PSI	Preliminary site investigation
QA/QC	Quality Assurance and Quality Control
Qld	Queensland
RA	Rehabilitation area *"…for a PMLU, means an area of land in the PMLU to which a rehabilitation milestone for the post-mining use relates"* (PRCP Guideline, 2024)
RE	Regional ecosystems
Rejects	Coarse sand to cobble-sized rock material produced during coal processing
Relevant structure	Overburden/spoil emplacements, waste rock dumps, tailings storage facilities, residual voids and flood protection landforms.
REMP	Receiving Environment Monitoring Program
Rill	A rill is a channel excavated by water, less than 0.3 m deep.
RM	Rehabilitation milestone *"…for the rehabilitation of land, means each significant event or step necessary to rehabilitate the land to a stable condition (section 112 of the EP Act)"* (PRCP Guideline, 2024)
ROM	Run-of-mine
RPEQ	Registered Professional Engineer of Queensland (RPEQ): Means a person who is registered under the *Professional Engineers Act 2002 (Qld)* and is competent in the relevant area of engineering practice for the matters being undertaken as required under the PRCP Schedule.
SIBERIA	A computer-based Landform Evolution Model (LEM) used for simulating long-term erosion and landform stability
SMART	Specific, measurable, achievable, reasonable/relevant, time-specific
SQP	Suitably Qualified Person (SQP): for performing a regulatory function under chapter 7, part 8 (Contaminated Land) of the EP Act or another function prescribed under a regulation, means a person who (a) has qualifications and experience relevant to performing the function; and (b) if a regulation prescribes an organisation for this paragraph—is a member of the organisation.
Stable	In relation to land, means landform dimensions are or will be stable within tolerable limits now and in the foreseeable future. Stability includes consideration of environmental context, geotechnical stability, settlement and consolidation allowances, bearing capacity (trafficability), erosion resistance and geochemical stability with respect to seepage, leachate and related contaminant generation.

Abbreviation	Description
Stabilised	Means one or both of the following conditions apply: no evidence of sediment movement; sides and/or floors of erosion form are revegetated (Australian Soil and Land Survey Field Handbook Fourth Edition).
Stable condition	See section 111A of the *Environmental Protection Act 1994*.
SPR	Source-pathway-receptor
Tailings	Very fine to medium grained sand, silt and clay-sized material produced during coal washing
TDS	Total dissolved solids
TEC	Threatened ecological communities
TLO	Train load-out
Transitional PRC Plan	*"…means the holder of an existing EA for an ineligible mining activity relating to a mining lease that is transitioning into the new PRC Plan framework"* (PRCP Guideline, 2024)
TSF	Tailings storage facility
TUFLOW	Two-dimensional Unsteady Flow
URBS	Unified River Basin Simulator
Vegetative groundcover	Means plants, plant litter, tree leaf litter, twigs and woody debris capable of protecting the soil surface from erosion.
VM Act	*Vegetation Management Act 1999* (Queensland)
Weed	a) Category 3 restricted invasive plant species, defined by the Biosecurity Act 2014; and b) Weeds of Natural Significance, defined by Invasive Plants and Animals Committee 2016, Australian Weeds Strategy 2017 to 2027, Australian Government Department of Agriculture and Water Resources, Canberra.
WEPP	Water Erosion Prediction Program
WQOs	Water quality objectives

2 Introduction

2.1 Purpose

Persons (including organisations) carrying out mining activities in Queensland are legally obligated to rehabilitate the land. In 2018, the Queensland Government introduced a package of reforms intended to improve rehabilitation and financial assurance outcomes in the Queensland resources sector.

A key part of these reforms was the introduction of the *Mineral and Energy Resources (Financial Provisioning) Act 2018* (Qld) (MERFP Act), which enacted new requirements under the *Environmental Protection Act 1994* (Qld) (EP Act) for the progressive rehabilitation and closure of mined land.

These new requirements included the obligation for mining operations to prepare a Progressive Rehabilitation and Closure Plan (PRCP), setting out how and where activities would be carried out in a way that maximises progressive rehabilitation, and defined the condition to which land was required to be rehabilitated.

The PRCP framework establishes a structured approach to planning progressive rehabilitation to a stable condition and articulating the required final land condition.

The PRCP is comprised of two parts:

1. A rehabilitation planning part (PRC Plan); and
2. The PRCP schedule.

This document constitutes the rehabilitation planning part for Blackwater Mine (BWM), also referred to as the 'site'.

The purpose of the rehabilitation planning part is to detail how progressive rehabilitation and closure will be carried out across the site (including rehabilitation and improvement activities, as relevant), having regard to the approved PRCP Schedule and the current mine planning context.

The rehabilitation planning part is not approved by the administering authority but must be submitted to support the PRCP Schedule. The PRCP Schedule is approved by the administering authority and operates separately from the Environmental Authority (EA). The PRCP Schedule is included in *Appendix 4.1 – PRCP Schedule*.

As stated in the PRCP Statutory Guideline (ESR2019/4964, Version 3.01, 16 September 2024) *"the EA authorises the carrying out of an environmentally relevant activity (ERA) and includes conditions to avoid, mitigate, or manage environmental harm that could occur during an activity. The PRCP schedule contains milestones and conditions that relate to the completion of progressive rehabilitation and mine closure. Both the EA and the PRCP schedule apply to the entire life of the mining activities, irrespective of when the underlying tenure expires. As per section 202E of the EP Act, where there is an inconsistency between an EA and a PRCP schedule the EA prevails to the extent of the inconsistency"*.

For new site-specific EA applications, applicants must submit a proposed PRCP as part of the EA application process. For existing EA holders, transitional provisions previously applied to enable the preparation and assessment of a PRC Plan and PRCP Schedule. For BWM, those transitional steps concluded with the approval of the PRCP Schedule (refer to Section 2.2 below for a brief historical summary).

2.2 PRCP Schedule approval timeline

On 2 April 2024, Whitehaven acquired BWM from BMA, and on 29 January 2025 the EA was successfully transferred by the administering authority from BMA to Whitehaven Blackwater Pty Ltd, NS Blackwater Pty Limited and JFE Steel Australia (BW) Pty Ltd.

Part 27, Chapter 13 of the EP Act sets out the transitional provisions following the commencement of the MERFP Act. Under these provisions, BM Alliance Coal Operations Pty Ltd (BMA) (former owners of BWM) were a 'mining EA holder' at the commencement of the MERFP Act, and therefore was "*the holder of an environmental authority (EPML00717813) for a mining activity relating to a mining lease authorising operations*" at BWM (section 750, EP Act). As BWM had an approved EA, the site fell under the ambit of the requirements of a transitional PRCP.

A Transition Notice for BWM was issued to BMA by the administrating authority, dated 13 December 2021. The Transitional Notice required submission of the BWM PRCP and PRCP schedule by 15 November 2024. On 2 April 2024, Whitehaven Blackwater Pty Ltd (Whitehaven) acquired BWM from BMA. At the time of the PRCP Version 1 submission, the transfer of the EA from BMA to Whitehaven had not yet been completed, however Whitehaven had authority from BMA to act as an agent on behalf of BMA in relation to submission of the PRCP.

On 11 November 2024, Whitehaven BWM submitted a PRC Plan and PRCP Schedule (Revision 1) application to the administering authority for assessment. On 25 November 2024, the Department of Environment, Tourism, Science and Innovation (DETSI) issued a *Not Properly Made (NPM) Application Notice*, outlining the reasons the application was considered not properly made and specifying the actions required to address the identified issues.

On 16 May 2025, following several DETSI meetings and correspondence regarding the NPM Notice, the PRC Plan, appendices, and the PRCP Schedule were revised to incorporate the additional information requested by DETSI.

On 13 June 2025, DETSI issued an *Information Request Notice* to Whitehaven, which requested further information be provided to DETSI to enable it to assess the PRCP application. A response to the information request was due by 19 December 2025.

On 19 December 2025, Whitehaven submitted a Change Application together with an updated PRC Plan and revised PRCP Schedule (Revision 2 submission). Following submission, Whitehaven and DETSI continued to consult on aspects of the PRC Plan and PRCP Schedule. On 17 April 2026, the administering authority issued a notice to Whitehaven advising of its decision to approve with conditions or amendments the proposed PRCP Schedule under section 172(3)(a) of the EP Act. All other amendments to the proposed PRCP Schedule were agreed to in writing by Whitehaven on 17 April 2026.

On 18 May 2026, Whitehaven submitted an updated PRC Plan to ensure alignment with the decided PRCP Schedule. On 19 May 2026 the finalised and signed PRCP Schedule was issued by the administering authority.

Accordingly, the transitional pathway concluded with the approval of the PRCP Schedule.

2.3 Scope

This revised PRC Plan (Revision 3) applies to BWM, a metallurgical coal mine located in the Bowen Basin, Queensland, operated by Whitehaven. BWM has pre-approved post-mine land uses (PMLUs) and express provisions for non-use management areas (NUMAs) to be a component of the concluded mine. These are addressed within the Land Outcome Documents (LODs) discussed in Sections 3.3.1.3, 3.4.1 and 3.5.1 of this PRC Plan. These were transitioned into the approved PRCP Schedule under Revision 2 (refer to Section 2.2). This revision primarily ensures alignment with the approved PRCP Schedule, while also incorporating targeted refinements to reflect updated mine planning, including the integration of the BNEP, and associated updates to the supporting technical studies.

For the purposes of the PRCP, BWM comprises the areas covering Mining Lease (ML) ML1759, ML1760, ML1761, ML1762, ML1767, ML1771, ML1772, ML1773, ML1792, ML1800, ML1812, ML1829, ML1860, ML1862, ML1907, ML70091, ML70103, ML70104, ML70139, ML70167, ML70329. This PRC Plan does not apply to other lands owned by Whitehaven or offset properties that do not contain ERAs.

This PRC Plan has been prepared for BWM in accordance with the requirements of the MERFP Act, the EP Act and the PRCP Statutory Guideline (DESI, 2024). Table 2-1 shows compliance with the requirements by listing the relevant sections in this PRC Plan addressing each requirement.

The PRCP schedule is included in Appendix 4.1 – PRCP Schedule.

2.3.1 Blackwater North Extension Project

The scope of this revised PRC Plan (Revision 3) includes the Blackwater North Extension Project (BNEP) (Project), which involves the extension of open cut mining operations to the north-east of the existing BWM mining area within ML1759 Surface Area (SA) 10 and ML1762 SA 7. The Project has an anticipated commencement date of around 2030.

The Project represents a logical continuation of existing operations at BWM and will utilise established site infrastructure, including the coal handling and preparation plant (CHPP), run-of-mine (ROM) and product coal stockpiles, tailings storage facilities, train load-out facility, water management and storage infrastructure.

The Project disturbance footprint is approximately 2,317 ha and is incorporated within the broader planning framework already considered under the approved PRCP Schedule. The Project includes open cut pits, waste rock emplacements, water management infrastructure, haul roads, access tracks and associated infrastructure.

The Project is expected to extend mining operations to approximately 2055 and facilitate extraction of approximately 200 Mt of additional ROM coal while maximising the use of established mining infrastructure. The Project would support ongoing employment, regional investment, royalty generation and broader economic activity within the Central Highlands and Queensland resources sector. It is anticipated that the Project would support approximately 2,250 direct operational positions by 2032, increasing to approximately 2,400 direct operational positions between 2033 and 2055.

The mine layout and sequencing have been designed to optimise resource recovery while minimising impacts to environmental values, including avoidance and management of sensitive features such as Taurus Creek (and tributaries) and the ecological values along its riparian corridor.

The precise mine sequence and layout may evolve over time in response to operational, geological and economic factors, consistent with the approved Environmental Authority.

The Project forms part of the operational footprint relevant to this PRC Plan. Rehabilitation obligations for the Project area are reflected in the proposed Appendix 4.1 – PRCP Schedule, including progressive rehabilitation of disturbed areas and development of a final landform consistent with the nominated post-mine land uses and or non-use management areas. Detailed design and mitigation measures to avoid or minimise environmental impacts associated with the Project are addressed in the relevant sections of this PRC Plan.

In addition, the incorporation of the BNEP results in changes to the extent and configuration of residual voids and associated NUMAs, with associated changes to the extent and configuration of residual voids and NUMAs relative to Revision 2 (refer to Section 3.4.2).

2.4 Historical transitional provisions

In accordance with the transitional provisions under the MERFP Act, existing rehabilitation and closure outcomes in LODs (as defined in section 750 of the EP Act) were historically transitioned into the PRC Plan and are now reflected in the approved PRCP Schedule. For BWM, the relevant LODs are listed below:

- EA (EPML00717813) – the primary LOD for BWM.
- Residual Void Investigation report (BMA, 2020) – secondary LOD for BWM.

In alignment with the transitional provisions and the PRCP Statutory Guideline requirements, rehabilitation and closure outcomes from the BWM LODs were transitioned into the BWM PRC Plan and PRCP Schedule through the following process:

- Identified rehabilitation and closure outcomes in the LOD (EA EPML00717813);
- Identified post-mining land uses (PMLUs) and non-use management areas (NUMAs);
- Mapped and defined rehabilitation areas within the PMLUs, and improvement areas within the NUMAs;
- Identified milestones to achieve the PMLUs and manage the NUMAs;
- Identified milestone criteria for showing success or completion of the PMLUs or NUMAs; and
- Identified when the first milestone must commence and completion dates for the milestones.

Following preparation of the proposed PRCP Schedule, Whitehaven and the administering authority (DETSI) engaged in negotiations to refine milestones, criteria and conditions, culminating in the administering authority's decision to approve the PRCP Schedule with conditions and amendments, which now govern the rehabilitation and closure requirements for the site.

2.5 Knowledge base refinement

Compilation of this PRC Plan has been supported by the rehabilitation and closure-related knowledge base for BWM at the time of this PRC Plan submission. Relevant studies contributing to this knowledge base have been referenced throughout this PRC Plan, with key resources provided in Section 4: Appendices and attachments.

As highlighted by the International Council of Mining and Metals (ICMM) in the Integrated Mine Closure Good Practice Guide, 2nd Edition (2019), "*the collection, updating, use and review of the knowledge base is considered an ongoing and iterative process over the mine life, and will be used to inform iterative refinement and improvement of the rehabilitation and closure planning process over time*". As the rehabilitation and closure knowledge base for BWM develops over the life of the operation, it will be used to inform the ongoing refinement of the plans for rehabilitation and closure, as well as this PRC Plan as required.

Any future updates will be undertaken in accordance with the PRCP framework and, where relevant, through amendment to the PRCP Schedule.

Table 2-1 Compliance with PRCP statutory guideline requirements

PRCP Statutory Guideline Requirements	Section in PRCP
3.1 PROJECT PLANNING	
Legislative Requirements In accordance with section 126C(1)(b) and (c)(ii) of the EP Act, the rehabilitation planning part of the PRCP must include a description of:	
• each resource tenure, including the area of each tenure	3.1.1.2
• relevant activities to which the application relates	3.1.4.1
• duration of relevant activities	3.1.4.1
• how and where the relevant activities were carried out, including maps	3.1.1.3
Baseline Information 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)	3.1.2.1
• climate (general and specific (rain, evaporation, temperatures)) including long-term projections	3.1.2.2
• geological setting	3.1.2.3, 3.1.2.4
• site hydrology and fluvial networks	3.1.2.6
• groundwater levels and properties	3.1.2.5
• soil types, properties and productivity	3.1.2.8
• land stability (pre-existing land degradation/erosion and predisposition to ongoing stability issues)	3.1.2.9
• vegetation communities and ecological data (including existing regional ecosystem mapping)	3.1.2.10
• fauna presence and populations	3.1.2.11
• pre-mining land use	3.1.2.12
• identification of underlying landholders	3.1.2.13
Project Description The project description must include the following details:	
• mining tenements	3.1.1.2
• primary mine features/infrastructure on site (e.g. TSF, waste rock dump, etc.)	3.1.1.3
• type of mining operation	3.1.1.4
• proposed duration of operation as a whole	3.1.1.5
Design for Closure	

PRCP Statutory Guideline Requirements	Section in PRCP
The rehabilitation planning part of the PRCP for new or expanding sites must include a description of how certain aspects have been designed for closure. To demonstrate that rehabilitation will be maximised for the mine site, the rehabilitation planning part of the PRC plan for new or expanding sites must include a description of how the following aspects have been designed for closure:	
• location of mine features/infrastructure	3.1.1.3
• size, shape and design of mine features/infrastructure (e.g. waste rock dump design)	3.6.1.5
• Mining methods (such as underground methods versus open cut)	3.1.1.4
Rehabilitation/Improvement Planning In order to meet the legislative requirements in 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	3.1.4.1
• the predicted duration of each of the relevant activities proposed for the mine site	3.1.4.1
• the size/extent of the relevant activities	3.1.1, 3.1.4.1
• whether the different relevant activities can be progressively rehabilitated	3.1.4.1
Applicability to Transitional PRCPs Under section 126C(1)(j) of the EP Act, transitional PRCPs must also include the following details about any existing rehabilitation already completed at the time of submission of the proposed PRCP:	
• a description of the rehabilitation works previously carried out	3.1.4.2
• when the rehabilitation works commenced and were completed	3.1.4.2
• whether the rehabilitation has been applied for or approved as progressively certified under the EP Act	3.1.4.2
Spatial Information The following spatial information must be submitted as part of the PRCP:	
• location and maximum extent of disturbance footprint for the mine life	4.1.1
• the PMLUs and NUMAs for the area within the resource tenures	4.1.1
• any sensitive receptors	4.1.1
• Spatial Information outlining the rehabilitation and improvement areas that correspond with the proposed PRCP schedule, for a 10-year period (minimum)	4.1.1
3.2 COMMUNITY CONSULTATION	
Legislative Requirement In accordance with section 126C(1)I(iii) and (iv) of the EP Act, the rehabilitation planning part of the PRCP must include:	
• details of the consultation undertaken by the applicant in developing the proposed PRCP, and	3.2, 3.3.2, 3.4.4, Appendix 4.4
• details of how the applicant will undertake ongoing consultation in relation to the rehabilitation to be carried out under the plan.	3.2.3, Appendix 4.4

PRCP Statutory Guideline Requirements	Section in PRCP
Note where there are land outcomes have been identified in a land outcome document, the applicant must include details of any previous community consultation undertaken or advise if previous consultation has not been recorded or is unknown. To comply with section 126C(1)(c)(iii) of the EP Act, the rehabilitation planning part must include a community consultation register identifying the consultation carried out in developing the PRCP. The community consultation register must include:	
• previous consultation (history of community engagement)	3.2, Appendix 4.4
• consultation date(s)	3.2, Appendix 4.4
• identification of each community member	3.2, Appendix 4.4
• description of consultation type (workshop, quarterly meetings, etc.)	3.2, Appendix 4.4
• information provided to the community	3.2, Appendix 4.4
• issues raised/discussed by the community	3.2, Appendix 4.4
• how issues have been considered	3.2, Appendix 4.4
• decisions/outcomes of engagement	3.2, Appendix 4.4
• commitments made by the applicant	3.2, Appendix 4.4
To comply with section 126C(1)(c)(iv) of the EP Act, the rehabilitation planning part must include a community consultation plan detailing how ongoing consultation will be carried out in relation to the rehabilitation to be carried out under the PRCP. The community consultation plan must include details of:	
• the objectives for community consultation	3.2.3, Appendix 4.4
• how the community will be engaged	3.2.3, Appendix 4.4
• proposed consultation frequency	3.2.3, Appendix 4.4
• what information will be released for community consultation	3.2.3, Appendix 4.4
• how feedback/comments will be considered	3.2.3, Appendix 4.4
3.3 POST-MINING LAND USE	
Legislative Requirements In accordance with section 126C(1)(d) of the EP Act, the rehabilitation planning part of the PRCP must state the extent to which each post-mining land use for land identified in the PRCP schedule for the plan is consistent with:	
a) the outcome of consultation with the community in developing the plan, and	3.2, 3.3.2
b) any strategies or plans for the land of a local government, the State or the Commonwealth.	3.2, 3.3.4, 3.4.5, Appendix 4.4
An applicant must propose a PMLU for all land within the relevant resource tenures of the EA (this includes land that will be undisturbed). Note where a PMLU has been previously addressed in a land outcome document and is able to be transitioned into the PRCP schedule, the applicant is not required to complete the information requirements under section 126C(1)(j) of the EP Act in this section for those PMLUs.	
The description of proposed PMLUs must include (where relevant), but is not limited to:	
• a description of the use of the land	3.3.3
• if applicable, the specific vegetation types (e.g. RE 13.2.9) or land suitability classification (e.g. Class 4)	3.3.3
• identification of any permanent or essential management infrastructure to be included as part of the PMLU	3.3.3, 3.6.5

PRCP Statutory Guideline Requirements	Section in PRCP
• success criteria for measuring whether the PMLU has been achieved successfully.	3.3.3
3.4 NON-USE MANAGEMENT AREAS	
Legislative Requirements 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 PRCP must:	
• state the reasons the applicant considers the area cannot be rehabilitated to a stable condition (g)	3.4, 3.4.1, 3.4.2, 3.4.3, 3.4.4
• include copies of reports or other evidence relied on by the applicant for each proposed non-use management area (h)	3.4.2, 3.4.3, 3.5.3, 3.6.1.1, 3.6.1.2, 3.6.3.3, 3.6.3.4, Appendix 4.2, Appendix 4.5, Appendix 4.14, Appendix 4.15, Appendix 4.16 and the EA
• 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 (d)	3.2, 3.4.4
• 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 (d)	3.4.5
Note 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, nor complete the information requirements under section 126C(1)(j) of the EP Act, for those NUMAs. Requirements under section 126C(1)(d) still apply.	
The proposed PRCP 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	3.4.2, 3.4.3
• any relevant safety features	3.4.2, 3.4.3
• success criteria for measuring whether the NUMA has achieved sufficient improvement (in which each of the following is minimised: ○ the risk of the area collapsing, eroding or subsiding; ○ the need to actively manage the area; and ○ access to the area by an animal or person by, for example, fencing the boundary of the area)	3.4.2, 3.4.3, 3.6.3.4, 3.6.3.5, 3.6.3.6, Appendix 4.1
3.5 VOIDS IN FLOOD PLAINS	
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.	
Note that section 754(3) excludes the operation of section 126D(3) and that a voids in floodplains assessment has been conducted to address section 3.4 of the PRCP Guideline which provides that the applicant is required to carry out flood plain modelling in circumstances where the location of the NUMA is not identified in the EA.	
PRCP Guideline (Section 3.4)	3.5, 3.5.4, 3.6.1.2.4

PRCP Statutory Guideline Requirements	Section in PRCP
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). 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 floodplain 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 floodplain 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 floodplain modelling in accordance with this section of the guideline.	
3.6 REHABILITATION AND MANAGEMENT METHODOLOGY	
Legislative requirement In accordance with section 126C(1)(e) and (i), the rehabilitation planning part of the PRCP 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.	3.3.3, 3.6, 3.8
• 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.	3.4.2, 3.4.3, 3.6.3, 3.8
Hydrogeology 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 hydrogeological assessment should include the following steps:	
• determining the groundwater occurrence including the existence of, and depth to, aquifers and aquitards	3.1.2.5.2, 3.6.1.1.3
• locating groundwater recharge and discharge locations locally and regionally	3.1.2.5.3, 3.6.1.1.3
• groundwater quality within each of the aquifers and from surface expressions (i.e. seeps and springs)	3.1.2.5.3
• current and potential future uses of groundwater including existing groundwater extraction bores	3.1.2.5.5
• groundwater flow direction and velocity, including field tests to determine hydraulic conductivity	3.6.1.1.4
• the development of potentiometric mapping and hydrostratigraphic cross-sections	3.6.1.1.4, 3.6.1.1.5
• groundwater modelling to determine contaminant transport and potential changes to groundwater level from dewatering or waste storage	3.6.1.1.4
Flooding In addition to floodplain modelling, 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.	
When assessing flooding, you must at least:	

PRCP Statutory Guideline Requirements	Section in PRCP
• consider the location of domains in relation to potential flood levels	3.6.1.2, Appendix 4.6
• consider alteration of flow upstream and downstream	3.6.1.2, Appendix 4.6
• model flood levels (including probable maximum flood levels) for a range of design storm events	3.6.1.2.1, Appendix 4.6
• develop a flooding risk profile	3.6.1.2.4, Appendix 4.6
Soil and Capping Material Assessment A soil assessment must be carried out that, at a minimum, identifies and characterises the following:	
• the quality and quantity of available resources (such as topsoil, clay material and competent rock) required to complete the target rehabilitation methodology	3.6.1.4.1, 3.6.1.4.2, Appendix 4.3
• the location (i.e. with respect to haul distance) and accessibility of cover material (i.e. is the material located on the tenure or are other approvals required?)	3.6.1.4.2 , 3.6.1.4.3
• an assessment to determine the need for ameliorants and fertilisers	3.6.1.4.3
• the relationship between soils and vegetation ecosystems for the PMLU and rehabilitation methodology	3.6.1.4.2
Waste Characterisation The rehabilitation planning part must include a description of the following:	
• Describe contaminants that can pose a risk to the environment, such as contaminants associated with AMD, neutral mine drainage and saline mine drainage	3.6.1.3.1, Appendix 4.7
• Demonstrate that the sampling regime meets best practice standards, is spatially representative of all material being mined (i.e. the ore body, exposed pit walls and overburden etc.) and is representative of all lithologies	3.6.1.3.2, Appendix 4.7
• Landform design must include a waste placement strategy	3.6.1.5.8, 3.6.1.5.12
• Describe how mine waste streams can be classified confidently based on environmental risk and management requirements	3.6.1.3.2
• Describe the generation of block models and estimation of the volume of mine waste based on waste type (i.e. level of environmental risk)	3.6.1.3.4
• Provide recommendations for the management and mitigation of waste streams to manage environmental risk and achieve proposed rehabilitation methods and objectives.	3.6.1.3.7
• Maintain a database to store the characteristics of each rock type	3.6.1.3.2
• Characterise materials based on both static tests and kinetic tests	3.6.1.3.2
• Conceptual site model for waste rock dumps, stockpiles, and TSFs must identify site-specific factors that may result in geochemical risks, including consideration of natural and anthropogenic processes that influence management controls	3.6.1.3.6
Landform Design The final landform design must include:	
• 3D design plans of the final landform	3.6.1.5.1
• method of determining landform design	3.6.1.5.2

PRCP Statutory Guideline Requirements	Section in PRCP
• modelling predicting the long-term stability of the final landform design	3.6.1.5.6, Appendix 4.8
• method of construction	3.6.1.5.7
• Quality Assurance/Quality Control (QA/QC) requirements	3.6.1.5.9
• trial methodology to verify the predicted success of the final landform design	3.6.1.5.10
• limitations and assumptions of the landform design	3.6.1.5.12
Key considerations of the landform design report must also include:	
• structure location, footprint and height (including proposed lift heights) – these factors may be influenced by location of environmental values, local topography, location of sensitive receptors or visual impact	3.6.1.5.2
• whether the structure requires a lining to prevent water or air ingress and minimise the potential for seepage release and/or a seepage collection system	3.6.1.5.2
• whether the landform is 'water-retaining' or 'water-shedding', considering rainfall patterns, and intensity, and the composition and texture of the waste	3.6.1.5.2, 3.6.1.5.4
• the identification of materials available for landform rehabilitation including their ability to achieve the required landform design outcomes	3.6.1.5.3, 3.6.1.4
• erosion assessments to determine landform heights, gradients, profiles, and material placement	3.6.1.5.6, Appendix 4.8
• slope profile design considering the interactions between soil erodibility, rainfall erosivity, landform height, gradient and vegetation cover to identify acceptable erosion rates over a long-term average	3.6.1.5.6, Appendix 4.8
• settling and subsidence over time, which may impact the availability of areas for rehabilitation	3.6.1.5.12
• hydrological and hydrogeological assessments	3.6.1.5.4
• a waste placement strategy developed to mitigate environmental and rehabilitation risks during the construction and decommissioning phase	3.6.1.5.9
• specific landform requirements committed to in stakeholder consultation, mine planning or other sources, which could include rock incorporation, designed flow paths, aesthetic considerations, non-linear batter slopes and targeted placement of materials	3.6.1.4.3, 3.3.2, 3.4.2, Appendix 4.4
• monitoring to determine performance of control measures (i.e. liners or seepage collection systems)	3.6.1.5.10, 3.8.1.3.2
Provide an analysis of future stability based on the factors described above (e.g. landform evolution modelling).	Appendix 4.8
Cover Design The cover design should include:	
• identification and specification of the objectives of the cover system	3.6.1.6.3
• a detailed description of the design including the thickness of each layer	3.6.1.6.4
• a detailed description of construction methodology including any proposed staging of the cover system	3.6.1.6.4
• a quantitative assessment that identifies the location and quantity of proposed capping material available on site	3.6.1.4.2, 3.6.1.5.3, 3.6.1.6.5

PRCP Statutory Guideline Requirements	Section in PRCP
• proposed QA/QC for the construction of the cover system including the timely implementation of corrective actions where deviations from the design are identified	3.6.1.6.7
Water Management 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	3.6.1.7.2
• source, pathway and fate of contaminants that have the potential to impact environmental values	3.6.1.7.2, 3.6.1.7.3
• infiltration and seepage intervention and collection controls	3.6.1.7.2
• surface water diversions and long-term management requirements	3.6.1.7.5
• dewatering requirements	3.6.1.7.7
• on-going water management and reduction requirements (i.e. treatment)	3.6.1.7.7
Revegetation The Revegetation Plan must propose activities to establish self-sustaining vegetation communities appropriate for the intended PMLU. The Revegetation Plan must:	
• propose activities to establish self-sustaining vegetation communities appropriate for the intended PMLUs	3.6.1.8
• Articulate revegetation objectives	3.6.1.8.1
• Identify key flora species appropriate for the PMLUs	3.6.1.8.5, 3.6.1.8.7, 3.6.1.8.9, Appendix 4.1
• Identify species of conservation significance	3.6.1.8.5, 3.6.1.8.7, 3.6.1.8.9
• Identify fauna habitat or use requirements, including monitoring and management plan	3.6.1.8.4
• Include evidence and justification for analogue sites of the monitoring plan	3.8.1.3.1
• Describe works for establishing and managing revegetation	3.6.1.8
• Identify appropriate plant/seed mixes and their source	3.6.1.8.4, Appendix 4.1
• Identify seed density application rate and timing of seeding	3.6.1.8.5, 3.6.1.8.7, 3.6.1.8.9, Appendix 4.1
• Identify proposed locations of any infrastructure required to protect revegetation	3.6.1.8.1, 3.6.1.8.2
• Identify the growth media suitable to sustain the PMLUs and their availability	3.6.1.4.1, 3.6.1.4.2
• Identify topsoil depth requirements	3.6.1.8.5, 3.6.1.8.7, 3.6.1.8.9 3.6.1.4.2, Appendix 4.1
The following elements must be included in the site preparation strategies:	
• the application and incorporation of ameliorants (if required for chemical balance) and bulk ameliorants such as gypsum, lime and other organic materials	3.6.1.4.3
• spreading of growth medium layer (topsoil, topsoil/rock mix, or suitable waste if appropriate) to a depth suitable for the target vegetation	3.6.1.4.3

PRCP Statutory Guideline Requirements	Section in PRCP
• the application of seed, fertiliser and, where applicable, irrigation.	3.6.1.4.3, 3.6.1.8
Tailings Storage Facilities The tailings require characterisation to determine the geochemistry, rheology and geotechnical parameters that influence the rehabilitation or management strategies and the capacity of the site to support revegetation.	
The geotechnical characterisation of tailings must also include:	
• Particle size distribution analysis based on conditions in the TSF. Particle size distribution of tailings affects their hydraulic sorting down the tailings beach and their settling, consolidation and desiccation on atmospheric exposure	3.6.2.2.3
• Specific gravity testing. The specific gravity of tailings affects their hydraulic sorting down the tailings beach, and their settling and consolidation	3.6.2.2.3
• Atterberg limit testing to determine the plasticity of the tailings, which affects their settling, consolidation and desiccation on atmospheric exposure	3.6.2.2.3
• The moisture content and dry density profiles with depth of the indicative tailings. The dry density profile indicates the efficiency to which the available storage volume for tailings is utilised. Rheological testing to determine the pumpability of the tailings	3.6.2.2.2, 3.6.2.2.3
• Settling testing of the tailings used as an indicator of the settling density of the tailings	3.6.2.2.3
• Shear strength testing of the indicative tailings, both peak and remoulded shear strengths. The shear strength profile of deposited tailings affect their bearing capacity on rehabilitation	3.6.2.2.2, 3.6.2.2.3
• Consolidation testing of the tailings to estimate their consolidated density and saturated hydraulic conductivity	3.6.2.2.3
• Soil water characteristic curve testing to assess the unsaturated behaviour of the tailings on desiccation and calculate the unsaturated hydraulic conductivity function	3.6.2.2.3
• Instrumented column testing of the tailings to assess their settling, self-weight consolidation and desiccation	3.6.2.2.3
• The design for a TSF must include relevant elements: ○ lining of TSF (i.e. embankments and base of structure) ○ leak detection systems ○ cellular design of TSF ○ seepage collection systems ○ design storage allowance ○ spillway location ○ designing TSF for progressive rehabilitation	3.6.2.1, 3.6.2.3
Voids For mine sites with voids, the rehabilitation planning part must include a void closure plan that includes, but is not limited to, the following:	
• options available for minimising final void area and volume (where a final void is proposed)	3.6.3.4
• proposed final dimensions of the void (i.e. depth, length and width)	3.6.3.2, 3.6.3.5

PRCP Statutory Guideline Requirements	Section in PRCP
• pit wall geotechnical and geochemical stability, considering the effects of long-term erosion and weathering of the pit wall and the effects of significant hydrological events	3.6.3.2.1, 3.6.3.2.2, 3.6.3.3.3, Appendix 4.14, Appendix 4.15
• proposed final slope angles of high wall, low wall and end walls of each final void	3.6.3.5, Appendix 4.14
• void hydrology, addressing the long-term water balance and water level in the voids, stratification connections to groundwater resources and potential for overflow	3.6.3.3
• groundwater modelling to determine whether the void is acting as a sink or a source for groundwater	3.6.3.3.2
• a water balance study including an assessment of void surface and groundwater interactions such as:	3.6.3.3.1
○ groundwater lowering/reduction in hydraulic head (from new voids e.g. caves/karst systems)	3.6.1.1.3, 3.6.3.3.2
○ cones of depression and associated impacts	3.6.3.3.2
○ the drainage and flooding behaviours of surface waters in the vicinity of the void	3.6.1.2
○ the potential extent of flooding and implications of interactions with the void	3.6.1.2
○ a conceptual model that incorporates all projected inflows, outflows, and recharge rates	3.6.1.5.4
○ water storage and long-term water balance	3.6.3.3.1, 3.6.3.3.2
○ each of the major water fluxes into and out of the void	3.6.1.1, 3.6.1.1.4, 3.6.1.7.3, 3.6.3.3.1, Appendix 4.2
○ the sources of surface water within the mine catchment that are likely to influence the water quality in the void	3.6.3.3, 3.6.1.7.2, 3.6.1.7.3
○ predicted water quality in the long term including potential stratification	3.6.3.3.3
• a 3D void design plan	3.6.3.1, 3.6.1.5.1
• rehabilitation strategies	3.6.1.4, 3.6.1.5.2, 3.6.3.4, 3.6.3.6
Underground mining The rehabilitation planning part must include:	
• a geotechnical study	3.6.4.2, Appendix 4.17
• an assessment of groundwater interactions and potential lowering of groundwater levels that includes: • consideration of the potential exposure of previously saturated geological formations to air - leading to AMD generation • consideration of measures to avoid or minimise groundwater discharges to the surface through appropriate mine access planning, including post mining sealing off of tunnels, shafts, adits, boreholes, and other openings	3.6.4.4, 3.6.4.5, Appendix 4.17
• the development of a hydrogeological conceptual model	3.6.1.1.5
• subsidence analysis and modelling and a subsidence vegetation/habitat impact assessment	3.6.4.3, Appendix 4.17, Appendix 4.18
• consideration of how potential entries to underground workings will be sealed (i.e. through some form of capping or back filling)	3.6.4.5, Appendix 4.1, Appendix 4.17

PRCP Statutory Guideline Requirements	Section in PRCP
• how surface ponding and cracking will be mitigated	3.6.4.3, Appendix 4.1, Appendix 4.17
• 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	3.6.4.2, 3.6.4.6, Appendix 4.1, Appendix 4.17
Built Infrastructure The rehabilitation planning part must include:	
• Identification of infrastructure that will be decommissioned and the methods for decommissioning	3.6.5.1, 3.6.5.2, 3.6.5.3
• A description of infrastructure that will remain post rehabilitation and the identification of ongoing maintenance requirements	3.6.5.1
• Evidence of agreement for any infrastructure that will have ownership transferred	3.6.5.1
3.7 RISK ASSESSMENT	
Legislative requirement In accordance with section 126C(1)(f) of the EP Act, the rehabilitation planning part of the PRCP 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.	
Identify sources of risk, areas of impacts, events and their causes and their potential consequences	3.7.1, Appendix 4.19
Determine causes and sources of risk, their positive and negative consequences, and the likelihood that those consequences can occur. The level of confidence in the analysis and any assumptions made should be clearly identified in the risk assessment	3.7.1, Appendix 4.19
Determine what risks need to be managed and prioritised.	3.7.1, Appendix 4.19
Risk treatment must detail:	
• the reasons for selecting the treatment option	3.7.1.3, Appendix 4.19
• those responsible for the approval and implementation of the plan	3.7.1.3, Appendix 4.18
• proposed actions	3.7.1.3, Appendix 4.19
• resource requirements	3.7.1.3, Appendix 4.19
• performance measures and constraints	3.7.1.3, Appendix 4.19
• reporting and monitoring requirements	3.7.1.3, Appendix 4.19
• timing and scheduling	3.7.1.3, Appendix 4.19
3.8 MONITORING AND MAINTENANCE	
• 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.	3.8
• 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	3.8.1, 3.8.1.2, 3.8.6
○ description of methodologies and standards, which could include field-based assessments and the application of new remote sensing, GIS and other relevant emerging technologies	3.8.1.3

PRCP Statutory Guideline Requirements	Section in PRCP
○ monitoring that enables the repeatable collection of relevant statistically valid data	3.8.1.2, 3.8.1.3, 3.8.1.4, 3.8.1.5, 3.8.2, 3.8.3, 3.8.4, 3.8.5, 3.8.6, 3.8.7, 3.8.8, 3.8.9, Appendix 4.1
○ monitoring using appropriate quality assurance and data management processes and systems	3.8.8
○ regular analysis of site data including multi-year comparison trends and bench-marking against analogue/reference sites	3.8.1, 3.8.1.2, 3.8.1.3, 3.8.6, 3.8.8
○ contingency strategies if monitoring data indicates milestone criteria are not being met	3.8.7, 3.8.9, Appendix 4.1
○ post-closure monitoring to ensure milestone criteria has been demonstrated	3.8.1.2, 3.8.9, Appendix 4.1
○ intent of monitoring reports, such as provision of results and key findings	3.8.7, 3.8.9, Appendix 4.1
• Describe the processes and activities that will be used to determine the biophysical state of rehabilitation and closure	3.8.9
• Standardised and repeatable approach to the measurement of certain biophysical attributes and processes must be identified that can be compared against the PRCP schedule	3.8.1.3
• If there has/is any monitoring or maintenance of areas already rehabilitated, details must be included in the PRCP	3.1.4.2

3 Rehabilitation planning part

3.1 Project planning

Legislative Requirement

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

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

PRCP Guideline

- *The following spatial information must be submitted as part of the PRC Plan:*
- *the location and maximum extent of disturbance footprint for the mine life*
- *the PMLUs and NUMAs for the area within the resource tenures*
- *any sensitive receptors.*

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

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

3.1.1 Project description

3.1.1.1 Geographic location

BWM is a metallurgical coal mine located approximately 20 kilometres (km) south-west of the town of Blackwater and 75 km to the east of Emerald in the Bowen Basin, Central Queensland (Qld) (Figure 3-1).

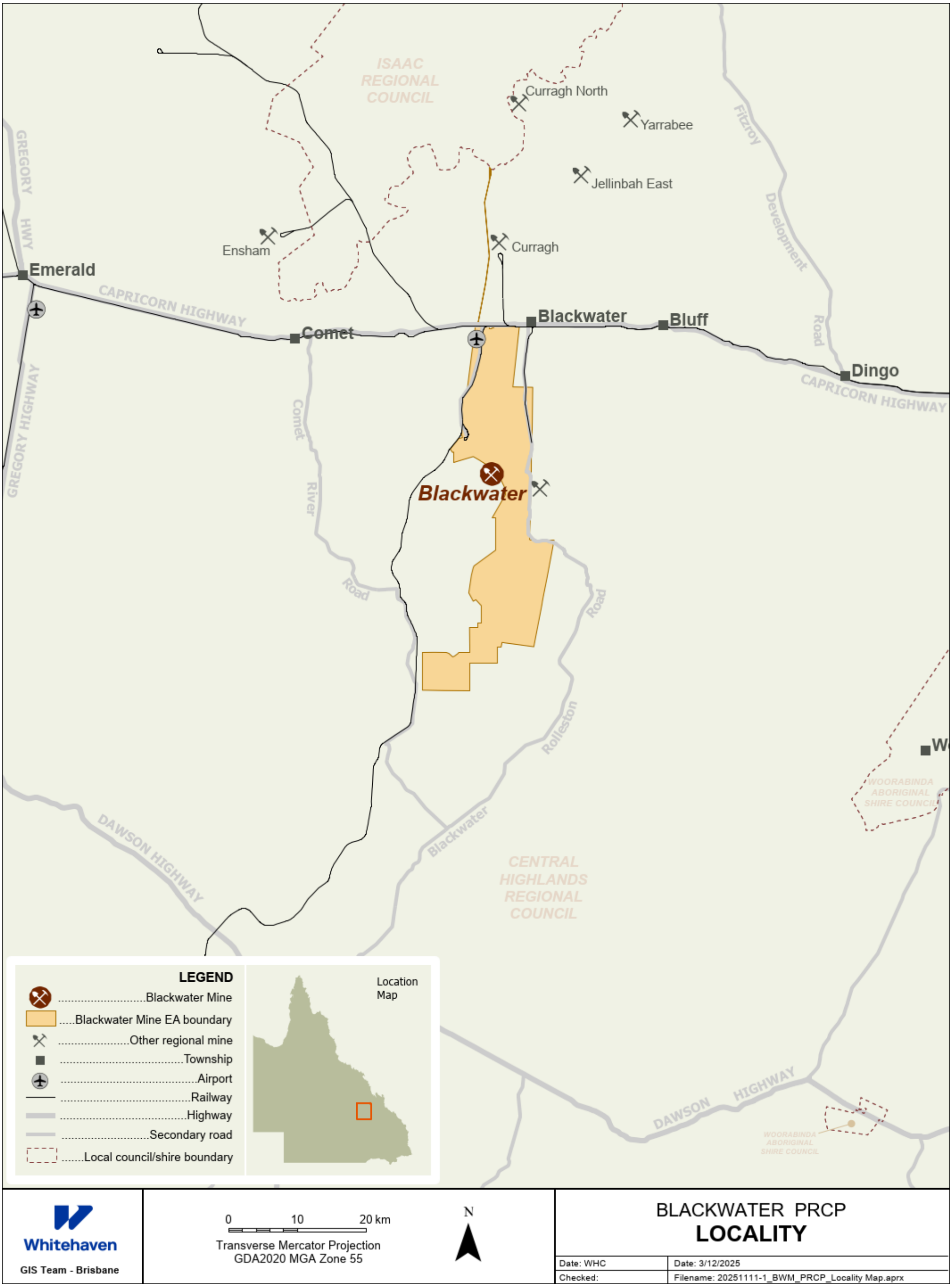


Figure 3-1 BWM location map

3.1.1.2 Mining tenements

BWM is located on 21 mining leases (MLs) as shown in Table 3-1 and illustrated in Figure 3-2.

Table 3-1 BWM mining tenements

Lease number	Permit name	Date granted	Total area (ha)	Lease expiry
ML1759	Blackwater Mine	2 December 1965	13,525	31-Dec-29
ML1760	Blackwater	1 January 1967	160.6	31-Dec-29
ML1761	Mackenzie River	1 February 1967	3.04	31-Jan-30
ML1762	South Blackwater	01 May 1969	7,248	31-Jul-32
ML1767	South Blackwater Mine	19 September 1968	1,140	31-Aug-33
ML1771	Sirius Creek	12 October 1978	7,209	31-Oct-20
ML1772	South Blackwater Mine	25 March 1976	77.6	31-Aug-33
ML1773	Laleham	25 September 1975	1,488	31-Aug-33
ML1792	Terang	15 January 1976	2,406	31-Jan-38
ML1800	Wilpeena Mining Lease	10 May 1979	200.3	31-May-21*
ML1812	Terang No. 2	28 September 1978	128	30-Sep-41
ML1829	Togara	22 March 1979	32	31-Mar-21*
ML1860	Togara No. 2	25 March 1982	666.6	31-Mar-24*
ML1862	Mimosa	25 March 1982	628.7	31-Mar-24*
ML1907	Marshmead	1 August 1981	844.4	31-Aug-33
ML70091	Western	23 June 1994	809.3	31-Aug-33
ML70103	Wilpeena West	17 August 1995	134.7	30-Sep-41
ML70104	Sugarloaf	4 July 1996	274.1	31-Jul-22*
ML70139	South Marshmead	24 October 2002	946.3	31-Oct-23*
ML70167	Buckles	31 January 2002	3,754	31-Jan-23*
ML70329	Comet	9 August 2009	324.5	31-Aug-37

*Mining lease renewals have been

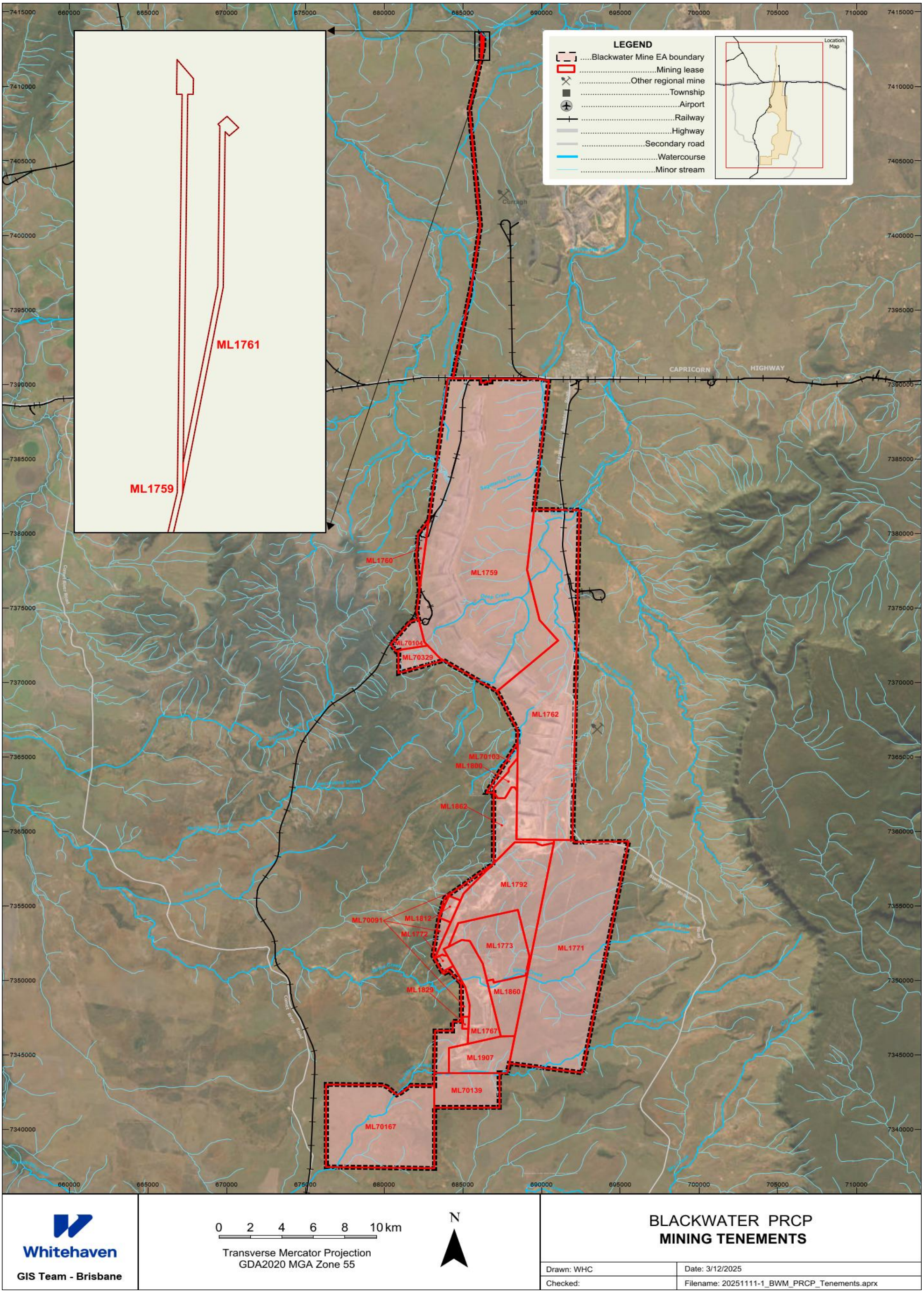


Figure 3-2 BWM mining tenements

3.1.1.3 Primary mine features and infrastructure

The current primary features and infrastructure at BWM are summarised in Table 3-2, with the site layout illustrated in Figure 3-3 and Figure 3-4. These features form the basis for rehabilitation and closure planning under the PRCP Schedule and are considered in the context of progressive rehabilitation and final landform development.

Table 3-2 Primary mine features and infrastructure at BWM

Mine domain	Mine feature name
Pits and spoil dumps	— Bonnie Doon Pit and spoil dump — Mimosa Pit and spoil dump — Ramp 30 Pit and spoil dump — Sagittarius Pit and spoil dump — Burngrove Pit and spoil dump — Airstrip Pit and spoil dump — Besgrove Pit and spoil dump — Deep Creek Pit and spoil dump — Stewarton North Pit and spoil dump — Stewarton South Pit and spoil dump — Tannyfoil Pit and spoil dump — Wilpeena Pit and spoil dump — Blackdown Pit and spoil dump — Terang Pit and spoil dump — Kenmare Pit and spoil dump — Laleham Pit and spoil dump — Togara Pit and spoil dump — North Marshmead Pit and spoil dump
Underground mining areas (all historic)	— Kenmare 1 + 2 — Laleham — Sirius Creek No. 1 and No. 2 — Ballamoo — Clutha trial mine
Stockpiles	— Run-of-mine (ROM) coal stockpiles — Coal stockpiles — Topsoil stockpiles — Rock stockpiles
Tailings storage facilities (TSFs) and rejects	— Bonnie Doon TSF (in-pit) — NCPP TSF — Ramp 72 TSF — Laleham TSF — Ramp 74 TSF (in-pit) — Bottom Dam TSF (and ROM3 Rejects Area) — Ramp 36 Rejects
Dams	— Mine-affected water dams

Mine domain	Mine feature name
	— Sediment dams — Process water dams
Creek diversions and clean water drainage	— Deep Creek Diversion — Sirius Creek Diversion — Taurus Creek Diversion — Burngrove Creek Diversion — Rockland Creek Diversion — Clean water drains
Processing infrastructure	— North Coal Processing Plant (NCPP) — South Coal Processing Plant (SCPP) — Thermal Coal Plant (TCP) — Conveyors and transfer stations — Stackers and reclaimers
Rail infrastructure	— Rail line — Train load-out facility — Conveyors
General Infrastructure	— Administration, warehouse, crib — Workshops — Sheds — Fuel, oil and chemical storage — Fuel and wash bays — Power lines — Switchyards and substations — Communication and lighting towers — Sewage treatment plant — Fences
General disturbance	— Laydown areas — Access roads — Haul roads — Drains — Exploration
Rehabilitated areas	— Spoil dumps — Creek diversions and crossings — Heavy infrastructure areas — Stockpiles — Roads — General infrastructure — Surface areas above historic underground mines — Explorations areas — Existing rehabilitation — TSFs and rejects

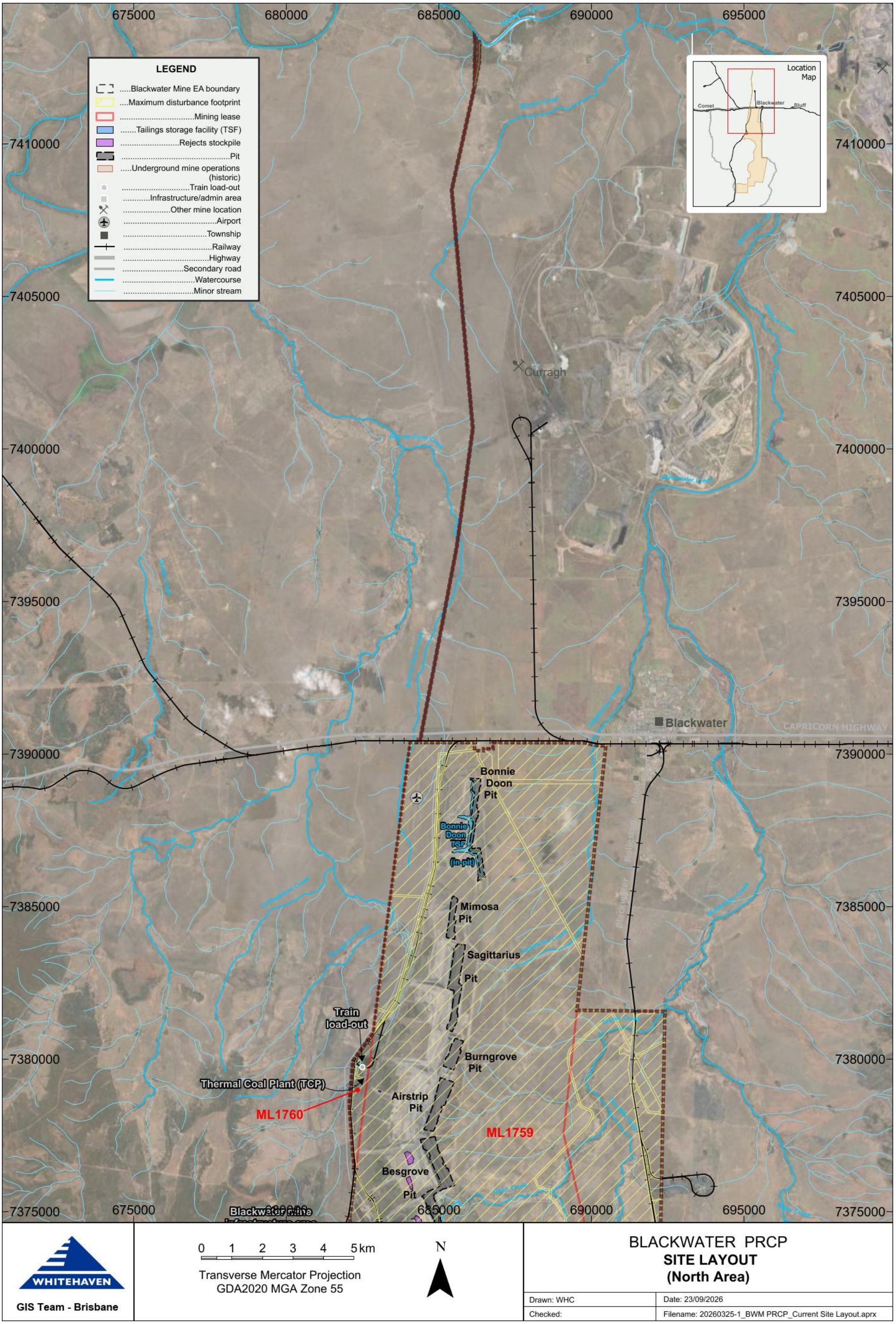


Figure 3-3 BWM site layout (North)

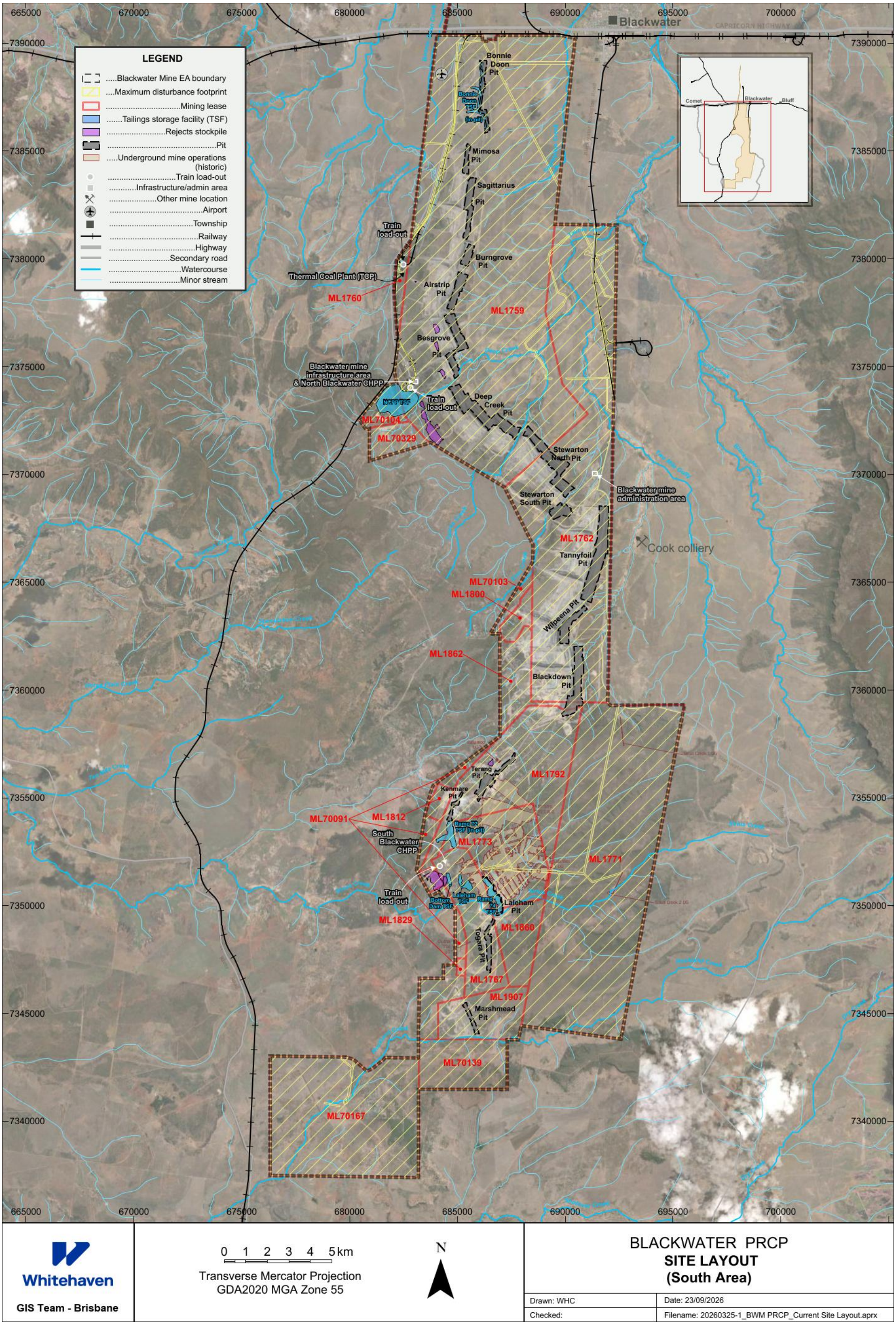


Figure 3-4 BWM site layout (North, Central and South)

3.1.1.4 Type of mining operation

BWM is a conventional open cut strip mine using both draglines and truck and shovel fleets.

Mining involves the removal and stockpiling of topsoil, drilling and blasting of overburden and interburden, mining of overburden and interburden by draglines and truck and shovel fleets, and mining of the coal by truck and shovel fleets.

The overburden and interburden are placed in spoil dumps within the void of the previous strips. As mining progresses down-dip and the pits get deeper, the spoil dumps increase in height to dump as much material in-pit as possible and to reduce out-of-pit dumping. For deep mines, this limits the amount of area available for progressive rehabilitation to the final outside spoil dump slopes until spoil dumps reach the final height, as more spoil material continues to be dumped on higher benches. This reflects the operational constraints associated with large-scale open cut mining and has been considered in the development of progressive rehabilitation commitments under the PRCP Schedule.

Due to the large size of the BWM spoil dumps, the outside spoil dump areas (the areas to be rehabilitated) are only a small proportion of the operational dump surface as the dumps advance Figure 3-5.

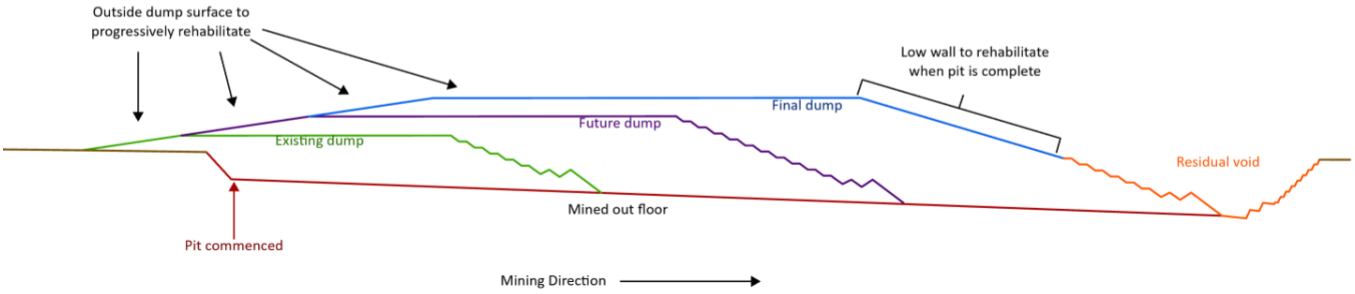


Figure 3-5 Indicative dump progression during life-of-mine (illustrative purposes only)

Coal is hauled from the pits to the coal handling and preparation plant (CHPP) ROM area, or to designated stockpiles. The coal is processed at the CHPP to produce a predominantly hard coking coal product, i.e. BWC (Blackwater Coke) and BWW (Blackwater Weak), for the export market. Product coal is loaded onto coal trains via an existing train load-out facility located adjacent to the CHPP and product stockpiles.

Coal waste fines are disposed of in dedicated TSFs, and coarse rejects are disposed of within the spoil dumps.

Product coal is transported by rail to the Port of Gladstone for export.

3.1.1.5 Proposed duration of the operation

Operations at BWM commenced in 1967. Based on current life-of-mine planning, approved extents (per the operation's EA area), are planned to be mined until 2113. This timeline assumes mining continues at current mining rates. Variations to the planned mining rates due to business or market conditions or refined resource information may change the proposed duration. Any material changes to mine planning or rehabilitation timeframes will be managed in accordance with the PRCP framework, including amendment to the PRCP Schedule where required.

3.1.2 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*

The baseline information presented in this section provides the foundation for the development of post-mining land uses, rehabilitation methodologies and assessments described in subsequent sections of this PRC Plan.

3.1.2.1 Site topography

The most prominent topographic feature in the region is the Blackdown Tablelands (also known as the Blackdown Ranges) – a sandstone plateau situated about 10 km east of BWM mine, which rises abruptly from the surrounding plains to an elevation of approximately 900 metres Australian Height Datum (mAHD); however, most of the Tablelands have an elevation of around 340 to 400 mAHD. The relatively steep slopes associated with the Blackdown Tablelands contrast with the generally lower relief areas west of the ranges at BWM, particularly throughout the northern half of the site.

A topographic divide runs through the site and separates the mine into a distinct northern catchment area that drains to Blackwater Creek, and a southern area that flows to the Comet River. The topography of the mine site consists of gently undulating plains in the north, with gravelly ironstone ridgelines and hills to the south (see Figure 3-6).

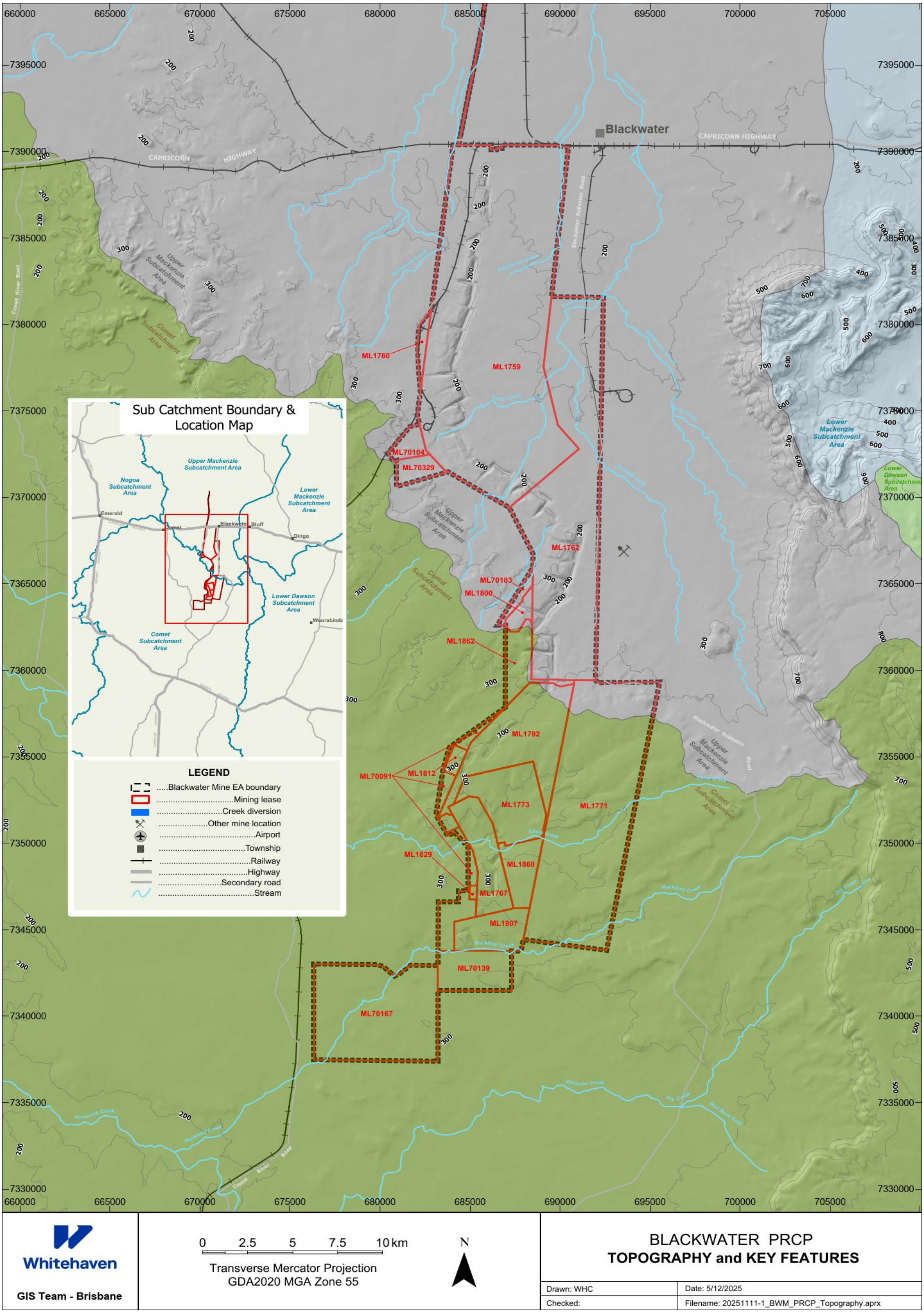


Figure 3-6 Topography and key features

3.1.2.2 Climate

BWM 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; with higher rainfall and higher evaporation occurring over the summer months (December to February). Climate data is available from the Bureau of Meteorology (BOM) weather stations near Blackwater township [Blackwater water treatment plant (station ID 035290) from 1995 to 2010, Blackwater airport (station ID 035134)] from April 2023 to present; and Emerald Airport (station ID 035264) between 1981 to present) (BOM, 2024). A summary of climate data at BWM is provided in Table 3-3 and Figure 3-7.

3.1.2.2.1 Temperature

Average maximum temperatures range from approximately 23°C in June/July to 34°C in December/ January, with average minimum temperatures ranging from approximately 9°C in June/July to 22°C in December/January.

3.1.2.2.2 Rainfall

The average annual rainfall is approximately 547 mm at Blackwater Township and about 561 mm at Emerald.

Rainfall events are often associated with thunderstorms, which are typically short-lived, intense and have variable coverage. Sustained rainfall over a large landscape area is experienced when tropical lows with cyclonic activity occur in coastal areas. However, periods of prolonged drought do occur within the region

3.1.2.2.3 Evaporation

The average annual evaporation is approximately 2000 mm for the area. As would be expected for the region, the evaporation rate is highest in the summer months (December/January) and lowest in the cooler months (June/July).

Table 3-3 Average total monthly rainfall, evaporation and evapotranspiration (Jan 1970-Oct 2023)

Average total monthly	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Rainfall (mm)	88	75	48	29	32	23	22	16	24	46	59	83	547
Evaporation (class A Pan) (mm)	230	186	189	149	115	91	99	131	172	214	222	241	2,037
Evapotranspiration (Moreton's areal actual) (mm)	134	113	106	68	43	31	35	52	71	98	115	134	999

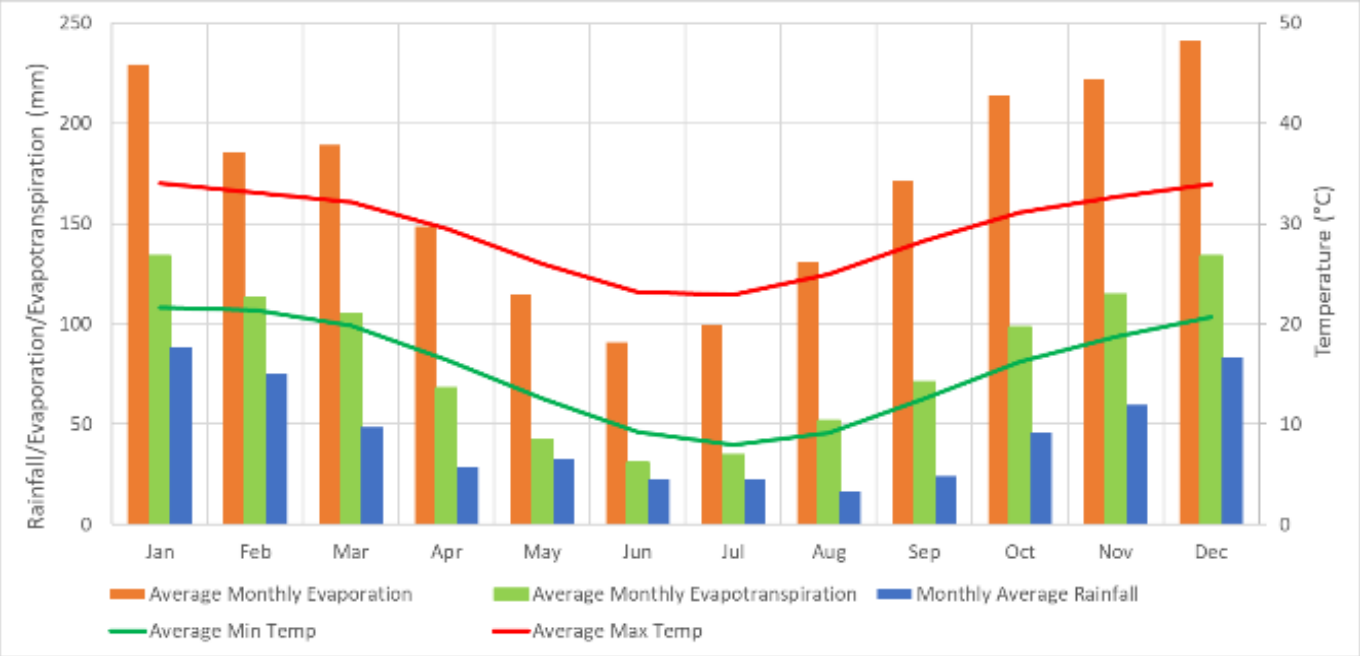


Figure 3-7 Average monthly evaporation, evapotranspiration, rainfall and temperature (Jan 1970 to Oct 2023)

3.1.2.2.4 Wind

Wind records for Emerald Airport for January-April show an easterly predominance of moderate strength (1-20 km/h), with southeasterlies dominating in May-July. East to north-easterly winds predominate for August-December with strong gusts increasing from October to December over 100km/h. Daily mean wind speeds are consistently of moderate strength (1-20 km/h).

3.1.2.2.5 Long-term climate projections

To account for potential future climate uncertainties this PRCP is supported by technical studies that have utilised climate change modelling and adaptation measures within their hydrologic designs and mine water planning.

3.1.2.3 Geology

3.1.2.3.1 Regional geology

BWM is located in the Bowen Basin, one of five major foreland sedimentary basins formed along the eastern side of Australia during the Permian geologic period. The north-south oriented Bowen Basin stretches from Townsville in the north to the Queensland-New South Wales border in the south and is the largest productive coal basin in Australia.

The stratigraphic sequence across the Study Area primarily comprises unconsolidated Quaternary-aged sediments that unconformably overlie consolidated Triassic and Permian-aged sequences. The Tertiary sediments and basalt, and Quaternary alluvium are present as the cover that overlays the consolidated basal units. At the eastern extents of the Study Area, the Triassic-aged Clematis Group outcrops with a dramatic change in topography associated with the comparatively weathering-resistant sandstones of that geologic unit.

The stratigraphic sequence of the Study Area, from youngest to oldest, primarily comprises unconsolidated Quaternary-aged sediments that unconformably overlie consolidated Triassic and Permian-aged sequences, as presented in Figure 3-8, Figure 3-9 and Table 3-4.

Table 3-4 Summary of stratigraphy in the study area

Age	Unit	Thickness (m)	Description
Quaternary	Alluvium	0.5-12	Alluvium - silt, clay, sand and gravel.
Tertiary	Basalt	30	Weathered basalt soils, residual basalt. Moderately weathered and fresh basalt.
	Sediments/ sedimentary units	30	Clays, sandstones, sands, gravels, often poorly consolidated (Tu, Te(w), Tf and TQa). Regional mapping shows highly weathered Tertiary sediments display some areas of duricrust (Td) and partially cemented fanglomerate (Tf)
Triassic	Clematis Group	100-800	Weathering-resistant medium to coarse grained quartzose to sublabile and micaceous sandstone, siltstone, mudstone and conglomerate.
	Rewan Group	50-300	Lithic sandstone, pebbly lithic sandstone, green to reddish brown mudstone and minor volcanilithic pebble conglomerate (at base); deposited in a fluvial-lacustrine environment. Occurs 2-6 m above the Aries seam.
Permian	Rangal Coal Measures	100	Feldspathic and lithic sandstone, carbonaceous mudstone, siltstone, tuff and coal seams. Coal seams include the Aries, Castor, Pollux and Orion and Pisces seams. The Pollux and Orion seams commonly coalesce into a single seam, which is referred as the Argo seam.
	Burngrove Formation	170	Sandstones, siltstones and mudstones, and banded coal seams frequently interbedded with tuff and tuffaceous mudstones. Coal seams include the Virgo and Leo seams.

3.1.2.3.2 Structural geology

The structural geology in the region is characterised by gently folded consolidated sediments and a major north to north-west striking fault system which forms the Jellinbah Thrust fault system (AGE, 2013). A series of easterly dipping thrust faults occur parallel to the Jellinbah Thrust, including the Shotover Fault (occurring to the east of the Study Area where the Clematis Group outcrops) and the Como Fault that runs through the Curragh Mine (Figure 3-9) (Mallet et al., 1985). Regionally the structure is defined as a faulted monoclinal limb (AGE, 2013).

The strata in the vicinity of the Project Area are heavily influenced by a series of easterly dipping, north to northwest striking faults (AGE, 2008). The Shotover Fault at the southeastern boundary of the Study Area is of major importance as there is a displacement of up to 3,000 m (AGE, 2013). Locally, thrust faulting that occurs within the BWM may be attributed to thrusts occurring in the footwall of the Shotover Fault. Local structure is influenced by strike-slip movement of basement rocks. Local fault displacement is reported to be less than five meters on average but can reach up to 20 m (AGE, 2008).

3.1.2.4 Local geological setting

3.1.2.4.1 Quaternary Sediments

Quaternary alluvial sediments unconformably overlie the Triassic Rewan Group and Permian coal measures. This unit comprises a thin surficial layer of predominantly unconsolidated clays, silts, sands, and gravels associated with floodplain environments of major drainage systems, principally Blackwater Creek.

Drilling data within the Study Area indicates that the alluvial sequence varies in thickness from approximately 0.5 m to 16 m.

Recent investigations at BWM demonstrate that alluvium associated with creek systems is discontinuous and spatially restricted. In 2020, four boreholes were proposed for installation within alluvial deposits near northern BWM (Taurus Creek, Sagittarius Creek, and Two Mile Gully). Of these, only one borehole at Taurus Creek encountered sufficient alluvial material, which was completed as a dry bore (AGE, 2020). In 2021, an additional borehole targeting alluvium at Sagittarius Creek revealed insufficient sediment thickness, necessitating installation into the underlying Rewan Group (HydroFS, 2021). The outcome of additional drilling attempts and groundwater indicated the spatial extent of alluvium within the Study Area is considered to be significantly smaller than depicted on the regional surface geology map (Figure 3-8).

3.1.2.4.2 Tertiary Sediments and Basalts

Tertiary sediments and basalt flows unconformably overlie Triassic and Permian units. The sequence comprises unconsolidated to weathered Tertiary sediments and weathered claystone, siltstone, and sandstone, with thickness ranging from 5 to 50 m and locally up to 115 m, generally increasing toward the south. Drilling indicates that southern areas contain thicker Tertiary deposits, primarily claystone, siltstone, sandstone, and interbedded basalt of the Emerald Formation.

Basalt flows occur in the south and southwest of the Project Area (Figure 3-8), exhibiting variable weathering and thickness. Moderately weathered thin flows were intersected in ML 70167 (Humboldt area), while thicker, fresher flows were encountered farther north in ML 70139 (South Marshmead area). Basalt thickness ranges from approximately 10 to 42 m (AGE, 2003).

3.1.2.4.3 Triassic Clematis Group

The Clematis Group unconformably overlies the Rewan Group and forms an elevated plateau and escarpment along the eastern margin of the Study Area (Figure 3-9). It comprises resistant medium- to coarse-grained quartzose to micaceous sandstone, siltstone, mudstone, and conglomerate. Within the Study Area, the Clematis Group includes the Glenidal Formation and Expedition Sandstone members, with an estimated thickness ranging from 100 to 800 m (Geoscience Australia, 2021).

3.1.2.4.4 Triassic Rewan Group

The Rewan Group overlies the Permian coal measures, thickening eastward with the dip of the coal seams and thinning toward outcrop areas in the west (Figure 3-8). It consists predominantly of siltstone and mudstone with interbedded lithic and volcanic sandstones, displaying a characteristic greenish hue due to glauconite.

Based on exploration and groundwater monitoring bores installed in the Study Area, the Rewan Group is comprised of siltstone and mudstone, with interbeds of lithic and volcanic sandstones, of variable thickness ranging between approximately 50 to 300 m.

3.1.2.4.5 Permian Rangal Coal Measures

The Rangal Coal Measures (RCM) underlie the Rewan Group and outcrop along the western margin of the Project Area (Figure 3-8). The unit comprises interbedded sandstone, siltstone, mudstone, coal, and basal tuff, with a thickness of up to 100 m. Regionally, the principal economic seams are Aries, Castor, and Pollux; at BWM these correspond to the Top, Middle, and Lower seams, respectively.

Additional splits and minor seams include Upper Top, Top Rider, Middle Rider, and Lower/Upper Rider. In the southern South Blackwater area, Pollux and Orion coalesce to form the thick Argo seam, while in northern areas Orion and Pollux merge into the Lower seam, which further splits into L01 and MFULL. Between Deep Creek/Wilpeena and Blackwater pits, the Middle seam coalesces with Aries and Castor.

3.1.2.4.6 Burngrove Formation

The Burngrove Formation comprises mudstone, siltstone, sandstone, coal, and tuff. It is conformably overlain by the Rangal Coal Measures and is equivalent to the Fort Cooper Coal Measures elsewhere in the Bowen Basin. For this assessment, the Burngrove Formation is considered the basement unit.

The geology of the study area is discussed in *Appendix 4.2 – Hydrogeology Assessment* (SLR, 2026a).

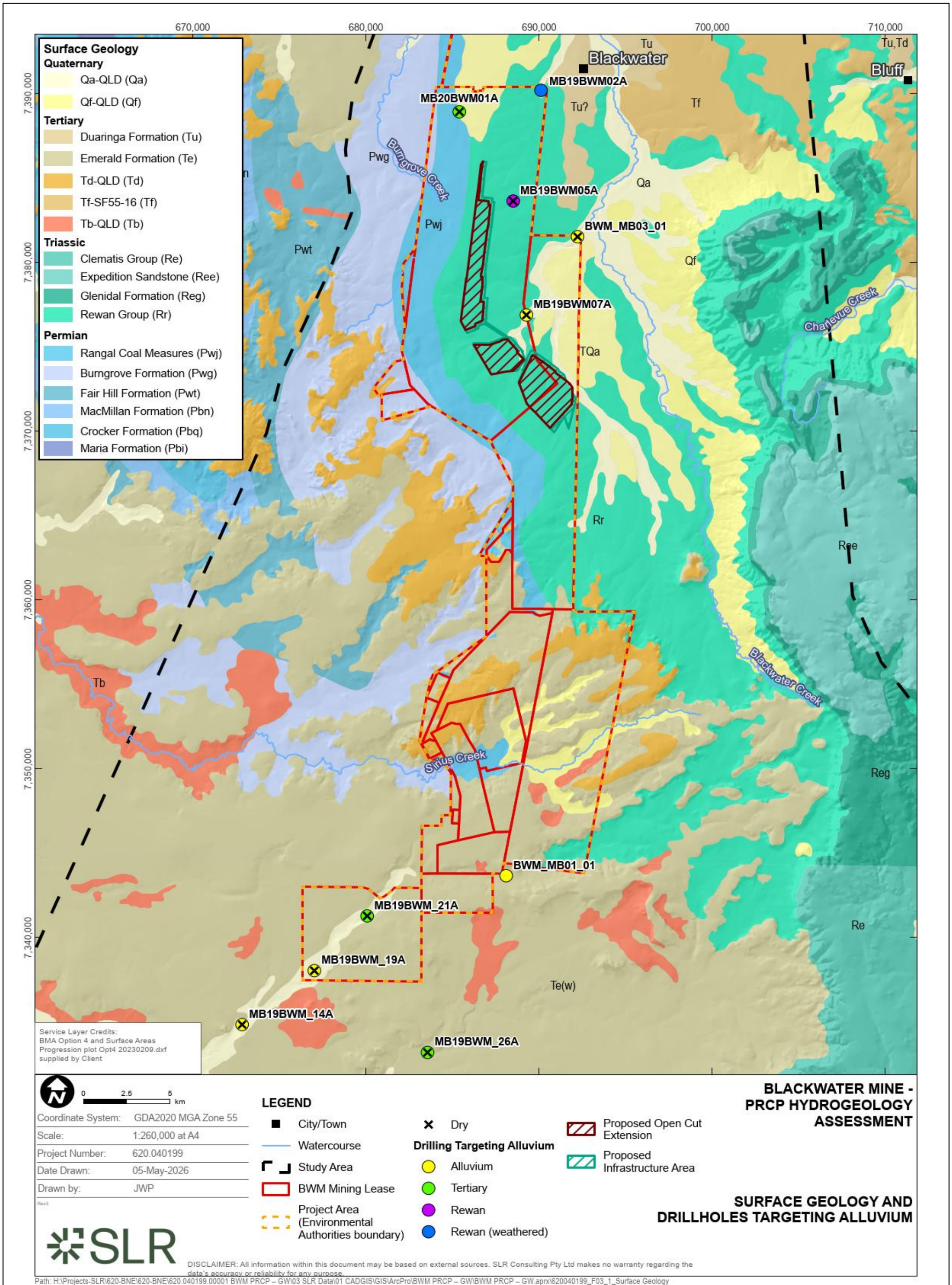


Figure 3-8 BWM surface geology

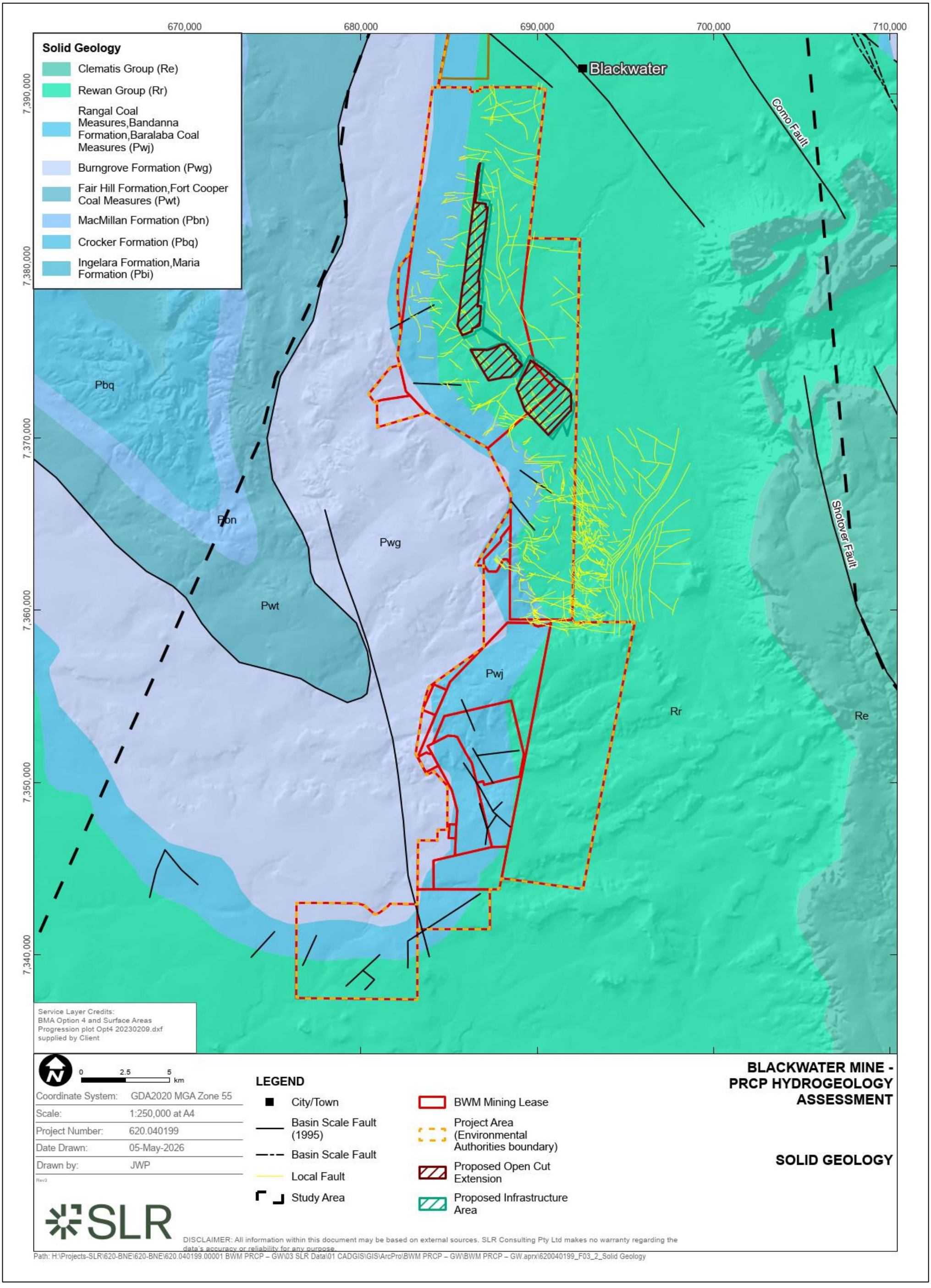


Figure 3-9 BWM solid geology

3.1.2.5 Hydrogeology

A hydrogeological assessment, including conceptual and numerical modelling, has been undertaken to support the development of this PRC Plan, and to inform the assessment of groundwater-related risks and rehabilitation outcomes. The report, *Blackwater Mine PRC Plan Hydrogeology Assessment – Revision 3*, is provided in Appendix 4.2 (SLR, 2026a).

3.1.2.5.1 Hydrogeological units

The local hydrostratigraphic units are described below, from the shallowest (Alluvium) to the deepest (Burngrove Formation):

- Alluvium – Associated with local creeks; recent investigations indicate these deposits are typically dry.
- Tertiary Sediments and Basalt – Weathered, unconsolidated material (regolith) that may act as a preferential flow path if groundwater levels intersect the base of weathering.
- Clematis Group – Outcrops along the eastern margin, forming elevated plateaus; composed of resistant quartzose to micaceous sandstone, siltstone, mudstone, and conglomerate.
- Rewan Group – A regional aquitard of mudstone interbedded with siltstone and labile sandstone; upper weathered zones may exhibit higher hydraulic conductivity.
- Rangal Coal Measures (RCM) – Identified as a regional aquifer; groundwater occurs primarily within coal seams via cleats and fractures, confined by low-permeability interburden. Recharge occurs where seams outcrop or subcrop.
- Burngrove Formation – Considered the basement unit; predominantly an aquitard of siltstone, carbonaceous and tuffaceous shale, mudstone, and thin coal seams. Some landholder bores suggest localized permeable horizons supporting low yields.

3.1.2.5.2 Groundwater monitoring network

Douglas Partners (1998) undertook early investigations of groundwater conditions in the South Blackwater area, noting that only limited pre-mining groundwater data were available at that time. Since these investigations, the groundwater monitoring network has been progressively developed and refined. The most recent groundwater quality and groundwater level information is provided in Appendix 4.2.

Baseline groundwater data presented in Table 3-7 comprise groundwater quality results from selected BWM monitoring network bores where baseline information exists. Local shallow contaminant investigation bores, which are addressed through separate investigations for this PRCP, have been excluded from the assessment.

The data obtained from each geological unit screened by the monitoring bores is summarised as follows:

- Quaternary Sediments, including six monitoring bores (one of which is a current EA bore and five that are dry) installed at depths ranging from 7 to 16 mBGL, with available data for the period 2019-2025
- Tertiary Sediments and Basalt, including 47 monitoring bores (five of which are current EA bores and 24 that are dry) installed at depths from 4.5 to 56 mBGL, with available data for the period 2009-2025.
- Triassic Rewan Group, including six monitoring bores (two of which are current EA bores, and one is dry) installed at depths ranging from 15 to 95 mBGL, with available data for the period 2023-2025.

- Rangal Coal Measures, including 62 monitoring bores (11 of which are current EA bores and six that are dry) installed at depths ranging from 17 to 231.5 mBGL, with available data for the period 2009-2025.
- Burngrove Formation, including 20 monitoring bores (two of which are current EA bores and five that are dry) installed at depths ranging from 8 to 72.9 mBGL, with available data for the period 2012-2025.

The tabulated groundwater data and figures of the bore locations per individual geological unit screened, including the level trends are presented in graphs in Appendix 4.2.

The EA monitoring bores are provided in Table 3-5 below and graphically presented in Figure 3-10.

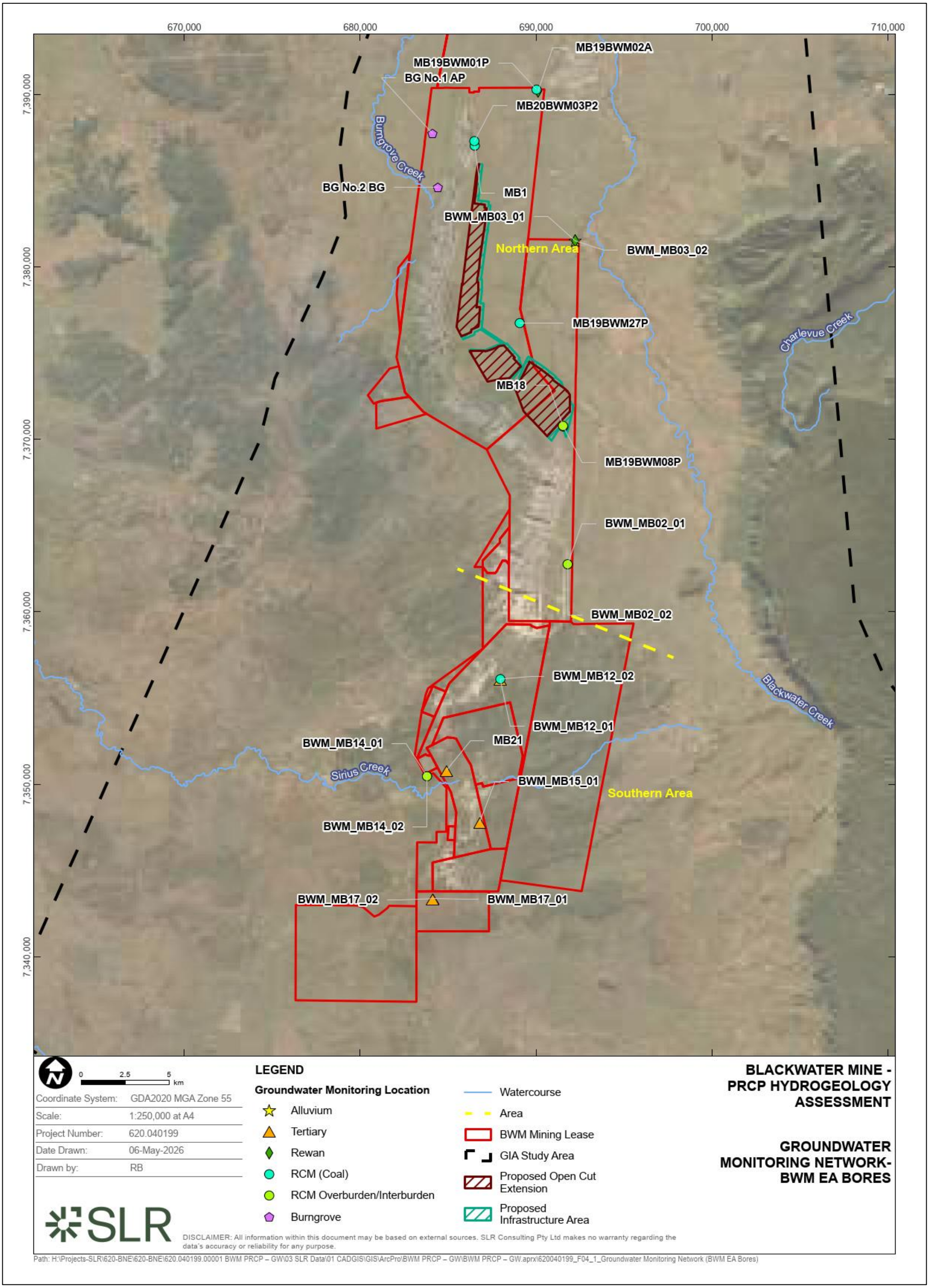


Figure 3-10 Groundwater monitoring network – BWM EA bores

Table 3-5 EA monitoring Bores

Bore Name	Location	Easting (GDA2020)	Northing (GDA2020)	Ground RL (mAHD)	Cased Depth (mbgl)	Screened Interval (mbgl)	Monitored Aquifer	Monitoring Frequency	Monitoring Rationale
BG-1[1]	MB14 West Bonnie Doon	684,108	7,387,742	201.1	72.9	63.6 – 72.9	Burngrove Formation	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	Upgradient monitoring of Burngrove, Burngrove SWL>pit lake so flows toward pits, but dipping RCM creates a barrier to flow
BG-2[1]	SE corner of ML1762, downgradient MB for Blackwater Creek catchment	684,414	7,384,622	211.32	38.5	32.3 – 38.5	Burngrove Formation	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	Upgradient monitoring of Burngrove, Burngrove SWL>pit lake so flows toward pits, but dipping RCM creates a barrier to flow
BWM_MB02_01[1]	Central. East, monitor downgradient from existing pits. Co-located with 02_02	691,750	7,362,715	258.8	28.3	22.3 – 28.3	Permian inter/over burden	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	MB4 replacement
BWM_MB02_02[1]	Central. East, monitor downgradient from existing pits. Co-located with 02_01	691,737	7,362,716	258.7	173	144.0 – 150.0	Permian Coal	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	Expansion - co-located with MB4 replacement
BWM_MB03_01[1]	North. NE corner ML1762, monitor downgradient from existing pits, Blackwater Ck catchment. Co-located with 03_02	692,230	7,381,517	181.8	12	8.0 – 11.0	Alluvium	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	Compliance Network Expansion
BWM_MB03_02[1]	North. NE corner ML1762, monitor downgradient from existing pits. Co-located with 03_01	692,233	7,381,523	181.8	100	35.0 – 41.0	Rewan Formation	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	Compliance Network Expansion
BWM_MB12_01[1]	Kenmare UG and adjacent east of Terang Pit Ramp 64/66	687,960	7,356,102	332.1	24	16.0 – 22.0	Tertiary sediments	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	Expansion - Co-located with MB15 replacement
BWM_MB12_02[1]	Kenmare UG and adjacent east of Terang Pit Ramp 64/66	687,970	7,356,097	332.8	159	155.0 – 158.0	Permian Coal	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	MB15 replacement
BWM_MB14_01[1]	Red Dams, south of Lower Red Dam wall on inside corner of lease boundary	683,799	7,350,475	266.6	25	18.0 – 24.0	Permian inter/over burden	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	MB12 replacement. Red Dam Seepage extent.
BWM_MB14_02[1]	Red Dams, south of Lower Red Dams wall on inside corner of lease boundary	683,799	7,350,464	266.7	152.6	144.0 – 150.0	Permian inter/over burden	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	MB12 replacement. Red Dam Seepage extent.
BWM_MB15_01[1]	East of Ramp 80	686,771	7,347,804	320.1	16.4	10.4 – 16.4	Tertiary sediments	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	MB6 replacement
BWM_MB17_01[1]	ML70139 south, south of Marshmead Pit, to be mined out by FY30	684,111	7,343,372	261.6	18	12.0 – 18.0	Basalt	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	Compliance Network Expansion. SBW Monitoring
BWM_MB17_02[1]	ML70139 south, south of Marshmead Pit, to be mined out by FY30	684,119	7,343,374	261.6	29	22.0 – 28.0	Tertiary sediments	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	Compliance Network Expansion. SBW Monitoring
MB1[1]	East of Bonnie Doon	686,445	7,387,261	201.1	60	54.0 – 60.0	Permian Coal	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	Compliance Network Expansion
MB18[1]	East Ramp 46, north of BLW Administration area	691,529	7,370,782	221.34	40.6	37.6 – 40.6	Permian inter/over burden	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	Compliance Network Expansion
MB19BWM01P[1]	Far NE corner of BLW ML1759, near BLW township	690,038	7,390,282	195.7	192	168.0 – 171.0	Permian Coal	Quarterly[2]	Compliance Network Expansion
MB19BWM02A[1]	Far NE corner of BLW ML1759, near BLW township	690,241	7,390,363	168	17	12.0 – 15.0	Permian inter/over burden	Quarterly[2]	Compliance Network Expansion
MB19BWM08P[1]	East Ramp 46, north of BLW Administration area	691,543	7,370,741	217.9	198	184.0 – 190.0	Permian Coal	Quarterly[2]	Expansion - co-located Permian with MB18
MB19BWM27P[1]	North. East, Co-located with 07A, 25P and VWP19BWM01	689,072	7,376,740	198	200	180.0 – 189.0	Permian Coal	Quarterly[2]	MB3 replacement. Monitor downgradient from northern pits. SA7&10 expansion.
MB20BWM03P2[1]	Southeast of Bonnie Doon	686,491	7,387,289	198.7	109	98.0 – 107.0	Permian Coal	Quarterly[2]	Background
MB21[1]	South of Duck Pond	684,901	7,350,806	263.8	24.16	24.2 – 29.2	Tertiary Sediments	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter	Compliance Network Expansion

[1] Contaminant limits have not yet been developed for these bores due to the limited available monitoring dataset. Monthly monitoring will occur until a suitable dataset is available to set contaminant limits

3.1.2.5.3 Groundwater Levels

The representative groundwater levels for the underlaying geological units have been discussed in detail and graphically presented in Section 4.3 of 4.2, for both the BWM Northern and Southern Areas.

3.1.2.5.4 Groundwater quality and type

Groundwater aquifers with suitable groundwater quality for stock watering are generally limited to isolated low-yielding alluvial aquifers. Very few porous rock-type aquifer systems exist within the Bowen Basin coal system, which is confirmed by the lack of high-yielding, groundwater bores on surrounding properties. Groundwater associated with coal seams is moderately to highly saline and is not used (BMA 2020).

Douglas Partners (1998) investigated local bores in the South Blackwater area and summarised available data for each but overall, limited data exists for groundwater prior to mining. From limited analytical results of groundwater, salt levels as indicated by electrical conductivity are generally in the range of 1,000 to 1,500 µs/cm EC levels are much higher than this in groundwater in this area. Most samples are neutral to slightly alkaline with pH ranging from 7.1 to 7.7.

The physicochemical results from groundwater sampling at BWM (between 2009-2023) are provided in Appendix 4.2. The results indicate the water chemistry is typically pH-neutral for all geological formations where groundwater is encountered. Sampling targeted Quaternary Sediments, Tertiary Sediments and Basalt, Triassic Rewan Group, Rangal Coal Measures and Burngrove Formation hydrogeological units. The groundwater types are discussed and graphically presented in Section 5 of Appendix 4.2.

Limited data from the alluvial zone indicates a pH of approximately 5 to 6 – consistent with recent rainwater recharge.

Salinity, expressed as Total Dissolved Solids (TDS), is a critical factor influencing water and groundwater management. TDS data collected from BWM monitoring bores across various hydrostratigraphic units are summarised below, with salinity classifications based on the Food and Agriculture Organization of the United Nations (FAO, 2013).

- Alluvium (One bore sampled)
  - TDS range: 4,250–11,600 mg/L (average: 8,983 mg/L)
  - Classification: Moderately saline to saline
- Tertiary Strata
  - TDS range: 363–11,700 mg/L (average: 9,427 mg/L)
  - Classification: Fresh to saline
- Rewan Group
  - TDS range: 19,600–30,800 mg/L (average: 25,126 mg/L)
  - Classification: highly saline
- RCM (Coal Measures)
  - Coal seam bores
    - TDS range: 1,000–17,000 mg/L (average: 9,481 mg/L)
    - Classification: Brackish to highly saline
  - Interburden/overburden bores
    - TDS range: 3,250–18,500 mg/L (average: 10,400 mg/L)
    - Classification: Moderately to highly saline
- Burngrove Formation
  - TDS range: 3,250–14,400 mg/L (average: 6,964 mg/L)
  - Classification: Moderately saline to saline

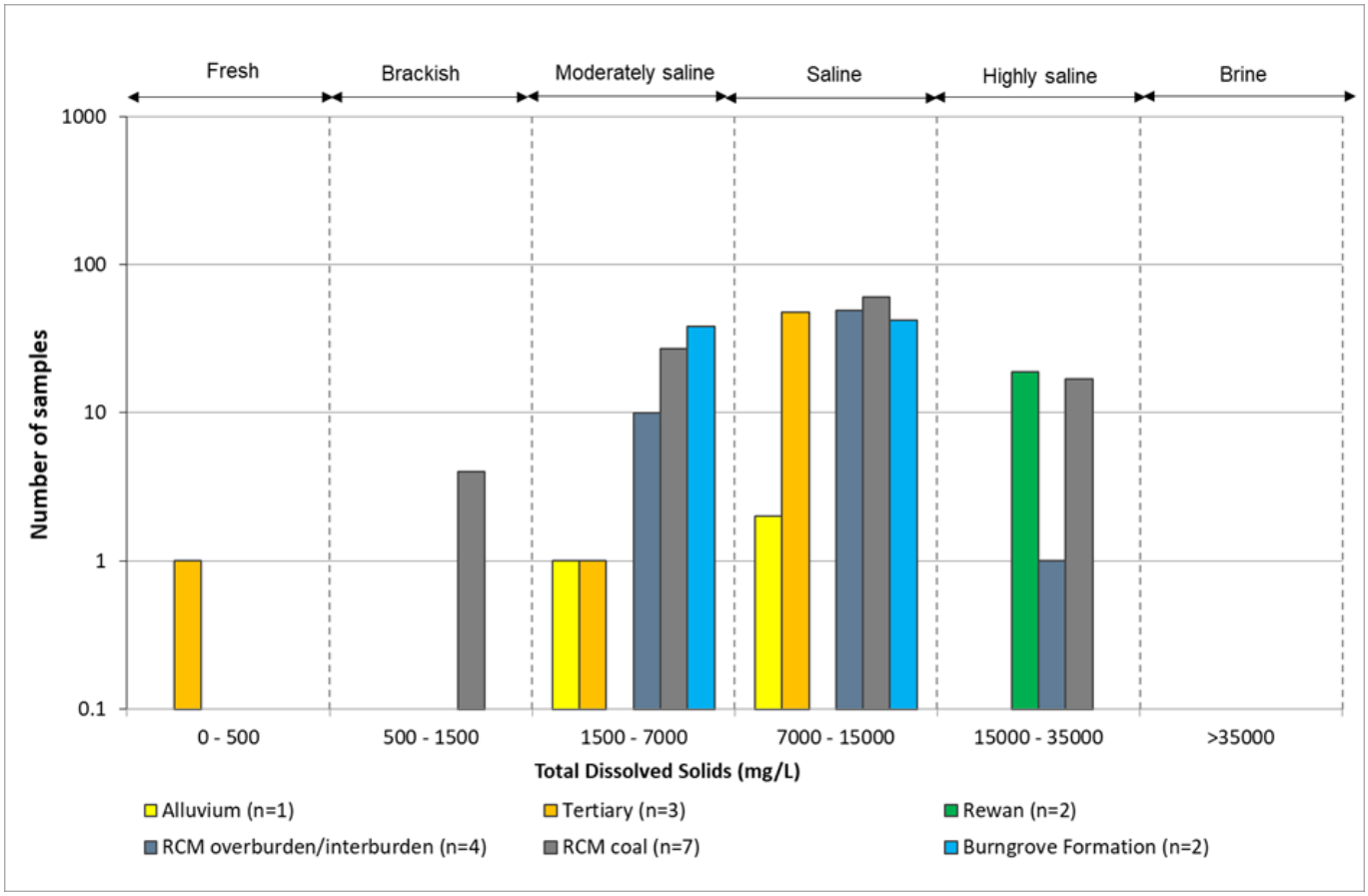


Figure 3-11 Salinity ranking by hydrostratigraphic unit

Major ions in groundwater at BWM are generally dominated by sodium and chloride. Limited data from the alluvial zone indicates a sodium-calcium-chloride-bicarbonate water type, consistent with rainwater recharge.

The existing concentrations of some dissolved metals in the groundwater are above the water quality guidelines (95% protection) for freshwater ecosystems (ANZG, 2018; QWQG, 2006). Slightly elevated concentrations of some elements in groundwater in Permian coal measures in the Bowen Basin are not uncommon and are considered to be naturally occurring.

The water quality from the monitoring wells located at and close to BWM indicates that, generally, the water is unsuitable for human consumption as assessed against the Australian Drinking Water Guidelines (HMRC-NRMMC 2011). Local groundwater use is primarily for livestock purposes owing to the variable salinity levels and generally low yields.

3.1.2.5.5 Groundwater use

BWM is located within the Fitzroy Basin under the *Water Plan (Fitzroy Basin) 2011*. The Highlands groundwater management area (GMA) consists of the following:

- Highlands Groundwater Unit 1, containing the aquifers of the Quaternary alluvium associated with the Sandy Creek Alluvium sub-area (to the distant northwest of BWM but not located within the Study Area); and
- Highlands Groundwater Unit 2, containing all sub artesian aquifers within the Highlands GMA other than the aquifers included in Highlands Groundwater Unit 1.

Groundwater resources are scheduled under the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (Qld) (EPP Water) as Comet Groundwaters (for the southern part of BWM within the Comet sub-catchment (DEHP, 2011a)) and Mackenzie Groundwaters (for the northern part of BWM). Table 3-6 summarises BWM's groundwater EVs, noting that these are limited to farm supply/use, stock

water and industrial use (i.e. mining). Aquatic ecosystems may also be associated with shallow alluvial systems.

Table 3-6 BWM groundwater environmental values

Fitzroy Basin Water Plan (WQ1310) Sub-catchment	Aquatic ecosystems	Irrigation	Farm supply/ use	Stock water	Aquaculture	Human consumer	Primary recreation	Secondary recreation	Visual recreation	Drinking water	Industrial use	Cultural and spiritual value
Comet Groundwaters	✓	✓	✓	✓	-	-	✓	-	-	✓	✓	✓
Mackenzie Groundwaters	✓	✓	✓	✓	-	-	-	-	-	✓	✓	✓
Potentially Locally Applicable based on EMM (2019) bore census	✓	-	✓	✓	-	-	-	-	-	-	✓	-

The EPP Water provides WQOs for the scheduled EVs in WQ1310 (Appendix 4.2). The objectives for groundwaters within the GMA – Zone 35 and 36 management area of the Water Plan (Fitzroy Basin) 2011 are for sustainable management to maintain ecological values and enable maintenance and ongoing use of the resources through water allocations and licensing.

In summary, the comparison of available groundwater quality data from the BWM monitoring bores shows that all hydrostratigraphic units at BWM generally exhibit water quality that exceeds some of the relevant parameter criteria for the scheduled EVs.

3.1.2.5.6 Groundwater receptors

3.1.2.5.6.1 Anthropogenic

A search of the Queensland Government's *Registered Groundwater Bore Database* (GWDB) (DRDMW, 2023) and the Bureau of Meteorology's *National Groundwater Information System* (NGIS) (BoM, 2017) was carried out for registered bores in and around the BWM ML. The search returned 313 bores with registered uses as mine monitoring (190 bores), petroleum exploration (3 bores), sub-artesian monitoring (23 bores), water resources investigation (3 bores), water supply (28 bores), unknown (32 bores) and decommissioned (34 bores). The location of private water supply bores (i.e. those 28 bores listed in the GWDB as water supply) and potential water supply bores (i.e. those 32 bores listed as unknown) are shown Figure 3-12.

A landholder bore census was conducted at BWM by EMM (2019). A total of 32 bores were visited during the census, including 20 registered bores and 12 unregistered bores (Figure 3-12), with all but one located west of BWM. The results of the survey indicated that 10 of the unregistered bores were in use while the other two were not in use.

3.1.2.5.6.2 Environmental

Desktop mapping and field investigations (EMM, 2023a) of potential aquatic and terrestrial Groundwater Dependent Ecosystems (GDEs) identify the areas illustrated in Figure 3-13 with possible high, moderate, and low potential for groundwater interaction that occurs in the vicinity of BWM. These include:

- Two springs associated with the Clematis Group outcrop escarpment, approximately 15 km south-east of BWM.
- The riparian terrestrial vegetation associated with Taurus Creek on the eastern margin of the site.

- A very small area of narrow linear communities that fringe Sagittarius Creek, with vegetation types consisting primarily of poplar box (*Eucalyptus populnea*), forest red gum (*Eucalyptus tereticornis*), or river red gum (*Eucalyptus camaldulensis*).

Further characterisation of GDEs, including field verification and ecological assessment outcomes is provided in Section 3.1.2.7.

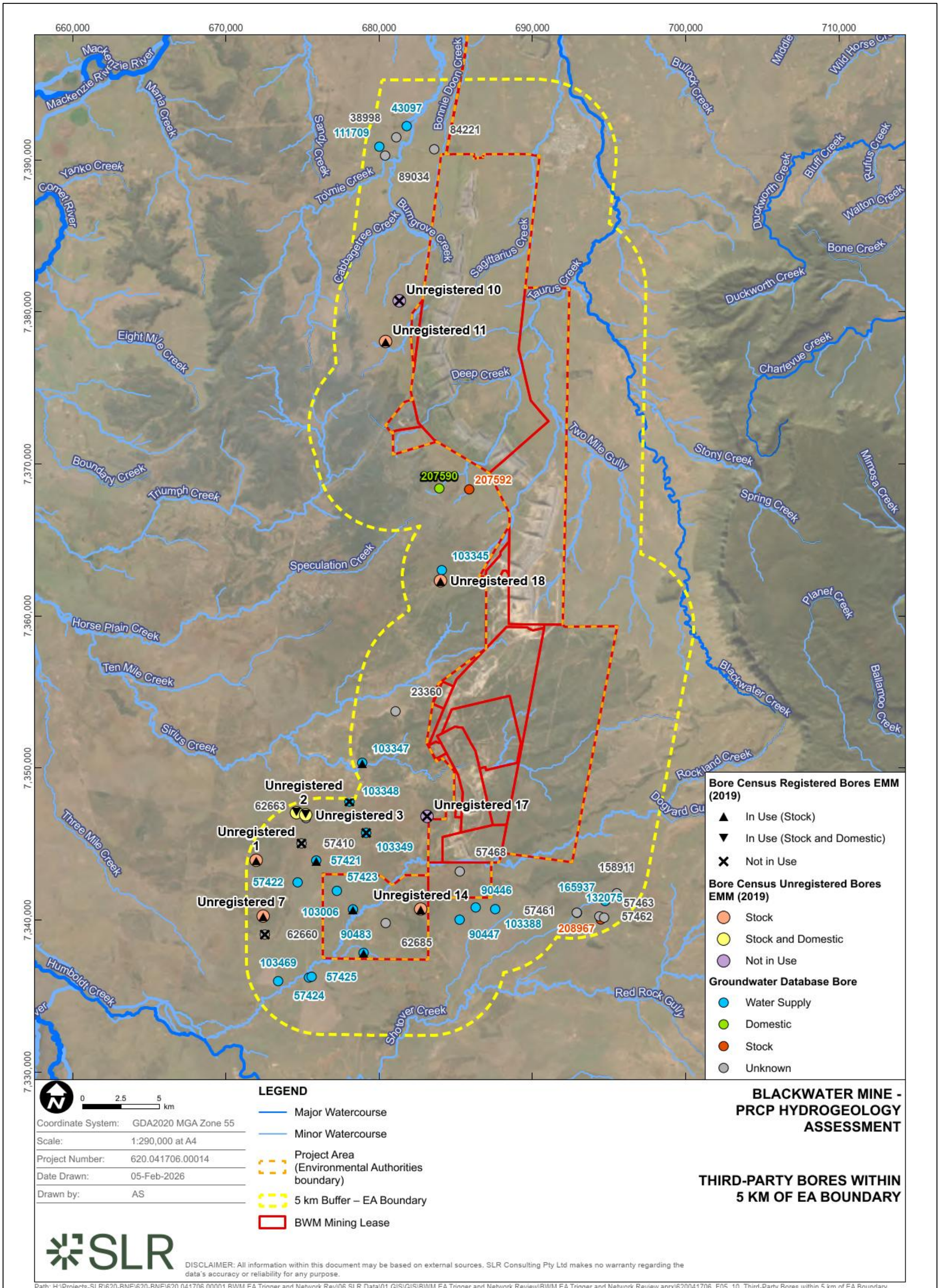


Figure 3-12 Private bores

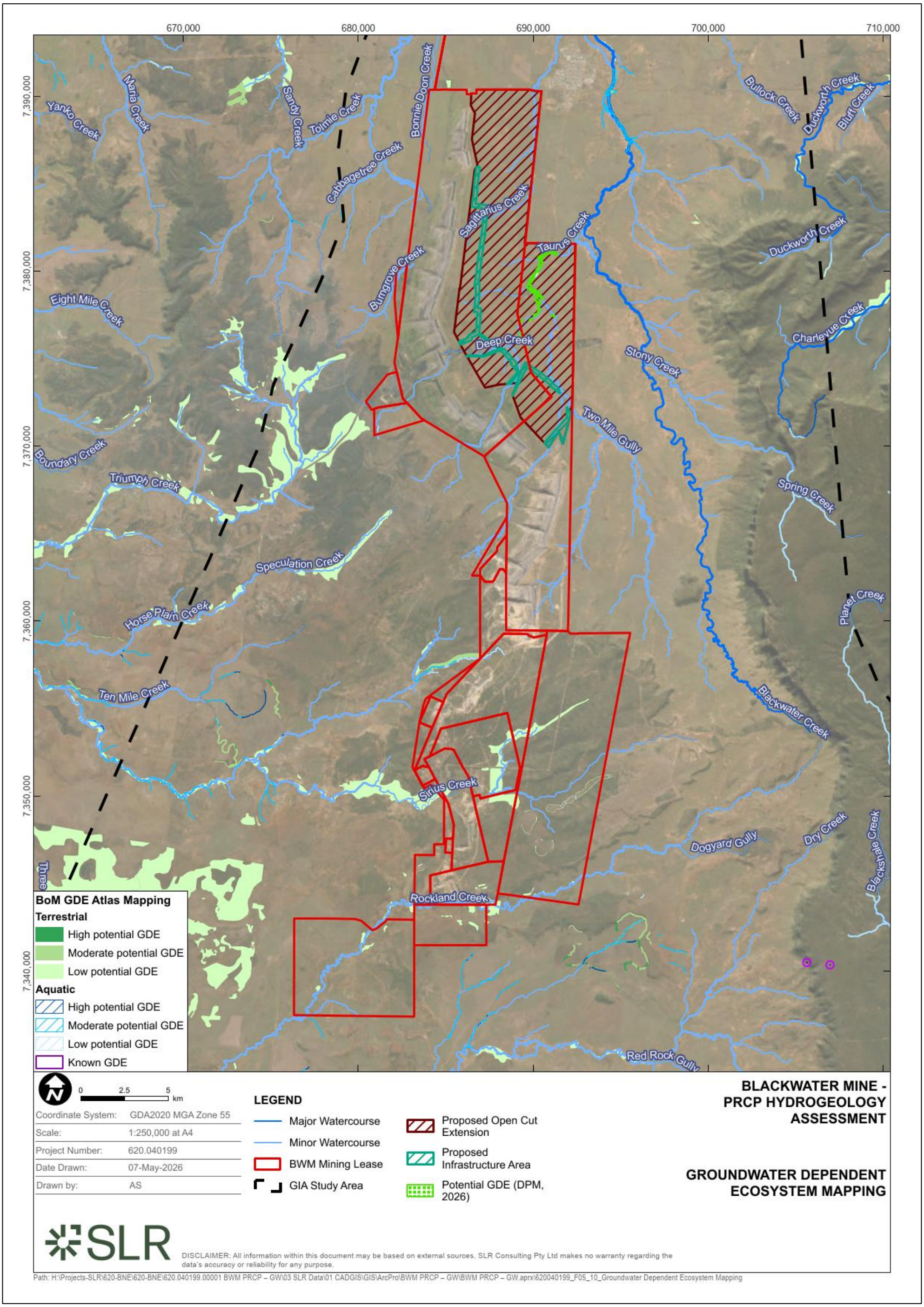


Figure 3-13 BWM groundwater dependent ecosystem

3.1.2.6 Site hydrology and fluvial networks

3.1.2.6.1 Site hydrology

The BWM EA area straddles both the Mackenzie River and Comet River sub-basins of the Fitzroy Basin. The northern portion of the site, down to the southern end of the Stewarton South residual void, is in the Mackenzie Southern Tributaries catchment. Surface drainage from this northern portion of BWM generally runs in a northerly direction through Blackwater Creek to the Mackenzie River. The southern portion of the BWM is in the Comet Eastern Tributaries catchment, which generally drains in a westerly direction towards the Comet River, which in turn flows to the north before its confluence with the Mackenzie River. These hydrological characteristics have been considered in the design of rehabilitation landforms, water management strategies and watercourse PMLUs.

Blackwater Mine is traversed by a number of tributaries, which flow intermittently with extreme variability in flow, both seasonally and annually. Ephemeral creeks are utilised by rural properties for stock as well as supporting a range of ecological processes and functions. These values are described by WBM (1999 and 2001). The Bedford Weir was constructed to harvest water from the Mackenzie River to supply water for local industry and community needs.

Surface water resources in the vicinity of the mine site are scheduled under the EPP Water. Details of the prescribed water Environmental Values (EVs) and Water Quality Objectives (WQOs) are contained in the following Department of Environment and Heritage Protection (DEHP) documents:

- Mackenzie River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Mackenzie River Sub-basin September 2011.
- Comet River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Comet River Sub-basin September 2011.

EVs of the sub-catchments at BWM are summarised in Table 3-7.

Table 3-7 BWM surface water environmental values

Sub-catchment	Aquatic ecosystems	Irrigation	Farm supply/ use	Stock water	Aquaculture	Human consumer	Primary recreation	Secondary recreation	Visual recreation	Drinking water	Industrial use	Cultural and spiritual value
Mackenzie Southern Tributaries	✓	-	✓	✓	-	✓	✓	✓	✓	✓	✓	✓
Comet Eastern Tributaries	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓

The watercourses and drainage lines present within the BWM EA area are highly ephemeral, with flows only occurring for short periods during and immediately after rainfall events. The watercourses that intersect BWM are described in Table 3-8 and shown in Figure 3-14.

Table 3-8 Watercourses and key drainage lines within and immediately surrounding BWM

Watercourse	Details	Description
Northern catchment creeks		
Sagittarius Creek and unnamed tributaries	Ephemeral Minor Strahler stream order: 3	• The upstream tributaries originate on the eastern side of the Bonnie Doon, Mimosa and Sagittarius pits. • The portion of Sagittarius Creek within the BWM EA area is an unmapped drainage feature under the Water Act (2000). • Non-mining related farm-type dams are present on the minor tributaries. • Sagittarius Creek passes to the west of the Blackwater township, before its confluence with Blackwater Creek.
Bonnie Doon Creek	Ephemeral Minor Strahler stream order: 2	• The upper reaches of the Bonnie Doon Creek catchment include the western side of the Bonnie Doon Pit and the Blackwater Airport. • Confluence with Burngrove Creek to the north of BWM.
Burngrove Creek and unnamed tributaries	Ephemeral Minor Strahler stream order: 3	• The upper reaches of Burngrove Creek and its tributaries drain the local catchment area to the west of Besgrove, Airstrip and Sagittarius pits. • Burngrove Creek, flows in a northeasterly direction west of the BWM final landform. A 3 km section of the natural Burngrove Creek channel was removed by the BWM operations and replaced by a diversion channel (licensed diversion reference 40137F) that drains north between the railway and the BWM. For this assessment, it is assumed that this diversion will remain under final landform conditions. • A small portion of Burngrove Creek within the EA area is an unmapped drainage feature under the Water Act (2000). • Within the EA area, select tributaries have been diverted through drains on the western side of the mining operations. • Burngrove Creek also flows through the Burngrove Creek Retention Dam which was previously part of the mine's water management system. • Burngrove Creek drains in a northerly direction before its confluence with the Mackenzie River.
Taurus Creek and unnamed tributaries	Ephemeral Minor Strahler stream order: 4 Catchment area: 297 km^2 Main stream length: 22 km	• Taurus Creek, a major tributary of Blackwater Creek, originates from the west of BWM and drains in a northeasterly direction downstream of the Emu Creek Diversion in between rehabilitated dumps, and then between the Deep Creek and Stewarton voids, eventually joining Blackwater Creek about 6 km east of BWM final landform. • The Taurus Creek diversion includes an excavated storage called the R42 Water Point Dam (R42 Dam) in the upstream section of the diversion immediately prior to flowing between the two pits. The creek is also impounded downstream of the diversion by New Taurus Creek Dam. • The Taurus Creek confluence with Blackwater Creek is located in the proximity of the northeastern corner of ML1762.

Watercourse	Details	Description
Emu Creek	Ephemeral Minor Strahler stream order: 3	• Pre-mining, Emu Creek was a tributary of Taurus Creek that was originally diverted into Two Mile Gully, then re-diverted back into Taurus Creek. Currently, the creek is diverted on the western side of Stewarton Pit and flows north before draining into Taurus Creek on the western side of the operations.
Deep Creek and unnamed tributaries	Ephemeral Minor Strahler stream order: 2	• Deep Creek, a tributary of Taurus Creek, originates from the west of BWM and drains in a northeasterly direction via the Deep Creek temporary diversion in between rehabilitated dumps, and between the Ramp 30 and Deep Creek voids, before joining Taurus Creek about 3 km east of BWM final landform. • Deep Creek has a confluence with Taurus Creek on the eastern side of ML1759.
Two Mile Gully and unnamed tributaries	Ephemeral Minor Strahler stream order: 4 Catchment area: 172 km^2 Main stream length: 23 km	• Located on the eastern side of the current operational area, the local catchment includes areas to the east of Blackdown, Wilpeena, Tannyfoil and Stewarton pits. Confluence with Taurus Creek within ML1762.
Blackwater Creek	Ephemeral Major Strahler stream order: 5 Catchment area: 760 km^2 Main stream length: 57 km	• Located to the east of the BWM ML, it is the major watercourse that collects surface runoff from the northern portion of the EA area. • Taurus Creek flows into Blackwater Creek to the east of the EA area. • Blackwater Creek flows to the north past the Township of Blackwater before its confluence with the Mackenzie River.
Southern catchment creeks		
Sirius Creek and tributaries (including Speculation Creek)	Ephemeral Minor Strahler stream order: 4 Catchment area: 207 km^2 Main stream length: 34 km	• Sirius Creek originates from the east (upstream) of BWM. It flows in a westerly direction through BWM via the Sirius Creek temporary diversion (licensed diversion reference 52652F), which drains around the southern side of the Ramp 74 void. Downstream of the Sirius Creek temporary diversion, Sirius Creek continues to drain in a westerly direction away from the BWM final landform.
Rockland Creek and tributaries	Ephemeral Minor Strahler stream order: 3	• Rockland Creek is a tributary of the Comet River. It drains in an east to west direction into the Comet River to the west of BWM. The headwaters of Rockland Creek are located at the base of the Shotover Range to the east of BWM. • Flows through Rockland Creek are currently regulated through the Rockland Creek Dam and directed to the south of Marshmead Pit via a diversion.

Of the above creeks, Burngrove Creek, Deep Creek and Taurus Creek in the northern catchment and Sirius Creek and Rockland Creek in the southern catchment are the most significant watercourses within and surrounding BWM. All other minor and unnamed tributaries flow into one of these five key watercourses.

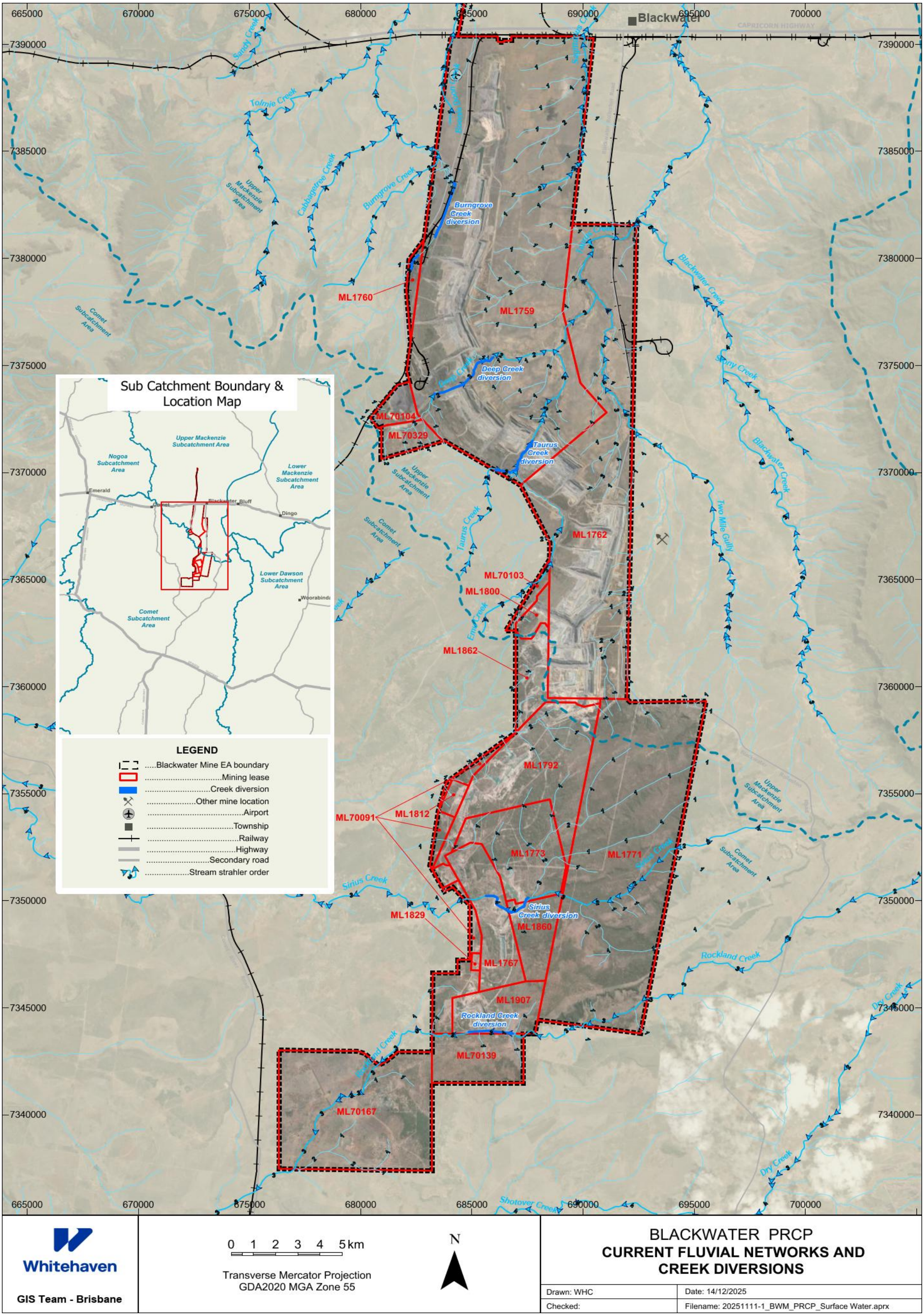


Figure 3-14 BWM current fluvial network and creek diversions

3.1.2.6.2 Water licences

The following water licences are associated with the BWM mining operations:

- Diversion of watercourses (creek diversions shown in Figure 3-14).
- Interfering with the flow of water by impounding.
- Taking of water.

Water licences applicable to the BWM operation are summarised in Table 3-9.

Table 3-9 Water licences applicable to BWM

Authorisation number	Authorisation activity	Authorised purpose	Expiry date
40137F	Licence to interfere by diversion - Burngrove Creek	Divert the course of flow	30/06/2111
606739	Licence to interfere by diversion -Burngrove Creek	Divert the course of flow	30/06/2111
51464F	Licence to interfere by impounding - embankment or wall - Burngrove Creek (Burngrove Creek Retention Dam)	Impound water	30/06/2111
603608	Licence to take water - Burngrove Creek	Take of water (industrial use)	30/06/2111
52652F	Licence to interfere by diversion - Sirius Creek	Divert the course of flow	30/06/2111
409112	Licence to interfere by diversion - Taurus Creek	Divert the course of flow	30/06/2111
57721WF	Licence to interfere by impounding – embankment or wall - Taurus Creek (Taurus Creek Dam)	Impound water	30/06/2111
57720WF	Licence to take water - Taurus Creek (Taurus Creek Pump)	Take of water (industrial use)	30/06/2111
57711WF	Licence to interfere by diversion - Rockland Creek	Divert the course of flow	30/06/2111
609051	Licence to interfere by diversion - Deep Creek	Divert the course of flow	30/06/2111
57801WF	Licence to interfere by impounding - embankment or wall - Deep Creek (New Deep Creek Dam)	Impound water	30/06/2111
100883	Licence to take water – Deep Creek (New Deep Creek Dam Pump)	Impound water	30/06/2111
52648F	Licence to interfere with the flow of water – Shotover Creek	Stock watering, water harvesting	30/06/2011
52649F	Licence to take water – Shotover Creek	Stock watering, water harvesting	30/06/2011

In accordance with Section 334ZP of the *Mineral Resources Act 1989* (Qld) and Section 1283 of the *Water Act 2000* (Qld), the taking of, or interference with, underground water associated with resource activities authorised under a mining lease is permitted where those activities were lawfully established and continue under the current legislative framework.

3.1.2.6.3 Fluvial water quality

The water quality of the streams within the BWM catchments has been altered over time due to many years of bush clearing, agricultural activities, regulations of stream flows not related to mining, and from mining and rural/urban development.

Although the water quality of the streams may have been altered it is recognised that mining may influence impacts. The water quality of creeks surrounding BWM has been recorded for many years. Table 3-10 shows measured pH and EC values for selected creeks upstream of operations. The values are considered natural (or background) values and are derived from historical monitoring data. Actual monitoring data varies considerably.

Table 3-10 Water quality of selected creeks upstream of operations

Source	Median pH	Median EC (µS/cm)	Range of EC values (µS/cm)
Sirius Creek[1]	6.8	677	58-1900
Rockland Creek[1]	6.8	125	69-900
Burngrove Creek[1]	7.9	150	20-280
Two Mile Creek[1]	7.5	90	50-190
Taurus Creek[2]	7.8	306	154-389
Deep Creek[2]	7.8	177	149-284
Emu Creek[2]	7.9	132	122-151

[1] Residual Void Investigation (BMA, 2020)

[2] Blackwater North Extension Project, Appendix B Surface Water and Flooding Assessment (WRM 2026d)

Surface water quality within the fluvial network that intersects BWM has previously been assessed through a Receiving Environment Monitoring Program (REMP), undertaken in accordance with site-specific EA Conditions (F22-F24). The REMP reports and associated surface water quality results have been supplied to the administering authority as part of the EA's annual reporting requirements. The 2022 REMP report includes water quality data for the period 2010 to 2021.

Since 2022, surface water monitoring has been undertaken as part of the wider Fitzroy Basin Regional Receiving Environment Monitoring Program (FRREMP), which aims to provide a more regional and consistent monitoring approach to coal mines throughout the basin. As such, only receiving environment samples are currently being collected. The implementation of surface water runoff sampling from rehabilitated land will be required to allow PRC P Schedule milestone criteria to be assessed.

The background surface water quality results are reflective of the upstream catchment and land uses, which primarily consist of grazing and woodland habitat. These results are explored further in Section 3.8.3.

3.1.2.7 Aquatic ecology

3.1.2.7.1 Aquatic habitat and ecological context

Aquatic ecosystems within the BWM area are intrinsically linked to the hydrological regime described in Section 3.1.2.6. These systems are characterised by predominantly ephemeral to intermittent flow regimes (refer to Section 3.1.2.6), with flows occurring in response to rainfall events and extended periods of low or no flow between events.

The fluvial network comprises a series of minor to major tributaries within the Mackenzie River and Comet River sub-basins (refer Table 3-8 and Figure 3-14), including key watercourses such as Taurus Creek, Burngrove Creek, Deep Creek, Sirius Creek and Rockland Creek. These systems provide habitat for aquatic, semi-aquatic and riparian-dependent species and support ecological processes typical of highly variable inland catchments within the Fitzroy Basin.

Aquatic habitat condition across the BWM area is influenced by a combination of natural factors (e.g. climatic variability, low baseflow conditions) and anthropogenic disturbance, including historical land clearing, grazing, water regulation and mining-related activities. As a result, aquatic ecosystems are generally representative of modified, low-order ephemeral stream systems.

3.1.2.7.2 Blackwater North Extension Project

As part of the BNEP, additional aquatic ecology investigations were undertaken to supplement the existing baseline understanding of aquatic habitats and values within the BWM area. These investigations are documented in the *Aquatic Ecology and Groundwater-Dependent Ecosystems Assessment* (DPM Enviros ciences, 2026).

The BNEP Study Area encompasses several waterways within the Mackenzie River sub-basin, including Taurus Creek, Two Mile Gully, Sagittarius Creek and Deep Creek, which are consistent with the broader hydrological regime described in Section 3.1.2.6. These drainage systems exhibit highly variable flow conditions, with connectivity typically limited to periods following rainfall events and extended dry periods resulting in isolated pools or dry channels.

Mapped wetlands within the Study Area are predominantly artificial or modified lacustrine systems (e.g. farm dams and mine water storages), with limited occurrence of natural wetland features.

Aquatic habitat assessments were undertaken at 16 sites across riverine and lacustrine environments. Habitat condition was generally assessed as low to moderate, with riverine sites generally rated as ‘fair’ condition in accordance with AusRivAS protocols, reflecting the disturbed nature of the systems and the influence of catchment-scale land use.

Aquatic ecological surveys identified assemblages typical of ephemeral, disturbed systems in central Queensland. No aquatic flora or fauna species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) or *Nature Conservation Act 1992* (Qld) (NC Act) were recorded during field surveys. Based on habitat availability and survey outcomes, the likelihood of occurrence of such species within the Study Area is considered low.

Overall, the findings of the BNEP investigations are consistent with the broader ecological characterisation of the BWM EA area, confirming that aquatic values are representative of modified, highly variable systems typical of the Fitzroy Basin.

3.1.2.7.3 Groundwater-dependent ecosystems

Groundwater-dependent ecosystems (GDEs) within the BNEP Study Area are limited in extent and are primarily associated with riparian vegetation along watercourses, particularly Taurus Creek.

As identified in the *Aquatic Ecology and Groundwater Dependent Ecosystems Assessment* prepared by DPM Enviros ciences (2026), no subterranean GDEs (e.g. stygofauna) or groundwater-dependent wetlands were identified during desktop assessment or field surveys.

The DPM Enviros ciences (2026) assessment identified that potential GDEs are associated with shallow alluvial sediments adjacent to ephemeral drainage lines (refer to Section 3.1.2.7.2), where water may accumulate following rainfall and flow events. These systems are typically maintained by intermittently recharged near-surface groundwater, rather than continuous connection to deeper regional aquifers.

Based on field observations and ecological assessment undertaken by DPM Enviros ciences (2026), vegetation within these areas is classified as facultatively groundwater-dependent. This indicates that groundwater may be utilised opportunistically when available but is not required for long-term persistence. Field observations indicate that groundwater use is intermittent and seasonally variable, with vegetation also relying on soil moisture during extended dry periods.

Riparian vegetation along Taurus Creek is considered to have comparatively higher ecological value within the Study Area due to its role in:

- providing habitat connectivity;
- maintaining channel stability; and
- supporting local ecological processes.

Consistent with the conclusions of DPM Enviros ciences (2026), these systems are considered to have a relatively low sensitivity to changes in groundwater conditions, compared to obligate groundwater-dependent ecosystems.

The broader hydrogeological context for these systems, including groundwater quality, availability and use, is described in Section 3.1.2.5.

3.1.2.7.4 Relationship to surface water quality and monitoring

Surface water quality within the BWM area (refer Section 3.1.2.6.3) reflects the combined influence of natural catchment processes and historical land use. Monitoring data, including results from the Receiving Environment Monitoring Program (REMP) and the Fitzroy Basin Regional Receiving Environment Monitoring Program (FRREMP), indicate that aquatic ecosystems are adapted to variable water quality conditions typical of ephemeral systems.

This ecological characterisation, including baseline water quality and aquatic ecosystem condition, is consistent with recorded background conditions, which demonstrate substantial temporal variability in parameters such as electrical conductivity and pH. These conditions inform the expected range of variability for rehabilitated watercourse PMLUs.

Ongoing monitoring programs provide an important mechanism for verifying the condition and recovery of aquatic ecosystems in response to rehabilitation and closure activities, including demonstrating achievement of PMLU outcomes, rehabilitation milestones and stable condition in accordance with the PRCP.

3.1.2.8 Soil types, properties and productivity

3.1.2.8.1 Soil types

Regional soil mapping of the mine identifies two broad soil groups across the BWM project area (QLD Department of Resources, 2023), as summarised in Table 3-11, with Figure 3-15 illustrating the broad Australian Soil Classification (ASC) types. Further detail is provided in *Appendix 4.3 Blackwater Mine Material Characterisation Study* (Landloch, 2025b).

Table 3-11 Summary of BWM soil types

Soil landscape code	Australian soil classification	Land suitability class	Description
MM7	Vertosol, Dermosol	3	Dark and yellow friable earths with friable brown soils.
SI12	Chromosol, Sodosol	5	Complex range of soils occurring. Dominant soils are sandy to loamy duplex soils.

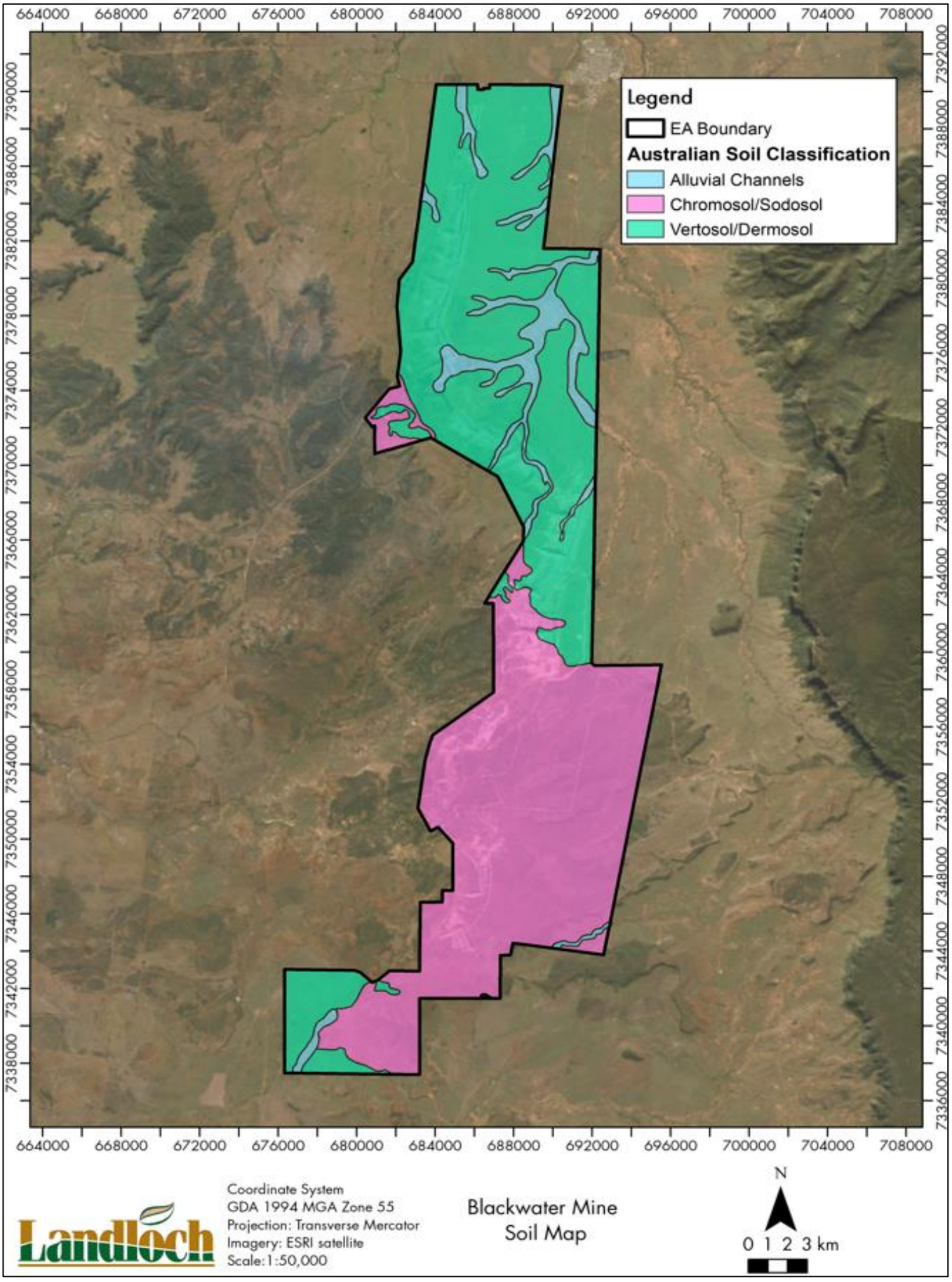


Figure 3-15 BWM soil mapping units (Australian Soil Classification)

3.1.2.8.2 Properties and productivity

Several soil surveys have been undertaken at BWM, resulting in the identification of 26 Soil Landscape Units (SLUs) across the mine site (Appendix 4.3 and Landloch, 2025b). A consolidated summary of the SLUs is provided in Table 3-12.

Table 3-12 Summary of soil landscape units' details for BWM

SLU	Soil details	Vegetation description	Grazing suitability class
A1	Uniform brown clay or texture contrast soils on alluvial material in and adjacent to active drainage lines.	Mixed brigalow, yellowwood, poplar box and sandalwood. River red gum and Moreton Bay ash in creek channel.	2/3
B1	Gently undulating plains with cracking and non-cracking uniform clays and areas of gilgai developed from weathered non-quartzrose Permian sedimentary rocks and Tertiary sediments.	Brigalow, blackbutt with associated bottle tree, poplar box and yellowwood.	2
B2	Undulating plains and rises of generally on-cracking clays with significant surface gravel.	Brigalow with blackbutt, ooline, sandalwood, Leichardt bean, carissa. Includes areas of undulating ridges and stony Yapunyah.	3
B2v	Reddish brown texture contrast soils with thin sandy or loamy surface layers over well-structured alkaline clay subsoils and gravel.	Main vegetation is brigalow and associated species which include poplar box.	3/4
B3	Soils are reddish brown non-cracking clays often with a hard setting sandy surface. Often quite shallow to weathered sediments.	Regrowth of brigalow, yellowwood, whitewood, occasionally poplar box. Ooline was present in original vegetation.	3
C1	Yellowish brown cracking and non-cracking uniform clays situated on gentle undulating plains with deep effective rooting depth.	Buffel grass with vegetation regrowth, consisting of mainly brigalow.	2
C1v	Yellowish brown cracking and non-cracking clays with reddish clays at depth situated on gentle undulating plains.	Buffel grass with vegetation regrowth	5
C1gv	Brown to dark brown cracking and non-cracking uniform clays situated on gentle undulating pains with microrelief present in the form of gilgai and melon holes of varying sizes.	Whipsick brigalow, brigalow, and buffel grass.	5
D1	Grayish and minor dull yellow non-cracking clays situated on gentle undulating plains with deep effective rooting depth of approximately 45-60cm with soft lime and calcium carbonate present.	Buffel grass and brigalow.	4
D1gv	Grayish and minor dull yellow non-cracking uniform lays on gentle undulating plains with an effective rooting depth of approximately 45-60 cm with normal gilgai present.	Whipsick brigalow, brigalow, and buffel grass.	4

SLU	Soil details	Vegetation description	Grazing suitability class
D2	Brownish black and black medium hard cracking clay situated on gentle undulating plains with deep effective rooting depth of approximately 70-80 cm with soft lime and calcium carbonate present	Bauhinia, broom bush, yellowwood and minor brigalow.	3
D3	Light-medium to medium clays overlying sand lenses near drainage, creek lines, and minor depressions.	Brigalow, whitewood.	4
D4	Cracking light to medium uniform brown clays over gentle underlying plains with no microrelief present.	Buffel grass.	3
D4sv	Cracking light to light medium brown clays over gentle undulating plains with no microrelief present, however, is located on a slope greater than 3%.	Buffel grass.	3
D4rv	Cracking medium to light brown clays over gentle undulating plains within shallow depressions and overland runoff with gravels and cobbles present.	Buffel grass, acacia.	3
D5	Sandy clay loam overlying light brown clays along gently undulating plains.	Whipstick brigalow, Bauhinia, buffel grass.	3
E1	Shallow, rocky earths with some areas of gravelly and shallow texture contrast soils on the mesa margins.	Dominated with lancewood and areas of Dawson gum, poplar box or yapunyah.	4/5
E2	Open ironbark with associated Acacias on hard-setting red sandy duplex of the tablelands.	Narrowleaf ironbark, yapunyah with associated acacias.	4
E3	Sandy texture contrast soils usually with hard-setting, gravelly surface and with erosive yellowish clays subsoils with are gravelly. Includes areas of shallow gravelly ridges and exposes bedrock.	Mixed scrub of poplar box, brigalow and sandalwood.	3
E4	Deeper loamy red earths on undulating plains.	Open silver leaf ironbark.	2
E5	Loamy red and yellow earths usually underlain with lateritic gravel before 60 cm depth on uplands and mesa tops.	Mainly narrowleaf ironbark and bloodwood with a variety of wattles and other species.	3
F1	Alluvial creek areas with loam and silty soil profiles.	Brigalow, poplar box, bottle trees.	4
F2	Active alluvial plains with loas and clayey sand with soft to firm sandy surface.	Mount Coolabah, minor brigalow.	3
F3	Brown silty clay loams on silty clays on gentle undulating plains. Calcium carbonate present in subsoils.	Buffel grass.	2
R1	Rocky outcrop/hill	Mixed vegetation	5
S1	Texture contrast and gradational soils situated on gentle undulating plains.	Buffel grass with very minor vegetation regrowth observed.	4

3.1.2.9 Land stability

Land within and surrounding BWM has a long history of disturbance, primarily due to agricultural activities (such as pasture management and cattle grazing), mining, and rural development. Adjacent lands in the Bowen Basin indicate that surface erosion is common when soils and vegetation are disturbed. Details of pre-mining land use and soil characteristics have been documented by Gunn et al. (1967) and Emmerton (1999), with summaries provided in the *Blackwater Environmental Management Plan (2008).*

The pre-mining topography at BWM was generally flat to undulating, consistent with the regional landscape. According to the *Land Management Manual: Dawson/Callide Districts* (1991), seven Land Resource Areas (LRAs) are defined within the Dawson/Callide districts based on geology, vegetation, and pre-development landforms. The Blackwater Mine is largely situated within the Mixed Brigalow Plains LRA, with smaller areas classified as Eucalypt Clay Uplands. Prior to mining, these areas supported moderate-density grazing on Brigalow clay soils and lower-density grazing on eucalypt plains and Tertiary lateritic rises. Much of the land had already been cleared or thinned for pasture before extensive open-cut mining commenced.

Soil and land stability across the Dawson/Callide districts is strongly influenced by soil type, profile depth, and landscape position. Within the Mixed Brigalow Plains LRA, moderate soil moisture deficiencies and moderate to severe water erosion hazards are particularly evident on slopes. The Eucalypt Clay Uplands LRA consists of shallow, erodible soils with limited moisture availability, further reducing pre-mining stability. Shallow, skeletal, and duplex soils (especially in the Eucalypt Clay Uplands, Softwood Scrub Uplands, and Ranges LRAs) exhibit low to moderate water-holding capacity and are highly susceptible to erosion on slopes. Hardsetting or flaking surfaces, massive subsoils, and high sodicity in some clay soils also compromise stability. In the Mixed Brigalow Plains, microrelief features such as melonholes and linear gilgai can cause localised waterlogging and surface instability, increasing erosion risk when vegetation is removed.

Soils in the Lateritic Plateaus LRA are typically sandy, shallow, highly erodible, and of very low fertility, making them vulnerable to wind and water erosion. Alluvial plains, by contrast, generally contain deeper, more fertile soils but are prone to flooding, which can compromise stability. Effective land management practices—including maintaining native or sown pastures, limiting tree clearing on slopes exceeding 20%, and implementing contour banks, diversion banks, and careful waterway management—are essential for mitigating erosion and maintaining land stability post-disturbance.

These inherent land stability characteristics have been taken into account in the development of landform design criteria and rehabilitation strategies described in Section 3.6.

3.1.2.10 Vegetation communities and ecological data

Several ecological studies have been undertaken within the BWM site. Since the approval of the mine, the following studies have been undertaken in relation to the broader vegetation communities and ecological values on the BWM site:

- Blackwater North Extension Project – Terrestrial Ecology Assessment (E2M, 2026)
- Whitehaven Coal Clutha Property Baseline Ecological Assessment (LEC, 2025a)
- Blackwater Coal Mine Underground Mining Surface Cracks and Sinkholes: Assessment of Impacts to Vegetation and Habitat (LEC, 2025b)
- Blackwater Terrestrial Ecology Survey Report Flora and Fauna Seasonal Surveys - Blackwater Mine Expansion (ML1759 and ML1762) (EMM, 2020a)
- Blackwater Terrestrial Ecology Survey Report Flora and Fauna Seasonal Surveys - Blackwater Mine Southern Expansion (EMM, 2020b)
- Field Ecology Survey Report - Blackwater Mine (EMM, 2019a)

- Blackwater Mine 3D Seismic Ecology Survey and Impact Assessment (EMM, 2019b)
- Blackwater Mine Ramp 74 Levee Ecological Survey Report (EMM, 2019c)
- A Review of Habitat Values for Biodiversity and Species of Conservation Significance – BMA Blackwater Mine (Ecoserve & LAMR, 2006)
- The baseline vegetation communities and ecological values of the BWM site have been described based on the results of the previous ecological studies as well as updated desktop searches of the following Queensland Government databases:
- Regional ecosystem mapping (DES, 2023a)
- Matters of State Environmental Significance (DES, 2023b)
- Maps of environmentally sensitive areas (DES, 2023c)
- Wildlife Online database (DES, 2023d)

3.1.2.10.1 Regional ecosystems

The remnant vegetation cover on the BWM site has been altered over time due to pre-mining clearing for agricultural land use purposes and historical clearing for approved mining activities.

The regional ecosystems on BWM have been ground-truthed and mapped as part of the broader previous ecological surveys (E2M 2026, LEC 2025a and 2025b, EMM, 2020a; EMM, 2020b; EMM, 2019a; EMM, 2019b; EMM, 2019c and Ecoserve & LAMR, 2006)

The highest disturbance to regional ecosystems to date is associated with areas cleared for mining activities and associated infrastructure through a long central strip of site extending north to south (Figure 3-16).

The remnant vegetation adjacent to the BWM extends from the southern end of the BWM EA boundary to approximately Ramp 56 in the north. Much of the remaining vegetation to the east and west of the central mining strip to the north of Ramp 56 has been largely cleared for cattle grazing. Nonetheless, several smaller remnant and high value patches of brigalow regrowth associated with RE11.4.9 (Acacia harpophylla shrubby woodland with Terminalia oblongata on Cainozoic clay plains) and RE11.9.5 (Acacia harpophylla and/or Casuarina cristata open forest to woodland on fine-grained sedimentary rocks) remain as well as narrow sections of remnant vegetation along drainage lines.

There are larger tracts of regional ecosystems mapped along the south-western and south-eastern section of the mine. A large tract of remnant regional ecosystems has been mapped on the Clutha property to the southeastern corner of the BWM (LEC, 2025a) (Figure 3-16). The Clutha property is approximately 6,760 ha. The majority of this area is located on a mixture of ironstone jump-ups (Land zone 7), Cainozoic sand plains (Land zone 5), Tertiary clay plains (Land zone 4), coarse grained sandstones (Land zone 10), Tertiary basalts (Land zone 8) and recent alluvial deposits (Land zone 3) in association with creeklines throughout the property including Sirius creek. There is clear evidence of historical mining exploration disturbance in the northwestern and southern areas of the Clutha property indicated by historical clearing for seismic lines, exploration drilling as well as an underground mining in the south.

The ground-truthed regional ecosystems returned on BWM as a result of previous ecological assessments have been mapped in Figure 3-16 and are listed in Table 3-13 along with their associated *Vegetation Management Act 1999* (Qld) *(VM Act)* class and biodiversity status (LEC 2025a, LEC 2025b, EMM, 2020a; EMM, 2020b; EMM, 2019a; EMM, 2019b; EMM, 2019c and Ecoserve & LAMR, 2006).

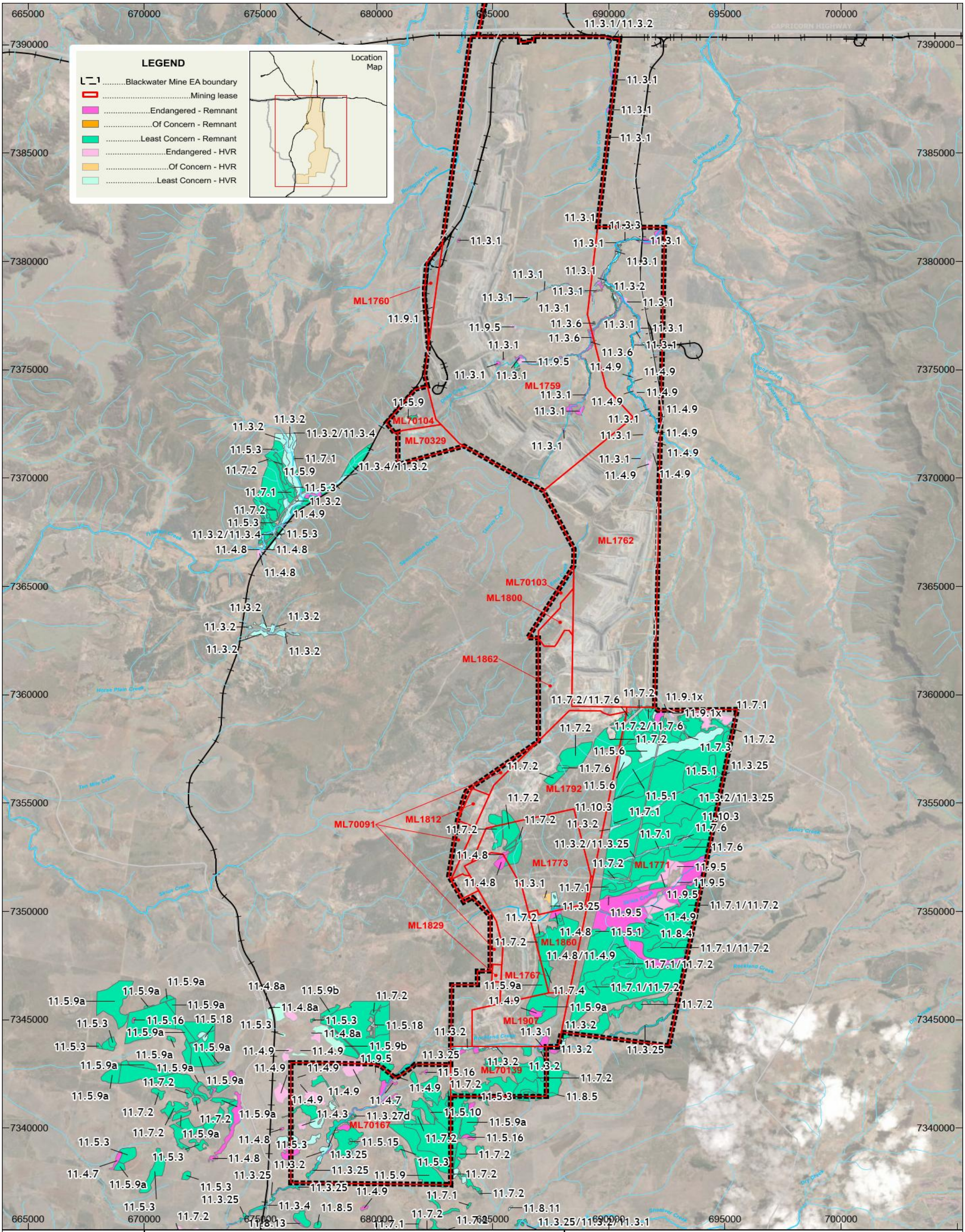


Figure 3-16 BWM baseline regional ecosystem

Table 3-13 Regional ecosystems recorded during baseline assessments at BWM

Regional ecosystem descriptions	RE Code	Remnant / High Value Regrowth (HVR)	RE VM Act class	RE Biodiversity status
Acacia harpophylla and/or *Casuarina cristata* open forest on alluvial plains	11.3.1	Remnant	Endangered	Endangered
Eucalyptus populnea woodland on alluvial plains	11.3.2	Remnant	Of concern	Of concern
Eucalyptus coolabah open forest woodland on alluvial plains	11.3.3	Remnant	Of concern	Of concern
Eucalyptus tereticornis or *E. camaldulensis* woodland fringing drainage lines	11.3.25	Remnant	Least concern	Of concern
Main river channels. Open water or exposed stream beds and bars. Usually devoid of emergent vegetation although scattered trees and shrubs such as *Melaleuca viminalis* or *Melaleuca* spp. May be present and aquatic species may be abundant, particularly in water holes and lagoons.	11.3.25f	Remnant	Least concern	Of concern
Eucalyptus camaldulensis and/or *E. tereticornis* woodland. A range of sedges and grasses occur in the ground layer including *Fimbristylis vagans, Myriophyllum striatum, Nitella pseudoflabellata* and *Pseudoraphis sp.* Occurs fringing large lakes.	11.3.27d	Remnant	Least concern	Of concern
Eucalyptus platyphylla, *Corymbia clarksoniana* woodland on alluvial plains	11.3.35	Remnant	Least concern	No concern at present
Eucalyptus tereticornis and/or *Eucalyptus* spp. woodland on alluvial plains	11.3.4	Remnant	Of concern	Of concern
Eucalyptus melanophloia woodland on alluvial plains	11.3.6	Remnant	Of concern	Of concern
Acacia harpophylla and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains	11.4.3	Remnant	Endangered	Endangered
Eucalyptus populnea with *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on Cainozoic clay plains	11.4.7	Remnant	Endangered	Endangered
Eucalyptus cambageana woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains	11.4.8	Remnant	Endangered	Endangered
Larger gilgai provides ephemeral wetland habitat.	11.4.8a	Remnant	Endangered	Endangered
Acacia harpophylla shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains	11.4.9	Remnant	Endangered	Endangered
Acacia harpophylla, Lysiphyllum carronii +/- Casuarina cristata open forest to woodland. Occurs on level to gently undulating Cainozoic plains, including weathered basalt.	11.4.9a	Remnant	Endangered	Endangered
Eucalyptus crebra and/or *E. populnea, Callitris glaucophylla, Angophora leiocarpa, Allocasuarina luehmannii* woodland on Cainozoic sand plains and/or remnant surfaces	11.5.1	Remnant	Least concern	No concern at present
Eucalyptus populnea and/or *E. melanophloia* and/or *Corymbia clarksoniana* on Cainozoic sand plains and/or remnant surfaces	11.5.3	Remnant HVR	Least concern	No concern at present
Triodia spp. hummock grassland on Cainozoic sand plains and/or remnant surfaces	11.5.6	Remnant	Of concern	Of concern
Eucalyptus crebra and other *Eucalyptus* spp. and *Corymbia* spp. woodland on Cainozoic sand plains and/or remnant surfaces	11.5.9	Remnant	Least concern	No concern at present
Eucalyptus melanophloia woodland. Occurs on Cainozoic sandplains formed on plateaus and broad crests of hills and ranges.	11.5.9a	Remnant	Least concern	No concern at present
Eucalyptus crebra, *E. tenuipes*, *Lysicarpus angustifolius* +/- *Corymbia* spp. woodland. Occurs on Cainozoic sandplains formed on plateaus and broad crests of hills and ranges.	11.5.9b	Remnant	Least concern	No concern at present
Melaleuca tamariscina tall open shrubland to low woodland on Cainozoic sand plains and/or remnant surfaces	11.5.10	Remnant	Of concern	Of concern
Semi-evergreen vine thicket on Cainozoic sand plains and/or remnant surfaces	11.5.15	Remnant	Least concern	Endangered
Acacia harpophylla and/or *Casuarina cristata* open forest in depressions on Cainozoic sand plains and remnant surfaces	11.5.16	Remnant	Endangered	Endangered
Micromyrtus capricornia open shrubland on Cainozoic sand plains and/or remnant surfaces	11.5.18	Remnant	Of concern	Of concern
Acacia harpophylla and/or *Casuarina cristata* and *Eucalyptus thozetiana* or *E. microcarpa* woodland on lower scarp slopes on Cainozoic lateritic duricrust	11.7.1	Remnant	Least concern	Of concern
Acacia spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone	11.7.2	Remnant	Least concern	No concern at present
Eucalyptus persistens, Triodia mitchellii open woodland on stripped margins of Cainozoic lateritic duricrust	11.7.3	Remnant	Least concern	No concern at present
Eucalyptus decorticans and/or *Eucalyptus* spp., *Corymbia* spp., *Acacia* spp., *Lysicarpus angustifolius* woodland on Cainozoic lateritic duricrust	11.7.4	Remnant	Least concern	No concern at present
Shrubland on natural scalds on deeply weathered coarse-grained sedimentary rocks	11.7.5	Remnant	Least concern	No concern at present
Corymbia citriodora or *Eucalyptus crebra* woodland on Cainozoic lateritic duricrust	11.7.6	Remnant	Least concern	No concern at present
Eucalyptus melanophloia woodland to open woodland on Cainozoic igneous rocks	11.8.4	Remnant	Least concern	No concern at present

Regional ecosystem descriptions	RE Code	Remnant / High Value Regrowth (HVR)	RE VM Act class	RE Biodiversity status
Eucalyptus orgadophila open woodland on Cainozoic igneous rocks	11.8.5	Remnant	Least concern	No concern at present
Dichanthium sericeum grassland on Cainozoic igneous rocks	11.8.11	Remnant	Of concern	Of concern
Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks	11.8.13	Remnant	Endangered	Endangered
Acacia harpophylla Eucalyptus cambageana woodland to open forest on fine-grained sedimentary rocks	11.9.1	Remnant	Endangered	Endangered
Acacia harpophylla and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks	11.9.5	Remnant	Endangered	Endangered
Eucalyptus populnea, Eremophila mitchellii shrubby woodland on fine- grained sedimentary rocks	11.9.7	Remnant	Of concern	Of concern
Acacia shirleyi or *A. catenulata* open forest on coarse-grained sedimentary rocks. Crests and scarps	11.10.3	Remnant	Least concern	No concern at present
Eucalyptus crebra woodland on coarse-grained sedimentary rocks	11.10.7	Remnant	Least concern	No concern at present

3.1.2.10.2 Environmentally sensitive areas

Category B environmentally sensitive areas (ESAs) are defined under Schedule 19 of the EP Regulations to include Endangered regional ecosystems based on the biodiversity status identified in the 'Regional ecosystem description database'.

The following ground-truthed regional ecosystems with an Endangered biodiversity status are associated with Category B ESAs on BWM (Figure 3-16):

- RE 11.3.1 *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains
- RE 11.4.3 *Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains
- RE 11.4.7 *Eucalyptus populnea* with *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on Cainozoic clay plains
- RE 11.4.8 *Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *Acacia argyrodendron* on Cainozoic clay plains
- RE 11.4.8a Larger gilgai provides ephemeral wetland habitat.
- RE 11.4.9 *Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains
- RE 11.4.9a *Acacia harpophylla, Lysiphyllum carronii* +/- *Casuarina cristata* open forest to woodland. Occurs on level to gently undulating Cainozoic plains, including weathered basalt.
- RE 11.5.15 *Semi-evergreen vine thicket* on Cainozoic sand plains and/or remnant surfaces
- RE11.5.16 *Acacia harpophylla* and/or *Casuarina cristata* open forest in depressions on Cainozoic sand plains and remnant surfaces
- RE 11.8.13 *Semi-evergreen vine thicket* and microphyll vine forest on Cainozoic igneous rocks
- RE 11.9.1 *Acacia harpophylla*, *Eucalyptus cambageana* woodland to open forest on fine-grained sedimentary rocks
- RE 11.9.5 *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks

3.1.2.10.3 State significant flora species

The following threatened flora species listed under the NC Act are known to occur on BWM based on the results of previous ecological surveys:

- *Solanum elachophyllum* (Endangered NC Act)
- *Solanum dissectum* (Endangered NC Act, Endangered EPBC Act)
- *Cadellia pentastylis* (ooline) (Vulnerable NC Act, Vulnerable EPBC Act)
- *Cerbera dumicola* (Near Threatened NC Act)

Solanum elachophyllum is a small shrub that occurs almost exclusively on cracking clay soils in association with brigalow communities including either *Eucalyptus thozetiana* or Dawson Gum (*Eucalyptus cambageana*).

Solanum elachophyllum has been recorded on BWM site most frequently on clay or loamy soils in fragmented non-remnant vegetation in association with brigalow (EMM, 2020a).

Solanum dissectum is a perennial shrub 0.3 to 1 m high that occurs in open forests and woodlands of brigalow or *Eucalyptus thozetiana* on solodic clay soils. It has been recorded during previous ecological

surveys on BWM site in endangered RE11.4.8 (EMM, 2019c; LEC, 2025a). The E2M 2026 survey did not identify the presence of *Solanum dissectum* within the BNEP area.

Ooline is a tree growing to 10 m (rarely to 25 m) with dark, hard and scaly bark. Ooline has been previously recorded on the lower scarps of RE11.7.1 and RE11.7.2 to the east of the South Blackwater Industrial Area (Ecoserve & LAMR, 2006; LEC, 2025a).

Cerbera dumicola is a shrub or small tree growing to 4 m high that occurs across a range of habitats in central and southern Queensland. It occurs in woodlands of *Eucalyptus thozetiana, Acacia shirleyi* and/or *Acacia catenulata* on sandstone hills, plateaus, and acidic soils. It also occurs in semi-deciduous notophyll-microphyll vine forests. It has been recorded on the BWM in RE11.7.2.

Bertya opponens has been previously recorded within close proximity to the BNEP Study Area, however, the E2M 2026 survey indicated it was unlikely that the Study Area contains suitable habitat for the species (E2M, 2026).

3.1.2.10.4 Blackwater North Extension Project

This section summarises the findings of the Terrestrial Ecology Assessment undertaken by E2M (2026) for the BNEP, which assessed flora, fauna, ecological function and habitat quality within the Project Area. This section summarises the findings of that assessment.

The BNEP is located within the Brigalow Belt bioregion and comprises approximately 6,907 ha of predominantly cleared and modified land that has been historically used for cattle grazing. Vegetation within the BNEP is highly disturbed, with the majority of the landscape characterised by non-remnant pasture dominated by exotic grasses and scattered regrowth vegetation.

Remnant and regrowth vegetation occurs primarily in association with drainage lines and watercourses and is typically dominated by *Acacia harpophylla* (Brigalow) and Eucalyptus species. Several regional ecosystems (REs) present within the BNEP are listed as endangered or of concern under the Vegetation Management Act 1999, including RE 11.3.1, 11.4.9 and 11.9.5.

A total of 112 flora species were recorded, comprising predominantly native species, with a notable presence of introduced pasture species. One threatened flora species, *Solanum elachophyllum* (Endangered under the NC Act), was confirmed within the BNEP, occurring across multiple locations, primarily within disturbed and non-remnant vegetation.

Vegetation condition across the BNEP is generally low, reflecting a long history of clearing, grazing pressure and weed invasion. Native vegetation is often structurally simplified, with reduced canopy cover, limited recruitment and a high proportion of exotic groundcover.

The terrestrial habitat across the BNEP is highly modified, reflecting a long history of vegetation clearing and pastoral land use. While remnant and high value regrowth vegetation associated with Category B ESAs (e.g. Brigalow-dominated regional ecosystems) are present, these habitats are generally fragmented and restricted to drainage lines and isolated patches. Habitat condition is variable but typically moderate to low, with many areas exhibiting reduced native species diversity, simplified vegetation structure, and high levels of disturbance. Non-remnant areas are widespread and dominated by exotic pasture species, resulting in limited structural complexity and reduced habitat availability for fauna.

Key drivers of habitat degradation include historical clearing, ongoing grazing pressure, weed encroachment and habitat fragmentation, which have collectively diminished ecological function and connectivity across the landscape. Higher quality habitat is largely confined to remnant and regrowth vegetation aligned with riparian corridors and gilgai landforms, which provide important refuge, foraging and movement opportunities for fauna.

Overall, the baseline environment within the BNEP area is characterised by predominantly low-quality habitat interspersed with discrete areas of moderate ecological value associated with remnant vegetation and watercourse features (E2M, 2026).

3.1.2.11 Fauna presence and populations

3.1.2.11.1 State significant fauna species

The following threatened fauna species listed under the NC Act are known to occur on BWM based on the results of previous ecological surveys:

- Koala (*Phascolarctos cinereus*) (Endangered NC Act, Endangered EPBC Act)
- Ornamental snake (*Denisonia maculata*) (Vulnerable NC Act, Vulnerable EPBC Act)
- Squatter pigeon (*Geophaps scripta scripta*) (Vulnerable NC Act, Vulnerable EPBC Act)
- White-throated needle tail (*Hirundapus caudacutus*) (Vulnerable NC Act, Vulnerable EPBC Act)
- Fork-tailed swift (*Apus pacificus*) (Special Least Concern NC Act, Migratory not threatened EPBC Act)
- Rufous fantail (*Rhipidura rufifrons*) (Special Least Concern NC Act)
- Short-beaked echidna (*Tachyglossus aculeatus*) (Special Least Concern NC Act)
- Australian painted snipe (*Rostratula australis*) (Endangered NC Act, Endangered EPBC Act)
- Latham's Snipe (*Gallinago hardwickii*) (Special Least Concern NC Act, Vulnerable EPBC Act)

Koalas have been recorded on BWM during a number of previous ecology surveys (EMM, 2020a; EMM, 2020b). Koalas have been recorded in Rockland Creek and Shotover Creek in the south and scratches have been previously recorded on blue gums *(Eucalyptus tereticornis)* adjacent to Taurus Creek in the north (EMM, 2020a; EMM, 2020b). Known habitat is mapped along the creek lines where records of individuals or signs of scratches and scats have occurred (EMM, 2020b) as well as other drainage lines supporting narrow fringing *Eucalyptus* spp. forests and woodlands. Koala habitat has been mapped on BWM in association with remnant and high value regrowth regional ecosystems containing preferred koala feed tree species including; *Eucalyptus camaldulensis, Eucalyptus tereticornis, E. populnea, E. coolabah. E. melanophloia, E. crebra, and Corymbia citriodora* (Kerswell, Evans, & Appleby, 2020) (Figure 3-17)

The ornamental snake has been recorded on BWM in its preferred habitat during previous ecological surveys (EMM, 2020a). Preferred habitat for the ornamental snake includes remnant of regrowth brigalow or *E. coolabah* woodlands and open forests with deep cracking clays associated with moist areas, particularly gilgai (melon-hole) mounds, and depressions on Land Zone 4 and/or wetland margins (DCCEEW, 2023; Kerswell, Evans, & Appleby, 2020). Suitable ornamental snake habitat on BWM has been mapped in areas of remnant and regrowth woodlands with gilgai (Figure 3-17).

The squatter pigeon is a ground-dwelling bird species that prefers eucalypt woodlands with a sparse native grass cover within close proximity to water (DCCEW, 2023). Squatter pigeons have been recorded in suitable habitats on BWM during previous ecological surveys (Ecoserve & LAMR, 2006). Suitable squatter pigeon habitat on BWM has been mapped in (Figure 3-17).

The Australian painted snipe and Latham's snipe may occur in shallow freshwater wetlands, of both an ephemeral and permanent nature across all states of Australia. Both species have been previously recorded in preferred wetland habitats on the BWM sites in areas of gilgai and/or farm dams (EMM, 2020a; EMM, 2020b; Ecoserve & LAMR, 2006).

Short-beaked echidna has been recorded during a number of previous ecology surveys on BWM (Ecoserve & LAMR, 2006). This species occurs in a wide range of habitats and is likely to occupy remnant and regrowth habitats within the BWM site.

A number of migratory bird species including the white-throated needletail, fork-tailed swift and rufous fantail have been previously recorded within or flying over BWM (EMM, 2019b; Ecoserve & LAMR, 2006). These migratory species are seasonal visitors and can occur in a broad range of habitats from open woodlands and forests to wetlands and/or are highly mobile being observed only flying over the BWM site.

The rehabilitation approach includes areas adjoining undisturbed Endangered or Of Concern regional ecosystems or threatened species habitats to be rehabilitated to a woodland habitat PMLU wherever possible. This approach will provide long-term connectivity between rehabilitated areas and existing vegetation and habitat values. Similarly, areas rehabilitated to a watercourse PMLU will connect existing riparian habitat values for several conservation significant species (e.g. koalas).

Areas adjoining undisturbed threatened fauna species habitats will be rehabilitated to a woodland habitat PMLU wherever possible, and disturbed areas of watercourses will be rehabilitated to a watercourse PMLU. Woodland habitat and watercourse revegetation rehabilitation will include a combination of *Eucalyptus* spp, *Corymbia* spp and non-Eucalyptus framework tree species, woody understorey species and native grasses that will provide broad habitat values for more highly mobile fauna taxa including birds and mobile mammals (e.g. kangaroos and wallabies), as well as longer term foraging and shelter opportunities for common fauna species and several species of conservation significance (e.g. koala, echidna).

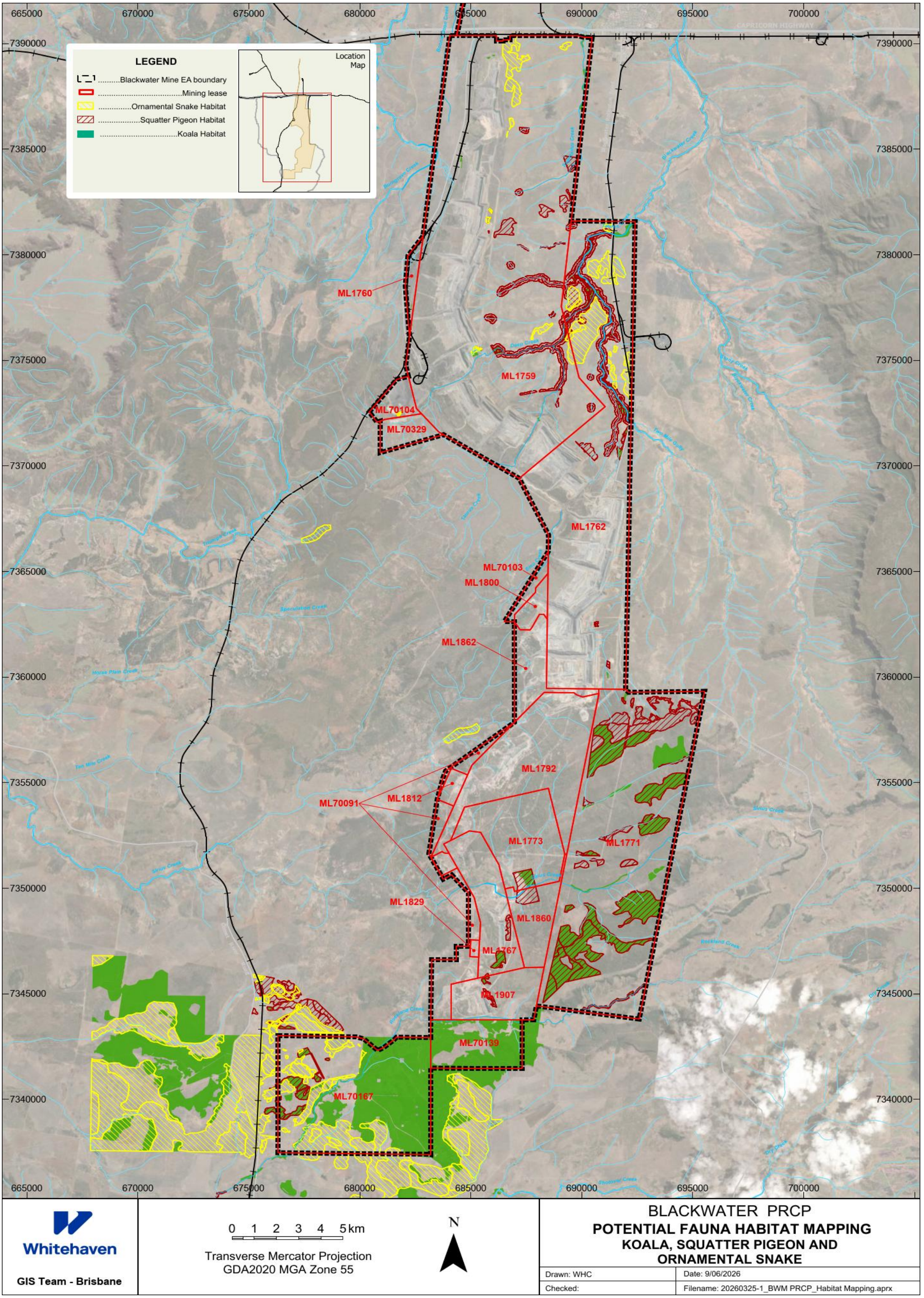


Figure 3-17 BWM baseline potential fauna habitat mapping for koala, ornamental snake and squatter pigeon

3.1.2.12 Pre-mining land use

Although large areas of remnant bushland (Brigalow and/or eucalypt scrub) still exist within the BWM MLs (mainly in the southern area), land within and around BWM has a long history of disturbance due predominantly to vegetation clearing related to agricultural activities (pasture management and cattle grazing), mining and rural development. Details for pre-mining land use and soils has been described by Gunn et al (1967) and Emmerton. B.R. (1999). Summaries of this information are included in the *Blackwater Environmental Management Plan (2008)*. Basically, a range of soils and land types existed prior to mining. Land use was moderate density grazing on Brigalow clay soils and lower density grazing on eucalypt plains and Tertiary lateritic rises. Much of this land had been cleared or thinned for pastures before extensive open-cut mining commenced.

3.1.2.13 Underlying landholders

Most of the land within the BWM EA boundary is currently owned by Whitehaven Blackwater Pty Ltd. Other owners of land within the EA boundary include:

- One private landowner (Taurus Homestead (land lease) and Stewarton Homestead (freehold))
- Central Highlands Regional Council (CHRC) (Lawn Cemetery) (reserve)
- QCoal Pty Ltd (land used by the Koorilgah Mine Balloon Railway) (land lease)
- BMA (two properties, Terang and Aviemore)
- Owners of utilities (land lease), including:
    - Sunwater Ltd
    - Queensland Rail (QR) (Laleham Branch Railway and Kinrola Branch Railway)
    - Ergon Energy Corporation Ltd
    - State of Queensland (Bauhinia Branch Railway, microwave tower at CHPP, Telstra Amplitel microwave tower, West Bedford weir)
- Holders of non-Whitehaven related easements within the EA boundary include:
    - Ergon Energy Corporation Ltd (power supply)
    - Powerlink (power supply)
    - Sunwater Ltd (water supply)
    - Aurizon (railway)
    - Central Highlands Regional Council (access)

The underlying landholders for BWM leases are shown in Figure 3-18 and Figure 3-19.

There are 12 lessees and agistment licensees within the EA boundary, with of the licensees being owners of nearby properties. An additional agistment licence area applies to land that is adjacent to the western EA boundary.

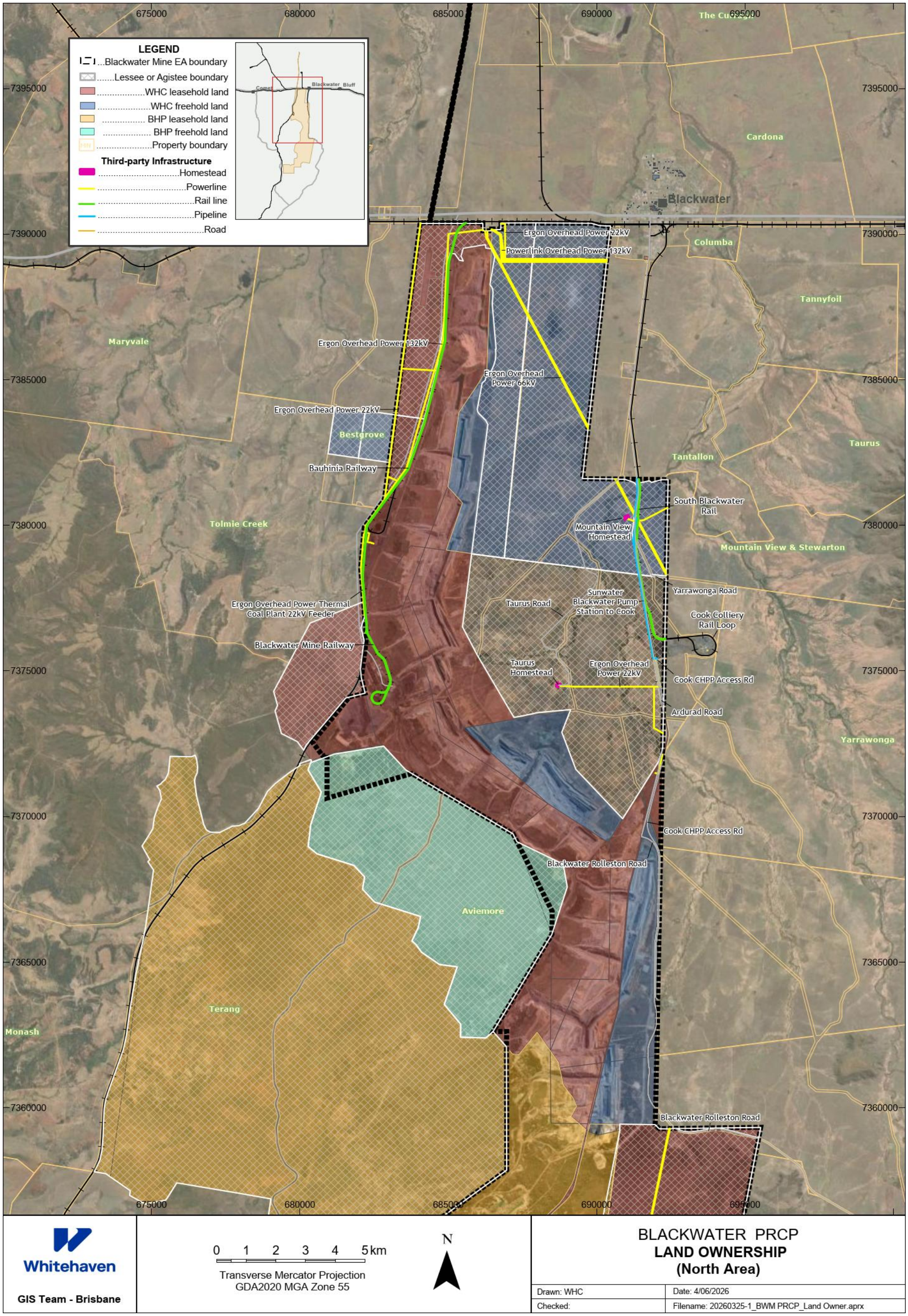


Figure 3-18 BWM land ownership (North and Central)

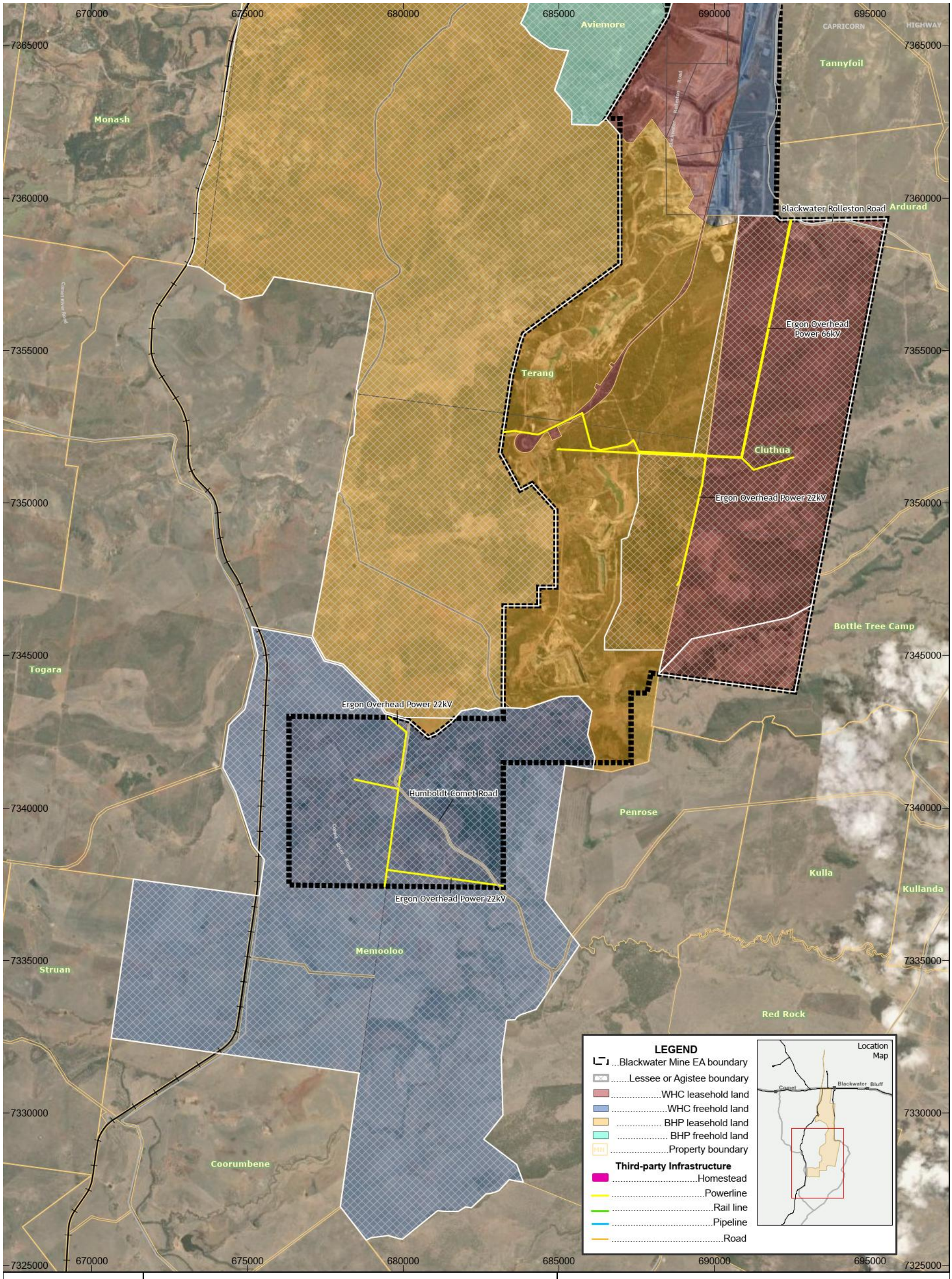


Figure 3-19 BWM land ownership (Central and South)

3.1.3 Design for closure

This PRC Plan has been developed to manage progressive rehabilitation of the BWM site, 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 and NUMAs.
- Defining and implementing rehabilitation practices based on identified risks that could influence the achievement of milestone criteria.
- Demonstrating a successful rehabilitation trajectory towards the achievement of these milestone criteria by ongoing site monitoring and maintenance.

3.1.4 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.*

3.1.4.1 Relevant activities requiring rehabilitation, duration and progressive rehabilitation

A relevant activity for a PRC Plan is defined in the EP Act as the relevant activities to be carried out on land that is the subject of the plan. The relevant activities at BWM that will require rehabilitation, the predicted duration and availability for progressive rehabilitation are detailed in Table 3-14 and illustrated in Figure 3-20 and Figure 3-21.

Due to the long life of the operation, Blackwater Mine does not have any agreements in place for mining related infrastructure that may have ownership transferred in the future. Formal agreements for the transfer of mining related infrastructure ownership will be developed and secured over time as the mine progresses through the rehabilitation milestones associated with the PRCP Schedule. In the instance that no agreements are in place and the intent is not to retain the infrastructure, rehabilitation will be carried out as defined in the PRC Plan and PRCP Schedule, and in support of the proposed PMLU for the relative area.

It is also important to mention that Figure 3-20 and Figure 3-21 include mapping insets which show areas defined by the legend as *"Current third-party infrastructure alignment".* This information is shown to denote areas where the potential future realignment of third-party infrastructure may be required to enable mining activities in accordance with the PRC Plan. Any future realignment of these areas, and also potentially other areas not currently defined, would be subject to future agreement between Whitehaven and the relevant owner. For clarity, should future mining activities not progress in these areas, the infrastructure will remain in place and any future decisions, including for decommissioning and rehabilitation, will be at the discretion of the owner.

Based on current life-of-mine planning, mining at BWM is planned to conclude in 2113. Progressive rehabilitation works are underway across BWM and are expected to continue beyond the cessation of mining as defined in the PRCP Schedule (Appendix 4.1).

Table 3-14 Relevant activities requiring rehabilitation at BWM

Relevant activity	Predicted duration	Availability for progressive rehabilitation
Spoil dumps	Varying: utilised from the start of the PRCP Schedule until the end of mining	— Progressive rehabilitation has commenced. — Progressive rehabilitation areas become available as dump areas reach final position and are no longer required for associated infrastructure or access requirements. — Due to the depth of the mining operation and the size of the spoil dumps, areas become available as per the indicative dump progression shown in Figure 3-5 — Progressive rehabilitation is maximised by scheduling rehabilitation as soon as practicable after land becomes available. — Low-wall areas become available once mining in each pit is complete.
Residual voids	Utilised until the end of mining	Available for improvement once the low-wall spoil rehabilitation is complete for each pit and any partial backfill for flood mitigation is complete.
TSFs and rejects	Varying, depending on design capacity	Available once planned tailings deposition and/or dumping of spoil within or above each TSF reaches the final TSF or spoil dump position, and required studies to inform rehabilitation methods have been completed and the area is no longer required for associated infrastructure or access requirements.
Creek diversions and crossings	Varying: with the latest utilised until the end of rehabilitation activities	Depending on the location in relation to mining and closure activities. Areas are available at the end of mining or after major rehabilitation activities are complete.
Mine dams	Varying: with the latest utilised until the end of rehabilitation activities	Available when no longer required for water management.
CHPP and associated infrastructure; coal stockpiles	Utilised until the end of mining	Available once coal processing is complete.
Workshop; buildings and other infrastructure areas	Varying: with the latest utilised until the end of rehabilitation activities	Availability dependent on the use and location. The majority will be available at the end of the major rehabilitation activities. Some areas may be available earlier, such as at the end of mining or coal processing.
Train loadout (TLO) and rail infrastructure (excluding third-party infrastructure)	Utilised until the end of coal loading	Surrounding area is available once coal loading is complete and infrastructure is removed by third-party owners.
Roads; laydown and general disturbance	Varying: with the latest utilised until the end of rehabilitation activities	Availability dependent on the use and location. Typically, areas will be available either at the end of mining or coal processing or after the major rehabilitation activities are complete.
Exploration	Western areas are planned until 2025; other areas likely in the future	Available within six months after exploration activities are complete (as per *Eligibility criteria and standard conditions*

Relevant activity	Predicted duration	Availability for progressive rehabilitation
		for exploration and mineral development projects (ESR/2016/1985), or its successor). Exploration areas not planned to be mined and within designated Rehabilitation Areas, will be rehabilitated in accordance with the Eligibility criteria and standard conditions for exploration and mineral development projects' or its successor.

It is noted that the BWM EA includes the following condition regarding the commencement of progressive rehabilitation:

- E4: *"Progressive rehabilitation must commence within three (3) years when areas become available for rehabilitation".*

All areas are included in the PRCP Schedule for rehabilitation as soon as practicable after land becomes available. For infrastructure and general disturbance areas, rehabilitation is scheduled the year after the land becomes available to allow for final planning. Spoil dump areas are scheduled within three years after the land becomes available to allow for final settlement, planning and availability of resources (and as aligned to EA Condition E4).

3.1.4.2 Existing rehabilitation

When open-cut operations commenced at BWM most overburden was removed by electric draglines. Initially, (i.e. prior to the introduction of pre-stripping with truck-and-shovel) areas of rehabilitation were generally constructed by regrading dragline spoil rows to undulating plains and rises which were seeded to improved pastures, trees and shrubs.

Methods used since the commencement of more formal rehabilitation in about 1980 have included spoil regrading with scrapers and draglines in addition to more common techniques using large dozers. Subsequently, extensive areas have since been rehabilitated by regrading spoil with dozers to long uniform slopes. BWM ML conditions initially required that lands disturbed by mining should be 'reinstated to no less than its former value for grazing'. Hence, rehabilitation efforts focused predominantly on the establishment of pasture-based grazing systems. There are however several areas, particularly in South Blackwater (Figure 3-22), that have been historically rehabilitated to a woodland habitat largely focused on the establishment of native Eucalyptus and Acacia species.

As outlined in the PRCP Schedule, BWM is progressing towards the achievement of 2,854 ha of existing rehabilitation. Of this area, 1,910 ha is existing cattle grazing rehabilitation (RA7) and 944 ha is existing woodland habitat rehabilitation (RA6). A total of 45.33 ha of woodland habitat rehabilitation and 63.5 ha of cattle grazing rehabilitation has received progressive certification from the administering authority, for resource activities under EP Act.

A summary of existing rehabilitation performance has been undertaken by LEC (2025a) and is provided within this PRC Plan. Cattle grazing rehabilitation performance is discussed in Section 3.1.4.2.1 and woodland habitat performance in Section 3.1.4.2.2. These summaries are based on the results of rehabilitation monitoring conducted between 2018-2024.

Routine rehabilitation monitoring will continue to be implemented as discussed in Section 3.8.1.2 to identify any maintenance/corrective actions required to enable the rehabilitated areas to achieve the milestone criteria.

Applications will be made to the administrating authority for areas identified as being suitable for progressive rehabilitation certification under the EP Act as a result of ongoing monitoring.

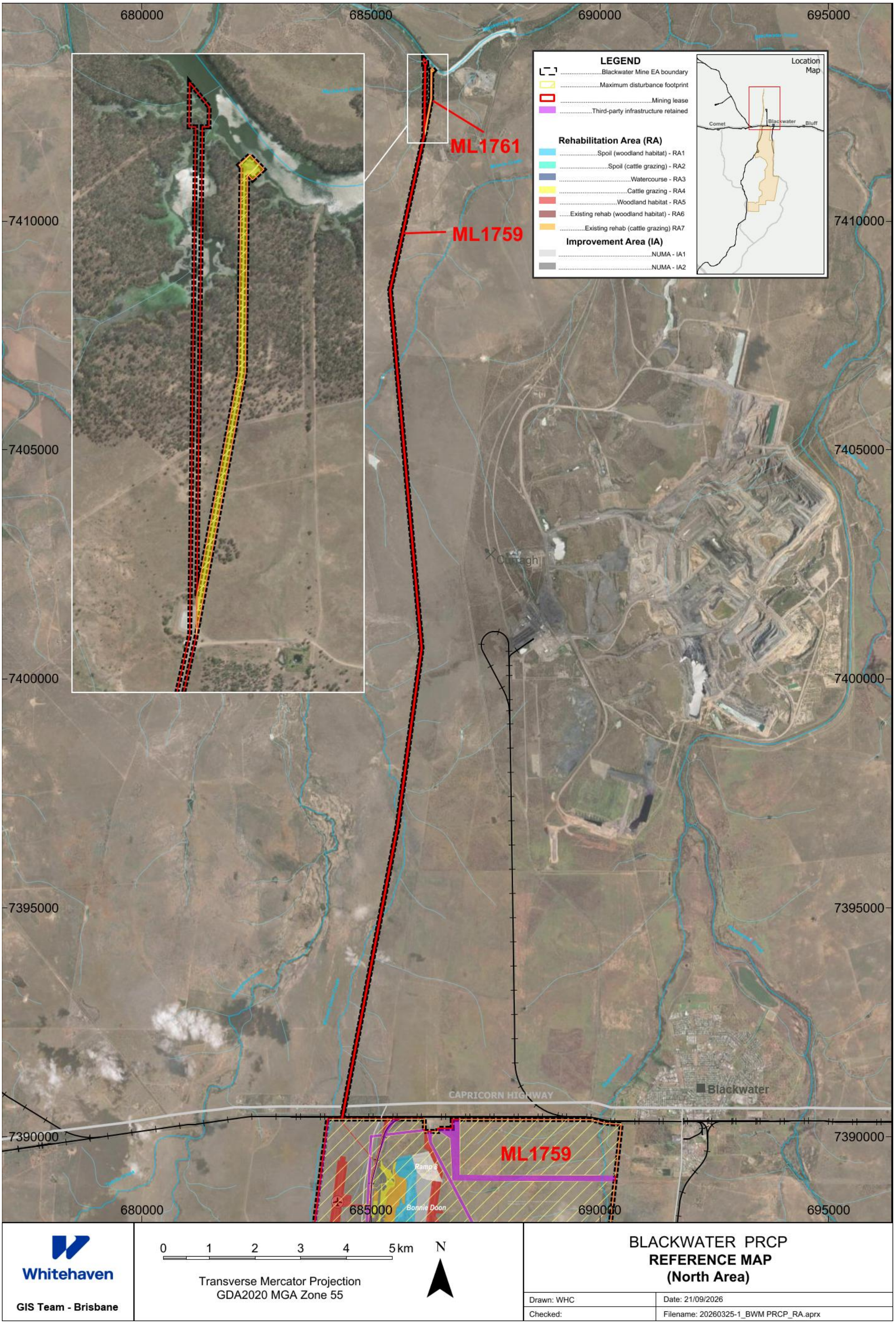


Figure 3-20 Reference map - indicative areas available for rehabilitation (BWM North)

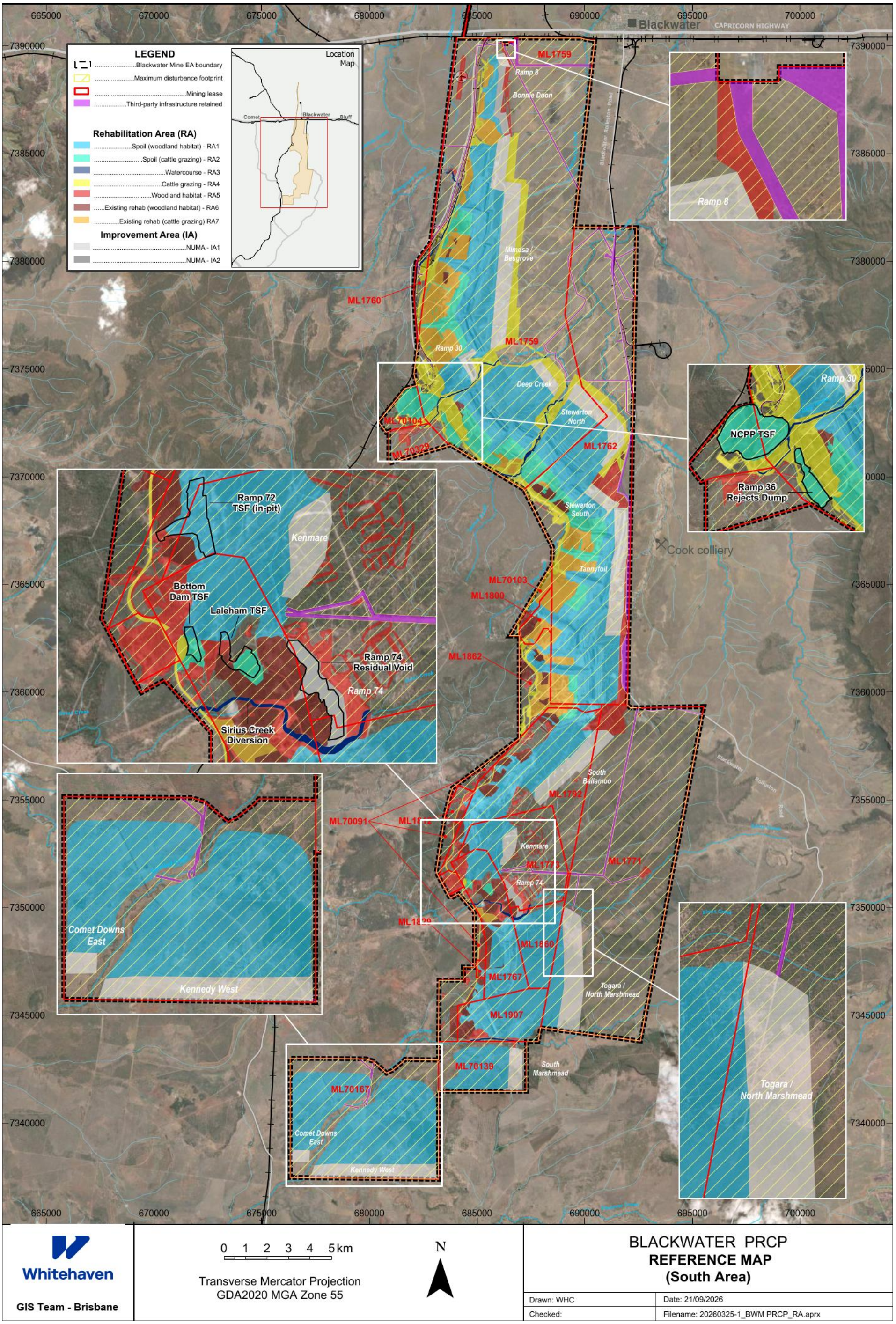


Figure 3-21 Reference map - indicative areas available for rehabilitation (BWM North, Central and South)

3.1.4.2.1 Existing Cattle Grazing Rehabilitation

The results of monitoring of existing cattle grazing rehabilitation areas have been summarised below as it relates to the following key post-mining land use rehabilitation milestone criteria for a cattle grazing land use:

- Land suitability class ≤3 as per '*Rehabilitated mined land suitability for beef cattle grazing in the Bowen Basin: Technical Paper* (Short, 2023)
- Land condition Good (A) or Fair (B) as per the *'Queensland Reef Quality Program Reef Protection Regulations Farming in Reef Catchments Grazing Guide Version 2* (DES, 2022a)

The raw land suitability class data has been provided for all cattle grazing sites assessed between 2022 and 2024 (Figure 3-23). The land suitability class results are summarised in Figure 3-23 with the results of rehabilitation monitoring sites represented in the light blue bars and the cattle grazing reference sites in dark blue bars. The results indicate that the majority of the existing cattle grazing is classed between LSC 4 and 5. It is important to note, in accordance with Short (2023), land suitability is scored on the most limiting factor taken from the *'Regional land suitability framework for beef cattle grazing PMLU rehabilitation in the Bowen Basin* (Short, 2023). The results of a review of the raw monitoring data (WHC, 2025a) indicate that many sites are limited by low available Phosphorus (P) in 0.1m of the rehabilitated soil profile as well as moderate to higher pH in 0.1m of the rehabilitated soil profile at >8.4 pH. Other limiting factors include percent slope and exchangeable sodium percent (ESP) in 0.1 and/or subsoil erosion associated with high >23% ESP at 0.5m depth. Whilst available Phosphorus (P) can be ameliorated through application of fertiliser, it is important to note that both cattle grazing reference sites are also limited by low available P. The results of monitoring cattle grazing reference sites could therefore be considered evidence of a pre-mining limitation indicative of grazing lands in the surrounding areas. Furthermore, both reference sites are also limited by high moderate to higher pH in 0.1m which can also be considered a pre-mining condition.

Whilst not a current completion criterion in the BWM EA, areas of cattle grazing have also been assessed against 'land condition' criteria based on the *Queensland Reef Quality Program Reef Protection Regulations Farming in Reef Catchments Grazing Guide Version 2* (DES, 2022a). The results of the grazing land condition monitoring have been summarised in Figure 3-24 with the results of rehabilitation monitoring sites represented in the blue bars and the cattle grazing reference sites in purple bars. Whilst land condition is not a completion criterion in the BWM EA, it is an important criterion for monitoring the condition of grazing lands in Central Queensland (DES, 2022a). The results indicate the majority of the cattle grazing is in Good (A) or Fair (B) land condition.

It is important to note that the majority of existing cattle grazing in Good (A) or Fair (B) land condition predominantly supports one preferred, perennial and palatable (3P) grass species buffel grass (*Cenchrus ciliaris*). The BWM PRCP Schedule addresses this issue for all future cattle grazing requiring at least four 3P species of pasture grass to be sown.

A total of 63.5 ha of cattle grazing rehabilitation received progressive certification from the administering authority on 4 July 2026.

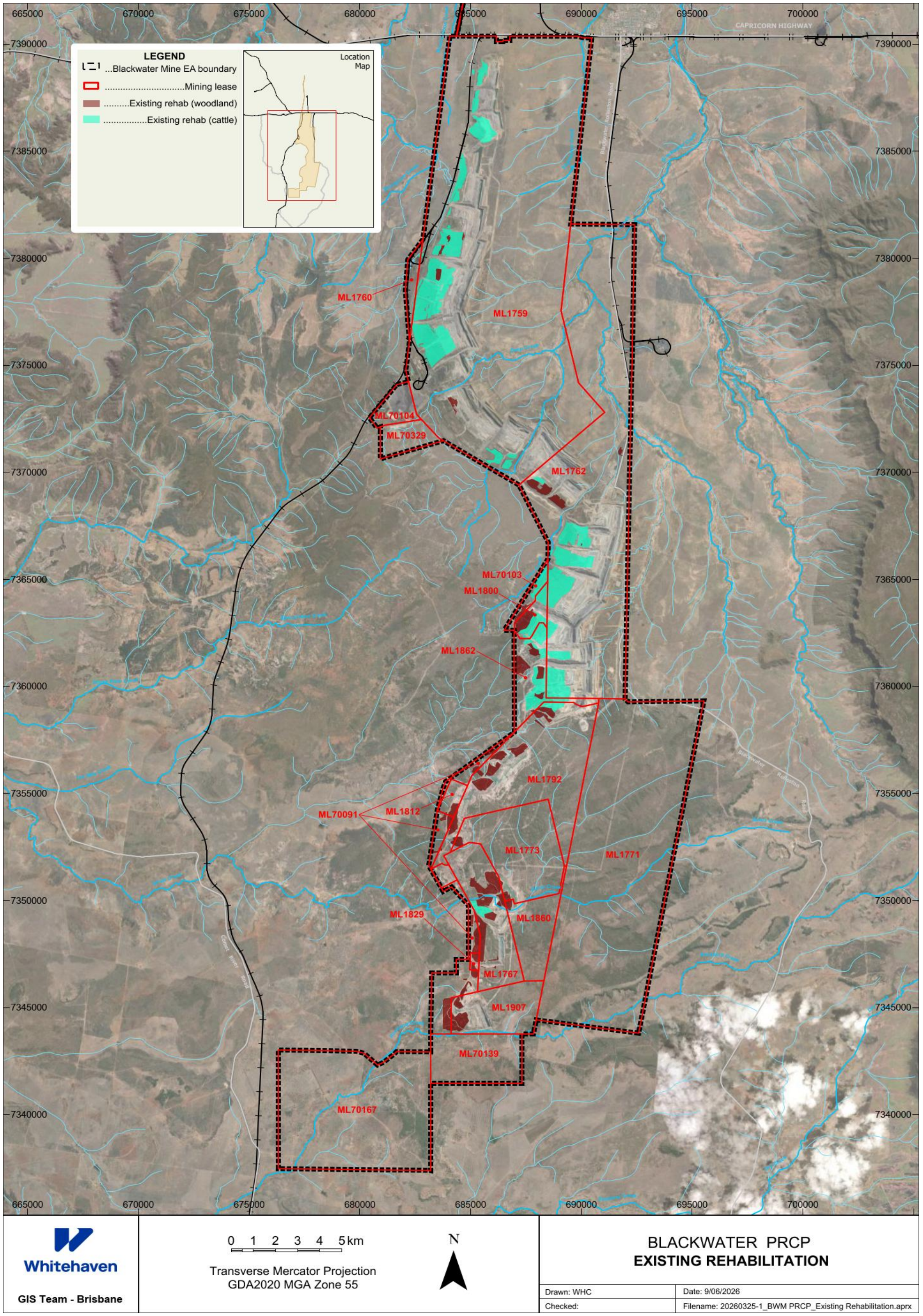


Figure 3-22 BWM existing rehabilitation

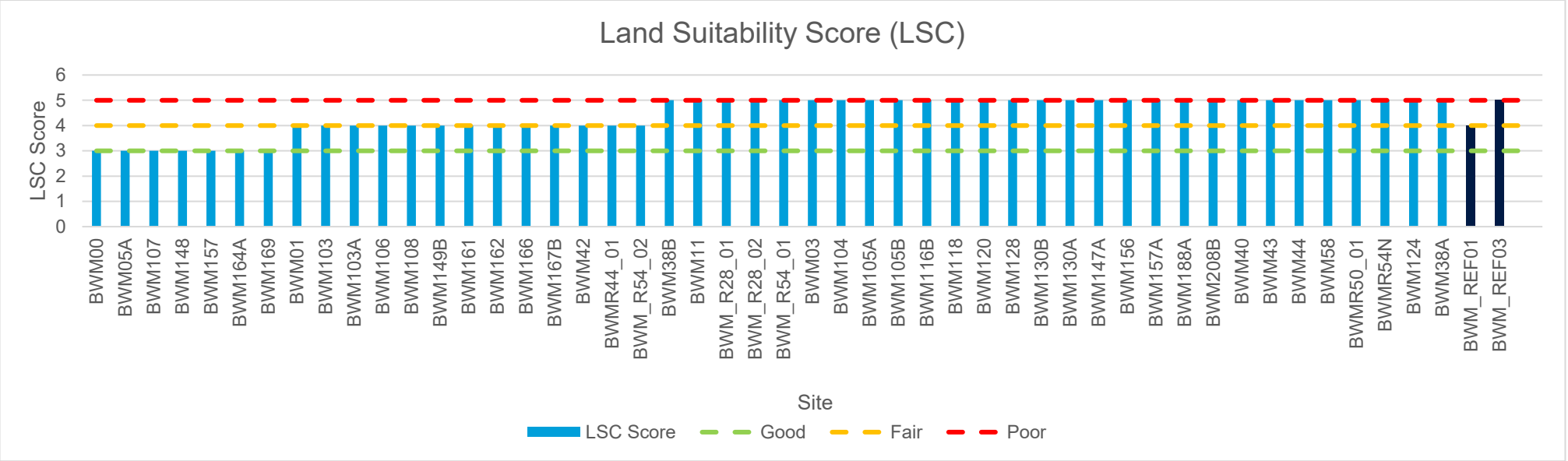


Figure 3-23 BWM land suitability class results 2022-2024

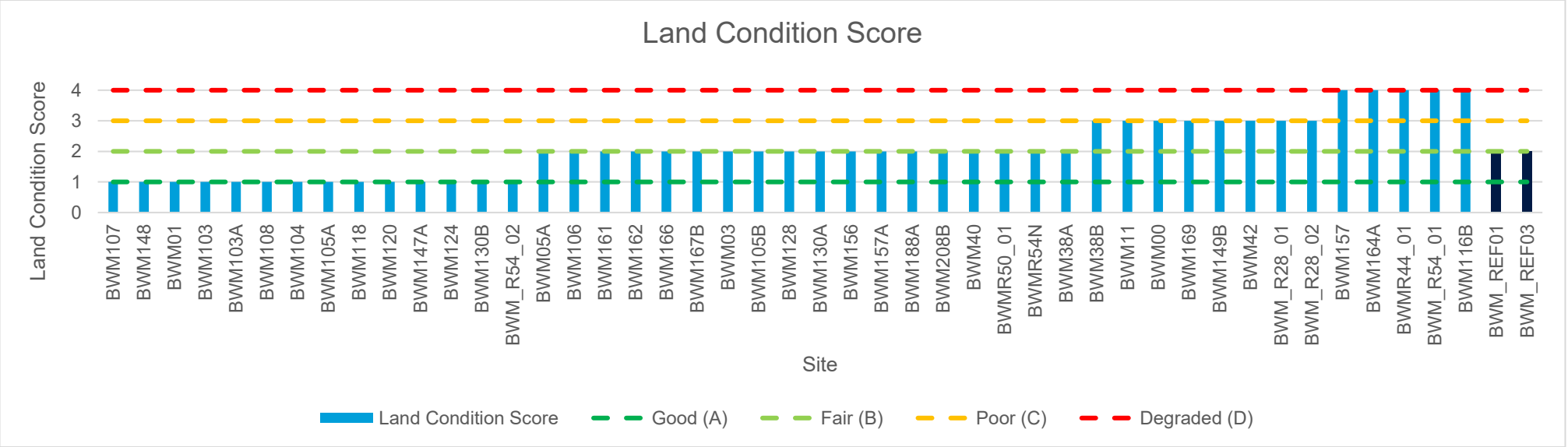


Figure 3-24 BWM land condition monitoring results 2022-2024

3.1.4.2.2 Existing Woodland Habitat Rehabilitation

Table E1 of the BWM EA requires all woodland areas to meet 'native bushland habitat characteristics' including ≥2 tree, ≥3 shrub and ≥4 grass species richness as well as ≥16% canopy cover. The raw woodland habitat data has been provided for all woodland habitat sites assessed between 2022 and 2024 (LEC, 2025a)

A summary of the overall results for all woodland habitat sites has been presented for each of the native bushland habitat characteristics with the rehabilitation site results represented by the blue bars and the woodland habitat reference sites represented by the purple bass as follows:

- Species richness:
    - Trees ≥2 (Figure 3-25)
    - Shrubs ≥3 (Figure 3-26)
    - Grasses ≥4 (Figure 3-27)
- Tree canopy cover ≥16% (Figure 3-28)

A summary of erosional stability of woodland habitat has also been provided in Figure 3-29 based on the following EA criteria:

- Groundcover (steep slopes, >15%) ≥80%
- Groundcover (lesser slopes, ≤15%) ≥50%

The results of the woodland habitat monitoring indicate that the majority of the existing woodland habitat sites are performing well with ≥2 tree species, ≥3 shrub species, ≥16% tree canopy cover and total ground cover (%) over slope consistent with the EA requirements. It is however important to note grass species' richness is quite low across many of the existing woodland sites. Mine soils and spoils are often contaminated with exotic pasture grasses and historically rehabilitation focused primarily on trees and shrubs with exotic pasture species. Native grasses have only become available in commercial quantities over the last ten or so years. For this reason, both exotic and native grasses are considered justified for older areas of rehabilitation >10 years.

The woodland habitat analysis also considers invasive plant species cover and recruitment of the canopy species. The majority of the woodland rehabilitation is low in invasive plant cover and has evidence of recruitment of canopy species. Despite the low presence of invasive plans BWM is conducting weed control in woodland areas and is also focusing on a control program of Leucaena.

In December 2024 BWM lodged a woodland habitat progressive certification application for areas of historic woodland habitat rehabilitation meeting completion criteria associated with BWM25 and BWM33. The application demonstrated the conditions of the environmental authority have been complied and the land has been satisfactory rehabilitated. Satisfactory rehabilitation is safe, stable, non-polluting and able to sustain the agreed post-mining land use. In addition to demonstrating compliance with the rehabilitation success criteria, the application also described the ongoing environmental management requirements and presented a detailed assessment of environmental risks associated with the rehabilitation. On 1 September 2025, 45.33 ha of existing woodland habitat rehabilitation received certification under the progressive certification for resource activities under EP Act.

BWM intend to continue to maintain woodland habitat and pursue further progressive certification application for woodland habitat that complies with the BWM EA.

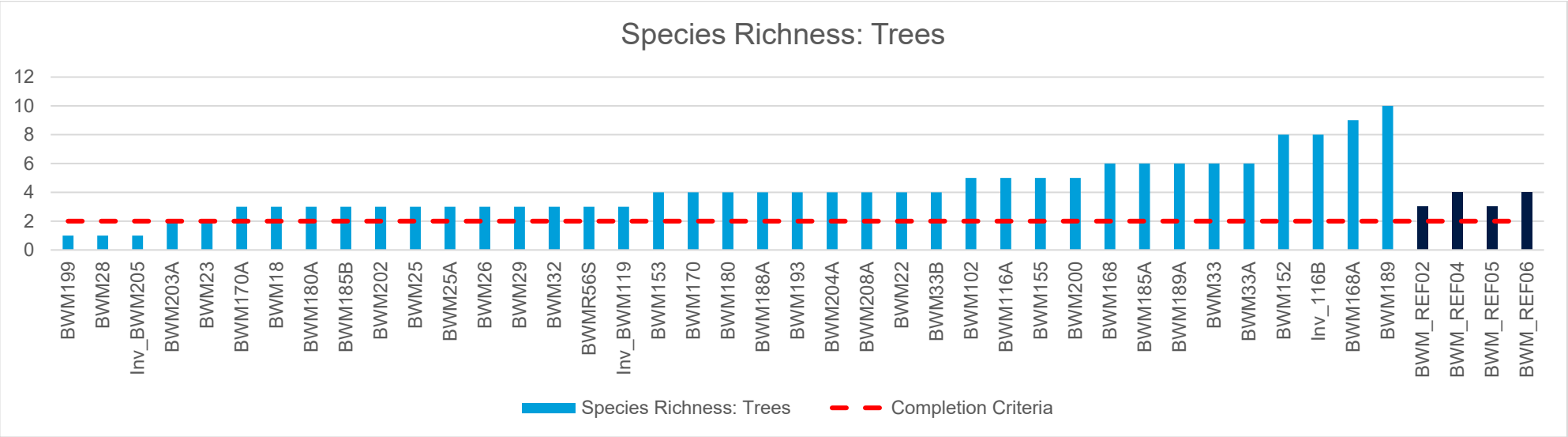


Figure 3-25 BWM woodland habitat rehabiliaition tree species richness 2022-2024

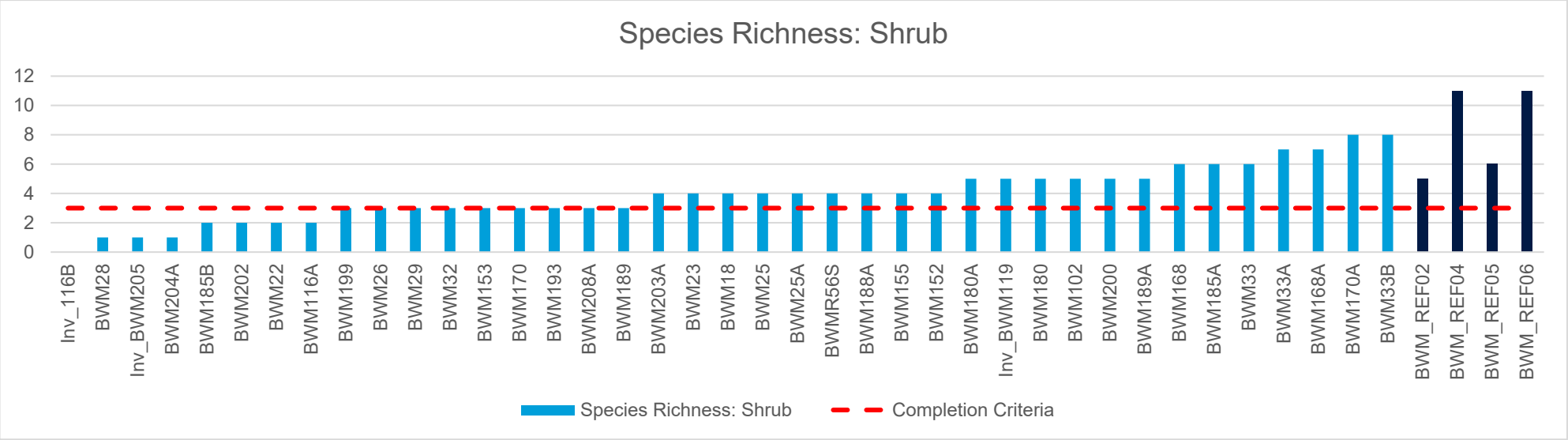


Figure 3-26 BWM woodland habitat rehabilitation shrub species richness 2022-2024

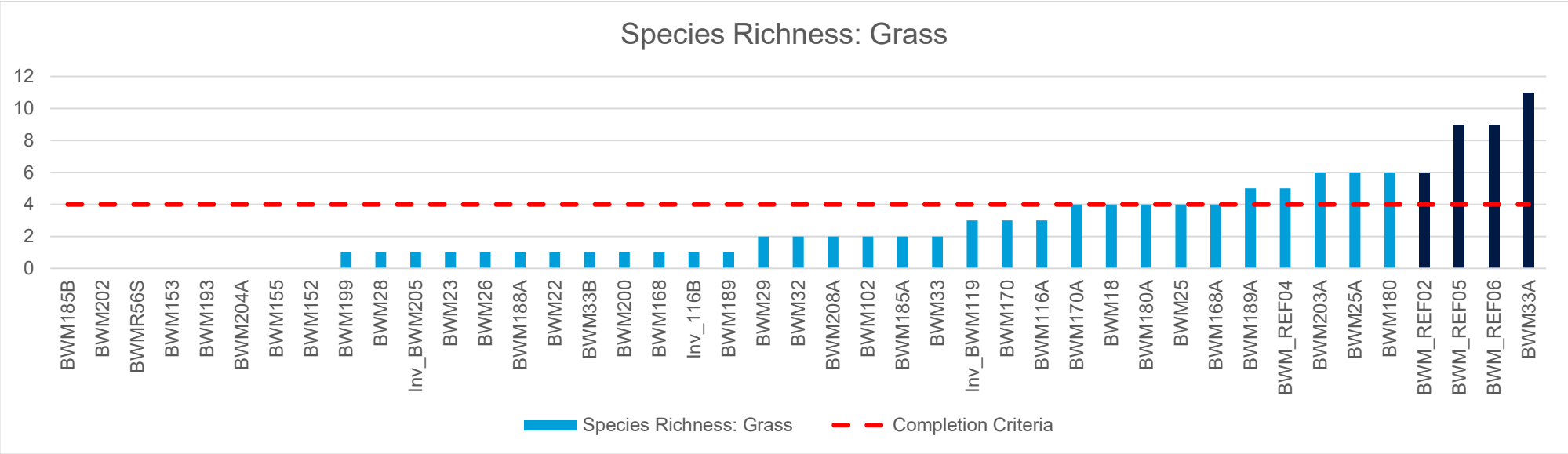


Figure 3-27 BWM woodland habitat rehabilitation grass species richness 2022-2024

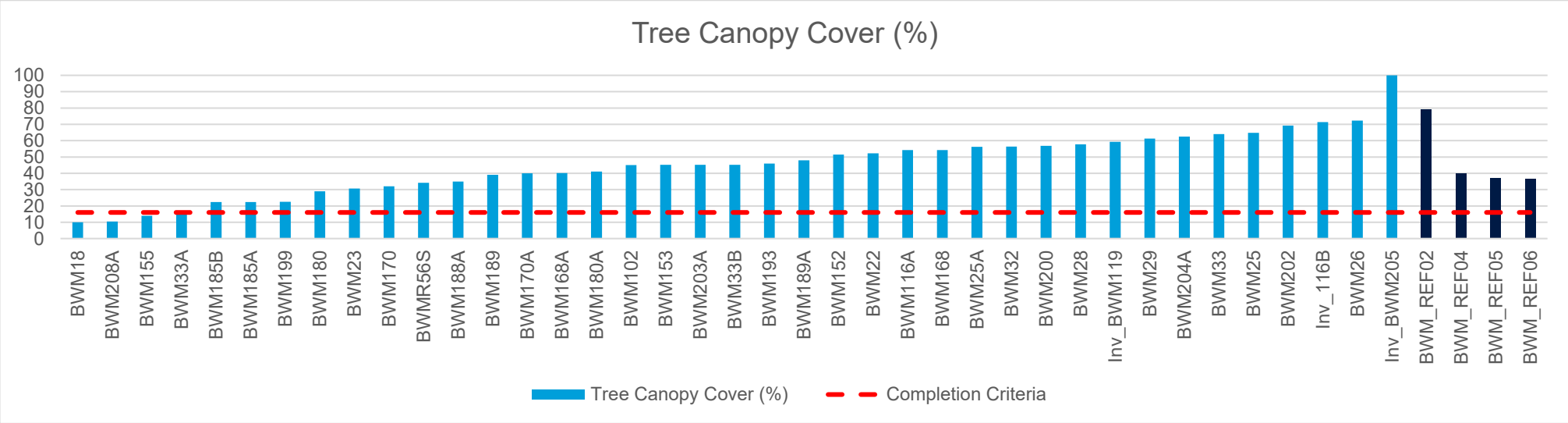


Figure 3-28 BWM woodland habitat rehabilitation tree canopy cover percent (%) 2022-2024

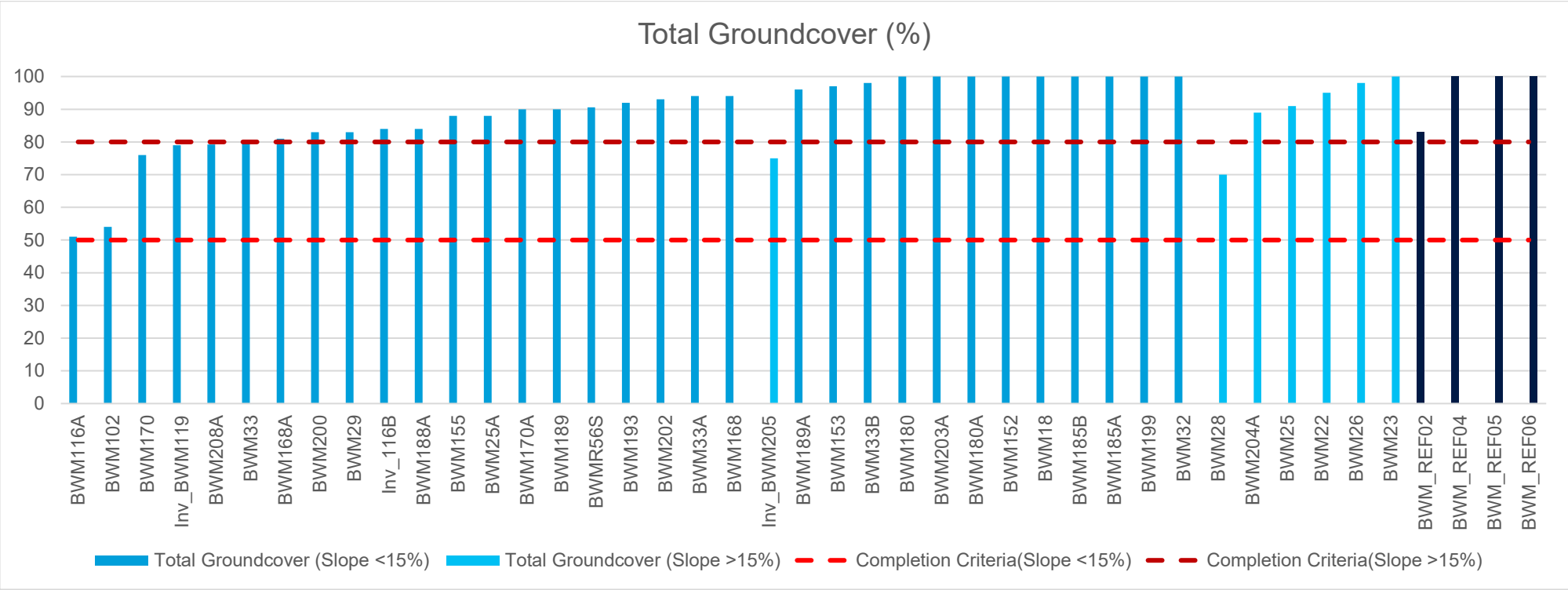


Figure 3-29 BWM woodland habitat rehabilitation total ground cover (%) over slope 2022-2024

3.2 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.

To support the development of this PRC Plan a Community Consultation Plan (CCP) directed the consultation approach, and a supporting consultation register has been maintained throughout the process. The CCP and register are provided in *Appendix 4.4 – Community Consultation Plan and Register*.

Consultation outcomes have informed the development and refinement of rehabilitation objectives and post-mining land use considerations; however, final landform design and feasibility are primarily determined by technical, environmental and safety constraints (refer Sections 3.4 and 3.6).

The CCP documents the iterative consultation process to enable ongoing PRCP-related engagement identifying stakeholders[1] considered to have a genuine, demonstratable and legitimate interest in the ongoing rehabilitation and closure planning at BWM. Table 1 of Appendix 4.4 describes the stakeholders, the nature of existing relationships, and their potential areas of interest with respect to the BWM's PRCP planning.

The Community Consultation Register (Appendix 4.4) is compliant with section 126(1)(c)(iii) of the EP Act and includes:

- Identification of each community member/stakeholder
- Previous engagement with the community
- Consultation relevant to the PRCP development, including:
  - Consultation date(s)
  - Description of consultation type (e.g. letter, meeting)
  - Information provided to the community
- Engagement outcomes, including:
  - Issues raised by/discussed with the community
  - How issues have been considered
  - Decisions/outcomes of the engagement
  - Commitments made to address feedback

[1]Noting that the documented mine relationships capture those predominantly developed by BMA as the previous site owner (until end-March 2024).

3.2.1 Commitments made to address feedback and consultation to date

Operations commenced at BWM in 1967. At this time, from a regulatory perspective, an Environmental Impact Statement (EIS) and associated community consultation were not required. However, the following consultations relevant to rehabilitation and closure planning were subsequently undertaken by BMA prior to the development of this PRC Plan:

- During 2018, BMA engaged with DESI to implement the current EA conditions in relation to PMLUs and the required acceptance criteria for those PMLUs, which were included in the EA - reflected in Table E1: Rehabilitation Requirements.
- During 2020-2022, ongoing engagement with DESI in relation to how the PRCP Guideline elements (particularly regarding transitional arrangements) and the current EA conditions related to rehabilitation and closure would transition to BMA's PRC Plans.
- During 2023, high level information about the BWM PRCP planning process was provided by BMA to the Central Highlands Regional Council (CHRC) and the Central Highlands Development Corporation (CHDC).
- On an ongoing basis, prior to the divestment of the BWM to Whitehaven on 2 April 2024, BMA engaged with nearby landholders on land management and lease/licence conditions, and on operational, environmental management and/or water matters, as required.

Historically, community consultation was conducted and resulted in the agreed PMLUs and NUMAs that are included in the conditions of the EA. Consultation and engagement conducted by BMA was to transition the PMLUs and NUMAs within the EA to the PRCP. Refer to the previous engagement column in the Community Consultation Register (Appendix 4.4) for further information.

Following WHC's acquisition of BWM in 2024, WHC has undertaken further consultation to inform the development and approval of PRC Plan Revision 2 and the subsequent update to PRC Plan Revision 3 through:

- in-person meetings,
- letters,
- newsletter articles,
- emails, and
- phone calls

The following parties were engaged (see also Table 3-15):

- Gaangalu Nation People as the registered native title applicants and as a party to the Indigenous Land Use Agreement (ILUA);
- The owners of underlying freehold land within the BWM EA area;
- Licensees of Land within BWM EA area;
- BWM General Manager and mine personnel;
- CHRC;
- Landowners whose properties are within 5 km of the BWM EA area, including private landowners and licensees of WHC land;
- The Blackwater community;
- Central Highlands Community Groups and Businesses;
- Owners of utility assets within and adjacent to BWM;
- Owners of adjacent and nearby mining interests;

- Adjacent petroleum tenement holders;
- Queensland Government: DETSI, DNRMMRRD, and the Department of Primary Industries;
- Queensland Member for Gregory; and
- Office of the Minister and Deputy Secretary for Environment Protection and Department of Climate Change, Energy, the Environment and Water (DCCEEW).

The following information was provided to stakeholders:

- BWM location, approved activities and production;
- Requirements and timing for PRC Plan development, including information requirements;
- The plan for the mine (proposed site design);
- PMLUs and NUMAs, and the progressive rehabilitation schedule;
- Overview of consultation conducted to-date for PRC Plan development, and the requirement for consultation to inform the PRC Plan;
- Commitment to future engagement and participation in the process; and
- Contact details for the relevant WHC team (e.g. for landholders, the Land Management team) for further information, discussion or feedback.

As documented in the *Appendix 4.4 – Community Consultation Plan and Register*, consultation undertaken to inform development of the PRC Plan identified several consistent themes:

- Gaangalu Nation People expressed continual interest in final landforms, water quality and access to land after mining, as well as opportunities to participate in final landform and rehabilitation discussions and activities over time.
- Multiple underlying landholders indicated a preference for reinstating as much grazing PMLU as practicable, consistent with surrounding property uses and future land management expectations. Concerns regarding pest and weed management were also raised.
- A number of stakeholders either acknowledged the consultation received, provided no substantive feedback, or did not raise any issues for consideration..
- Some government and community representatives expressed interest in receiving future updates related to PRC Plan progress and implementation.

3.2.2 Community consultation register and outcomes of stakeholder engagement

The community consultation register provided in Appendix 4.4 is compliant with section 126C(1)(c)(iii) of the EP Act and includes:

- Identification of each community member/stakeholder
- Previous engagement 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
- Decision/outcomes of engagement

- Commitments made

The stakeholders identified as part of this register are considered as having a genuine, demonstrable and legitimate interest in the ongoing rehabilitation and closure planning at BWM. Table 3-15 summarises identified stakeholders and the outcomes from PRC Plan related engagements. Further detail is provided in the Community Consultation Register available in Appendix 4.4.

Table 3-15 Identified stakeholders and outcomes from BWM PRCP engagements

Stakeholder	Outcomes from BWM PRC Plan engagement
Gaangalu Nation People - have a Registered Native Title (NT) claim (QC2012/009) and ***BWM Cultural Heritage Management Plan (CHMP)***.	— Ongoing engagement according to the consultation protocol developed with the Gaangalu Nation People during 2023-2025. — Noted key interests in environmental management and mine rehabilitation. — Ongoing Traditional Owners' access to land within the EA area in accordance with the terms of the registered Indigenous Land Use Agreement.
Underlying landowners	— Continue to make available land within the MLs for grazing under the licence agreement with the landowner. — Landholders and cattle will be excluded from affected areas while land disturbance is occurring. — As disturbed land becomes available, it will be rehabilitated to a state suitable for the approved post-mining land use e.g. grazing, woodland, water courses, or managed as a non-use management area. — Whitehaven Blackwater will engage with BMA regarding any relevant progressive rehabilitation and closure activities that may affect BMA-owned land.
Licensees of land within the BWM EA area	— Grazing is considered a PMLU in areas where disturbed land would be rehabilitated to enable this use.
Nearby landowners (within 5km)	— Regular community updates will be used to provide information about PRC planning and implementation.
Blackwater community	— Provide community updates on PRC planning where there are substantive changes or updates to the PRC plan.
Central Highlands community members, groups and businesses	— Continue providing community information and opportunities for feedback as part of future PRC planning processes.
BWM	— Cooperation between BWM GM and the Whitehaven Blackwater Pty. Ltd.'s Closure Planning team will continue during PRC plan implementation and updates to the PRC plan. — Continue to update the workforce as PRC plans are implemented and updated.
Local government	— Ongoing engagement with Central Highlands Regional Council (CHRC) regarding PRC planning, with updates provided at meetings between Whitehaven Blackwater Pty. Ltd. and CHRC. — Consult CHRC on management plans if rehabilitation and/or closure activities impact CHRC assets including road management and recycling facilities. — Future engagement with CHRC will include discussions of rehabilitation methods and milestones.
Utility owners	Maintain correspondence regarding progressive rehabilitation activities with: — Sunwater as they affect the Blackwater Pipeline, and undertake consultation regarding crossing/interface agreements, if required. — Department of Main Roads Queensland (DTMR) as they affect Capricorn Highway and Ardurad (Blackwater-Rolleston) Road, and undertake consultation regarding crossing/interface agreements, if required. — CHRC as they affect Council roads and road reserves, and undertake consultation regarding crossing/interface agreements, if required. — Ergon Energy as they affect Ergon Energy assets, and undertake consultation regarding agreements about energy infrastructure, if required. — Powerlink as they affect Powerlink assets, and undertake consultation regarding crossing/interface agreements, if required. — Telstra Amplitel as they affect Telstra Amplitel assets, and undertake consultation about telecommunications infrastructure agreements, if required. — Telstra Vocus as they affect Telstra Vocus's assets, and undertake consultation about internet infrastructure agreements, if required. Advise of any substantive changes to closure planning or the rehabilitation schedule as part of future PRC planning processes: — Queensland Rail — Aurizon Network — Total Energies, as an adjoining landholder
Adjacent and nearby mining interests	Advise of any substantive changes to closure or rehabilitation schedule as part of future PRC planning processes: — QCoal — Coronado Curragh Pty. Ltd
Petroleum tenement holders	Advise of any substantive changes to closure or rehabilitation schedule as part of future PRC planning processes: — Bow CSG Pty. Ltd — Comet Ridge Mahalo entities — Adjacent petroleum tenement holders
Queensland government agencies	— The PRC plan will be completed in accordance with Whitehaven Blackwater's agreements with DETSI. A copy of the PRC plan and updates on any substantive future changes to the PRC Plan will be provided to: — DDG Georesources, with annual updates to the Department of Resources as per the CCP — Director Native Title Services and Coal Hub, Rockhampton — Executive Director, Minerals and Coal Information and opportunities for feedback as part of the future PRC planning process will be provided to: — Interested government agencies — Department of Agriculture and Fisheries
Queensland government representatives	Provide updates on any substantive future changes to the PRC Plan to: — Office of the Minister — Office of the Shadow Minister — The Member for Burdekin — The Member for Gregory
Federal government	Provide updates on any substantive future changes to the PRC Plan to the Office of the Minister for Environment Protection and DCCEEW.

3.2.3 Consultation for BNEP

Consultation with relevant regulatory stakeholders has been undertaken as part of the environmental approvals process for BNEP, including:

- On 30 March 2026, Whitehaven Blackwater held a pre-lodgement meeting with DETSI to discuss the Project and the scope of works undertaken as part of the EA Amendment Supporting Document; and
- On 30 September 2025, representatives from the Commonwealth DCCEEW attended a site visit at Blackwater Mine, during which key operational areas of the existing mine and proposed Project area were inspected.

3.2.4 Ongoing consultation

3.2.4.1 Consultation objectives, engagement type and frequency

As BWM has an approved PRCP Schedule, consultation associated with implementation of the PRC Plan will be undertaken in accordance with the program documented in Table 3-16, which includes:

- Consultation objectives;
- Stakeholders addressed by each objective;
- Engagement type; and
- Proposed frequency of consultation.

WHC will monitor progress against these objectives as part of its regular reviews of consultation commitments and outcomes.

Table 3-16 Consultation program for PRC Plan implementation

Consultation Objective #1:	*To engage stakeholders with a genuine interest in developing objectives and aspirations for PMLU and landform, and social value opportunities to be considered in PRC planning*	
Stakeholders	**Engagement Type**	**Proposed Consultation Frequency**
Gaangalu Nation People	Meet with the Gaangalu Nation People to provide an update on the PRC Plan and progress with rehabilitation, and invite inputs and feedback on: • PMLUs, NUMAs and post-mining landforms, including any particular values or opportunities in specific disturbed areas; • Rehabilitation methods which would optimise future woodland habitat and/or grazing opportunities, and potential land management requirements; • Access to land within the EA area as provided in the ILUA and as agreed with the Coordinating Committee; • Rehabilitation methods, schedule and progress towards milestones • Involvement of businesses owned by Gaangalu Nation People in rehabilitation works • The pipeline of opportunities relating to rehabilitation work and land management • The need for an Indigenous business capability development program to match rehabilitation opportunities, if this is required	As requested, or as agreed with representatives
Underlying Landowners	Advise the landowner in writing when the PRC Plan is approved, including how to access the PRC Plan.	Once-off
	Meet with the landowner to discuss any proposed changes to the PRC Plan (as and when amended) that affect the landowners' interests in freehold land within the EA, and/or other areas within the EA area that are of interest to the landowner, such as: • PMLUs, NUMAs and post-mining landforms, including any particular values or opportunities in specific disturbed areas; • Land that may be available for grazing or other purposes after rehabilitation; • Access to water resources; • Rehabilitation methods which would optimise future woodland habitat and/or grazing opportunities, and potential land management requirements; • Shared value initiatives (e.g. infrastructure retention, capacity building, environmental management, or research); and/or • Rehabilitation methods, schedule and progress towards milestones.	As required to address PRC Plan consultation requirements for amendment of the BWM PRC Plan
	Correspond and meet with the landowner commencing five years prior to the forecast cessation of mining and as agreed with the landowner, to discuss: rehabilitation objectives and timeframes, PMLUs and NUMAs, land access and tenure arrangements, and other land use/management/rehabilitation issues as relevant to the private freehold land.	Five years prior to the forecast cessation of mining, and as agreed during pre-closure period
	Correspond with the landowner to initiate the legal/statutory and consultation processes required to enable relinquishment of rights and interest in the freehold land within the EA area.	One year prior to the forecast cessation of mining
Licensees of Land within BWM EA area Nearby Landowners (within 5 km)	Advise adjacent and nearby landholders, including licensees, in writing when the PRC Plan is approved, including how to access the PRC Plan.	Once-off
	Advise in writing, and meet if requested, regarding any proposed changes to the BWM PRC Plan (as and when amended) that have potential to affect landowners or licensees' interests in freehold land within or adjacent to the EA area.	As required to address PRC Plan consultation requirements for amendment of the BWM PRC Plan
	Communicate with licensees of land that is within or adjacent to the EA area during the terms of their licence and seek their inputs the PRC Plan schedule, PMLUs and NUMAs during PRC Plan revisions and amendments.	As required to address PRC Plan consultation requirements for amendment of the BWM PRC Plan
	Correspond and if requested meet with adjacent landholders to the EA area (landowners and licensees of land owned by BWM's owner) during the pre-closure, closure/decommissioning and rehabilitation periods, to reduce the potential for works to impact on their amenity, land use, property access or access to water.	Five years prior to the forecast cessation of mining, at least annually, or as agreed with the landowner
Consultation Objective #2:	*To support transparent access to information about BWM's PRC planning and implementation, enabling opportunities for the Blackwater community, BWM suppliers and government agencies and representatives to provide inputs and feedback on rehabilitation and closure outcomes*	
Stakeholders	**Engagement Type**	**Proposed Consultation Frequency**
BWM: General Manager and Mine Personnel	Keep the BWM workforce updated if there are changes to the PRC Plan.	Ongoing engagement process
Blackwater Community	Using community forums such as interagency meetings, partnership meetings and community and business networks, provide community updates on PRC planning (BWM-specific as relevant, and portfolio wide).	Ongoing engagement process
Blackwater Businesses	Provide information about the pending closure of BWM and potential future supply opportunities as part of closure and rehabilitation to local businesses, Traditional Owner businesses and WHC suppliers.	Five years prior to decommissioning; subsequent consultation to be agreed
Local Government State Government Queensland Ministerial Representatives	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	As requested, or as agreed with representatives

	• Shadow Minister for Environment, Great Barrier Reef, Science and Youth Affairs Resources • Member for Gregory (Queensland Parliament) • PRC Plan Team and Regional Director Queensland Parks and Wildlife Service and Partnerships - Mackay (DETSI) • Deputy Director-General, Fisheries and Forestry (Department of Primary Industries) • Director, Native Title Services and Coal Hub (DNRMMRRD) • Deputy Director-General of Georesources (DNRMMRRD) • Executive Director, Minerals and Coal (DNRMMRRD) • Assistant Secretary Assessments and Governance Branch, DCCEEW	
Consultation Objective #3:	*To engage with utility owners and operators, and adjacent mining and energy tenement holders, to provide information about BWM's closure planning that supports them to manage their assets and interests*	
Stakeholders	**Engagement type**	**Proposed consultation frequency**
BWM: General Manager and Mine Personnel	Involve internal WHC stakeholders in PRC Plan processes to build capacity for community consultation on PRC Plan issues and support effective delivery of PRC Plans.	Ongoing
Utility Owners: Sunwater, DTMR, CHRC, QR, Aurizon Network, Ergon Energy Corporation Ltd, Powerlink, Telstra Amplitel, Telstra Vocus, Total Energies	Engage with relevant utility owners to inform them of closure timelines and rehabilitation activities relevant to the land.	Initiated three years prior to decommissioning
	Maintain correspondence regarding progressive rehabilitation and undertake consultation regarding interface agreements, as required if rehabilitation will affect utilities.	During the three years prior to decommissioning
Adjacent and Nearby Mining Interests: including QCoal Services Pty Ltd (Koorilgah Mine Balloon Railway land) and Coronado Global Resources Inc Petroleum Tenement Holders: including Bow CSG Pty. Ltd, Comet Ridge Mahalo North Pty Ltd, Comet Ridge Mahalo Far East Pty Ltd, Comet Ridge Mahalo East Pty Ltd hold, Bronco Energy Pty Limited, and Santos QNT. Pty. Ltd	Write to advise adjacent and nearby resource interests if there are any substantive changes to the closure and rehabilitation schedule in the PRC Plan. At a business level, WHC will participate in industry and research partnerships of relevance to PRC Plan and rehabilitation.	As requested, or as agreed with representatives/mining operations
State Government	Provide updates on PRC Plan to the Director Native Title Services and the Deputy Director General (DNRMMRRD) in writing or through regular meetings.	As requested, or as agreed with DNRMMRRD representatives

3.3 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 be 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.

3.3.1 Regulatory context

Determining the appropriate PMLUs is a critical first step in mine rehabilitation planning. It supports and informs the remainder of the proposed PRCP, including rehabilitation and management strategies, and the PRCP schedule. Mining is a temporary land use, and therefore it is important to consider a future land use that aligns with social, economic, and environmental expectations for the site, as per Section 126C(1)(d) of the EP Act. Criteria for all PMLUs to be adopted for BWM will align with the requirements of the EP Act as described. The EP Act and *Environmental Protection Regulations 2019 Qld* (EP Regulations) contain several additional sections that need to be complied with, as further described below.

3.3.1.1 Section 111A of the EP Act 1994

For a proposed PMLU to be accepted, the PRCP must demonstrate that the land can be rehabilitated to a stable condition in accordance with the following definition from Section 111A of the EP Act:

"Land is in a stable condition if:

(a) the land is safe and structurally stable; and

(b) there is no environmental harm being caused by anything on or in the land; and

(c) the land can sustain a post-mining land use".

This PRCP provides the pathway through which the above requirements can be achieved for the nominated PMLUs described in Section 3.3.2.

3.3.1.2 EP Regulations

The EP Regulations (Schedule 8A, Part 3, Table 1) requires that each PMLU:

a) *"is viable, having regard to the use of land in the surrounding region, and*

b) *satisfies at least one of the following:*

   i. *the use is consistent with how the land was used before a mining activity was carried out on the land;*

   ii. *the use is consistent with a development approval relating to the land;*

   iii. *the use is consistent with a use of the land, other than a use that is mining, permitted under a State or Commonwealth Act, including, for example, a planning instrument under the Planning Act;*

   iv. *the use will deliver or is aimed at delivering a beneficial environmental outcome".*

3.3.1.3 Transitional PRCP context

In accordance with the transitional provisions under the MERFP Act, existing rehabilitation and closure outcomes in land outcome documents (LODs) (as defined in section 750 of the EP Act) were transitioned into the PRCP. The primary LOD for BWM is the site's EA, with the secondary LOD being the *Residual Void Investigation* report (BMA, 2020). Where there is an inconsistency between these documents the primary LOD prevails to the extent of the inconsistency.

In alignment with the transitional provisions and the PRCP Statutory Guideline requirements, rehabilitation and closure outcomes in the BWM LODs were translated into the PRCP Schedule through the following process:

- Identified rehabilitation and closure outcomes in the LOD (EA EPML00717813);
- Identified post-mining land uses (PMLUs);
- Mapped and defined rehabilitation areas within the PMLUs;
- Identified milestones to achieve the PMLUs;
- Identified milestone criteria for showing success or completion of the PMLU; and
- Identified when the first milestone must commence and completion dates for the milestones.

In accordance with the PRCP Statutory Guideline (DESI, 2024), which sets out the information considered necessary by the administering authority under section 126C(1)(j) of the EP Act, the development and refinement of post-mining land uses for BWM has had regard to relevant regulatory, physical, chemical, environmental, social and economic considerations. These considerations are informed by the baseline information and technical assessments presented throughout this PRC Plan, including those relating to land capability, geotechnical and geochemical constraints, hydrology and hydrogeology, available rehabilitation methodologies, and the pre-mining and surrounding land uses (refer Section 3.1.2 and Section 3.6). Consideration has also been given to the potential environmental, social and economic benefits associated with the nominated PMLUs, consistent with the regional setting of the site. The nominated PMLUs represent a balanced and practicable outcome that is capable of achieving a stable condition in accordance with section 111A of the EP Act and has had regard to stakeholder feedback and community expectations and the existing regional land use context.

3.3.2 Community considerations

As demonstrated in Section 3.2, the proposed final landform use concept (including the approved PMLUs in the EA and the NUMAs) has been presented and refined through consultation with external stakeholders to confirm land use outcomes that provide value to the community post-mining.

Consultation undertaken by Whitehaven to inform both PRC Plan Revision 2 (and the approved PRCP Schedule) and subsequent updates in Revision 3 has confirmed that the achievement of the PMLUs is aligned with stakeholder expectations. In particular, the underlying landowners generally expect disturbed land to become rehabilitated to a state suitable for the approved PMLUs or is managed as a non-use management area, where rehabilitation to a PMLU is not feasible.

Additionally, the PMLUs are consistent with historical and surrounding land uses. The local landscape is largely a mosaic of agricultural land, townships and native vegetation (though fragmented, with no habitat corridors or connectivity within or adjacent to BWM that would require habitat connectivity as part of the final landform).

Consultation outcomes have been considered alongside technical, environmental and safety constraints, which are the primary determinants of final landform design and feasibility (refer Sections 3.4 and 3.6).

3.3.3 Nominated PMLUs

Three approved PMLUs under EA EPML00717813 were transitioned into the BWM PRCP and are identified as follows:

- Cattle Grazing;
- Woodland Habitat; and
- Watercourse.

The feasibility of the nominated PMLUs is informed by the baseline conditions described in Section 3.1.2 and the rehabilitation strategies outlined in Section 3.6.

The nominated PMLUs have been developed to support achievement of a stable condition in accordance with section 111A of the EP Act.

The cattle grazing PMLU is predominantly planned for the lower gradient areas disturbed by mining activities, areas that require shallow rooted species and areas where significant clearing occurred prior to mining. The woodland habitat PMLU is planned for areas where cattle grazing is unsuitable (e.g. steeper slopes) and for disturbed areas near existing vegetation communities to improve longer term connectivity. The watercourse PMLU is planned for areas where existing watercourses run through BWM and the associated creek diversions.

In terms of third-party infrastructure associated with roads, rail, power, water and communications supply to landowners or townships, these areas do not have a defined PMLU and the rehabilitation of these areas is not included in this PRC Plan. These areas have been undisturbed by mining activities and may continue to exist once mining activities have ceased, subject to the owner's discretion. Table 3-59 and Figure 3-20, Figure 3-21, Figure 3-76 and Figure 3-77 outline the third-party owned land and assets (infrastructure) which is located within the BWM mining leases which will not be rehabilitated under this PRC Plan. Where infrastructure is retained post-mining, it is not assigned a PMLU and is managed separately, and does not preclude achievement of a stable condition across the site.

The proposed post-mining land use concept for BWM is illustrated in Figure 3-30 and Figure 3-31 and the PMLUs are listed in Table 3-17 along with their associated rehabilitation area and milestones.

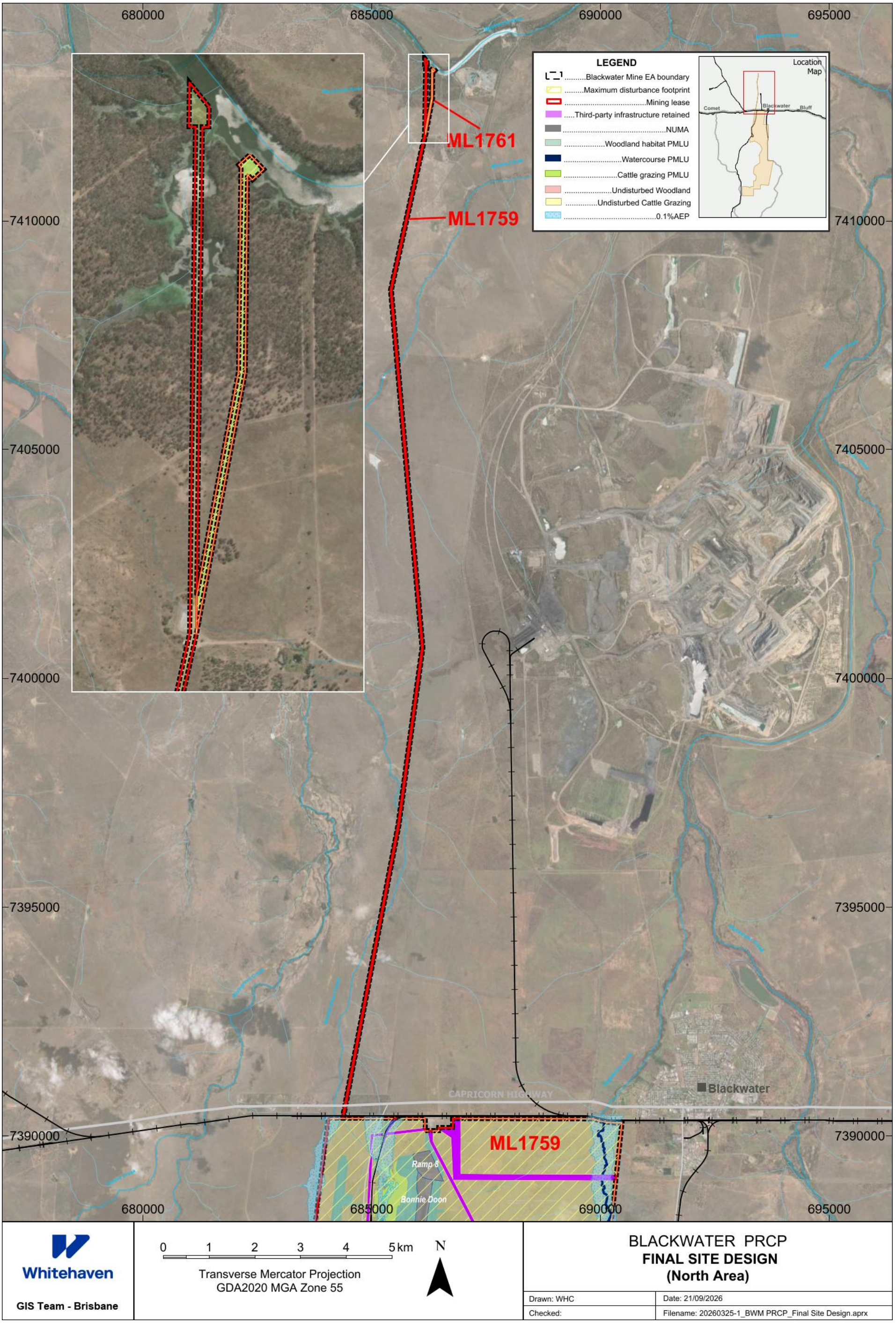


Figure 3-30 Final site design - locations of BWM PMLUs and NUMAs (North)

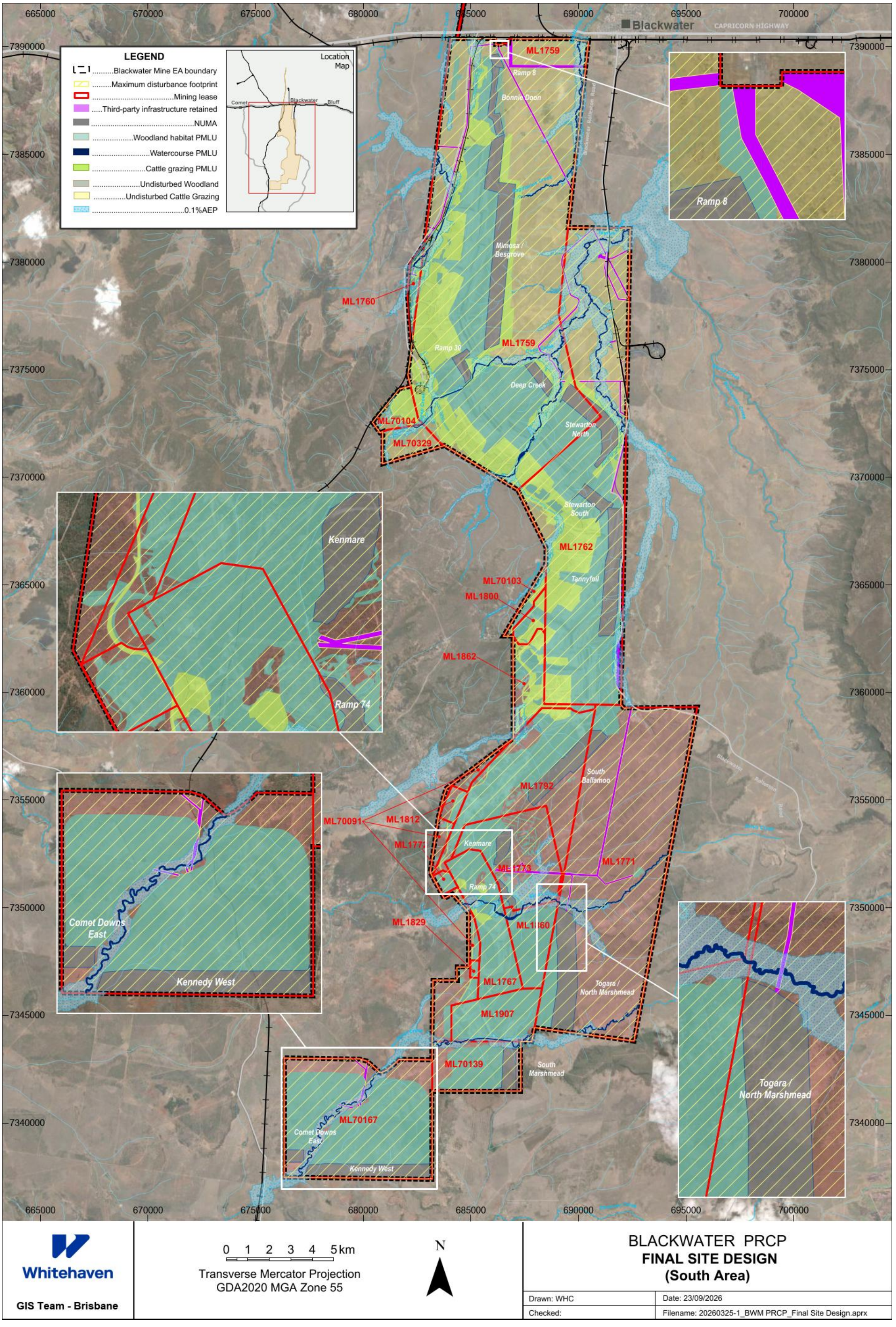


Figure 3-31 Final site design - locations of BWM PMLUs and NUMAs (North, Central and South)

Table 3-17 Nominated PMLUs and their associated rehabilitation areas and milestones

PMLU	Rehabilitation Area (RA)	Milestones	Progressively rehabilitated
Cattle grazing	RA2 - spoil dumps, NCPP TSF, Laleham TSF, Bottom Dam TSF and R36 Rejects	RM1 – Infrastructure decommissioning and removal RM2 – Identification, remediation and removal of contaminated land RM3 – Landform development (re-profiling / reshaping) RM4 – Surface preparation RM5 – Revegetation RM6 – Achievement of surface requirements RM7 – Achievement of post-mining land use to a stable condition RM8 – Achievement of post-mining land use water quality	Yes
	RA4 – infrastructure areas (CHPP North, coal stockpiles, TLO, Thermal Coal Plant, workshops, administration buildings, laydown yards, roads, mine water dams)	RM1 – Infrastructure decommissioning and removal RM2 – Identification, remediation and removal of contaminated land RM3 – Landform development (re-profiling / reshaping) RM4 – Surface preparation RM5 – Revegetation RM6 – Achievement of surface requirements RM7 – Achievement of post-mining land use to a stable condition RM8 – Achievement of post-mining land use water quality	Yes
	RA7 – existing rehabilitation	RM6 – Achievement of surface requirements RM7 – Achievement of post-mining land use to a stable condition RM8 – Achievement of post-mining land use water quality	N/A
Woodland habitat	RA1 – spoil dumps and Ramp 72 TSF	RM1 – Infrastructure decommissioning and removal RM2 – Identification, remediation and removal of contaminated land RM3 – Landform development (re-profiling / reshaping) RM4 – Surface preparation RM5 – Revegetation RM6 – Achievement of surface requirements RM7 – Achievement of post-mining land use to a stable condition RM8 – Achievement of post-mining land use water quality	Yes
	RA5 –infrastructure areas (CHPP South, coal stockpiles, roads, laydown yards, workshops, administration buildings, mine water dams, exploration, historic subsidence areas)	RM1 – Infrastructure decommissioning and removal RM2 – Identification, remediation and removal of contaminated land RM3 – Landform development (re-profiling / reshaping) RM4 – Surface preparation RM5 – Revegetation RM6 – Achievement of surface requirements RM7 – Achievement of post-mining land use to a stable condition RM8 – Achievement of post-mining land use water quality	Yes
	RA6 – existing rehabilitation	RM6 – Achievement of surface requirements RM7 – Achievement of post-mining land use to a stable condition RM8 – Achievement of post-mining land use water quality	N/A
Watercourse	RA3 – creek diversions and crossings	RM1 – Infrastructure decommissioning and removal RM2 – Identification, remediation and removal of contaminated land RM3 – Landform development (re-profiling / reshaping) RM4 – Surface preparation RM5 – Revegetation RM6 – Achievement of surface requirements RM7 – Achievement of post-mining land use to a stable condition RM8 – Achievement of post-mining land use water quality	Yes

3.3.3.1 Cattle grazing PMLU (future and existing)

Areas with this PMLU will be rehabilitated to support beef cattle grazing. At BWM, cattle grazing is predominately planned for the lower gradient areas disturbed by mining activities, areas that require shallow rooted species and/or areas where significant clearing occurred prior to mining. Within the BWM MLs, the total proposed cattle grazing PMLU area is approximately 13,404 ha, of which approximately 3,567 ha are to be rehabilitated as part of RA2 and RA4. The total cattle grazing PMLU also includes 1,910 ha of existing rehabilitation in RA7.

The relevant EA acceptance criteria have been transitioned into the PRCP Schedule as the rehabilitation milestone criteria for the final milestone of achieving a safe, stable, non-polluting and self-sustaining PMLU condition for cattle grazing. The pre-mining land suitability assessment specified in the EA acceptance criteria is based on the five land suitability classes defined under the *Guidelines for Agricultural Land Evaluation in Queensland* (DSITI & DNRM, 2015). Land suitability decreases progressively from Class 1 (suitable land with negligible limitations) to Class 5 (unsuitable land with extreme limitations). The pre-mining land suitability assessment for cattle grazing at BWM has been described in Section 3.1.4.2.1.

To ensure that planned rehabilitation is suitable for sustainable cattle grazing, a land suitability assessment was completed, using the *Rehabilitated mined land suitability for beef cattle grazing in the Bowen Basin - Technical paper 1* (Short, 2023). This was completed for cattle grazing on rehabilitated coal mining land in Queensland. However, for the areas at BWM that have existing rehabilitation for cattle grazing in place before the development of this PRCP (areas as defined in RA7), these areas will instead be assessed against the indicators associated with land condition as described in the *Queensland Reef Protection Regulations Farming in Reef Catchments Grazing Guide* (DES, 2022a).

Revegetation for cattle grazing PMLU areas will be based on seeding a mix of native and naturalised exotic species, comprising preferred, palatable and perennial (3P) grasses and legumes, in a manner cognisant of grazing best management practice.

Species availability may vary, however the seed mix is to include at least four preferred pasture grass species, including two preferred native pasture grasses, and two legumes.

In addition, at least two native shade tree species are to be included in the seed mix, except for the upper surfaces of the NCPP TSF, Laleham TSF, Bottom Dam TSF and R36 Rejects Dump, where deep-rooted trees species are not appropriate due to geotechnical considerations.

3.3.3.2 Woodland habitat PMLU (future and existing)

Areas with this PMLU will be rehabilitated to support woodland habitat. At BWM, woodland habitat PMLU is planned for elevated landforms associated with the spoil dumps (RA1), and general disturbance areas near existing vegetation communities (RA5). Within the BWM MLs, the total proposed woodland habitat PMLU area is approximately 24,248 ha, of which approximately 13,252 ha is to be rehabilitated as part of RA1 and RA5. The total woodland habitat PMLU also includes 944 ha of existing rehabilitation in RA6.

When targeting vegetation communities for this PMLU, consideration is given to the regulatory constraints of the approvals, the surrounding land uses (specifically connectivity with existing native vegetation), and the quantity and quality of growth media resources (topsoil and spoil). Areas targeting native vegetation do not attempt to recreate a specific, recognised regional ecosystem (RE) or Threatened Ecological Community (TEC). However, species mixes used for rehabilitation have been selected based on the species found within REs in the surrounding region.

Wherever possible, BWM is however aiming for woodland habitat revegetation to achieve characteristics of the surrounding natural historic REs (i.e. RE11.5.3, RE11.5.9, RE11.7.1, RE11.7.2,RE11.7.6, RE11.10.7). Where woodland habitat aligned to a specific RE is not possible due to seed availability, soils or spoils variability, the remaining areas of woodland habitat have been planned based on a 'hybrid' woodland habitat ecosystem as defined by Spain, Nuske, Gagen and Purtill (2023). This will be achieved through revegetation

with key framework tree, shrub and grass species known to occur within representative regional ecosystems within and surrounding the mine site. This approach aims to achieve a woodland habitat ecosystem with characteristics of both the representative regional ecosystems within and surrounding the mine site, as well as species that are better adapted to the macro climatic (i.e. drought, fire, flooding rains, climate change) and microclimatic factors associated with the final landforms (i.e. growth media, physical and chemical variation, variation in slope, aspect, altitude).

The relevant EA acceptance criteria have been transitioned into the PRCP Schedule as the rehabilitation milestone criteria for the final milestone of achieving a safe, stable, non-polluting and self-sustaining PMLU condition for woodland habitat.

3.3.3.3 Watercourse PMLU

Areas with this PMLU will be rehabilitated to provide riparian habitat. Within the BWM MLs, the total proposed watercourse PMLU area is approximately 466 ha, of which 136 ha is to be rehabilitated as part of RA3.

The watercourses that transverse through BWM, and any associated diversions, are assigned a watercourse PMLU. These include Burngrove Creek, Deep Creek, Rockland Creek, Taurus Creek, Two Mile Gully, Blackwater Creek and Sirius Creeks (Section 3.1.2.6). The lateral limits of the watercourse PMLU were defined based on the following considerations:

- Aerial imagery of the watercourses and associated riparian vegetation (Section 3.1.2.10)
- Strahler stream orders (Section 3.1.2.6)
- Flood modelling (Section 3.6.1.2)
- Creek diversion designs (Section 3.6.1.7)

Where possible, BWM is aiming for riparian habitat revegetation to achieve characteristics of the RE11.3.25 (*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines) with specific riparian revegetation zones for natural watercourses. Specific species have been included based on the dominant flora species for each zone. These zones are defined as follows:

- Upper bank: defines the lateral limits of both sides of the watercourse or diversion. It does not include the land adjacent. The upper bank generally extends down the riparian profile and is dominated by taller *Eucalyptus* spp, with a mixed woody and grassy understorey.
- Mid bank: occurs between the upper and lower banks and will vary in size depending on the watercourse geomorphology or diversion design. The mid bank may include benches created from high flow events. The vegetation on the mid bank comprises a mix of species including scattered *Eucalyptus spp.*, as well as species that are more adapted to periodic inundation of water and can withstand some disturbance from floods (i.e. *Melaleuca* spp).
- Lower bank (including bank toe) commences at the edge of the low flow channel or stream bed and extends up the bank to the area affected by more regular lower flows. The vegetation in the lower bank is dominated by scattered trees adapted to wetter environments (i.e. Melaleuca spp) and a high ground cover of grasses, reeds, sedges and rushes.

The relevant EA acceptance criteria have been transitioned into the PRCP Schedule as the rehabilitation milestone criteria for the final milestone of achieving a safe, stable, non-polluting and self-sustaining PMLU condition for watercourse.

3.3.4 Regional planning integration

3.3.4.1 Central Queensland Regional Plan

BWM falls under the statutory Central Queensland Regional Plan 2013 (CQRP) (Department State Development, Infrastructure and Planning, 2013), developed to support economic growth, development and liveable communities while protecting natural resources and reconciling State interests outlined in the State Planning Policy (2017). The CQRP aims to protect priority agricultural land uses (PALUs) while supporting co-existence opportunities for the resources sector through the mapping of priority agricultural areas (PAAs) and provide certainty for the future of towns, through the identification of Priority Living Areas (PLAs).

Though BWM is not mapped within a PAA or PLA (excluding a small area mapped as PLA in the north-east corner of ML1759, as part of the Blackwater township), the proposed PMLUs of cattle grazing, woodland habitat and watercourses aligned with the intent of the CQRP, in returning the disturbed land to agricultural land uses and native vegetation and enabling the opportunity for continued economic growth in the region.

In this context, the proposed PMLUs contribute to sustainable post-mining land use outcomes consistent with the CQRP objectives, including the coexistence of resource activities and agricultural productivity.

Of additional note, under the Queensland Biodiversity Planning Assessments (BPAs) BWM is mapped within the Brigalow Belt Bioregion (v2.1). However, no BWM MLs contain vegetation of State or regional significance under the BPA for this region.

3.3.4.2 Local Government Area

BWM is located within the Central Highlands Regional Council (CHRC) Local Government Area (LGA) and is covered by the Central Highlands Regional Council Planning Scheme 2016 (Central Highlands Regional Council, 2016). Under this scheme, BWM is located within land mapped as the Rural Zone, which is for primary production uses ranging from cattle grazing and cropping to the extractive industry and animal industries. The purpose of the Rural Zone code is to:

- Provide for rural uses and activities; and
- Provide for other uses and activities that are compatible with-
    - Existing and future rural uses and activities; and
    - The character and environmental features of the zone; and
- Maintain the capacity of land for rural uses and activities by protecting and managing significant natural resources and processes.

Strategic outcomes for the Rural Zone, as noted in Section 3.8.1 of the CHRC Planning Scheme, include:

a. Rural places in the Central Highlands accommodate a diverse range of activities, including irrigated and dry land horticulture, pastoral industries, intensive animal industries, tourism and the natural resources sector, that continue to have a significant role in the economic development of the region.

b. Agricultural production and rural activities that contribute to the local and regional economy are protected from encroachment by incompatible land uses.

c. Opportunities for new value-adding and related rural industries are encouraged and nurtured, including greater sophistication in existing processing operations, expansion of beef cattle production (including organic beef operations), intensive animal industries where environmental and amenity impacts are appropriately managed, and the expansion of existing, as well as the establishment of new, horticultural and aquaculture operations, resulting in increased export volumes or supplies to processing operations.

The Rural Zone primarily accommodates pastoral industries and the expansion of beef cattle production and therefore, the proposed PMLUs of cattle grazing, mixed with woodland habitat and watercourses (where cattle grazing is not viable and to ensure connection to existing vegetation in the area) are aligned with the intent of the planning scheme, supporting the return of disturbed land to productive rural use while maintaining environmental values and land use compatibility within the Rural Zone.

In this context, the proposed PMLUs contribute to the strategic outcomes of the CHRC Planning Scheme by supporting ongoing agricultural productivity, protecting the character of the rural landscape and enabling coexistence between resource activities and rural land uses.

3.3.4.3 Water Plan (Fitzroy Basin) 2011

The Water Plan (Fitzroy Basin) 2011 was developed to guide the sustainable management of water resources within the Fitzroy Basin area. Its primary purpose is to define the availability of water in the region, ensuring that water use is aligned with long-term environmental and community needs.

The plan establishes a framework for the responsible and sustainable taking of water, and outlines priorities and mechanisms to address future water requirements.

In addition, the plan provides a structured approach for the establishment of water allocations, supporting equitable access and efficient use. It also aims to reverse, where practicable, degradation in natural ecosystems, contributing to the restoration and preservation of environmental values. Furthermore, the plan includes provisions to regulate the taking of both overland flow water and groundwater, ensuring that all forms of water extraction are managed within a consistent and sustainable framework.

A description of how the proposed PMLUs at BWM are consistent with the objectives of the Water Plan is provided in Table 3-20.

Table 3-18 Consistency of BWM PMLUs with the Water Plan (Fitzroy Basin) 2011

Water Plan Objective	Consistency of Proposed NUMAs
Protection of flows and water quality	The proposed PMLUs are designed to maintain pre-disturbance surface water and groundwater interactions to the extent practicable. Final landforms and drainage arrangements are intended to avoid long-term interference with natural flow paths and to protect downstream water quality, such that adverse impacts are avoided to the extent practical and consistent with the objectives of the Water Plan, on existing water allocations or environmental flow objectives.
Environmental outcomes	The proposed PMLUs support the Water Plan's environmental outcomes by promoting stable landforms, controlled runoff and appropriate drainage integration, thereby reducing the risk of erosion, sediment generation and water quality degradation over the long term. These outcomes contribute to the restoration and maintenance of natural ecosystem function where practicable.
Water allocation security	The proposed PMLUs do not rely on the taking of additional surface water or groundwater and therefore do not affect the availability, reliability or priority of water entitlements established under the Water Plan.
Floodplain protection	Where PMLUs intersect floodplain areas, final landform design and surface water management measures are intended to maintain flood conveyance and storage functions, such that flood behaviour and floodplain connectivity are maintained to the extent practicable and consistent with regional hydrological processes.
Ecological outcomes	The proposed PMLUs are consistent with the ecological outcomes of the Water Plan by: — minimising long-term changes to natural flow regimes; — maintaining connectivity between surface water, groundwater and floodplain environments;

	— protecting downstream aquatic ecosystems and refugia; and — supporting water-dependent ecosystems through stable post-mining landform and drainage design. These measures collectively align with the Water Plan objective of protecting ecological integrity and water-dependent environmental values.

3.3.4.4 Summary

Overall, BWM is mapped within a Rural Zone under the Central Highlands Regional Council Planning Scheme and is not mapped as a Priority Agricultural Area under the Central Queensland Regional Plan, although it is surrounded by agricultural land. The proposed PMLUs have been developed to align with the intent of the Central Queensland Regional Plan, the CHRC Planning Scheme and the Water Plan (Fitzroy Basin) 2011, supporting stable, non-polluting and compatible landforms that integrate with the surrounding landscape.

Final landforms and drainage arrangements are intended to maintain appropriate surface water and groundwater interactions, protect downstream water quality, and avoid adverse impacts on existing water allocations, flood behaviour and ecological values to the extent practicable and consistent with regional hydrological processes. The PMLUs are designed to minimise long-term environmental risk and support safe, sustainable land use outcomes, while allowing for adaptive management where future technological advancements may enable alternative rehabilitation or land use options.

3.3.5 Compliance with PRCP objectives (Schedule 8A)

The proposed PMLUs have been developed having regard to the PRCP objectives and performance outcomes outlined in Schedule 8A of the Environmental Protection Regulation 2019, as summarised in Table 3-19.

Table 3-19 Alignment with PRCP Objectives (Schedule 8A) - PMLUs

PRCP Objective	Response / Justification
Final site design – suitability and consistency of PMLUs	The nominated PMLUs have been selected based on an assessment of land capability, surrounding land uses and stakeholder expectations, and are considered to be viable, appropriate and achievable for the site. The proposed PMLUs are consistent with pre-mining land uses, relevant planning instruments and regional land use practices, and are achievable having regard to the final landform and rehabilitation constraints described in Section 3.3. The PMLUs are also intended to deliver beneficial environmental and land use outcomes, including grazing and habitat establishment.
Rehabilitation milestones and long-term sustainability	Rehabilitation milestones have been developed for each PMLU and reflect the most achievable rehabilitation approach based on land capability, material characteristics and operational constraints. These milestones are supported by appropriate milestone criteria and structured to support progression toward subsequent rehabilitation milestones, demonstrating the achievement of a stable condition and the intended land use outcomes. Final rehabilitation milestones and associated criteria demonstrate that the landform will be safe, stable and sustainable in the long term without requiring ongoing active management beyond that defined in the PRCP Schedule.
Progressive rehabilitation and implementation	Rehabilitation areas have been planned to maximise progressive rehabilitation, with activities commencing as soon as practicable following disturbance. Timeframes for achieving rehabilitation milestones have regard to identified risks, operational constraints and stakeholder expectations, ensuring that rehabilitation to a stable condition is progressively achieved during the life of the mine in accordance with the PRCP Schedule.

Accordingly, the proposed PMLUs are consistent with the PRCP objectives and performance outcomes under Schedule 8A of the EP Regulation.

Relationship with PRCP Schedule
The proposed PMLUs for BWM are consistent with pre-mining land uses, current adjacent land uses and PMLUs already approved as part of the site's EA. They are also aligned with future land use development outcomes defined as part of State and regional plans. The PMLU extents consider the post-mining landform, growth media, pre-mining land uses, existing vegetation, ecological values, watercourses and surrounding public infrastructure. The approved EA acceptance criteria for cattle grazing, woodland habitat and watercourse have been transitioned into the PRCP Schedule milestone criteria for achieving these PMLUs. On this basis, the proposed PMLUs provide an appropriate foundation to demonstrate achievement of stable condition, with detailed implementation, monitoring and verification to be undertaken in accordance with the PRCP Schedule. The PMLUs have also been evaluated against the PRCP objectives and performance outcomes under Schedule 8A of the EP Regulation, confirming their suitability and alignment with the regulatory framework.

3.4 Non-use management areas

Legislative Requirement

In accordance with sections 126C(1)(d), (g) (h) and (i) 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;*
- *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; and*
- *state how the proposed non-use management area achieves best practice environmental management of the area to support the management milestones under the proposed PRCP Schedule for the area.*

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.*

3.4.1 Regulatory context

Conditions E10, E11 and E12 of the EA identify residual voids as an outcome for land. The EA defines 'residual void' to mean *'an open pit resulting from the removal of ore and/or waste rock that will remain following the cessation of all mining activities and completion of rehabilitation processes'*.

With approval of the transitional PRCP Schedule, the transitional provisions in Part 27 of the EP Act no longer apply.

The approved PRCP Schedule establishes the extent and location of existing NUMAs at BWM. For the purposes of this amendment application, those existing NUMAs are not subject to re-justification.

Where changes to NUMA extent or configuration are proposed, including the introduction of new NUMAs or expansion of existing NUMAs, these changes have been assessed in accordance with the relevant

requirements of the EP Act (including Sections 126C,126D and 126E), and the EP Regulations (including Sections 41B and 41C, where applicable to NUMAs).

Supporting technical assessments have been prepared for all new and amended NUMAs and are presented within this PRC Plan and associated appendices. Existing assessments continue to apply to unchanged NUMAs. Accordingly, the following sections:

- identify the current NUMA extents, including areas subject to amendment;
- provide justification for new and amended NUMAs in accordance with Sections 126C and 126D of the EP Act; and
- demonstrate that the proposed NUMA outcomes minimise environmental risk and are supported by appropriate technical evidence.

3.4.2 Minimisation of NUMAs

The BWM NUMAs comprise areas associated with the 15 residual voids listed below and depicted in Figure 3-30 and Figure 3-31. The residual void and associated NUMA configurations presented in this updated PRC Plan (Revision 3) reflect the proposed final landform. In particular, the Mimosa/Besgrove, Ramp 30, Deep Creek, Stewarton North and Stewarton South residual voids and associated NUMA boundaries are proposed Revision 3 configurations and differ from those approved under the PRCP Schedule (Revision 2), as described further below.

- Ramp 8
- Bonnie Doon
- Mimosa / Besgrove
- Ramp 30
- Deep Creek
- Stewarton North
- Stewarton South
- Tannyfoil
- South Ballamoo
- Kenmare
- Ramp 74
- Togara / North Marshmead
- South Marshmead
- Kennedy West
- Comet Downs East

The extent of the NUMAs has been designed to achieve a safe and structurally stable landform. Design criteria reflect the need to avoid unacceptable environmental and geotechnical risk associated with further landform disturbance, including:

- the residual voids remain below natural ground level (high-wall, end-walls, low-wall and floor);
- the associated wall setbacks at natural ground level are to achieve a factor of safety (FoS) of 1.5; and
- safety bunds and appropriate fencing will be installed.

The approved PRCP Schedule (Revision 2) (refer to Section 2.2) established a total NUMA footprint of approximately 3,178 ha. This represents the approved baseline against which the proposed Revision 3 NUMA configuration is assessed.

Further reductions to NUMA areas in Revision 2 were not technically achievable under the mine design and closure assumptions due to the following constraints, and because further reduction would introduce additional environmental and geotechnical risks:

- the depth and geometry of remaining voids, which exceed the safe angle of repose for reprofiling;
- geotechnical constraints preventing reshaping of the pit floor and lower benches to meet rehabilitation slope requirements; and
- the requirement to maintain wall stability and avoid unacceptable geotechnical risks if additional slope reductions were attempted.

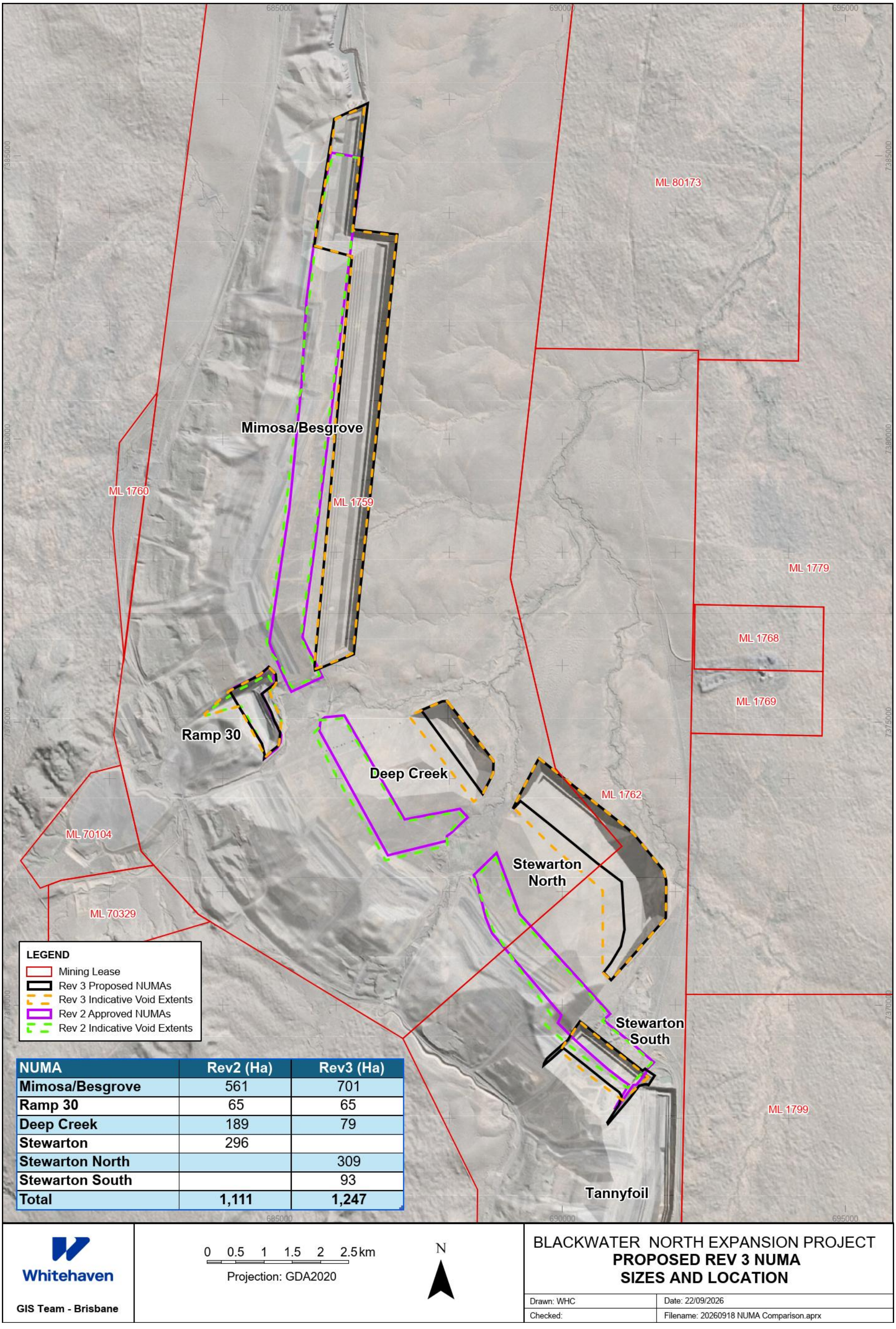
These constraints, as identified in the approved PRCP Schedule (Revision 2), remain applicable to NUMA areas that are unchanged in Revision 3. In developing the proposed Revision 3 mine and closure design plan, these constraints have also been considered for areas subject to change (described below), and demonstrate that opportunities to reduce NUMA extents relative to the approved baseline are limited without introducing increased environmental or geotechnical risk.

In addition, during development of Revision 3, further consideration was given to opportunities to reduce the extent of residual voids through alternative mine sequencing, backfilling and landform design configurations. This iterative assessment confirmed that additional reduction of NUMA extents beyond those presented was not reasonably achievable without introducing increased environmental or geotechnical risk.

The proposed Revision 3 closure design incorporates void reduction measures through the placement of approximately 88.1 million bank cubic metres (MBCM) of material within the Ramp 30, Deep Creek and Stewarton North residual voids. These works are associated with the construction of proposed flood protection landforms and demonstrate that practicable opportunities to reduce residual void extents have already been incorporated into the preferred closure strategy. The proposed NUMA configuration therefore does not represent a "do nothing" outcome but rather reflects a closure design that includes substantial landform modification and partial void filling where this can be achieved safely and consistently with the proposed post-mining land uses.

Changes to residual void extents are not solely a consequence of revised mine sequencing or landform design. In some cases, movement of mining further down dip results in deeper final voids which, when applying the same geotechnical, safety and landform design criteria, naturally produce larger residual void footprints.

Figure 32 compares the approved Revision 2 and proposed Revision 3 NUMA boundaries and residual void extents for Mimosa/Besgrove, Ramp 30, Deep Creek, Stewarton North and Stewarton South. The figure illustrates how the updated mine sequencing and final landform design associated with BNEP have influenced the location, extent and configuration of the proposed residual voids and NUMAs.



NUMA	Rev2 (Ha)	Rev3 (Ha)
Mimosa/Besgrove	561	701
Ramp 30	65	65
Deep Creek	189	79
Stewarton	296	
Stewarton North		309
Stewarton South		93
Total	1,111	1,247

Figure 32 Comparison of approved Revision 2 and proposed Revision 3 NUMA boundaries and residual void extents

Revision 3 of the PRC Plan incorporates the BNEP (refer to Section 2.3.1), which results in proposed changes to the extent and configuration of several residual voids, and consequently the NUMA footprint relative to the approved PRCP Schedule (Revision 2). These changes reflect updated mine sequencing and final landform design associated with BNEP, and include:

- the extension of the Mimosa/Besgrove residual void to the north and east;
- relocation of the Deep Creek residual void further to the northeast; and
- separation of the Revision 2 Stewarton residual void into two distinct proposed Revision 3 voids (Stewarton North and Stewarton South), including adjustment of their respective extents.

These changes result in both increases and decreases to individual NUMA extents when the proposed Revision 3 NUMA configuration is compared with the approved Revision 2 NUMA configuration, as described below.

Specifically, the proposed Revision 3 NUMA footprint of the Mimosa/Besgrove residual void increases by 140 ha, and the combined Stewarton North and Stewarton South NUMA areas increase by 106 ha compared to the single Stewarton NUMA area approved in Revision 2. In contrast, the proposed Revision 3 Deep Creek residual void NUMA footprint decreases by 110 ha.

Overall, the proposed Revision 3 configuration results in a net increase in NUMA footprint of 135 ha, increasing the total NUMA area from 3,178 ha under the approved PRCP Schedule (Revision 2) to 3,313 ha under the proposed Revision 3 configuration.

Accordingly, the proposed 3,313 ha NUMA footprint under Revision 3 represents the extent of areas that cannot be reasonably rehabilitated to a stable condition having regard to geotechnical, hydrological and landform constraints.

While changes to mine planning and closure design associated with BNEP would result in a net increase in NUMA extent relative to the approved PRCP Schedule (Revision 2), the proposed Revision 3 configuration reflects an updated assessment of these constraints and the associated environmental risks. Further reductions of NUMA areas would require substantial additional landform modification and disturbance, which would introduce increased environmental and geotechnical risk.

The NUMAs will incorporate safety features to prevent access, including:

- Safety bunds and fencing constructed at the NUMA extents to prevent human and livestock access; and
- Signage at regular intervals along the fence.

The proposed improvement areas and associated management milestones for the BWM NUMAs are provided in Table 3-20.

Table 3-20 NUMAs, improvement areas and management milestones

NUMA	Improvement Area (IA)	Management Milestones
NUMA	IA1 - Residual voids including Ramp 8, Mimosa/Besgrove, Ramp 30, Deep Creek, Stewarton North, Stewarton South, Tannyfoil, South Ballamoo, Kenmare, Togara/North Marshmead, South Marshmead, Comet Downs East, Kennedy West)	MM1 – achievement of structural stability MM3 – achievement of surface requirements MM4 – achievement of sufficient improvement
	IA2 - Ramp 74 TSF and Bonnie Doon TSF	MM1 – achievement of structural stability MM2 – installation of cover system MM3 – achievement of surface requirements MM4 – achievement of sufficient improvement

3.4.3 Environmental risk, alternative options and public interest considerations

Following approval of the PRCP Schedule (Revision 2) and development of the amended PRCP (Revision 3), the mining, rehabilitation design and closure approach for BWM has been iteratively refined, including consideration of alternative landform configurations, having regard to geotechnical feasibility, hydrogeological behaviour and potential environmental risks.

These refinements include changes in NUMA extent and configuration described in Section 3.4.2 and have been undertaken to minimise long-term environmental risk, improve long-term stability, and support appropriate post-mining land use outcomes, consistent with the intent of the PRC framework.

For NUMA areas that are unchanged from Revision 2, the previously assessed design and outcomes remain applicable. For amended or new NUMA areas introduced in Revision 3, the following assessments demonstrate how environmental risks have been minimised and managed.

Groundwater, void and flood studies have been undertaken as part of PRC Plan Revision 3 to assess and support the proposed NUMA locations and extent, and to minimise the potential for environmental harm. These studies support the design of both existing and amended NUMAs.

In addition, a comprehensive suite of technical studies was undertaken to assess and confirm the environmental performance of the proposed NUMA configurations, including amended areas, to minimise environmental harm. The final design approach incorporated findings from the following key studies.

- Void in floodplain modelling (Section 3.5.3)
- Water balance modelling (Section 3.6.3.3.1)
- Void water quality modelling (Section 3.6.3.3.3)
- Void geotechnical studies (Section 3.6.3.2)
- Groundwater modelling (Section 3.6.3.3.2)
- Rehabilitation flood modelling (Section 3.6.1.2)

The outcomes of these studies have informed the final NUMA configurations presented in this PRC Plan, which represent the most appropriate closure outcome having regard to environmental risk, environmental risk, rehabilitation feasibility, alternative rehabilitation options and the public interest considerations contained in section 126E of the EP Act. The assessments also demonstrate that environmental risks associated with the proposed NUMAs remain confined to the relevant resource tenure, consistent with section 126D(2)(b)(i), and support the conclusion that, having regard to section 126E, it is in the public interest for the proposed NUMAs not to be rehabilitated to a stable condition, consistent with section 126D(2)(b)(ii).

3.4.3.1 Key design outcomes

In particular, the refined NUMA configurations incorporate the following key features:

- Residual voids are modelled to achieve flood immunity up to a 0.1% AEP flood level through final landform construction, preventing flood ingress to the voids (Section 3.6.1.2).
- Updated numerical groundwater modelling indicates the residual voids will stabilise as permanent groundwater sinks over time, or exhibit localised inter-void processes that remain confined within the mine domain, thereby supporting long-term containment of impacted water within the BWM tenure boundaries. Direct evaporation from the surface of the void lakes is anticipated to maintain long-term void lake levels such that they are lower than the surrounding groundwater levels at equilibrium (Sections 3.6.1.1.4 and 3.6.3.3.2).
- Updated water balance modelling indicates long-term pit water levels will remain below the spill point, thereby reducing the likelihood of residual voids overtopping and releasing void water to

surface waters and/or the receiving environment, and support the conclusion that off-tenure impacts are not expected under modelled conditions (Section 3.6.1.1.2).

- Residual voids are designed to achieve structural stability, with a minimum FoS ≥ 1.5 used as guidance for void closure planning (Section 3.6.3.2). Safety bunds, fencing and warning signage will be installed around NUMA highwalls to prevent public access.

3.4.3.2 Assessment of alternative rehabilitation options for proposed BNEP voids

The development of the proposed Revision 3 closure strategy included consideration of alternative rehabilitation scenarios for the amended residual voids associated with BNEP. These alternatives were assessed having regard to the costs and consequences of implementation, the extent of additional disturbance required, rehabilitation outcomes, and the public interest considerations identified in section 126E of the EP Act.

Option 1, involving backfilling of the amended residual voids to approximate natural topography, would require placement of approximately 982 million cubic metres of material. Applying the DETSI ERC calculation methodology to these residual voids results in an estimated closure expenditure of approximately $3.024 billion, up to 11 years[2] of additional earthworks and up to 824 ha of deferred rehabilitation. This option would eliminate the amended NUMAs associated with BNEP. However, implementation would require substantial additional spoil rehandling, significantly delayed rehabilitation outcomes, and require approximately $3.024 billion in additional closure expenditure. In addition, large-scale backfilling of the residual voids would fundamentally alter the post-closure hydrogeological regime that underpins the current closure strategy and introduce significant uncertainty regarding long-term groundwater behaviour. Having regard to the scale of material movement, duration of earthworks, deferred rehabilitation outcomes and additional closure expenditure required, Whitehaven considers that implementation of this option would, in all likelihood, render the Project materially less viable.

Option 2, involving backfilling of the amended residual voids to approximately the pre-mining groundwater table elevation, would require placement of approximately 782 million cubic metres of material. Applying the DETSI ERC calculation methodology to these residual voids results in an estimated closure expenditure of approximately $2.410 billion, up to 8.6 years[2] of additional earthworks and up to 459 ha of deferred rehabilitation. Despite this substantial investment, residual voids would still remain within the final landform. In addition, implementation of this option would materially alter the post-closure hydrogeological regime that underpins the current closure strategy and introduce additional uncertainty regarding long-term groundwater behaviour.

The proposed Revision 3 closure strategy already incorporates substantial void reduction measures through the placement of approximately 88.1 MBCM of material within the Ramp 30, Deep Creek and Stewarton North residual voids associated with construction of the proposed flood protection landforms.

Implementation of either alternative scenario would require substantially greater material movement, additional closure expenditure and prolonged delays to rehabilitation outcomes beyond those already incorporated into the preferred closure strategy. Deferral of rehabilitation would extend the period during which disturbed land remains within the landscape and delay the return of land to productive post-mining land uses. It would also prolong closure-related impacts associated with earthworks activities, including dust generation, visual impacts, operational noise and greenhouse gas emissions associated with additional spoil movement.

Having regard to the significant additional costs, deferred rehabilitation outcomes, increased closure disturbance, hydrogeological uncertainty and the limited incremental benefit associated with the alternative

[2] Rehabilitation durations are planning-level estimates based on representative earthmoving productivity assumptions, including approximately five large excavators operating concurrently across the amended residual voids. Actual rehabilitation durations would be influenced by equipment allocation, production rates and closure execution strategy.

rehabilitation scenarios, Whitehaven considers that the proposed Revision 3 closure strategy represents the most appropriate and proportionate closure outcome.

3.4.3.3 NUMA boundary definition

NUMA low-wall boundaries have been defined to maximise the area where a PMLU can be safely and practically assigned. The NUMAs are limited to areas comprising the pit floor and slopes that are too steep to enable effective rehabilitation or cannot support long-term stability. This approach ensures that all practicable areas (where slope geometry, safety, and geotechnical conditions allow) are included for future rehabilitation, while only those sections that cannot feasibly be reprofiled or stabilised are designated as NUMAs.

The following section summarises how the proposed NUMAs align with the relevant PRCP objectives and performance outcomes under the EP Regulation.

3.4.3.4 Compliance with PRCP objectives (Schedule 8A)

The proposed NUMAs have been developed having regard to the PRCP objectives and performance outcomes outlined in Schedule 8A of the EP Regulation 2019, as summarised in Table 3-21.

Table 3-21 Alignment with PRCP Objectives (Schedule 8A) - NUMAs

PRCP Objective	Response / Justification
Minimisation of NUMA extent	The extent of NUMAs has been limited to areas where rehabilitation to a stable condition is not reasonably achievable, having regard to geotechnical, hydrogeological and landform constraints (refer Section 3.4.2). The preferred closure strategy incorporates approximately 88.1 MBCM of partial void filling associated with proposed flood protection landforms at Ramp 30, Deep Creek and Stewarton North.
Location of NUMAs	NUMAs have been located based on an iterative assessment of alternative landform configurations, having regard to environmental risks, the nature of potential environmental harm, and the sensitivity of the surrounding environment. This is informed by the outcomes of relevant technical assessments, including groundwater, surface water and flood modelling (refer Sections 3.4.3, 3.5 and 3.6).
Environmental risk management	The proposed NUMAs are informed by a comprehensive suite of technical studies that assess potential environmental pathways, including groundwater flow, surface water interactions and geochemical processes. These studies support the design of landforms that are intended to maintain long-term containment of residual impacts within the mine domain and minimise the release of contaminants.
Progressive improvement and management	Management milestones and monitoring requirements have been developed to support progressive improvement and long-term management of NUMAs in accordance with best practice environmental management principles, as defined in the PRCP Schedule.

Accordingly, the proposed NUMAs are consistent with the PRCP objectives and performance outcomes under Schedule 8A of the EP Regulation.

3.4.3.5 NUMA justification (EP Act requirements)

Further detail on the justification for the proposed NUMAs under the EP Act is provided in Table 3-22 and Table 3-23, which summarise the supporting evidence against the relevant statutory requirements.

Table 3-22 NUMA justification matrix to respond to EP Act s.126C(1)(g) and s.126C(1)(h)

EP Act s.126C(1)(g) - Reasons NUMAs cannot be rehabilitated to a stable condition	EP Act s.126C(1)(h) – Supporting evidence source
Residual voids cannot reasonably be rehabilitated to an alternative post-mining land use without substantial landform modification, disturbance and associated environmental geotechnical and hydrogeological consequences	Section 3.4.2, 3.6.3.4 and Appendix 4.14
Residual voids are characterised by depths, geometries and wall configurations that exceed practicable rehabilitation limits and would require large-scale backfilling to materially reduce NUMA extents.	Section 3.4.2 and Appendix 4.14
The proposed Revision 3 closure design already incorporates substantial void reduction measures through the placement of approximately 88.1 MBCM of material within the Ramp 30, Deep Creek and Stewarton North residual voids as part of the proposed flood protection landforms.	Section 3.4.2 and 3.6.1.2
Updated groundwater, water balance and geochemical assessments indicate that the residual voids function as part of an integrated hydrogeological system that promotes long-term containment of groundwater and solutes within the BWM tenure boundary.	Section 3.6.1.1, 3.6.1.3 and 3.6.3.3
Alternative rehabilitation options involving large-scale backfilling would require rehandling spoil, deferring land otherwise available for progressive rehabilitation, and re-disturbance of previously rehabilitated areas in some locations.	Section 3.4.3.2
Alternative rehabilitation options would materially defer rehabilitation outcomes and closure activities. Assessment of representative alternatives indicates up to 824 ha of deferred rehabilitation and up to 11 years of additional earthworks may be required.	Section 3.4.3.2

Accordingly, the proposed NUMAs represent those areas that cannot reasonably be rehabilitated to a stable condition having regard to the geotechnical, hydrogeological and landform constraints associated with the final landform. Supporting evidence demonstrating these constraints is provided throughout Sections 3.4, 3.5 and 3.6 and the associated technical appendices.

Table 3-23 NUMA justification matrix to respond to EP Act s.126D(2)(b)(i), s.126D(2)(b)(ii), s.126D(3) and s.126E

Legislative Requirement	Assessment / Justification	Supporting evidence source
Section 126D(2)(b)(i) *Environmental risks confined to resource tenure*	Groundwater modelling, water balance modelling, geochemical assessments and flood modelling indicate that environmental risks associated with the proposed NUMAs remain confined within the BWM resource tenure. Residual void water levels are predicted to remain below spill points and reach equilibrium levels with no overtop, residual voids function as groundwater sinks or form part of an internally connected void system, and flood protection measures have been incorporated into the final landform design. Collectively, these assessments demonstrate that environmental risks associated with the proposed NUMAs remain confined to the relevant resource tenure. Geotechnical assessments informed the definition of NUMA boundaries by identifying locations where final landform slopes achieve a minimum factor of safety (FoS) of 1.5. Areas that do not achieve the required FoS are contained within the NUMA footprint, ensuring that any geotechnical risks are confined	Sections 3.4.3.1, 3.6.1.1, 3.6.1.2, 3.6.1.3, 3.6.3, 3.6.3.3, Appendix 4.14, Appendix 4.16

Legislative Requirement	Assessment / Justification	Supporting evidence source
	within the managed NUMA area and do not adversely affect surrounding rehabilitated land or land outside the BWM tenure boundary.	
Section 126D(2)(b)(ii) *Public interest considerations for land not to be rehabilitated to a stable condition*	Having regard to each of the public interest considerations identified in section 126E (see items 126E(a) to 126E(d) below) including the benefits of the BNEP, the environmental impacts associated with the proposed NUMAs and the costs and consequences of alternative rehabilitation options, Whitehaven considers that it is in the public interest for the proposed NUMAs not to be rehabilitated to a stable condition.	Sections 3.4.3.2, Table 3-23
Section 126D(3) *Floodplain stability*	Residual voids planned to be located within flood-prone areas have been designed to achieve flood immunity (0.1% AEP or better), preventing flood ingress and supporting long-term landform stability. The proposed final landforms incorporate flood protection measures, flood assessment requirements, geotechnical and erosion stability criteria, monitoring, certification and performance milestones that provide a framework for demonstrating that the land achieves a stable condition that is safe, structurally stable, non-polluting and capable of sustaining the approved post-mining land use.	Sections 3.5.4, 3.6.1.2, 3.6.1.7.8, Appendix 4.5, PRCP Schedule Conditions PRCP12–18 and relevant rehabilitation/improvement milestones
Section 126E(a) *Benefit to community*	The BNEP is expected to extend mining operations to approximately 2055 and facilitate extraction of approximately 200 Mt of additional ROM coal, while continuing to utilise existing approved mining infrastructure, including the CHPP, TCP, rail facilities and water management infrastructure. The Project supports ongoing employment, royalties, taxes, contractor expenditure and regional economic activity throughout Central Queensland. The Project is expected to support approximately 2,250 direct operational positions by 2032, increasing to approximately 2,400 direct operational positions between 2033 and 2055, in addition to indirect employment and supply chain opportunities. These benefits are expected to accrue primarily to Blackwater, Emerald and the broader Central Highlands region.	Section 2.3.1
Section 126E(b) *Impacts on the environment or community*	Residual voids and associated NUMAs represent a long-term land use constraint and require ongoing management. However, environmental risks have been minimised through iterative mine planning, landform optimisation, flood protection landforms, geotechnical design, groundwater management and progressive rehabilitation. The proposed NUMAs are subject to management milestones, monitoring and certification requirements under the PRCP Schedule to ensure they remain safe, stable and non-polluting.	Sections 3.4.2, 3.4.3.1, 3.5, 3.6, PRCP Schedule Improvement Area Milestones
Section 126E(c) *Alternative options*	Alternative rehabilitation scenarios were assessed for the proposed Revision 3 residual voids, including: • **Option 1:** Backfilling the revised residual voids to approximate natural topography; and • **Option 2:** Backfilling the revised residual voids to approximately the pre-mining groundwater table elevation. Option 1 would require the placement of approximately 982 million cubic metres (Mm^3) of material. Applying the DETSI ERC calculation methodology to these residual voids results	Sections 3.4.2, 3.4.3.2, Mine Planning Assessment (2026)

Legislative Requirement	Assessment / Justification	Supporting evidence source
	in an estimated closure expenditure of approximately $3.024 billion, up to 11 years of additional earthworks and up to 824 ha of deferred rehabilitation. Option 2 would require the placement of approximately 782 million cubic metres (Mm³) of material. Applying the DETSI ERC calculation methodology to these residual voids results in an estimated closure expenditure of approximately $2.410 billion, up to 8.6 years of additional earthworks and up to 459 ha of deferred rehabilitation. Despite this substantial investment and additional disturbance, residual voids would still remain within the final landform. The proposed Revision 3 closure strategy already incorporates significant void reduction measures through the placement of approximately 88.1 MBCM of material within the Ramp 30, Deep Creek and Stewarton North residual voids as part of the proposed flood protection landforms. These works demonstrate that practicable opportunities to reduce residual void extents have already been incorporated into the preferred closure strategy. Alternative backfill scenarios would materially alter the post-closure groundwater regime that underpins the current closure strategy. The approved closure strategy maintains residual voids as groundwater sinks or as components of an internally connected groundwater system, supporting long-term containment of groundwater and solutes within the resource tenure. Alternative backfill scenarios would modify these hydrogeological conditions and introduce additional uncertainty regarding long-term groundwater behaviour. Implementation of either alternative rehabilitation scenario would result in substantial additional material movement, prolonged earthworks campaigns and a significant deferral of rehabilitation outcomes. Deferral of rehabilitation would extend the period during which disturbed land remains within the landscape and delay the return of land to productive post-mining land uses. It would also prolong closure-related impacts associated with earthworks activities, including dust generation, visual impacts, operational noise and greenhouse gas emissions associated with additional spoil movement. The scale of the additional expenditure associated with these alternatives, estimated at approximately $3.024 billion (Option 1) and $2.410 billion (Option 2) respectively, would have significant implications for the economic viability of the Project and, in all likelihood, would render the Project materially less viable. Having regard to the costs and consequences of the alternative rehabilitation scenarios, Whitehaven considers that the proposed Revision 3 closure strategy represents the most appropriate and proportionate closure outcome. The alternative options would require substantially greater expenditure, disturbance and delayed rehabilitation outcomes beyond those already incorporated into the preferred closure strategy, while providing limited incremental environmental benefit.	
Section 126E(d) *Net public interest outcome*	On balance, and having regard to the public interest considerations contained in section 126E of the EP Act, Whitehaven considers that retention of the proposed residual	Sections 3.4.2, 3.4.3.2

Legislative Requirement	Assessment / Justification	Supporting evidence source
	voids as NUMAs represents a proportionate and risk-based closure outcome. The proposed Revision 3 amendment results in an increase in NUMA footprint of approximately 135 ha relative to the approved PRCP Schedule (Revision 2), representing approximately 4% of the total NUMA footprint. At the same time, the proposed closure strategy incorporates substantial void reduction measures through the placement of approximately 88.1 MBCM of material within the Ramp 30, Deep Creek and Stewarton North residual voids. Environmental risks are demonstrated to remain confined within the BWM tenure boundary, while the alternative rehabilitation options would require substantial additional closure expenditure, prolonged earthworks campaigns, significant deferred rehabilitation outcomes and alteration of the post-closure hydrogeological regime. Having regard to these factors and the ongoing community, employment and economic benefits associated with BNEP, Whitehaven considers that the benefits to the community outweigh the impacts associated with retaining the proposed NUMAs.	
Overall Conclusion	Having regard to the assessments presented in Sections 3.4.2 and 3.4.3, Whitehaven considers that: • environmental risks associated with the proposed NUMAs remain confined to the relevant resource tenure, consistent with section 126D(2)(b)(i) of the EP Act; • alternative rehabilitation options have been assessed and evaluated, including consideration of their costs and consequences; • the costs and consequences of those alternatives outweigh their limited incremental environmental benefit; • floodplain-associated residual voids will be rehabilitated and managed to achieve a stable condition, consistent with section 126D(3) of the EP Act; and • having regard to the public interest considerations contained in section 126E of the EP Act, it is in the public interest for the proposed Mimosa/Besgrove, Deep Creek, Ramp 30, Stewarton North and Stewarton South NUMAs not to be rehabilitated to a stable condition, consistent with section 126D(2)(b)(ii) of the EP Act. Accordingly, Whitehaven considers that the proposed Mimosa/Besgrove, Deep Creek, Ramp 30, Stewarton North and Stewarton South NUMAs satisfy the requirements of sections 126D(2)(b)(i) and 126D(2)(b)(ii) of the EP Act, and that the proposed PRCP Schedule provides for rehabilitation of floodplain-associated residual voids to a stable condition consistent with section 126D(3).	Sections 3.4.2, 3.4.3, Table 3-23

3.4.4 Community considerations

Community feedback obtained through the consultation process (summarised in Section 3.2 and *Appendix 4.4 – Community Consultation Plan and Register*) has directly informed the designation of residual voids as NUMAs.

Consultation undertaken by Whitehaven to inform both PRC Plan Revision 2 (including the approved PRCP Schedule) and updates incorporated in Revision 3 has been used to validate this approach. Stakeholders including underlying landholders, Gaangalu Nation People, CHRC, adjacent resource operators, licensees of land within BWM EA areas and community representatives were presented with the proposed post-mining landforms, including the residual voids and their intended management as NUMAs.

Stakeholders were consulted on the technical and safety limitations associated with attempting to backfill residual voids or convert them to alternative post-mining uses. Consultation also outlined why these areas are proposed to remain as long-term containment and risk-management landforms within designated NUMAs. No stakeholders indicated that rehabilitation of residual voids to an alternative PMLU was either expected or preferred.

Consultation undertaken for both Revision 2 and Revision 3 did not identify any stakeholder objection to the proposed residual voids being managed as NUMAs. Feedback received through the consultation process generally recognised the technical, safety and operational constraints associated with residual void rehabilitation and supported a closure approach focused on achieving safe, stable and sustainable post-mining land uses across the broader mine footprint.

Consistent with this engagement, the classification of the residual voids as NUMAs aligns with community expectations that areas unsuitable for safe or practicable rehabilitation should be managed in a manner that avoids future risk, while allowing surrounding areas to be rehabilitated to support approved PMLUs.

Accordingly, the proposed NUMAs reflect the outcomes of community consultation by adopting a land use approach that:

- addresses the community's priorities for environmental protection and long-term stability;
- aligns with underlying landholder expectations for how disturbed land will be treated post-mining;
- is consistent with surrounding land uses and does not constrain ongoing agricultural or cultural land uses adjacent to the site; and
- ensures transparency about which areas will be rehabilitated to support PMLUs and which will remain managed non-use areas.

The proposed NUMA outcomes under Revision 3 are therefore consistent with the outcomes of community consultation, having regard to the technical and safety constraints associated with residual void rehabilitation.

3.4.5 Regional planning integration

3.4.5.1 Central Queensland Regional Plan

The statutory *Central Queensland Regional Plan 2013 (CQRP)* (Department State Development, Infrastructure and Planning, 2013) states the region's greatest competitive industry strengths are the coal and agricultural industries. An aim of the CQRP is to maximise the productive use of key mining resources whilst still providing for liveable communities. It is understood that mining is a temporary land use and is often in conflict with agricultural land use. To resolve this conflict, it is preferred to minimise the long-term impact on the productivity of agricultural land from resource activities wherever possible.

The CQRP recognises that, where practicable, land disturbed by resource activities should be returned to productive or environmentally sustainable uses following mining, while ensuring that residual risks are appropriately managed.

The designation of residual voids as NUMAs is consistent with this approach. The proposed NUMAs represent areas where rehabilitation to a productive land use is not technically feasible due to geotechnical, safety and landform constraints. Consistent with the minimisation approach described in Section 3.4.2, these areas have been limited to the minimum extent required to achieve a safe and stable post-mining landform.

By constraining NUMAs to areas where rehabilitation is not reasonably achievable, and maximising the extent of land returned to productive PMLUs (including cattle grazing and woodland habitat), the PRC Plan minimises long-term impacts on land capability and aligns with the CQRP objective of supporting coexistence between mining and agricultural land uses.

Accordingly, the proposed NUMAs are consistent with the CQRP as they ensure residual risks are appropriately managed while enabling the majority of disturbed land to be rehabilitated to beneficial post-mining land uses.

3.4.5.2 Local Government Area

The CHRC has a strong history and connection with mining and the resources sector, positioning the region as a gateway to mining and exploration activities. The mining, petroleum and extractive resources industry includes underground and open-cut thermal and coking coal mining, minerals and CSG extraction, quarrying, and gemstones extraction, with the Central Queensland region's greatest competitive industry strengths being in the coal, CSG/LNG and agricultural sectors (Department State Development, Infrastructure and Planning, 2013).

Within this context, the CHRC Planning Scheme recognises that resource activities are a fundamental component of the regional economy and that post-mining land use outcomes should appropriately balance long-term land capability with the practical constraints of mining.

The designation of residual voids as NUMAs reflects these considerations. The proposed NUMAs represent areas where rehabilitation to a rural land use consistent with the Rural Zone is not technically feasible due to geotechnical, safety and landform constraints. As such, these areas are limited to the minimum extent required to achieve a safe and stable post-mining landform.

By restricting NUMAs to those areas where rehabilitation is not reasonably achievable and maximising the extent of land returned to productive PMLUs, the PRC Plan maintains the productive capacity of the majority of the land within the Rural Zone and avoids unnecessary long-term sterilisation of land.

Accordingly, the proposed NUMAs are consistent with the intent of the CHRC Planning Scheme, as they manage residual risks associated with mining while enabling surrounding land to be rehabilitated to uses compatible with the Rural Zone.

3.4.5.3 Water Plan (Fitzroy Basin) 2011

A description of how the proposed NUMAs at BWM are consistent with the objectives of the Water Plan is provided in Table 3-24.

Table 3-24 Consistency of BWM NUMAs with the Water Plan (Fitzroy Basin) 2011

Water Plan Objective	Consistency of Proposed NUMAs
Protection of flows and water quality	The NUMA design aims to avoid interference with existing surface water flows and groundwater systems and is intended to minimise any potential influence of pit lake development on the availability of water for existing allocations or environmental flows. NUMAs will be constructed and managed to limit runoff and seepage, aligning with the plan's intent to ensure water use does not cause degradation of surrounding water resources, with residual risks managed within defined landform features.

Water Plan Objective	Consistency of Proposed NUMAs
Environmental outcomes	As discussed in Section 3.5 the design and location of the residual voids, together with associated landform features and required watercourse management, is designed to provide protection from flood events up to and including the 0.1% AEP, thereby minimising environmental risks and supporting the Water Plan's objectives for ecological and hydrological protection. Residual voids represent hydraulically contained features that are designed to avoid uncontrolled interaction with surrounding ecosystems.
Water allocation security	NUMA siting and management does not require additional water allocations and will not compromise the entitlements or priorities established under the plan, as residual voids function as contained systems rather than active water users.
Floodplain protection	The residual voids at BWM are located and designed to avoid adverse impacts on floodplain dynamics, maintaining natural inundation patterns and environmental flows. Flood protection landforms will be constructed to provide stability during flood events up to and including the 0.1% AEP, or a less likely event if required by PRCP Schedule Condition PRCP16(b)(ii) and PRCP Schedule Criteria RM3.12. Final landforms will incorporate energy dissipation methods to mitigate the impacts of high-energy flows (≥2.5 m/s) (PRCP Schedule Criteria RM3.12). These measures collectively support the Water Plan's objective of protecting floodplain function and associated ecological values.
Ecological outcomes	NUMA siting and management is consistent with the Water Plan's general ecological outcomes, including: minimising changes to natural flow variability; maintaining river-floodplain connectivity; protecting aquatic ecosystems and refugia; and supporting interactions between surface water, groundwater and water-dependent ecosystems. These outcomes are achieved through minimising disturbance to surrounding hydrological systems and containing residual risks within defined NUMA areas.

3.4.5.4 Summary

BWM is located within a Rural Zone under the CHRC Planning Scheme and, while not identified as a PAA under the CQRP, is surrounded by agricultural land uses.

In this context, the PRC Plan seeks to minimise the extent of NUMAs to the maximum extent practicable, consistent with the objectives of the CQRP, CHRC and the Water Plan (Fitzroy Basin) 2011.

Residual voids have been designed and will be managed such that they are not expected to present an unacceptable risk of environmental harm beyond the BWM tenure boundaries, based on available modelling and assessment of risk.

The proposed NUMAs have been assessed against the relevant requirements of the EP Act and EP Regulation, including the PRCP objectives under Schedule 8A, and are considered to satisfy these requirements.

Accordingly, the proposed NUMAs represent a risk-based and technically supported closure outcome. Whitehaven considers that environmental risks associated with the proposed NUMAs remain confined to the relevant resource tenure and that, having regard to the public interest considerations in section 126E of the EP Act, it is in the public interest for the proposed NUMAs not to be rehabilitated to a stable condition. In addition, floodplain-associated residual voids have been designed and will be managed to achieve a stable condition through incorporation of flood protection measures, geotechnical stability requirements, monitoring and performance criteria within the PRCP Schedule. The proposed NUMAs are therefore

justified having regard to sections 126D(2)(b)(i) and 126D(2)(b)(ii) of the EP Act, and the proposed PRCP Schedule provides for rehabilitation of floodplain-associated residual voids to a stable condition consistent with section 126D(3).

Safety controls, including bunding, fencing and warning signage will be implemented to prevent unauthorised public access.

Sections 3.4.2 and 3.4.3 provide further detail on the minimisation of NUMA extent and associated environmental considerations.

Residual voids are not precluded from alternative future land uses, should advances in technology enable practicable rehabilitation outcomes.

Relationship with PRCP Schedule
The proposed NUMAs for BWM are designed to be safe, structurally stable, minimise the risk of environmental harm and to be managed in accordance with the PRCP Schedule. The PRCP Schedule establishes the management framework for NUMAs at BWM, including monitoring, verification and adaptive management requirements, to support achievement of a stable condition for the site overall. On this basis, the proposed NUMAs provide an appropriate mechanism to manage residual risks associated with mining, consistent with the objectives of the PRCP framework.

3.5 Voids in flood plains

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 floodplain. A void is considered to be located in a floodplain if the floodplain 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, floodplain 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 floodplain 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 floodplain modelling in accordance with this section of the guideline.

Section 754(3) of the EP Act excludes the operation of section 126D(3) and, therefore, a voids in floodplains assessment was conducted to address Section 3.4 of the PRCP Guideline which states that the applicant is required to carry out floodplain modelling in circumstances where the location of the NUMA is not identified in the EA.

A voids in floodplain assessment was completed by appropriately qualified persons (AQPs) to support the development of this PRCP. The detailed report, *Blackwater Mine Progressive Rehabilitation and Closure Plan: Voids in Floodplain Modelling* (WRM, 2026b) is provided as *Appendix 4.5 – Voids in Floodplain Modelling*.

3.5.1 Background

The BWM closure landform includes 15 residual voids (Figure 3-30 and Figure 3-31) as pre-approved NUMAs:

- Ramp 8
- Bonnie Doon
- Mimosa / Besgrove
- Ramp 30
- Deep Creek
- Stewarton North
- Stewarton South
- Tannyfoil
- South Ballamoo
- Kenmare
- Ramp 74
- Togara / North Marshmead
- South Marshmead
- Comet Downs East, and

- Kennedy West

Since the locations of these voids are not explicitly stated in any LODs, a pre-mining void in floodplain assessment was undertaken.

The assessment was undertaken using the most recent final landform design (version 4.4). As described in Section 3.4.2, Revision 3 captures the BNEP and the revised final configurations for the Mimosa/Besgrove, Deep Creek and Stewarton residual voids, resulting in changes to the extent and configuration of NUMAs relative to Revision 2 (refer to Section 3.4.2).

3.5.2 Relevant watercourses

DETSI (2024) require floodplain modelling to be undertaken for “relevant watercourses”. Watercourses are defined as watercourses classified as stream order 4 or higher under the Strahler stream order classification system. Four relevant watercourses are present within BWM.

The relevant watercourses for the voids in floodplain assessment are:

- Blackwater Creek,
- Two Mile Gully,
- Taurus Creek (downstream of the Emu Creek confluence); and
- Sirius Creek.

3.5.3 Modelling method

Unlike the Final Landform Flood Assessment, voids in flood plain modelling must represent the flood plains at a time when all temporary structures or features have been removed. Therefore, the more recent available detailed topographic data was not suitable as it contained levees, mining pits, overburden dumps, stream diversion channels as well as road, rail and cross drainage infrastructure. The Fitzroy River catchment 25 m resolution Digital Elevation Model (DEM) embedded in the previous hydraulic model was considered to be the best representation of pre-mining topography within the BWM mine lease area and was adopted for areas within the BWM mine leases for the Voids in Flood Plains Assessment.

Hydrologic models were developed using the URBS software package. URBS incorporates the latest climate change guidance from Australian Rainfall and Runoff 2019 Version 4.2 (ARR 2019 v4.2) (Ball et al, 2019). Additionally, URBS has increasingly become the industry standard (and preferred) software package for undertaking hydrologic modelling. URBS hydrologic models were developed for the catchments pertaining to the relevant watercourses.

The assessment adopted the SSP5-8.5 (year 2030) climate scenario for modelling. Design Intensity-Frequency-Duration (IFD) design rainfall intensities were scaled up using uplift factors obtained from ARR datahub. The associated pre-burst rainfalls were also scaled up accordingly. The SSP5-8.5 climate adjustments account for approximately 1.3°C of global warming up to 2025 since the historical baseline period of 1961-1990.

TUFLOW hydraulic models were updated to incorporate the updated final landform (version 4.4) as well as updated design inflows from the URBS hydrologic models. Hydrologic and hydraulic modelling were undertaken for the 0.1% (1 in 1,000) annual exceedance probability (AEP) event.

The modelling scenarios provide a representative assessment of potential flood behaviour under a range of conditions, including the adopted climate change assumptions, and do not represent precise predictions of future flood events.

A detailed account of the modelling approach and methods of calibration and validation are documented in the Hydrologic Model Development, Calibration and Validation Report, provided as Appendix B of WRM (2026b).

3.5.4 Assessment results

All residual voids, with the exception of the Deep Creek and Ramp 74 residual voids, are located outside of the pre-mining 0.1% AEP flood event for the relevant watercourses.

The Deep Creek residual void is situated partially within the Taurus Creek inundation extent for the 0.1% AEP flood event. Therefore, the Deep Creek residual void is situated within a flood plain as defined by DETSI (2024). Protection against the 0.1% AEP flood event will be achieved by incorporating a relatively minor amendment to the final landform along the southern endwall of the Deep Creek residual void. The landform in this area is proposed to be raised to ensure it achieves a level above the 0.1% AEP event.

The final landform will separate the Deep Creek residual void from the modelled 0.1% AEP flood extent and reduce the potential for floodwater ingress. The landform will be constructed to prevent erosion or instability and will support a grazing PMLU. The proposed final landform, together with the rehabilitation requirements and milestone criteria established through the PRCP Schedule, provides a structured framework for demonstrating that the Deep Creek residual void and associated final landform is rehabilitated to a stable condition. This includes demonstrating that the final landform is safe and structurally stable, does not cause environmental harm from anything on or in the land, and is capable of sustaining the approved post-mining land use, consistent with section 126D(3) of the EP Act.

The Ramp 74 void is situated across the Sirius Creek inundation extent for the 0.1% AEP flood event and is therefore situated within a flood plain as defined by DESTI (2024). Under current (operational) conditions, there is a licensed temporary diversion (authorisation reference 52652F) that diverts Sirius Creek around the existing Ramp 74 open cut pit. The Ramp 74 pit is proposed to remain under post-mining conditions as the Ramp 74 residual void. To maintain free drainage of the Sirius Creek catchment under post-mining conditions, a permanent diversion of Sirius Creek will be required. A conceptual design for a permanent diversion around the Ramp 74 residual void is currently being developed in accordance with the watercourse diversion guideline (DNRME, 2019). The design for the permanent diversion will include measures to manage velocities through both diversion alignment and armouring of banks where necessary. The current conceptual design for the permanent Sirius Creek Diversion is discussed in Section 3.6.1.7.5 and provided in *Appendix 4.10 – Sirius Creek Diversion Concept Design*.

The predicted peak flood extents, levels, depths, and velocities along Taurus Creek, Two Mile Gully and Blackwater Creek are provided in Figure 3-33 and Figure 3-34 (WRM, 2026b). Predicted peak flood extents, levels, depths, and velocities along Sirius Creek are provided in Figure 3-35 and Figure 3-36 (WRM, 2026b). The permanent Sirius Creek Diversion will provide the same, if not greater level of flood protection to the Ramp 74 residual void as the existing temporary diversion. The predicted peak flood extents, levels, depths and velocities along Sirius Creek with the existing diversion in place are provided as Figure 3-37 and Figure 3-38 (WRM, 2026a).

These modelling results inform the assessment of potential flood-related hazards and associated environmental risks, which are considered in the context of residual void management and final landform design (refer to Sections 3.4 and 3.6.1.5). The management measures identified through these assessments are incorporated into the final landform design and supported by the rehabilitation milestones and associated completion criteria in the PRCP Schedule. Collectively, these measures provide a framework for demonstrating that residual voids, including the Deep Creek residual void, achieve and maintain a stable condition and are capable of sustaining the approved post-mining land use.

Relationship with PRCP Schedule
The location and extent of the residual voids, combined with other aspects of the landform design, including strategic landform structures and a permanent creek diversion is designed to provide flood protection up to and including the 0.1% AEP event, based on modelling outcomes. These designs inform the assessment of potential risks to the environment, as per PRCP Guideline requirements for voids in flood plains.

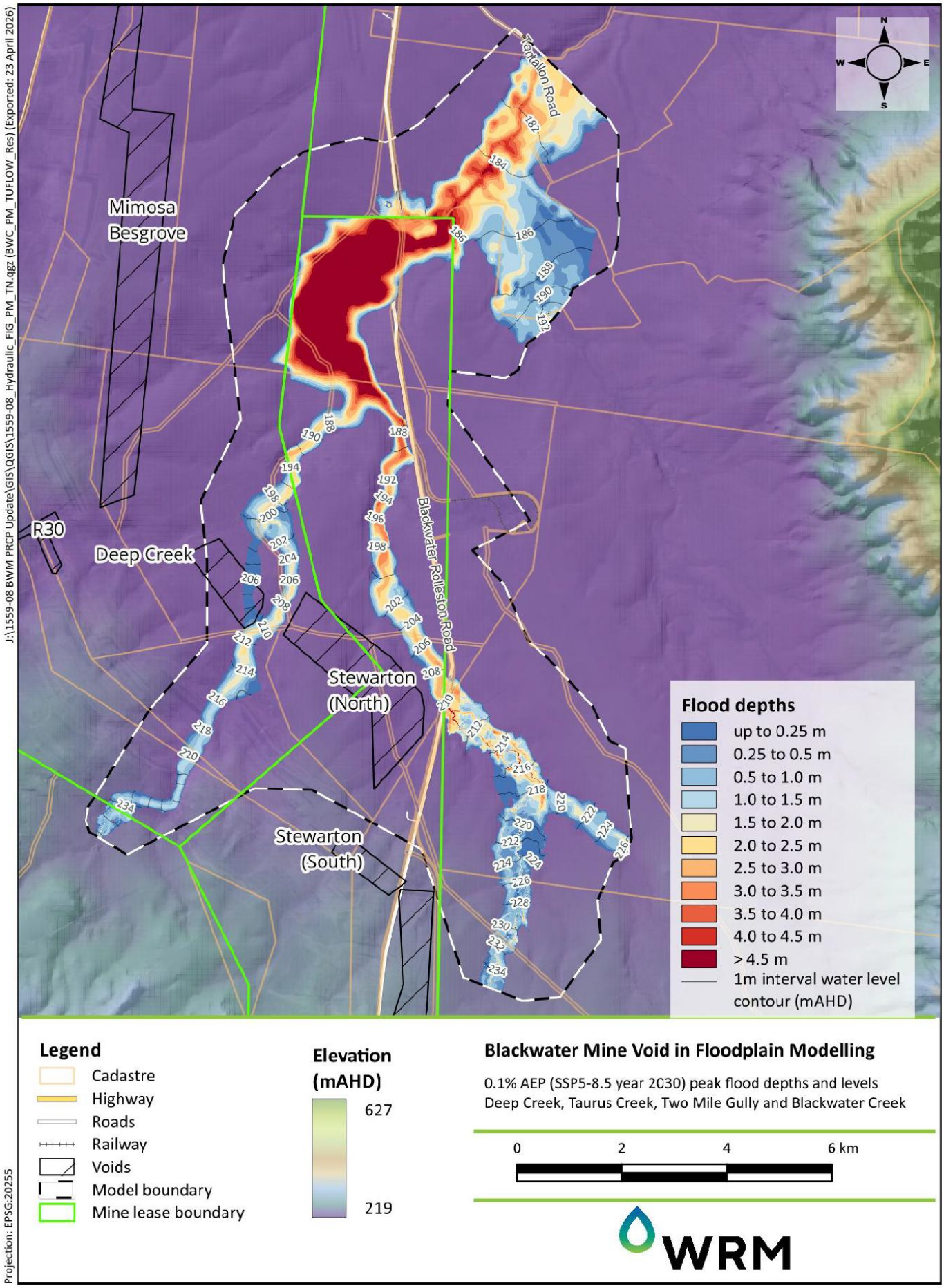


Figure 3-33 Peak flood extents, levels and depths for the 0.1% AEP event at Blackwater Creek

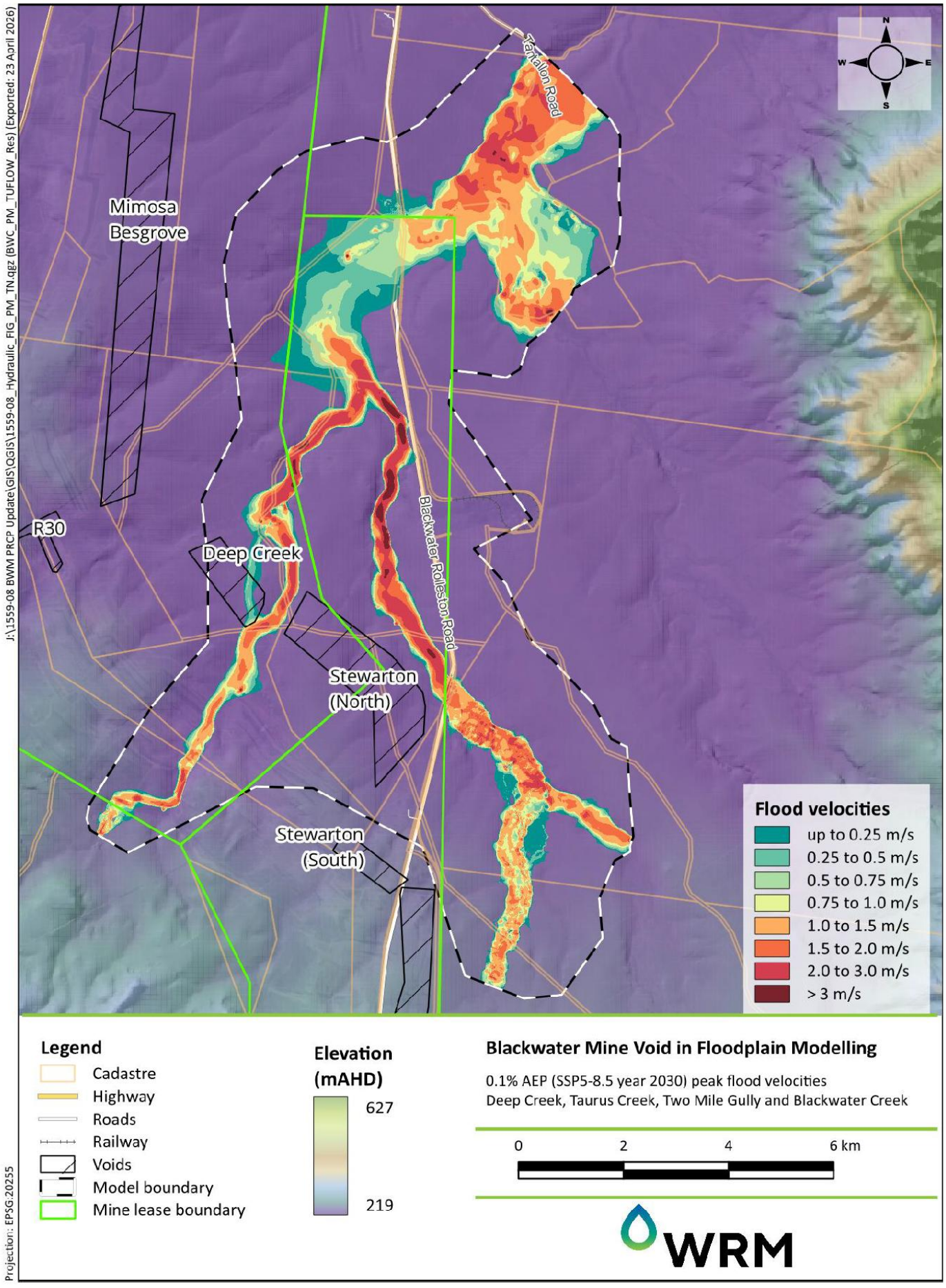


Figure 3-34 Peak flood velocities for the 0.1% AEP event at Blackwater Creek

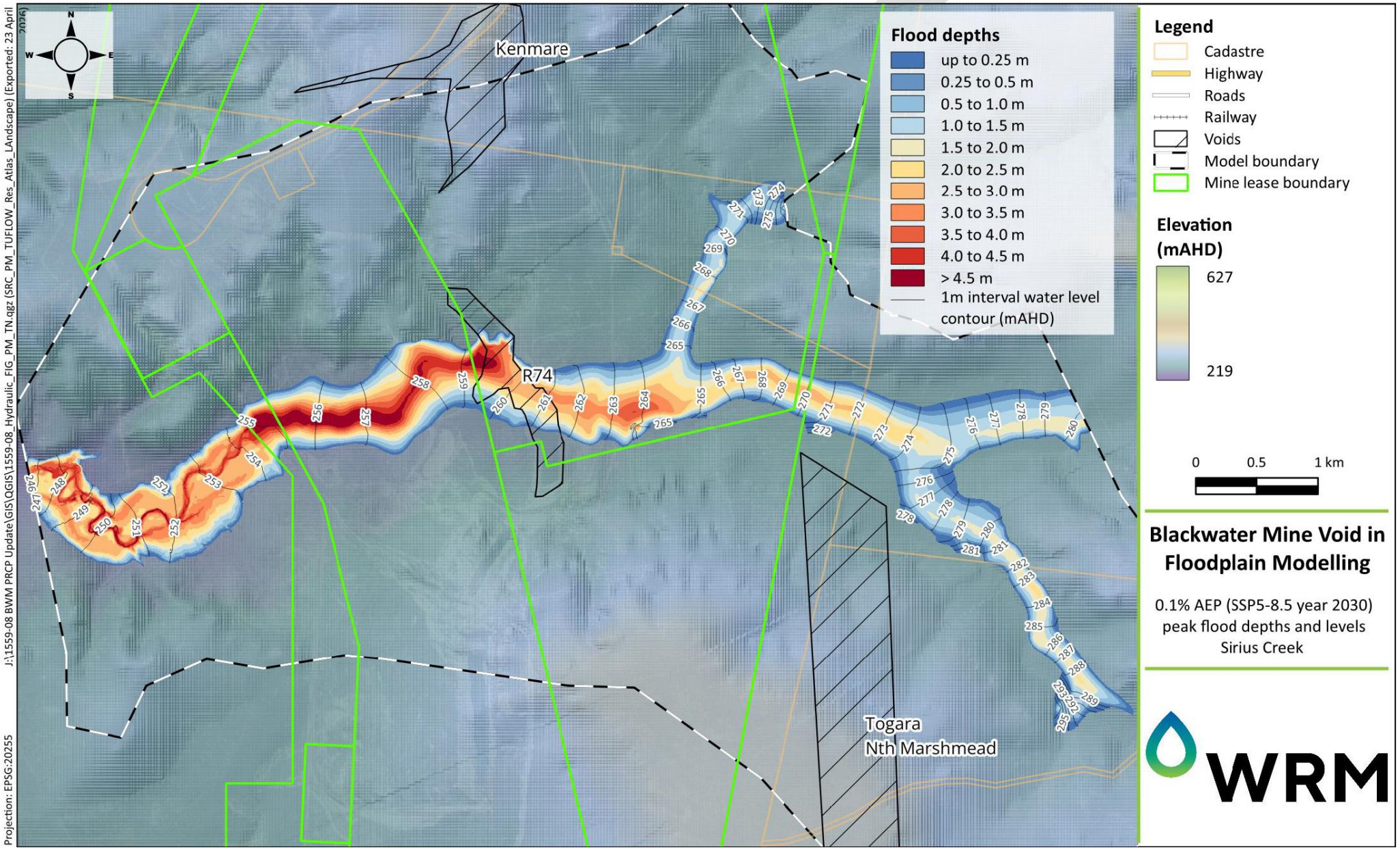


Figure 3-35 **Peak flood extents, levels and depths for the 0.1% AEP Event at Sirius Creek (without creek diversion)**

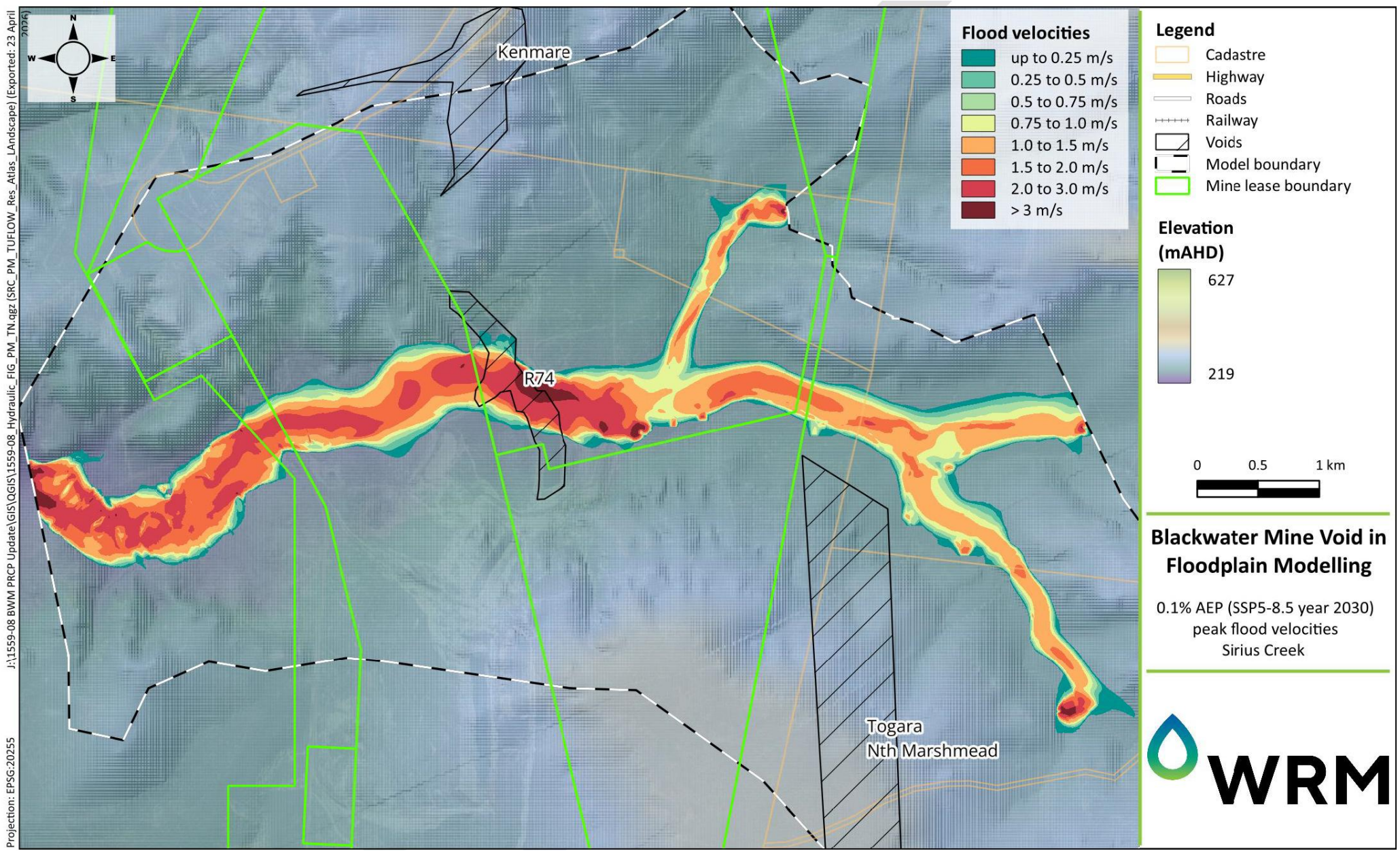


Figure 3-36 Peak flood velocities for the 0.1% AEP event at Sirius Creek (without creek diversion)

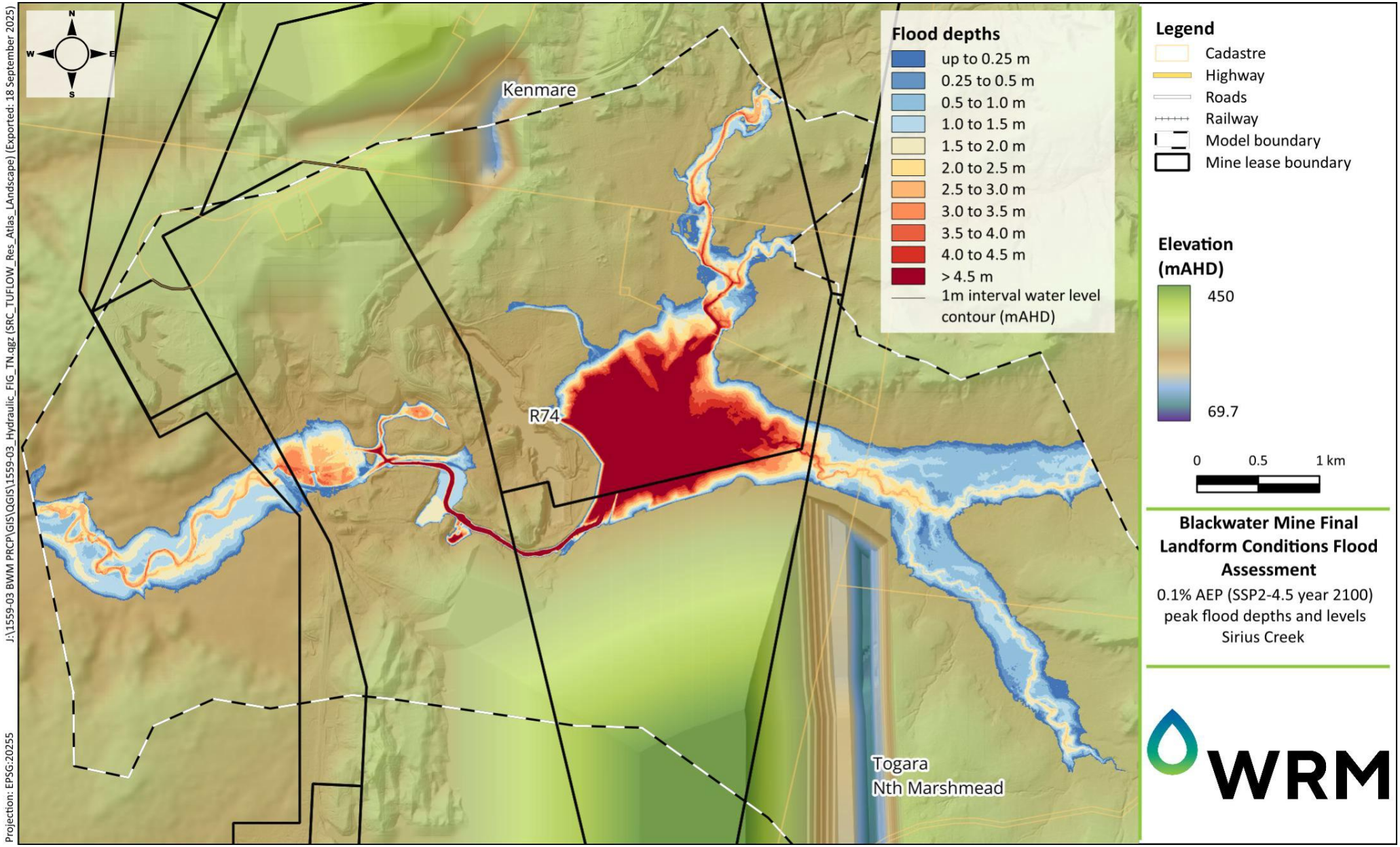


Figure 3-37 Peak flood extents, levels and depths for the 0.1% AEP event at Sirius Creek (with creek diversion)

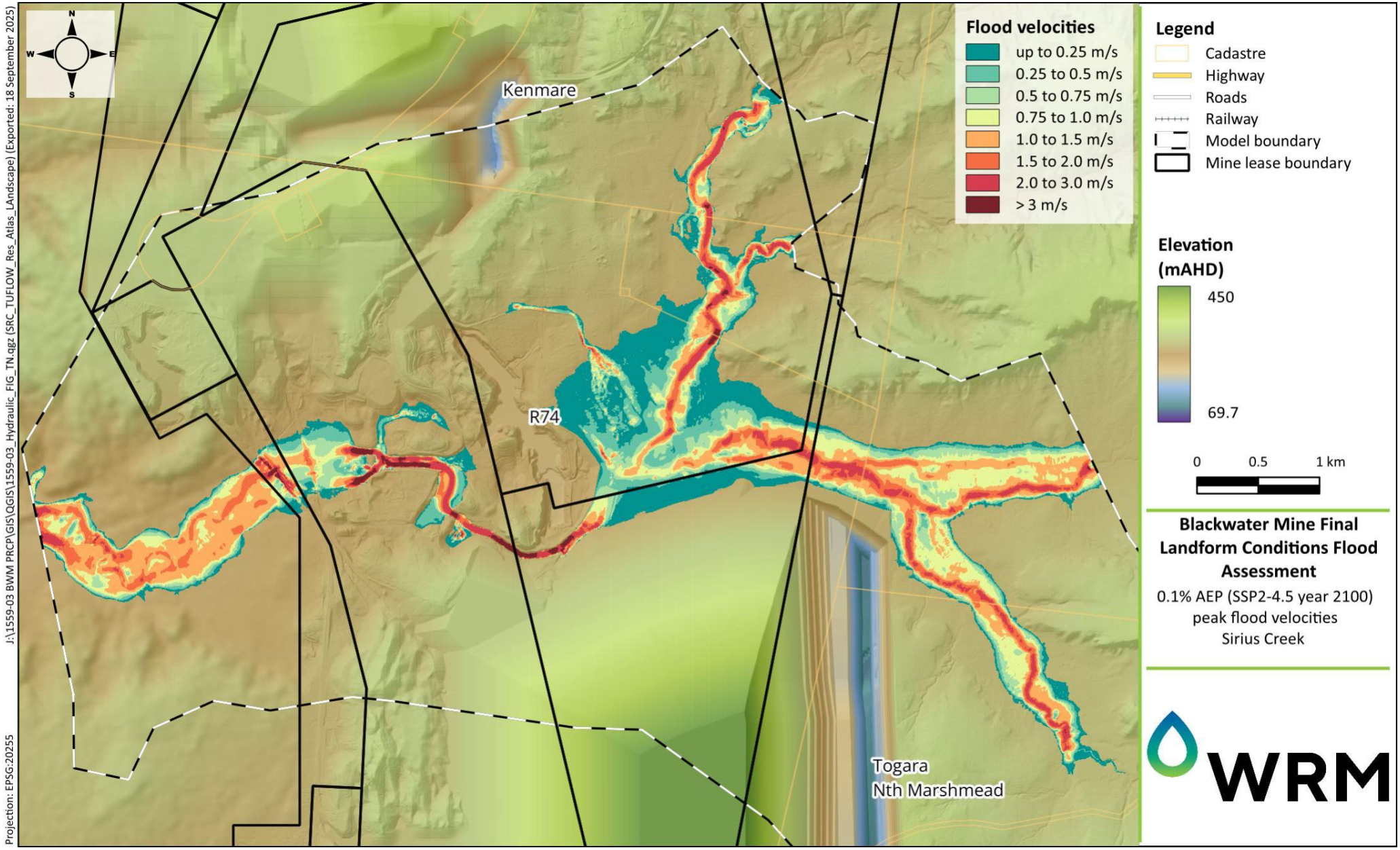


Figure 3-38 Peak flood velocities for the 0.1% AEP event at Sirius Creek (with creek diversion)

3.6 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)

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

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

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.

3.6.1 General rehabilitation practices

The rehabilitation and management methodologies described in this section have been developed having regard to the baseline conditions and technical constraints identified in Section 3.1.2.

3.6.1.1 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.

As discussed in Section 3.1.2.5, a hydrogeological assessment including conceptual and numerical modelling has been undertaken to support the development of this PRC Plan. The detailed report, *Blackwater Mine PRC Plan Hydrogeology Assessment* – Revision 3 (SLR, 2026a), is provided in *Appendix 4.2 – Hydrogeology Assessment*.

The main objective of the hydrogeological assessments undertaken was to assess the potential groundwater-related impacts at BWM at the completion of mining and until conditions stabilise post-rehabilitation (i.e. groundwater equilibrium). The focus was on demonstrating the suitability of the final landform for the intended PMLUs with respect to the BWM groundwater system by demonstrating that:

- The final landform is non-polluting with respect to groundwater; and
- There are minimal additional impacts to groundwater receptors post-closure caused by the final landform that has not already occurred as a result of approved mining.

3.6.1.1.1 Hydrogeological units

A list of the key hydrogeological units present within and immediately surrounding BWM is in Section 3.1.2.5 and described in more detail in Appendix 4.2.

3.6.1.1.2 Groundwater modelling

To support the assessment of potential groundwater impacts, numerical groundwater modelling has been undertaken in accordance with the Australian Groundwater Modelling Guidelines (Barnett et al., 2012), the MDBC Groundwater Flow Modelling Guideline (MDBC, 2001) and the IESC Explanatory Note for Uncertainty Analysis (Peeters and Middlemis, 2023). The model was developed using a Geographic Information System (GIS) in conjunction with MODFLOW-USG, which is distributed by the United States Geological Survey (USGS).

The objectives of the predictive numerical modelling were to:

- Assess groundwater inflow to the final landform's residual voids.
- Simulate the level and rate of recovery of the residual void lakes, and the level and rate of mining-related groundwater drawdown recovery in the groundwater system surrounding the residual voids.
- Simulate the level and rate of groundwater recovery within historic underground mine workings relevant to the PRC Plan.
- Identify areas of potential risk, such as private supply bores or GDEs, where groundwater impact mitigation/control measures may be necessary post-closure.

The BWM numerical model developed by SLR (2026b) is based on the final iteration of the site-wide landform design provided by Whitehaven. The groundwater model setup, underlying assumptions/limitations, model performance, calibration and model results are provided in Appendix 4.2.

Climate-related boundary conditions (i.e. recharge and evapotranspiration) in the recovery model were set constant for the duration of the recovery model, at their values consistent with the previous predictive mining model (SLR, 2026b).

Void lake levels were included within the groundwater model as part of an iterative modelling approach between the groundwater model and residual void lake water balance model (Section 3.6.3.3.1). The modelling results identify the residual voids generally develop into long-term sinks for all climate change scenarios modelled. Stabilised lake levels remain below the recovered groundwater levels. Four residual voids, Ramp 30, Ramp 74, Stewarton South and Bonnie Doon residual voids, show net negative groundwater inflow (i.e. net outwards flux). These residual voids are predicted to lose void water to adjacent voids via the natural geology between them at relatively small rates of 0.2, 2.3 and 0.04 and 0.14 ML/day respectively at post-mining equilibrium. Each of these voids with a net outwards flux have predicted lake elevations that are higher than the neighbouring voids, resulting in a hydraulic gradient between the voids that drives this outwards flux from each void to its neighbouring void. This negative groundwater flux represents movement of water between voids, not away from the BWM site.

3.6.1.1.3 Groundwater levels

Groundwater levels surrounding the residual voids are controlled by the predicted residual void lake levels, which in turn are controlled by the rate of evaporation from the void lakes balancing mostly surface inflows and some groundwater inflows to the lakes. Groundwater inflows include a component of groundwater that moves out of the natural geological formations into the residual voids via the spoil (Section 3.6.1.1.4). That is, predicted groundwater levels surrounding the residual voids are a function of predicted lake levels, which are mostly dominantly controlled by surface water fluxes and maintained by evaporation.

The water table is predicted to remain depressed in the immediate vicinity of the residual voids in the long term, driven by the ongoing groundwater discharge to the residual void lakes and governed by the lake elevations themselves. That is, long-term inwards groundwater flow gradients are maintained post-mining for the water table.

The following summarises the model-predicted stabilised groundwater levels for the Aries, Castor and Pollux Seams (main groundwater-bearing units surrounding the final landform):

- The Aries Seam is predicted to remain 'dry' in the long term across most of the mined area, with some saturation present predominantly along the east of the residual void areas. Additionally, dominant flow gradients towards the residual voids are apparent within the Aries Seam along the east of the BWM Area.
- The Castor Seam is predicted to remain saturated along most of the eastern margin of the mined area and within the south near the South Marshmead, Kennedy West and Comet Downs East residual void areas. Dominant flow gradients in the Castor Seam are again apparent towards all residual voids within the Aries Seam along the east of the BWM Area and surrounding Comet Downs East residual void.
- Predicted Pollux Seam groundwater levels show steeper gradients surrounding the southern and western side of the Besgrove, Stewarton North, South Ballamoo, Ramp 74, and Deep Creek residual voids, whilst the Togara/North Marshmead, Kenmare, Tannyfoil, and Stewarton South residual voids show steepest gradients along the western side of the residual voids. Gradients in the Pollux Seam are relatively flatter surrounding the Bonnie Doon residual void, to the east of Mimosa Besgrove, Deep Creek and Tannyfoil residual voids and surrounding the South Marshmead, Ramp 74, Commet Downs East, and Kennedy residual voids.

Predictive hydrographs generated from the hydrogeological model have been used to evaluate changes in groundwater levels over time. The predictive hydrographs indicate the following:

- The vast majority of groundwater level drawdown in the Permian Coal Measures occurs pre-closure as a result of active extractive mining operations.
- Post-closure, groundwater levels in the deeper coal seams at the north-eastern part of the BWM area adjacent to the residual voids recover from their lowest point that occurred during mining.
- Most groundwater units across the BWM area show persistent drawdown post-recovery. The Aries Seam near the Ramp 74 residual void also becomes desaturated during mining and remains dry to the end of the recovery simulation.

The hydrographs demonstrate very little effect on groundwater levels from the residual void inflow flux variability in the early post-closure period.

3.6.1.1.4 Flow path simulation

The mod-PATH3DU code (S.S. Papadopulos & Associates, Inc., 2020) was used to simulate particle pathways along the post-mining groundwater flow field. Transient head outputs from the groundwater flow model were input to mod-PATH3DU to generate particle flow pathlines.

Particles were distributed across the final landform and within residual voids (Figure 3-39), primarily at the model surface, except for those assigned to underground mine workings adjacent to Ramp 74. Surface particles were automatically repositioned to the shallowest saturated layer at simulation start. Particle release elevations were defined at the midpoint between the base of the first saturated layer and the water table. Due to widespread unsaturated conditions in shallow model layers (Layers 1 and 2) across much of the BWM Area at the commencement of post-mining conditions, many particles initiated within Permian units (including spoil backfill represented within these layers). Particles within underground workings were initiated in the Pollux seam (Layer 12) to represent water within flooded workings post-closure.

To assess flow paths from mine closure to equilibrium, particles were released at the start of the post-mining period (year 2094) and tracked through to year 4040. Figure 3-40 presents particle movement over the 1946-year simulation period, with colour coding indicating model layer position (green to red denoting progressively deeper layers).

Results indicate that particles originating in shallow saturated zones generally migrate downward toward deeper Permian coal measures or backfilled spoil over time. Conversely, particles originating in deeper units (e.g., Pollux seam, Layer 12) often show upward migration as groundwater levels recover within spoil and adjacent aquifers toward long-term equilibrium. Particle tracking demonstrates that flow is

predominantly directed toward void lakes, with the majority of particles ultimately captured within these features.

Flows from voids that are predicted to act as a source to the local groundwater are toward neighbourhood voids (Section 3.6.1.1.2). This can be observed in the particle movements shown in Figure 3-40 with:

- Particles released to the west of Ramp 30 moving toward Mimosa/Besgrove;
- Particles released to the southwest of Ramp 30 moving toward Deep Creek;
- Particles released to the north of Bonnie Doon moving toward Ramp 8;
- Particles released to the east of Ramp 74 moving toward Togara/ North Marshmead; and
- Particles released to west of Stewarton South moving towards Stewarton North.

No particles are predicted to travel outside of the mine lease in the 1930-year post mining simulation.

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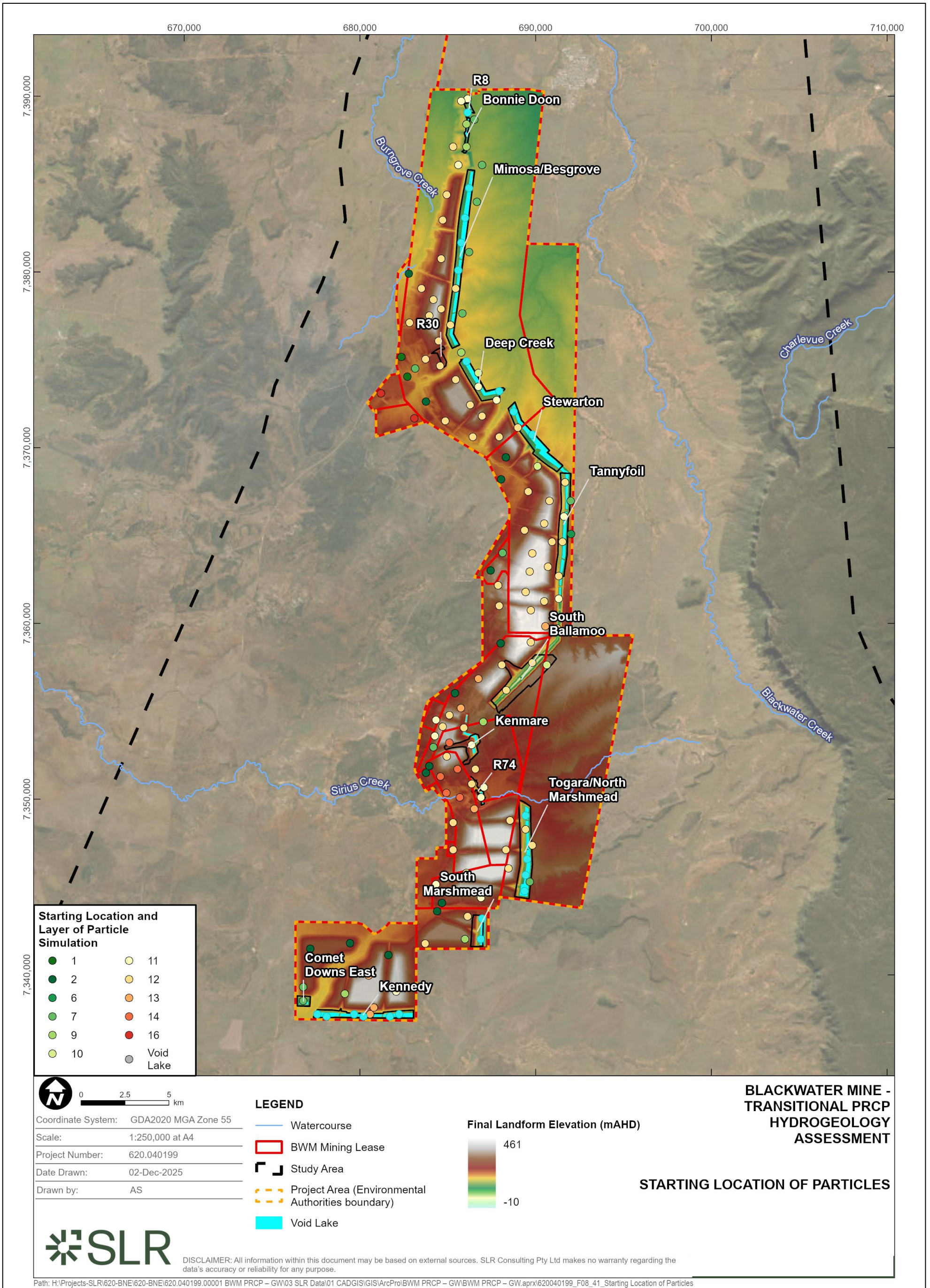


Figure 3-39 Starting location of particles (SLR, 2026a)

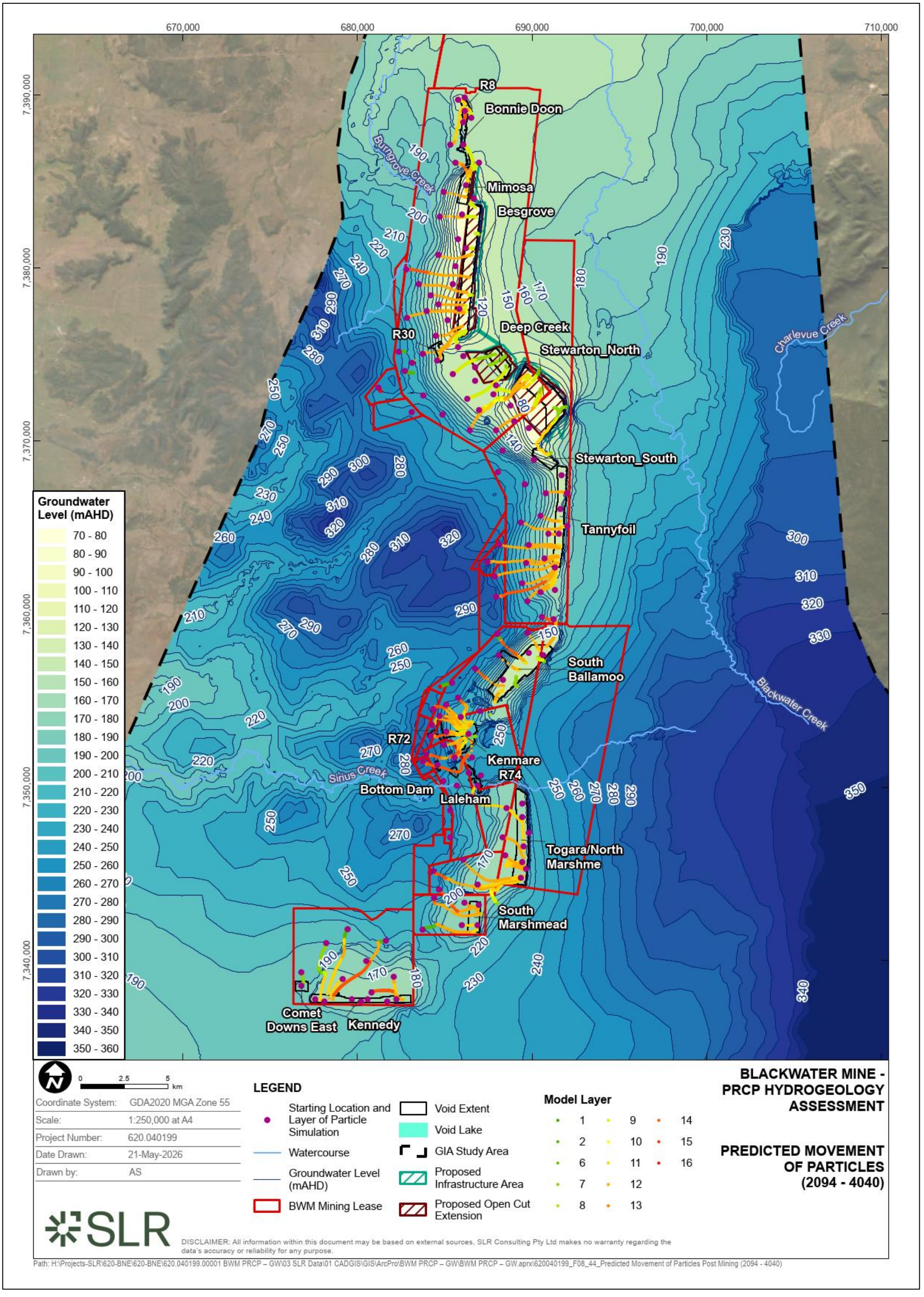


Figure 3-40 Predicted movement of particles (post mining 2094 - 4040) (SLR, 2026a)

3.6.1.1.4.1 Particle Conclusion

Water associated with spoil, tailings deposition, underground workings or residual void lakes is not predicted to migrate away from the BWM area post-mining. The residual voids act as passive containment for groundwater that has moved through the mine. This includes the four voids predicted to have an outward flux, as particle tracking confirms that any outward movement is captured by adjacent voids with lower pit lake levels (see Appendix 4.2, Section 8.2.6).

3.6.1.1.5 Conceptual site model

End-of-mining

A hydrogeological conceptual site model representing the PRC Plan extent of mining and approved activities on the last day of mining at BWM is illustrated in Figure 3-41 and Figure 3-42. The key hydrogeological features present at the end of mining that are relevant to the discussion of potential groundwater impacts post-mining are:

- Groundwater level drawdown occurs within the Rangal Coal Measures, associated with passive dewatering into the active BWM mine pit and other surrounding mines. The magnitude of this drawdown will be most significant near the pits and underground workings. At BWM, the groundwater drawdown extends northwards, eastwards and southwards of BWM by several kilometres and interacts with drawdown from nearby mines.
- Mine pits capture any seepage from spoil emplacements due to the hydraulic gradient orientated towards the void.
- Limited potential for groundwater level drawdown in the alluvium and Tertiary due to limited saturation, and poor lateral connection of water-bearing zones.
- No groundwater level drawdown of the alluvium away from BWM.
- Limited potential for groundwater level drawdown impacts to potential terrestrial GDEs due to the limited potential for groundwater level drawdown in the alluvium and Tertiary.
- No potential for groundwater quality impacts outside of BWM associated with spoil dumps and/or in-pit tailings emplacements due to the inward groundwater flow gradients towards the pit voids capturing all potential seepage.

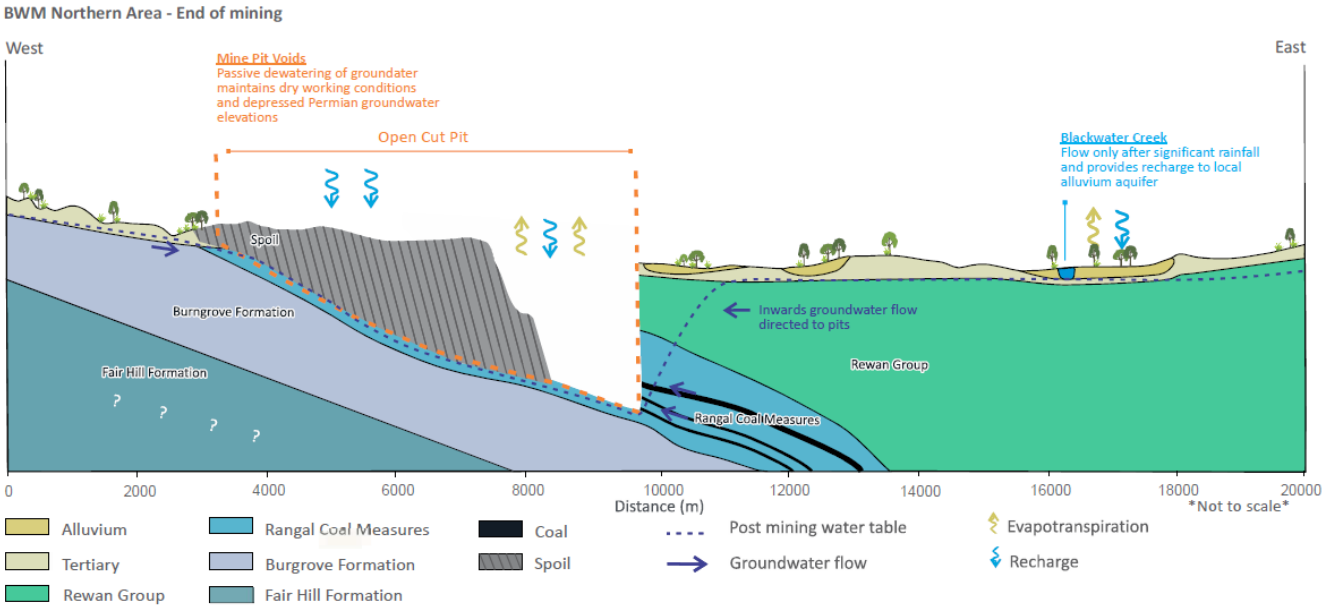


Figure 3-41 Conceptual hydrogeological site model of BWM end of mining – northern area

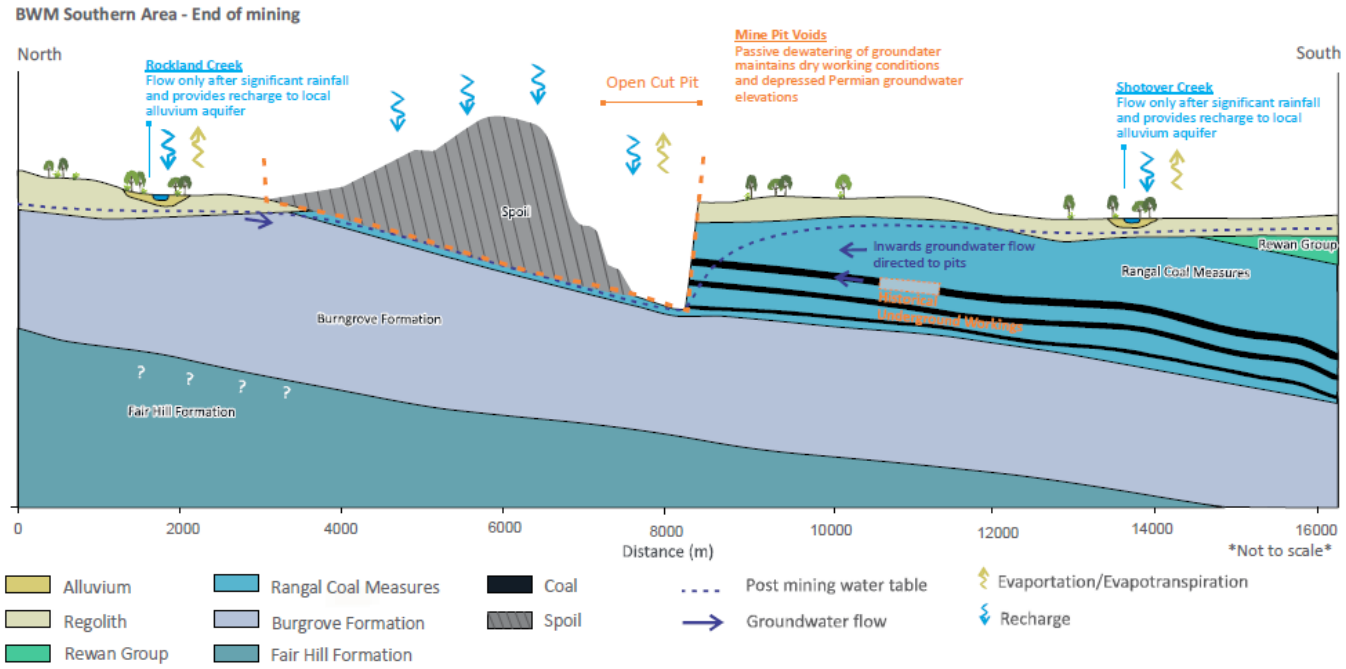


Figure 3-42 Conceptual hydrogeological site model of BWM end of mining – southern area

3.6.1.1.5.1 Post-mining conceptual site model

An evaluation of the source-pathway-receptor (SPR) linkages based on the modelling results for the post-mining environment, where groundwater conditions have stabilised, has identified the following key features:

- Residual void lake levels stabilise below shallow post-Permian strata, including the base of surficial weathering and shallow hydrostratigraphic units (i.e. alluvium and Tertiary strata).
- Partial groundwater system recovery outside the residual voids, primarily in the Rangal Coal Measures.
- Continued groundwater drawdown within the Rangal Coal Measures associated with evaporative discharge from the void lakes, resulting in continued inwards hydraulic flow gradients in the coal measures and ongoing groundwater discharge to the residual voids. Hence, residual voids continue to capture any seepage from spoil dumps and in-pit tailings.
- Re-flooding of historical underground workings will take place (for those workings not already flooded).
- Little to no additional impact on surficial aquifers, including the alluvial aquifers, caused by the final closure landform.
- Little to no impact on environmental receptors caused by the final closure landform.
- Little to no impact on anthropogenic receptors caused by the final closure landform.

Visual representations of the post-mining conceptual site model (CSM) are provided in Figure 3-43 and Figure 3-44.

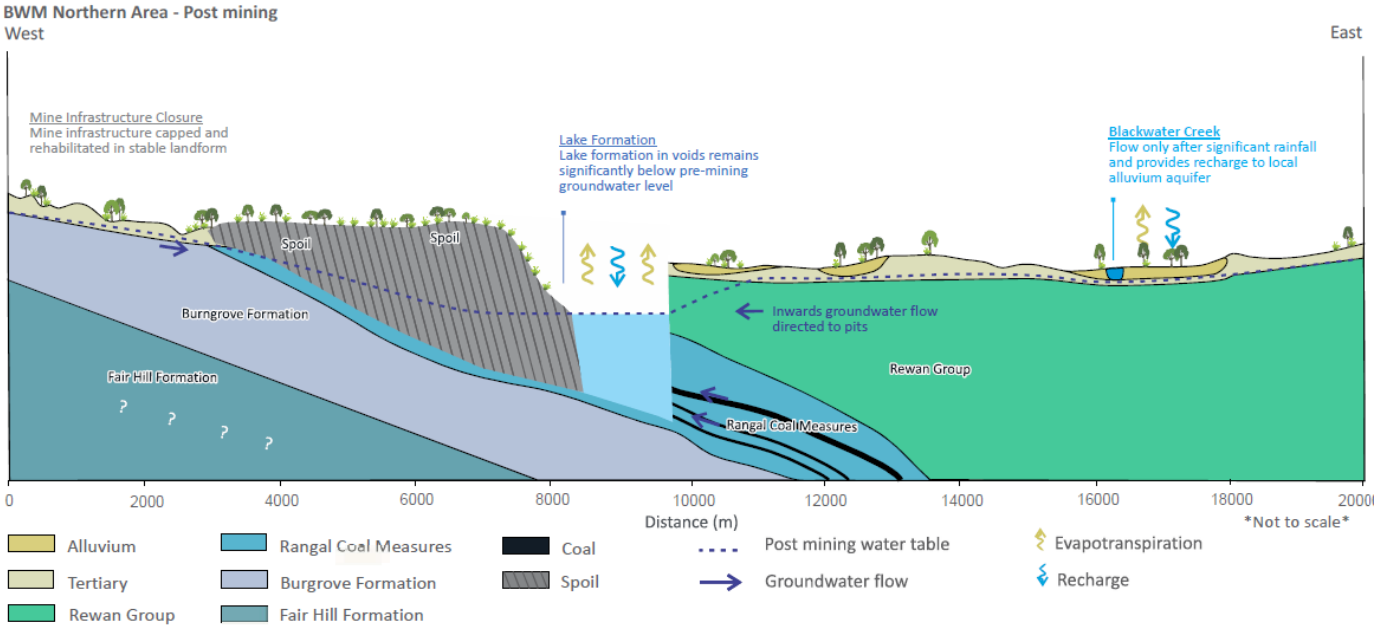


Figure 3-43 Conceptual hydrogeological site model of BWM post-mining – BWM northern area

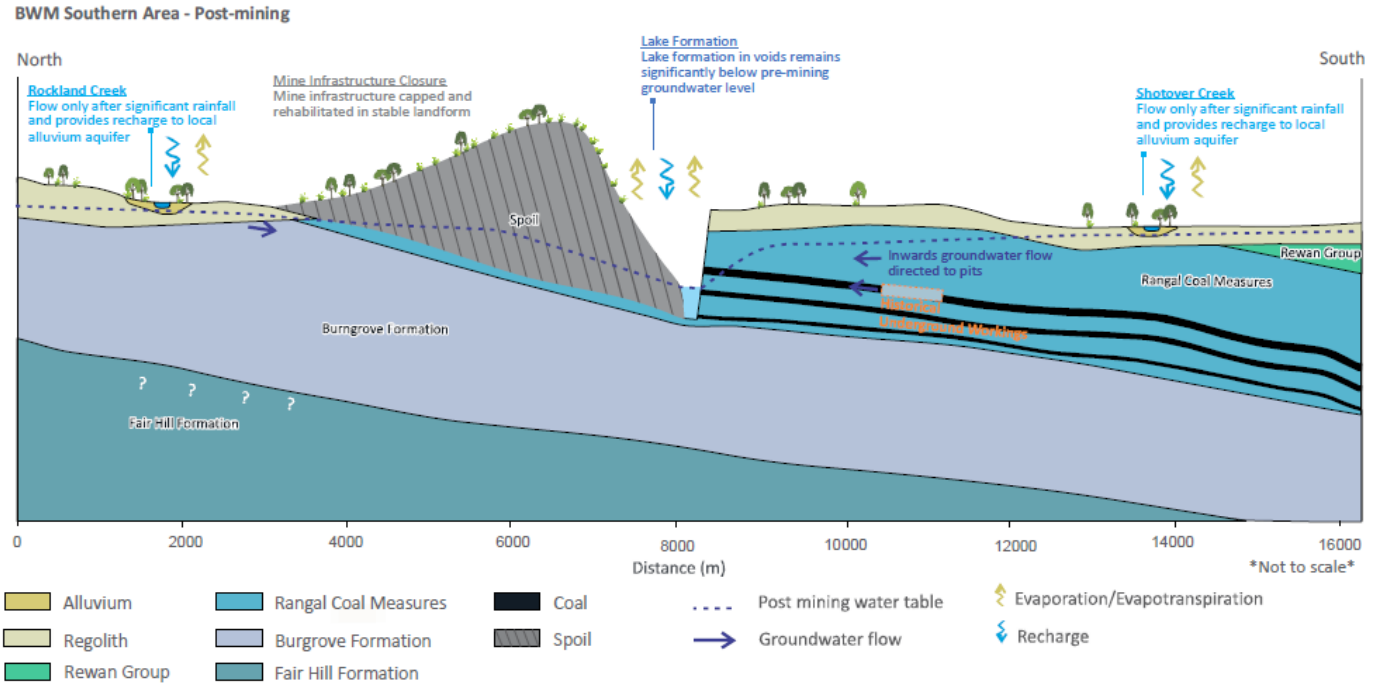


Figure 3-44 Conceptual hydrogeological site model of BWM post-mining – BWM southern area

3.6.1.1.6 Future requirements and commitments

In accordance with PRCP Schedule Condition PRCP19, an up-to-date closure groundwater and water balance model will be maintained for BWM. The model will be updated and recalibrated as new operational and monitoring data becomes available, rerun at least every five years from the date of approval of the PRCP Schedule, and rerun within one year of submitting any surrender application.

These updates will continue to inform predictions of groundwater levels, residual void lake behaviour, seepage, inflows, and potential interactions with surrounding hydrogeological units, and will enable progressive refinement of drawdown and groundwater-level elevation predictions as additional data becomes available, including in relation to potential impacts on GDEs and third-party bores.

In accordance with PRCP Schedule Condition PRCP20, by 1 July 2044, BWM will submit updated long-term post-mining numerical groundwater predictions for drawdown and groundwater level elevations. These will be in accordance with the current version of the Australian Groundwater Modelling Guidelines and will confirm that:

a) the residual voids will not cause environmental harm through the release of contaminants from the void lakes beyond the tenement boundaries post-closure;
b) any seepage from spoil dumps will not cause environmental harm through the release of contaminants beyond the tenement boundaries post-closure; and
c) groundwater drawdown will not negatively impact GDEs on or surrounding the site.

These future deliverables for PRCP Schedule Conditions PRCP19 and PRCP20 form part of the closure phase hydrogeological assurance pathway and complement the conceptual hydrogeological assessment presented in Sections 3.6.1.1 and 3.6.1.1.5.

Relationship with PRCP Schedule

Once groundwater levels stabilise, groundwater will flow toward the residual voids, which will act as long-term sinks. Water associated with spoil, tailings deposition, underground workings and residual void lakes is not predicted to migrate away from the BWM area post-mining. The residual voids will provide passive containment for groundwater moving through the post-mining landform. This includes the four voids predicted to show an outward flux, as particle-tracking assessments confirm that any outward movement is captured by adjacent voids with lower pit lake levels.

Seepage from spoil dumps, TSFs, the MIA and the CHPP will be collected within the residual voids, and contaminants mobilised within these areas are not expected to impact locations beyond the mining tenements.

Modelled groundwater drawdown around the residual voids is consistent with the approved mining activities, and the closure landform is not expected to cause additional drawdown.

The closure landform is therefore anticipated to have little to no additional impact on environmental or anthropogenic receptors. Active groundwater management is not expected to be required post-mining. Verification of groundwater quality, and confirmation of the hydraulic relationship between groundwater elevations and void lake levels to demonstrate the residual voids are functioning as sinks, will be undertaken through planned rehabilitation monitoring.

3.6.1.2 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.

When assessing flooding, you must at least:

- *consider the location of domains in relation to potential flood levels*
- *consider alterations of flow upstream and downstream*
- *model flood levels (including probable maximum flood levels) for a range of design storm events*
- *develop a flooding risk profile*

A rehabilitation flood assessment modelling flood levels for a range of design storm events, including consideration of flow alteration, and development of a flooding risk profile, has been undertaken to support the development of this PRC Plan. The modelling scenarios provide a representative assessment of potential flood behaviour under a range of conditions and do not represent precise predictions of future

flood events. The detailed report, *Blackwater Mine Progressive Rehabilitation and Closure Plan Final Landform Flood Assessment* (WRM, 2026a), is provided in *Appendix 4.6 – Rehabilitation Flood Assessments*.

Previous flood modelling for earlier BWM landform iterations was undertaken by SLR Consulting. In the SLR (2024a and 2024b) assessments, hydrologic modelling was undertaken using XP-RAFTS and hydraulic modelling using TUFLOW. These models were adapted from the XP-RAFTS and TUFLOW frameworks originally developed by *Blackwater Mine Flood Study* (GHD, 2021).

For the flood reporting (WRM, 2026a), hydrologic modelling undertaken in 2025 using the URBS software package, which applies the latest climate change guidance from A*ustralian Rainfall and Runoff 2019 Version 4.2* (ARR 2019 v4.2) (Ball et al, 2019) was adopted. The SLR (2024a and 2024b) TUFLOW hydraulic models were updated in 2025 to incorporate the new design inflows generated from the URBS hydrologic modelling.

3.6.1.2.1 Flood modelling methodology

The hydrologic and hydraulic modelling undertaken to support this PRC Plan builds on the models originally developed by GHD (2021) as well as the updates made in 2025. Updated URBS hydrologic models were calibrated to available rainfall and water level records from the March 2017 and January 2020 events. The WRM (2026) surface water assessment uses a split model approach separating the channel and catchment storage components of the Blackwater Creek catchment from the Sagittarius Creek catchment for routing purposes. This approach applies Aitken's equation to improve how the URBS model represents inflows from individual sub-catchments, providing a more accurate and detailed characterisation of runoff behaviour across the site.

Hydraulic modelling was carried out using TUFLOW 2D, an industry-standard hydraulic modelling package. SLR developed hydraulic models for seven catchment domains across the site: Sagittarius Creek, Bonnie Doon Creek, Burngrove Creek, Blackwater Creek (including Taurus Creek and Two Mile Gully), Speculation Creek, Sirius Creek and Rockland Creek. In the 2025 WRM update, these TUFLOW models were revised to incorporate the final landform current at the time and updated inflows from the new URBS hydrologic modelling. The 2026 modelling (WRM, 2026a) uses the revised models with an updated final landform (version 4.4).

The URBS model was simulated for the 1% AEP, 0.1% AEP and Probable Maximum Flood (PMF) events. Storm durations between 6 hour and 24 hours were assessed. ARR Datahub rare-bin temporal patterns were adopted for the 1% AEP event, while Jordan (2005) temporal patterns were used for the 0.1% AEP and PMF events for up to 9 hours, and GTSMR historical temporal patterns were used for durations greater than 9 hours.

The effects of climate change were considered as part of the hydrologic analysis. Design rainfall Intensity-Frequency-Duration (IFDs) were scaled up using uplift factors obtained from ARR Datahub. IFD design rainfalls and pre-burst estimates were uplifted in consistency with the SSP2-4.5 (year 2100) scaling factors.

3.6.1.2.2 Floodwater ingress to the residual voids

The final landform provides flood immunity for all residual voids under the 0.1% AEP flood event for all modelled catchments. The predicted 0.1% AEP peak flood depths, levels and extents for all modelled catchments are provided in FIGURES.

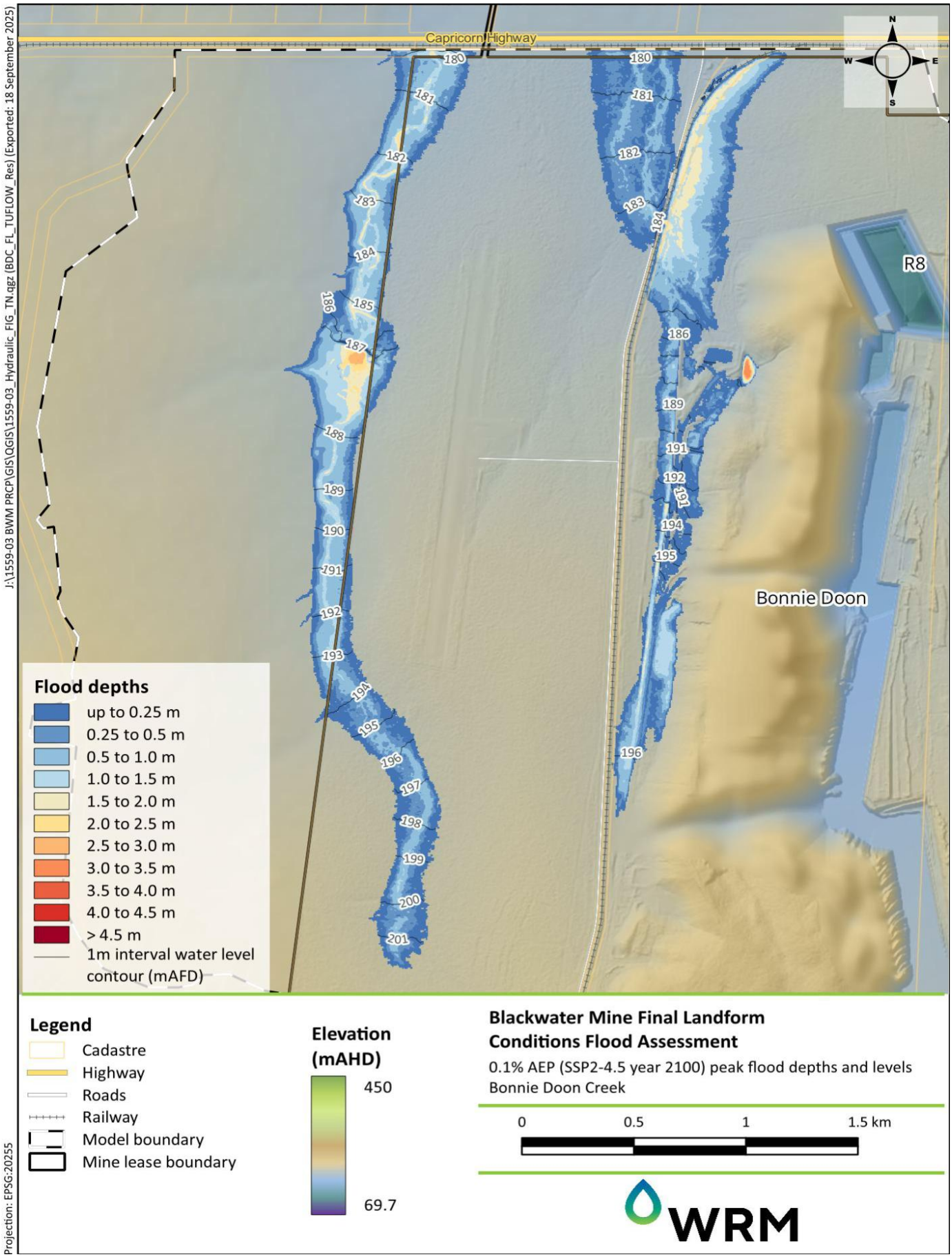


Figure 3-45 Peak flood depths, levels and extents for the 0.1% AEP flood event for Bonnie Doon Creek

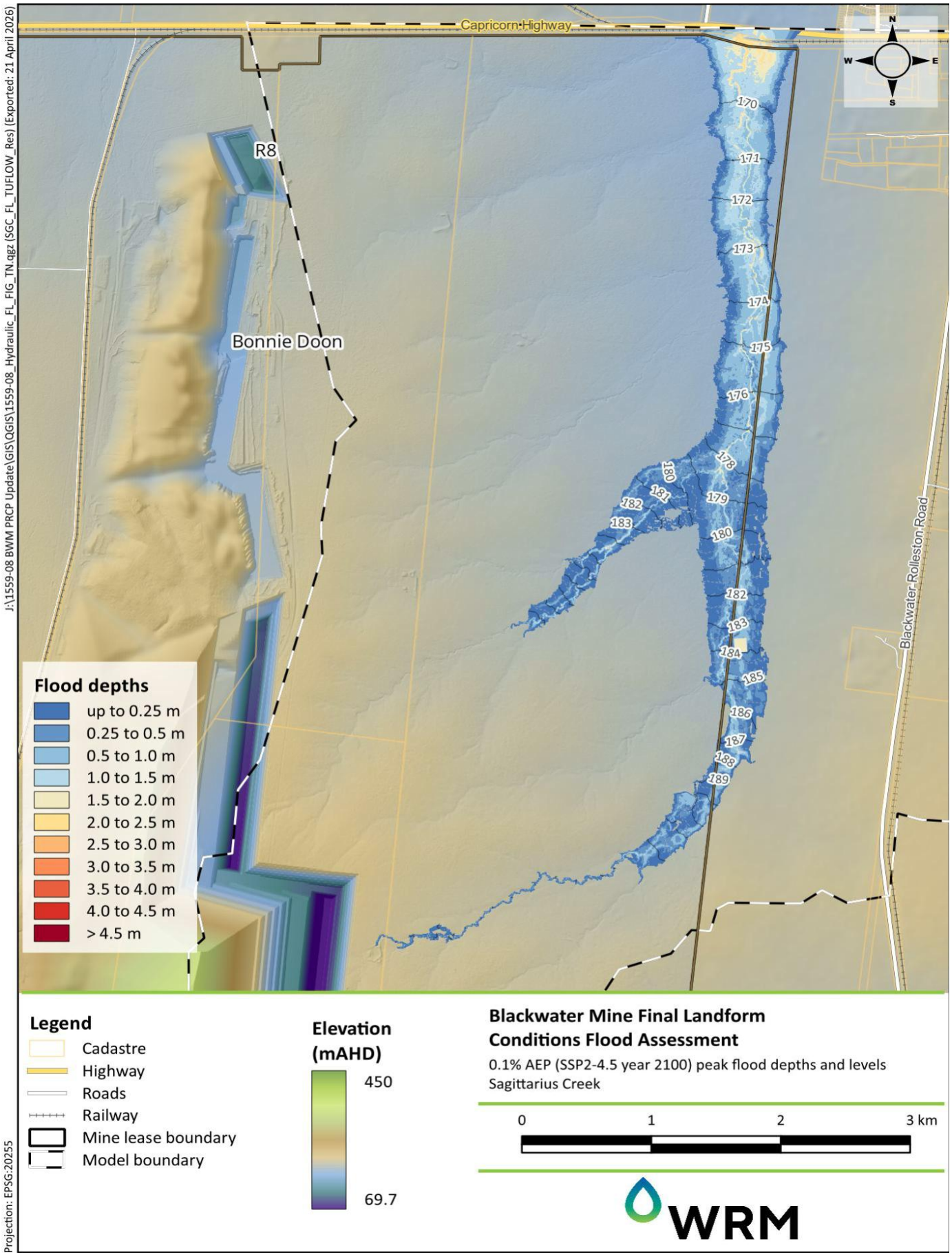


Figure 3-46 Peak flood depths, levels and extents for the 0.1% AEP flood event for Sagittarius Creek

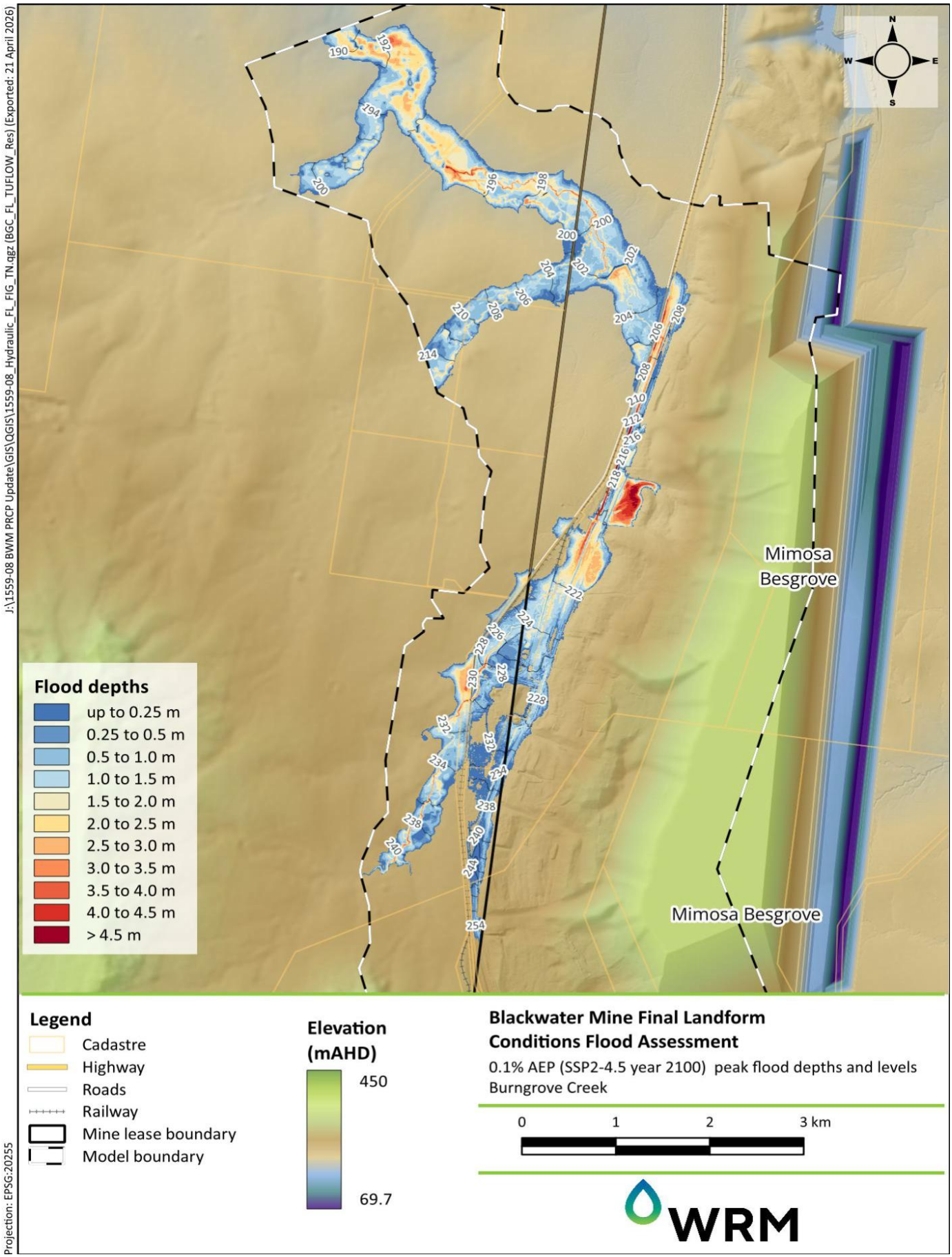


Figure 3-47 Peak flood depths, levels and extents for the 0.1% AEP flood event for Burngrove Creek

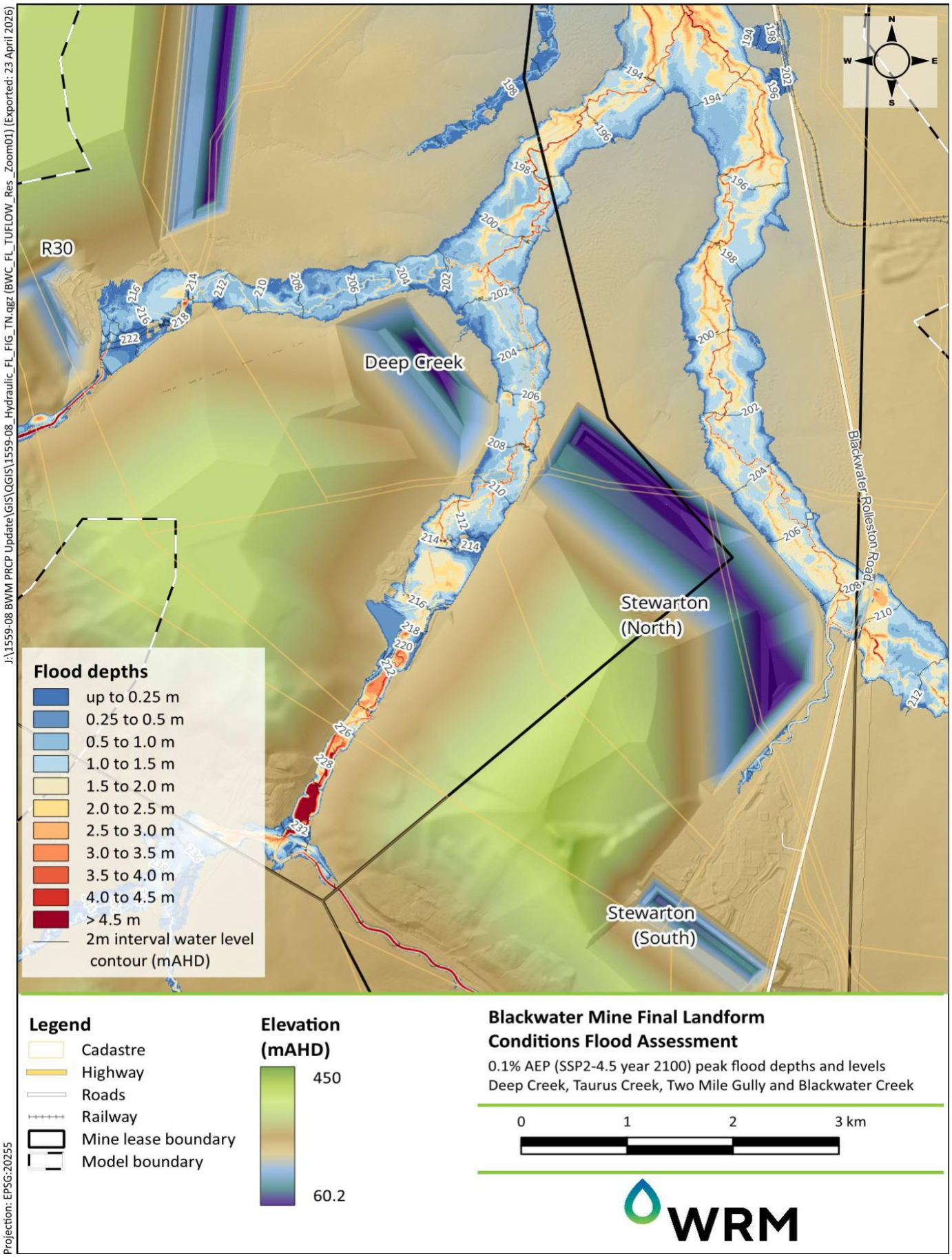


Figure 3-48 Peak flood depths, levels and extents for the 0.1% AEP flood event for Deep Creek, Taurus Creek and Two Mile Gully (adjacent to the Stewarton South Void)

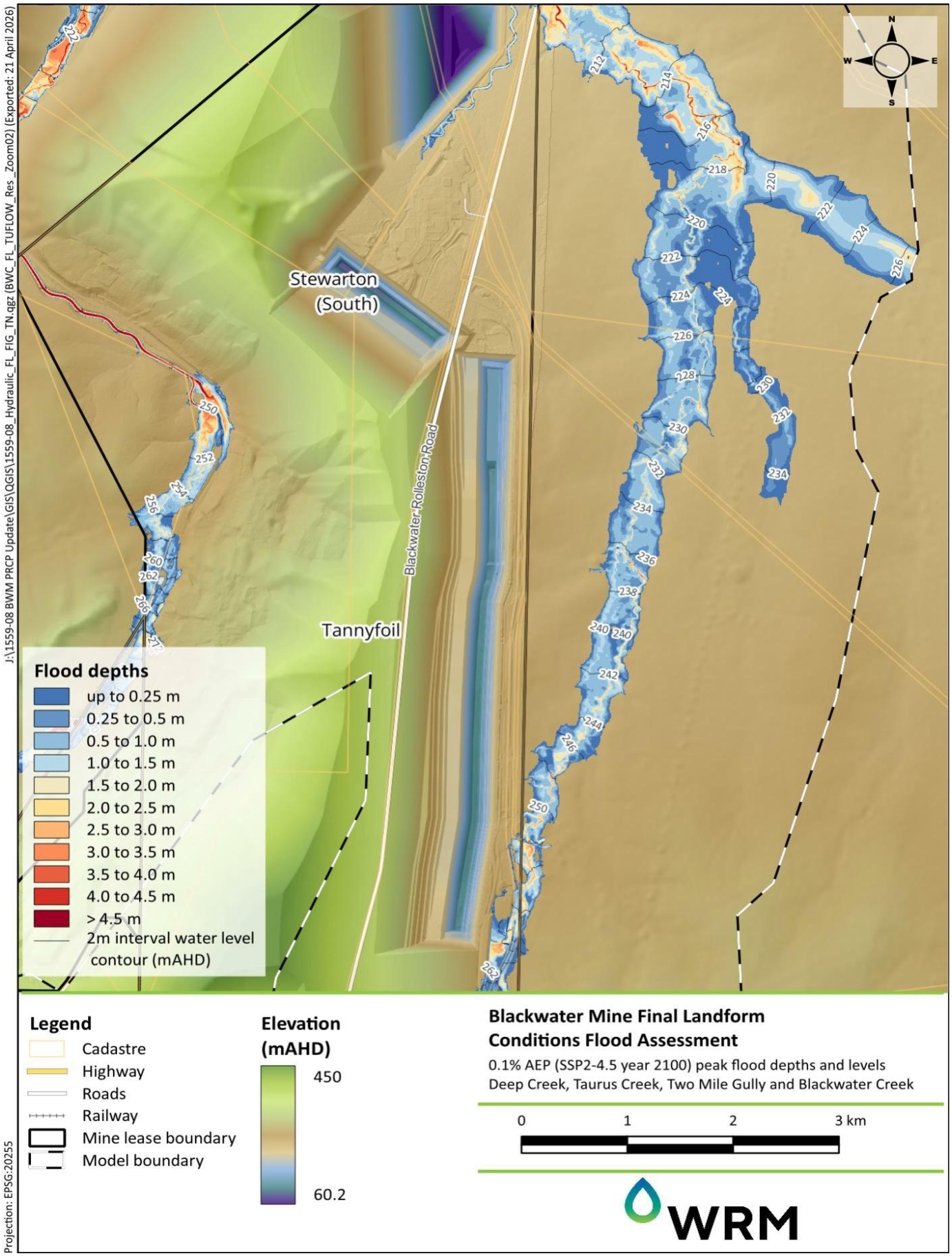


Figure 3-49 Peak flood depths, levels and extents for the 0.1% AEP flood event for Two Mile Gully (adjacent to the Tannyfoil Void)

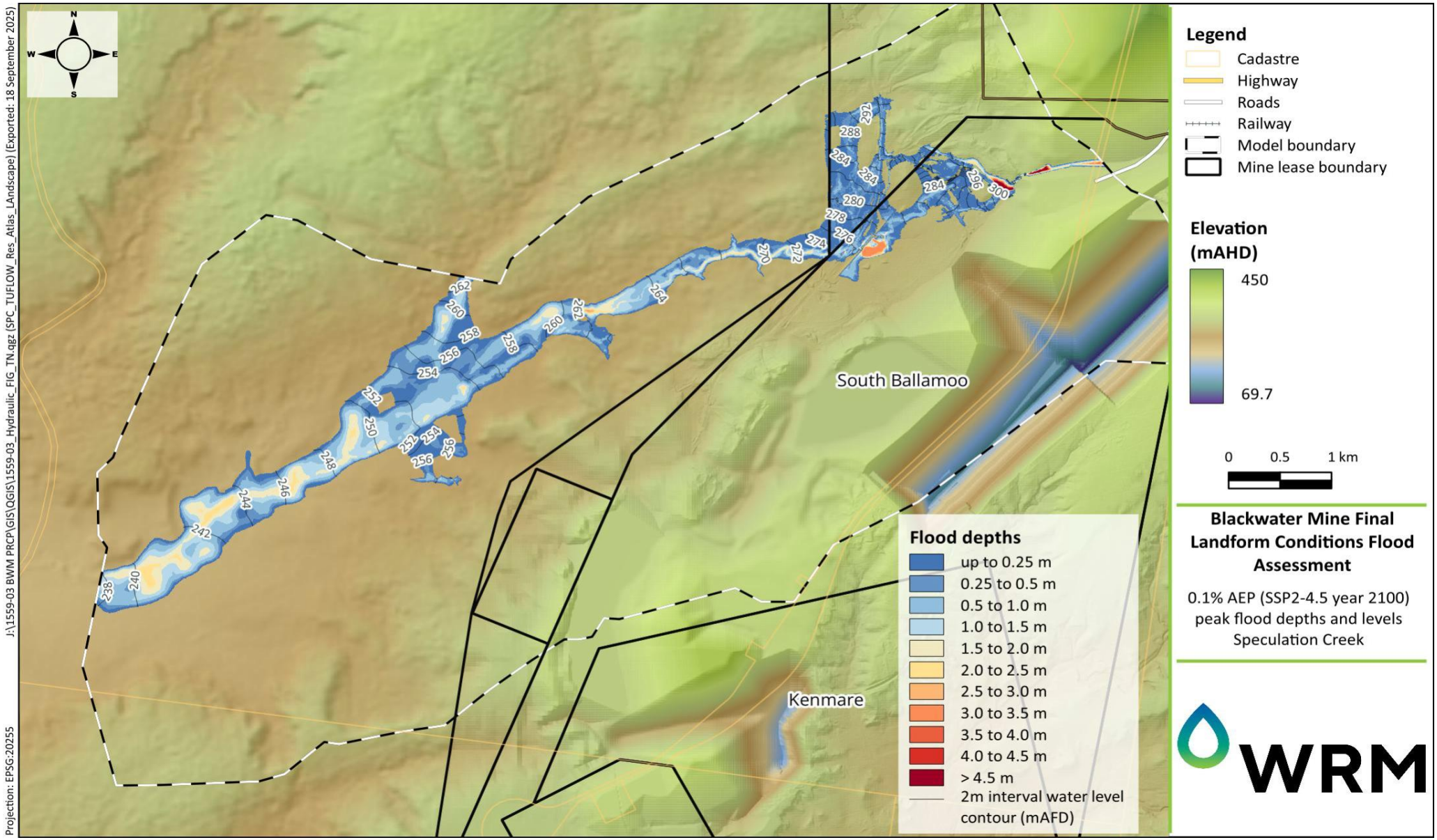


Figure 3-50 Peak flood depths, levels and extents for the 0.1% AEP flood event for Speculation Creek

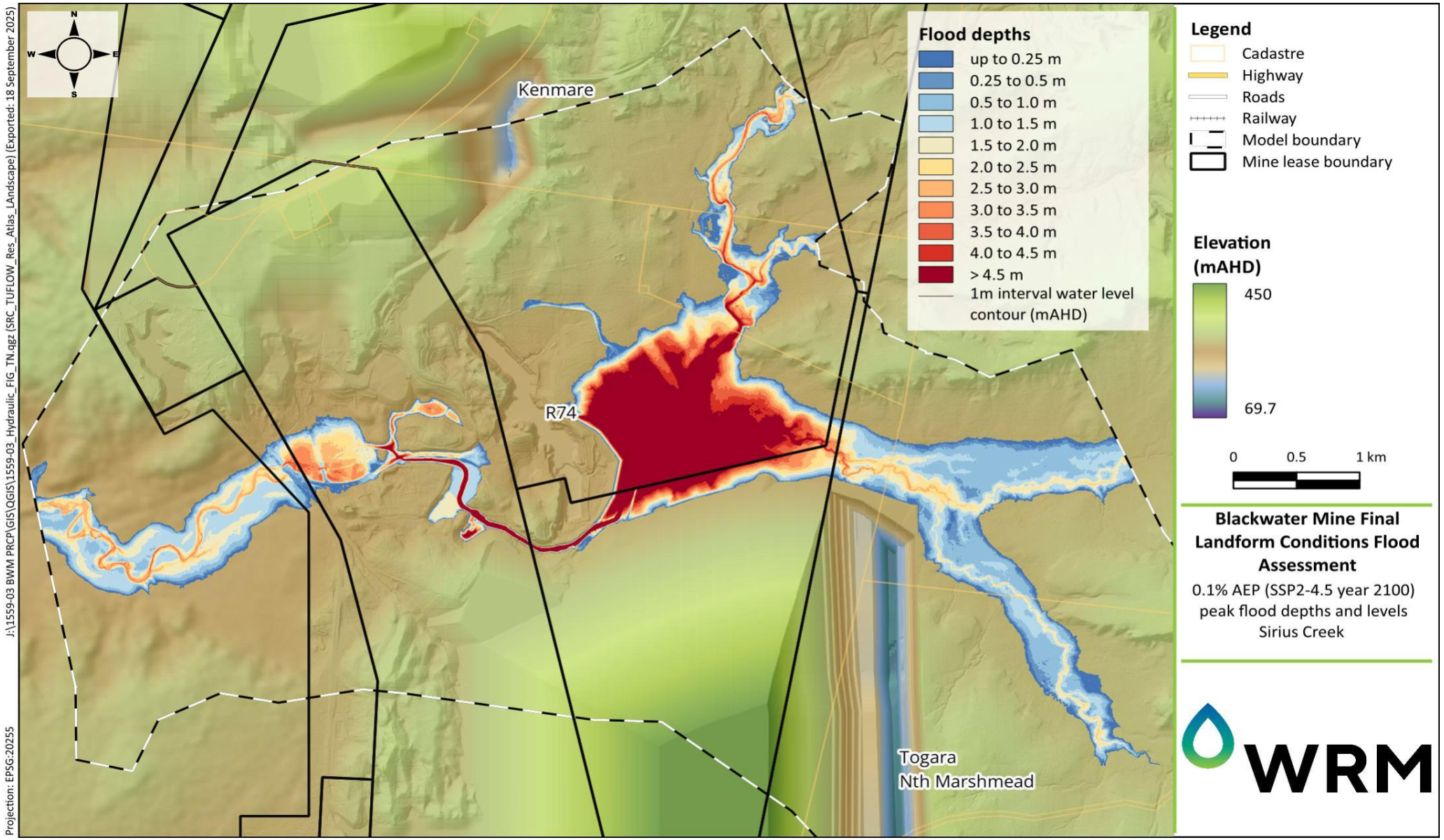


Figure 3-51 Peak flood depths, levels and extents for the 0.1% AEP flood event for Sirius Creek

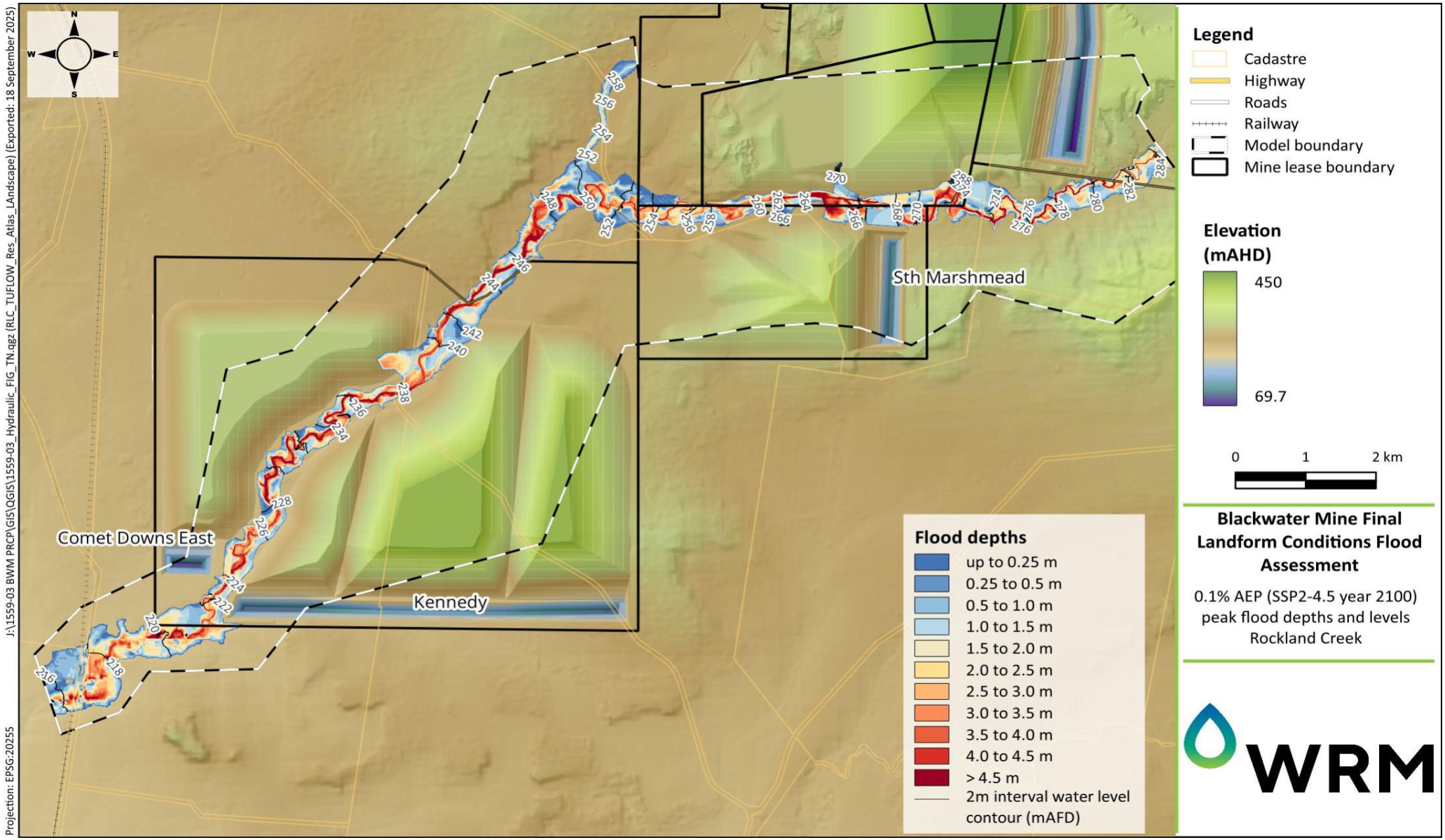


Figure 3-52 Peak flood depths, levels and extents for the 0.1% AEP flood event for Rockland Creek

The predicted 1% AEP and PMF peak flood depths, levels and extents for all modelled catchments are provided in Appendix C of WRM (2026a) (*Appendix 4.6 – Rehabilitation Flood Assessments*).

3.6.1.2.3 Scour and erosion potential

The risk of erosion on the post-mining rehabilitated landform was assessed by comparing modelled flood velocities adjacent to the final landform with the maximum allowable velocity threshold (2.5 m/s) informed by the currently approved PRCP Schedule Rehabilitation Area Milestones, specifically RM 3.12(b).

Where the toes of rehabilitated spoil emplacements or flood protection landforms are within the modelled flood plain, flood velocities were generally predicted to be less than 2 m/s and to not exceed 2.5 m/s during the 0.1% AEP flood event. Peak floodwater velocities under the 0.1% AEP flood event for all modelled catchments are provided in WRM (2026a). Peak floodwater velocities under the 1% AEP and PMF flood events for all modelled catchments are provided in Appendix C of WRM (2026a).

Velocities approaching, or predicted to exceed, 2.5 m/s tend to be restricted to existing diversions. Scour and erosion will be considered during the design of the final configuration and alignment of these structures. Permanent diversions will be developed in accordance with the *Watercourse Diversion Guideline* (DNRME, 2019) and be guided by the requirements of PRCP Schedule General Conditions PRPC14 to PRCP17. The flood modelling presented in WRM (2026a) represents existing diversion conditions and is not considered representative of post closure conditions. PRCP Schedule General Conditions PRPC14 to PRCP17 prescribe the actions and timeframes for designing permanent diversions (Section 3.6.1.2.5). Refer to Section 3.6.1.7.5 for further detail on the post closure diversions.

3.6.1.2.4 Residual flood risk

Residual flood risks were considered for the BWM post-closure conditions based on the hydraulic modelling results and assessed against the Whitehaven's Risk Assessment Criteria (Risk Matrix). Details of the residual flood risks are provided in Appendix 4.6 and were incorporated into the BWM PRC Plan Risk Assessment (Section 3.7 and Appendix 4.19 – Risk Assessment).

The residual flood risks identified were:

- Floodwater ingress to the R30, Togara/North Marshmead, R74, Comet Downs East and Kennedy voids during a PMF event (refer to sections 6.3.4, 6.3.6 and 6.3.7 of Appendix 4.6);
- Localised high energy flows (>2.5 m/s) in contact with the toe of rehabilitated overburden areas adjacent to Taurus Creek during a 0.1% AEP event; and
- High energy flows (>2.5 m/s) along the Sirius Creek temporary diversion.

Measures to mitigate these risks will be identified and addressed through the flood susceptibility and impact assessment, undertaken in accordance with conditions PRCP 15-17 of the PRCP Schedule, including the Consequence Category Assessment used to determine if changes to the Ramp 74 flood protection landform design are required as consequence of floodwater ingress. Similarly, the impacts of high-energy flows (≥2.5m/s) against flood protection landforms will be mitigated in accordance with RM 3.12(b) of the PRCP Schedule, using techniques such as, but are not limited to, energy dissipation measures (e.g. rock lining) and consideration of surface roughness to increase erosional resistance of the landform surface and ensure stability of the landforms. Through the iterative landform design and modelling process, the closure landform was progressively updated to minimise the potential for environmental harm and to achieve a stable final landform. As a result, the rehabilitation flood assessment identified low levels of risk associated with flooding and the proposed BWM closure landform. Accordingly, no critical controls were required.

3.6.1.2.5 Future requirements and commitments

In accordance with PRCP Schedule Condition PRCP15, by 1 July 2031 Whitehaven are to submit to the administering authority a flood susceptibility and impact assessment prepared and certified by an independent AQP. The assessment will:

a) Update flood modelling to incorporate the best available information at the time, including revised hydrologic parameterisation, the final landform topography (including diversions, residual voids and flood protection landforms), and modelling assumptions that allow realistic flood ingress and hydraulic connectivity.

b) Describe potential risks and impacts under extreme flood events up to and including PMF events, including quantifying potential interactions between residual voids, permanent diversions, flood protection landforms, adjacent floodplains and the receiving environment. In addition, for the Sirius Creek Diversion and adjacent residual voids (i.e. R74), the assessment must consider backwatering, overtopping, flood ingress pathways and erosion-driven failure mechanisms.

c) For the Sirius Creek diversion and associated R74 residual void, describe the potential impacts of extreme flood events up to and including PMF on flood protection landforms, including:

   i. the risks to achieving stable conditions; and

   ii. the potential for serious environmental harm to the receiving environment that is irreversible, of a high impact or widespread (as defined per Section 17(1) of the EP Act); and significantly different to impacts expected in the surrounding environment exposed to the flood.

d) Include a Consequence Category Assessment (CCA) for extreme flood events up to and including PMF events for the Sirius Creek diversion and R74 residual void, undertaken in accordance with the Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933) (or later version); and

e) Demonstrate how the current or proposed design of flood protection landforms will prevent serious environmental harm to the receiving environment that is significantly different to impacts expected on the surrounding environment exposed to the flood.

In accordance with PRCP Schedule Condition PRCP16, if the flood susceptibility and impact assessment required under PRCP Schedule Condition PRCP15 identifies the need for new flood protection measures or material modifications to existing flood protection landforms, by 1 July 2032 Whitehaven are to submit to the administering authority an updated Closure Landform Design Report and Design Plans for applicable permanent watercourse diversions, prepared and certified by an independent AQP. The updated design documentation will:

a) Demonstrate achievement of flood immunity for the 0.1% AEP event, with minimum stability criteria, crest elevations and freeboard requirements clearly defined; and

b) For the Sirius Creek diversion and associated R74 residual void, demonstrate achievement of flood immunity for:

   i. a 0.1% AEP event; or

   ii. if the CCA required by PRCP Schedule Condition PRCP15(d) determines a consequence category of “high” for ‘harm or humans’ or ‘general environmental harm’ for ‘Failure to contain – overtopping’ or ‘Dam break’ failure event scenarios, a design event less likely than the 0.1% AEP event, as determined by an AQP to be appropriately protective, with minimum stability criteria, crest elevations and freeboard requirements clearly defined.

c) Demonstrate how the Design Plans achieve hydraulic, erosional and geotechnical stability commensurate with the identified level of risk.

Flood protection landforms must mitigate against the impacts of high-energy flow (≥2.5m/s) (PRCP Schedule Criteria RM3.12).

In accordance with PRCP Schedule Condition PRCP17, where an AQP prepared Design Plan is submitted for a remaining permanent diversion under PRCP Schedule Condition PRCP14, an updated flood susceptibility and impact assessment is to be submitted to the administering authority within 12 months, reflecting changes required to the final landform. Where that assessment identifies the need for new or materially modified flood protection measures, an updated Closure Landform Design Report and Design Plan is to be submitted per the requirements of PRCP Schedule Condition PRCP16.

In addition, in accordance with PRCP Schedule Condition PRCP18, by 1 July 2124 Whitehaven are to submit to the administering authority, updated flood modelling (up to and including PMF events) incorporating the as-constructed final landform and calibrated against the approved closure landform design.

The above requirements, together with the rehabilitation milestone criteria in PRCP Schedule RM3, establish the assurance pathway for detailed design, independent certification, construction quality assurance, operational monitoring and long-term performance of flood protection landforms, permanent diversions and associated residual voids at BWM.

Relationship with PRCP Schedule

The interaction between flooding and the proposed final closure landform presents a low risk. Based on current assessment, the closure landform provides a suitable level of protection to the residual voids, flooding does not adversely impact the stability of the final closure landform, and cumulative flows from the BWM rehabilitated area are similar to existing conditions.

These outcomes demonstrate that the final landform has been designed to manage credible flood events assessed to date, that erosion risks are appropriately managed with the proposed rehabilitation measures, and that mining-affected water remains contained onsite.

Collectively, these findings support the PRCP Schedule by confirming that the final landform supports achievement of the Rehabilitation Area Milestones, maintain long-term stability, and minimise environmental harm in accordance with the PRC framework, while acknowledging the additional assessment, modelling updates and assurance pathways required under PRCP Schedule Conditions PRCP15 to PRCP18.

3.6.1.3 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 material characterisation assessment has been undertaken to support the development of this PRC Plan. The detailed report – *Blackwater Mine PRCP Environmental Geochemical Characterisation and Risk Assessment of Mineral Waste* (Terrenus Earth Sciences (TES), 2026), is provided in *Appendix 4.7 – Waste Characterisation*.

The objective of the assessment is to evaluate the geochemical nature of mineral waste currently at BWM and mineral waste likely to be present at closure and identify potential environmental issues/opportunities that may be associated with mining, handling and storing mineral waste to inform appropriate rehabilitation and management strategies. This assessment incorporates the full mineral waste dataset currently available for BWM.

The assessment also provides the geochemical basis for determining whether final landforms can achieve long-term chemical stability, avoid material impacts on environmental values and remain suitable as NUMAs. It identifies potential sources of Acid Metalliferous Drainage (AMD) and non-oxidative salinity, quantifies the distribution and hazard of waste materials and determines the level of engineering controls required to meet closure performance outcomes under the *PRC Guideline*.

3.6.1.3.1 Background

BWM has three main types of mineral waste. Geochemical characteristics and potential hazards associated with mineral waste materials on site are discussed by type:

Spoil (overburden and interburden) currently comprises ~99% of all mineral waste at BWM and includes weathered waste (Tertiary and Permian-age) and fresh (unweathered) waste (all Permian-age). On average, ~40% of spoil is weathered/oxidised and the remaining (~60%) is fresh, with the proportion of weathered to fresh spoil varying throughout the site. In the northern half of the site, the proportion of weathered to fresh spoil is 25% weathered to 75% fresh. In the southern half of the site, the proportion is 49% weathered to 51% fresh.

Tailings are generated at the NCPP (and previously also at the SCPP) from processing ROM coal and typically represent the clay, silt and fine sand fractions of ROM waste. Throughout operations at BWM, tailings have been disposed of as a slurry into several TSFs. Tailings comprise ~0.5% of all mineral waste throughout the life of mine.

Rejects are generated at the NCPP (and previously at the SCPP) from processing ROM coal and typically represent coarser and rockier seam roof, partings and floor material. Rejects are trucked to several locations for disposal in spoil dumps. Historically, rejects were also disposed of in rejects dumps, such as Ramp 36 rejects dump and Bottom Dam TSF [mixed tailings and rejects]. Some rejects have been used in the construction of TSF embankments and infrastructure pads (e.g. ROM and coal stockpile pads). Rejects comprise ~0.5% of all mineral waste throughout the life of mine.

Coal is included in the assessment. However, it is generally not considered mineral waste, except for small quantities of sub-economic seams that may report to the spoil dumps, and remnant coal exposed on pit highwalls (such as in residual voids).

Mineral waste and coal samples underwent geochemical assessment with regard to their potential to generate acid and metalliferous drainage (AMD), which includes:

- acid drainage (AD),
- neutral and metalliferous drainage (NMD), and
- saline drainage (SD).

Additionally, samples have been assessed with regard to their potential to generate salinity (non-oxidative) and, for spoil materials, their sodicity and dispersion potential.

Each sample was characterised using their respective sulfur content and acid neutralising capacity (ANC) as non-acid forming (NAF), NAF-sulfur (NAF-S; NAF, but with total S greater than 1%), potentially acid forming (PAF), PAF-low capacity (PAF-LC), or uncertain (UC) according to the criteria in Table 3-25.

Table 3-25 AD classification criteria for mineral waste

AD classification	Sulfur content (%)	NAPP (kg H_2SO_4)	ANC/MPA ratio	NAGpH
NAF	≤0.01	-	-	-
	≤1	<0	≥2	-
	≤1	<0	-	≥4.5
NAF-S	>1	<0	≥2	-
	>1	<0	-	≥4.5
PAF-LC	≤1	≥0 and <10	<2	-
	-	≥0 and <10	-	<4.5
PAF	-	≥10	<2	-
	-	≥10	-	<4.5
UC	Any result outside of the above criteria, or results that appear to significantly conflict with the expected result based on lithology or mineralogy			

Mine domains at BWM that are potential sources of AMD and salinity at closure are:

- residual voids,
- spoil dumps,
- the Ramp 36 reject dump, and
- TSFs.

Each of these final landforms will contain a variable proportion of spoil, rejects, tailings and coal depending on operational practices and planned LoM waste management.

Spoil dump landforms will be comprised of mined overburden and interburden disposed behind the active mining face to form a low-wall spoil dump, which will be reshaped to form the final closure landform.

- Mimosa-Besgrove, Deep Creek, Stewarton South, Stewarton North, Kenmare and Togara-North Marshmead spoil landforms contain a small proportion of existing or planned future rejects (between 0.2-1.9%, depending on the landform).
- Kenmare spoil landform also comprises ~1% existing tailings (Ramp 72 in-pit TSF).

TSF landforms comprise tailings (predominantly), with some rejects:

- NCPP TSF includes ~80% tailings, 19% rejects (forming the basis of most of the embankments), and 1% spoil/fill material mainly within embankments.
- Laleham TSF includes ~90% tailings, ~4% rejects (embankments) and ~6% spoil/fill material (embankments).
- Bottom Dam TSF comprises ~95% tailings and ~4% rejects, with ~1% spoil/fill.

The Ramp 36 rejects dump landform will contain ~98% rejects and ~2% fill (assumed to be spoil). All residual voids (except for Bonnie Doon and Ramp 74) will have pit/void floors comprising the P & L Lower seam group (conservatively assumed to be coal). Bonnie Doon and Laleham will have tailings on the pit/void floors.

3.6.1.3.2 Geochemical assessment

The geochemical characteristics of each waste type were assessed with respect to their ability to generate AMD using both historical data (defined as pre-2019) and data from a more recent sampling and analytical program (2020 onwards). In total, the dataset includes:

- 4,172 samples of non-carbonaceous spoil (657 weathered; 3,515 fresh) and 292 samples of carbonaceous spoil (9 weathered; 283 fresh) to assess spoil and ROM coal (and pit walls and floor).
- 703 tailings samples, comprising 311 'fresh' tailings samples collected from the NCPP and 392 'aged' tailings samples collected from geochemical and geotechnical investigation drill holes within several TSFs.
- 398 rejects samples, comprising 48 'fresh' rejects samples collected from the NCPP and 350 'aged' rejects samples collected from geochemical and geotechnical investigation drill-holes and test pits within NCPP TSF, Laleham TSF, Ramp 36 rejects dump, Kenmare Pit rejects dump and Red Dam area (surface samples).
- 64 'fill' samples and 33 'natural ground' samples collected from geochemical and geotechnical investigation drill holes within the above-ground TSFs (NCPP TSF and Laleham TSF) and Ramp 36 rejects dump. Fill (spoil) material is often used as part of TSF embankment construction.

The results indicate:

- Non-carbonaceous spoil has very low total sulfur concentrations (95th percentile 0.09%) and moderate to high ANC, reflecting a strong tendency toward NAF classifications.
- Carbonaceous spoil has low to moderate sulfur concentrations and limited ANC availability, with small proportions classified as PAF or PAF-LC.
- Tailings show distinct differences between fresh and aged material in terms of pH, ANC and sulfur content, with both fresh and aged tailings containing substantial proportions classified as PAF, PAF-LC or UC(PAF).
- Rejects include both fresh NAF material and aged material with higher proportions of PAF and lower pH.
- Total metal and metalloid concentrations in spoil and coal are generally low, while tailings and aged rejects show isolated elemental enrichment consistent with known mineralogical variability.
- Overall, spoil represents a low AMD hazard, while tailings and rejects represent moderate to high AMD hazard materials requiring specific management.

3.6.1.3.2.1 Assessment methodology

The environmental testing protocol included a variety of analytical techniques that are consistent with industry and regulatory accepted guidelines (e.g. GARD Guide [INAP, 2009]). The sampling approach was designed to capture the full vertical and lateral variability of waste materials at BWM:

- The overburden/interburden samples were selected from drill cores representative of the vertical and lateral geological variability encountered at BWM.
- Tailings and rejects samples from the CHPPs were collected over several years to ensure that the mineral waste variability was captured at the plant. Tailings and rejects samples collected from the TSFs were representative of the vertical and spatial distribution of these materials at each TSF to capture the temporal and lateral variability of the tailings and rejects deposited in the TSFs.

Static testing was conducted on mineral waste samples to assess AMD potential and metal and metalloid content. Initial testing was done on all samples and included analysis of:

- pH and EC on a 1:5 solid:water dispersion,

- net acid-producing potential (NAPP), including:
    - total S for calculating maximum potential acidity (MPA), and
    - ANC.

Additional static testing was conducted on selected samples to provide more detailed geochemical information where required.

Kinetic testing was conducted on tailings samples, which included:

- Oxygen (O_2) consumption and CO_2 generation analysis ("Kinetic OxCon Tests") on 5 fresh and 1 aged NCPP tailings samples, and 3 composite carbonaceous spoil samples from drill cores.
- Kinetic leaching tests of 5 fresh and 1 aged NCP tailings samples (exact same samples as the OxCon tests) following a modified AMIRA (2002) method.
- Tailings liquor samples collected from the NCPP decant pond from 2020-2023 and analysed for typical water quality parameters.

More details of the static and kinetic testing of mineral waste are in Appendix 4.7.

3.6.1.3.2.2 Uncertainties and conservative assumptions

The assessment by TES (2026) applies conservative assumptions to account for potential limits in data density, local geological variability and uncertainty around the extent and connectivity of shallow permeable strata. Key conservative elements include classifying ambiguous samples according to their highest plausible hazard category, assuming maximum plausible exposure of PAF domains and adopting a precautionary view of potential seepage pathways.

These assumptions ensure that AMD and salinity hazards are not understated in the SPR assessment.

3.6.1.3.3 Geochemical classification

3.6.1.3.3.1 AMD potential

The test work results were used to understand the geochemical properties of each material type (source) and assign an AMD classification. This data has been used to infer the geochemical hazard by each mineral waste type in their relative proportions within each landform. The geochemical risk of each landform was assessed using an SPR approach, as detailed in Section3.6.1.3.4.

Key findings from the geochemical assessment by TES (2026) are summarised below and in Table 3-26.

Non-carbonaceous spoil (4,172 samples, 93% of all spoil):

- Is expected to generate pH-neutral to highly alkaline run-off and seepage, typical for mine spoil in the Bowen Basin.
- Has a very low AMD potential:
    - 97% of samples were classified as non-acid forming (NAF), and 1% of samples were classified as UC(NAF).
- Is not enriched in total metals and metalloids.

Carbonaceous spoil (292 samples, < 7% of all spoil):

- Is expected to generate pH-alkaline to highly alkaline run-off and seepage.
- Has a generally low potential to generate AMD.
- Carbonaceous spoil associated with coal seams has a greater potential to generate low-level AMD.

- 85% of carbonaceous spoil samples were classified as NAF, and 1% of samples were classified as UC(NAF).
- The remaining 14% of samples were classified as PAF, PAF-LC, UC(PAF), or NAF-S.
- Almost all PAF and NAF-S carbonaceous spoil samples were associated with coal seams and could potentially end up as coarse reject if mined with ROM coal.
- Has an overall low ANC and little to no enrichment in total metals and metalloids.

Tailings (703 samples):

- Total S, ANC and pH differed between fresh tailings and aged tailings.

The overall AMD potential of both tailings sources is generally similar. The following discussion only differentiates between the two where the differences were significant. Otherwise, the AMD potential of tailings is discussed as a bulk material.

- 55% of tailings have a moderate-high AMD potential. 45% of tailings have a low AMD potential.
- Fresh tailings from the NCPP are expected to generate pH-alkaline to highly alkaline run-off and seepage. Aged tailings have generally lower pH compared to fresh tailings, i.e. moderately acidic to alkaline. This is most likely from oxidation processes consuming readily available neutralising minerals.
- The total S concentration is low-moderate, with median values of 0.76% and 0.52% for fresh and aged tailings, respectively. Total S content was generally larger in the fresh tailings compared to the aged tailings. This could be due to several different reasons, such as:
    - Sulfide oxidation and neutralisation reactions generate sparingly and/or readily soluble sulfate. This leads to sulfur loss through the leaching of sulfate minerals (e.g. jarosite, alunite and gypsum) and/or soluble salts (e.g. melanterite and copiapite).
    - Difference in initial geochemistry of ROM coal of different sources.
    - In the fresh tailings samples, ~69% of the total S is present as sulfide (S_{Cr}). Comparatively, only 48% of the total S is present as S_{Cr} in the aged tailings samples.
        - This is typical and expected, supporting that the aged tailings in the TSFs are being oxidised after deposition.
- Fresh tailings have moderate-high ANC (median 32 kg H_2SO_4/t) compared to aged tailings, which have low-moderate ANC (median 16 kg H_2SO_4/t).
    - This is likely related to ANC being consumed via buffering of acidity generated by sulfide oxidation and/or sulfate leaching.
- 55% of tailings samples are classified as PAF, PAF-LC, UC(PAF) or NAF-S.
    - Of the PAF and NAF-S tailings samples, ~72% were classified as UC(PAF) or PAF-LC.
- 45% of tailings samples are classified as NAF or UC(NAF).
- Total metal and metalloid content are generally low compared to the average elemental abundance in soil in the earth's crust according to Bowen (1979).
- Kinetic leach testing with deionised water showed that all fresh tailings and half of the aged tailings have low soluble metal and metalloid content and near-neutral to alkaline pH.
    - The remaining half of the aged tailings produced moderate to elevated metal and metalloid concentrations and all, but one strongly acidic sample had weakly to moderately acidic pH.
    - In saline leaching conditions, all tailings' samples produced low concentrations of soluble metals and metalloids.

Rejects (398 samples):

- About half of the rejects have a moderate-high AMD potential. The remaining half have a low-moderate AMD potential.
- Fresh rejects from the NCPP are expected to generate strongly alkaline run-off and seepage. Aged rejects have a lower pH compared to fresh rejects and are expected to generate weakly acidic to alkaline run-off and seepage.
- Fresh rejects have generally moderate-very high ANC (median 40 kg H_2SO_4/t). Aged rejects have low-high ANC (median 18 kg H_2SO_4/t).
- 45% of rejects (all aged rejects) are classified as PAF, PAF-LC, UC(PAF) or NAF-S. The remaining half are classified as NAF or UC(NAF).
    - All fresh rejects are classified as NAF.
    - Of the 'PAF' and NAF-S tailings samples (all being aged rejects), about two-thirds were classified as UC(PAF) or PAF-LC.
- Peroxide leaching on 26 aged rejects samples (mostly from Ramp 72) of predominantly 'PAF' classifications showed that almost all rejects samples are weakly to strongly acidic and have moderate to elevated metal and metalloid concentrations.
    - Under acidic conditions, these materials have the potential to generate elevated metal and metalloid loads. Sulfate and salinity loads are not expected to be high due to the generally low total S concentration (with some exceptions).

Table 3-26 AMD classifications of mining waste at BWM

Material Type		n	Number of samples (%)					
			NAF	UC(NAF)	NAF-S	UC(PAF)	PAF-LC	PAF
Spoil	Weathered non-carbonaceous	657	586 (89%)	43 (6.5%)	–	1 (<0.2%)	27 (4.1%)	–
	Weathered carbonaceous	9	6 (67%)	–	–	2 (22%)	–	1 (11%)
	Fresh non-carbonaceous	3,515	3,472 (99%)	12 (0.3%)	1 (<0.1%)	10 (0.3%)	16 (0.5%)	4 (0.1%)
	Fresh carbonaceous	283	242 (86%)	4 (1.4%)	2 (0.7%)	19 (6.7%)	13 (4.6%)	3 (1.1%)
	All	4,464	4,306 (96%)	59 (1.3%)	3 (<0.1%)	32 (0.7%)	56 (1.3%)	8 (<0.2%)
Coal		381	231 (61%)	14 (3.7%)	1 (<0.3%)	3 (0.8%)	105 (28%)	27 (7.1%)
Tailings	Fresh (NCPP	311	153 (49%)	15 (4.8%)	18 (5.8%)	52 (17%)	28 (9.0%)	45 (14%)
	Aged (TSFs)	392	88 (22%)	57 (15%)	1 (0.3%)	83 (21%)	116 (30%)	47 (12%)
	All	703	241 (34%)	72 (10%)	19 (2.7%)	135 (19%)	144 (20%)	92 (13%)
Rejects	Fresh (NCPP)	48	48 (100%)	–	–	–	–	–
	Aged	350	141 (40%)	29 (8.3%)	16 (4.6%)	54 (15%)	55 (16%)	55 (16%)
	All	398	189 (47%)	29 (7.3%)	16 (4%)	54 (14%)	55 (14%)	55 (14%)
Source: Table 15 in TES (2026) – Appendix 4.7								

3.6.1.3.3.2 Salinity, sodicity and dispersion potential

The salinity, sodicity and dispersion properties of each material type are summarised in Table 3-27. $EC_{1:5}$ values indicate the expected salinity of contact water, and ESP and Emerson class results describe the sodicity and dispersion behaviour of the spoil materials.

Non-carbonaceous spoil has very low total S, and fresh and weathered material fall within the non-saline to slightly saline range. Contact water from non-carbonaceous spoil is expected to be non-saline to slightly saline, driven mainly by dissolution of geogenic salts rather than sulfate released from sulfide oxidation. ESP results show that most samples are sodic or strongly sodic, and Emerson testing indicates that a large proportion is dispersive.

Carbonaceous spoil has low total S, with fresh and weathered material falling within the slightly saline range. Contact water from carbonaceous spoil is expected to be slightly saline. Fresh carbonaceous spoil is mostly strongly sodic, while weathered carbonaceous spoil is nonsodic. Around half of the samples show dispersive behaviour.

Fresh and aged tailings fall within the slightly to moderately saline range. Contact water from tailings is expected to be slightly to moderately saline. Total S concentrations indicate a low-moderate to moderate potential for additional salinity development as sulfide minerals oxidise.

Fresh rejects fall within the non-saline range, and contact water from fresh rejects is expected to be non-saline. Aged rejects extend into the slightly to moderately saline range, and contact water from aged rejects is expected to reflect this higher salinity. Total S concentrations indicate a low to low-moderate potential for further salinity development.

Coal is non-saline, with low $EC_{1:5}$ and low total S, and contact water from coal is expected to be non-saline.

Table 3-27 Salinity, sodicity and dispersion summary table

Material type		$EC_{1:5}$		Median Total S	ESP		Sodic/ strongly sodic fraction	Dispersive fraction (Emerson)	Expected salinity of contact water
		5^{th} to 95^{th} %ile range	Median		Median	95th %ile			
Unit		*µS/cm*		*%*					-
Non-carbonaceous spoil	Fresh	190-500	349	0.02	33	51	~92% (combined)	~60%	Slightly
	Weath.	38-1,050	300	0.01	25	40			Non-saline to slightly
Carbonaceous spoil	Fresh	120-530	350	0.12	36	58	Mostly sodic	~50%	Slightly
	Weath.	110-400	250	0.38	4	6	Nonsodic		Non-saline to slightly
Tailings	Fresh	400-1,700	750	0.76	n/a	n/a	n/a	n/a	Slightly to moderately
	Aged	290-2,200	790	0.52	n/a	n/a	n/a	n/a	
Rejects	Fresh	270-460	360	0.28	n/a	n/a	n/a	n/a	Non-saline to slightly
	Aged	280-2,500	900	0.61	n/a	n/a	n/a	n/a	Slightly to moderately
Coal		30-332	98	0.22	n/a	n/a	n/a	n/a	Non-saline
Adapted from the geochemical database provided by TES November 2025									

3.6.1.3.3.3 Metal and metalloid content

Multi-element data for 776 waste material samples were included in evaluating the metal and metalloid content of waste at BWM. The data comprises:

- 617 spoil samples across all spoil groups,
- 72 coal samples,
- 31 rejects samples; 13 fresh and 18 aged, and
- 56 tailings samples; 42 fresh and 14 aged.

This dataset provides sufficient coverage to assess the presence and degree of enrichment of elements of environmental interest.

The spoil results show limited enrichment. 26 of the 617 spoil samples (~4.2%) contain elevated concentrations of one or more elements including arsenic, barium, cobalt, chromium, copper, mercury, selenium, sulfur or uranium.

3 of the 72 coal samples (~4.2%) show similar enrichment. Where sulfur is elevated, the results are consistent with the corresponding ABA data.

For tailings, 11 of the 42 fresh tailings samples (~26%) and 4 of the 14 aged samples (~29%) are enriched in sulfur, consistent with the corresponding acid-base accounting results. 2 aged tailings samples (~14%) are enriched in arsenic.

Rejects show minimal enrichment, with no fresh rejects samples enriched in any metal or metalloid and 4 of the 17 aged rejects (~24%) enriched in sulfur.

Overall, the waste materials display low levels of metal and metalloid enrichment. The limited number of enriched samples is consistent with natural variability in Permian coal measures in Queensland and does not indicate widespread elevation of metals or metalloids within the waste streams.

3.6.1.3.4 Geochemical risk of final landforms

This section evaluates the intrinsic hazard of each landform by integrating waste composition, AMD potential, salinity potential and material quantities. The intent is to identify which landforms require engineered controls and which have sufficient inherent geochemical stability to meet closure performance requirements with standard rehabilitation measures. The source hazard score is a formula that considers the propensity to generate AMD, the AMD capacity (severity) and the quantity (volume) of material that could produce AMD.

The assessment incorporates the distribution of spoil, rejects and tailings within each landform, including the presence of Ramp 72 TSF and associated rejects within the Kenmare spoil landform, and the standalone nature of NCPP TSF, Laleham TSF, Bottom Dam TSF and Ramp 36 rejects dump.

The AMD source hazard scores of the mining waste types at BWM are as follows:

- Non-carbonaceous spoil: Low
- Carbonaceous spoil: Low-Moderate
- Tailings: Moderate-High (score ranged from Moderate-High to High depending on TSF facility, but was generally Moderate-High)
- Rejects: Moderate (score ranged from Low-Moderate to Moderate-High depending on rejects facility, but was generally Moderate)
- Coal: Low-Moderate

The potential environmental risk posed by each landform containing variable proportions of each mineral waste type was determined. This risk is determined by considering the following factors:

- Geochemical source hazard of the landform (as described above),
- Potential environmental and human health receptors of AMD from the landform, and
- Potential pathways between the source (landform) and the receptor.

The outcome of this assessment informed the development of appropriate management and rehabilitation measures for relevant landforms at closure.

A key element of the CSM developed as part of the hydrogeological assessment (Appendix 4.2) was that the residual voids at BWM will be groundwater sinks.

A conceptual facility model (CFM) was developed for each TSF and rejects dump to illustrate potential run-off and seepage pathways and surface water and groundwater receptors associated with these key mineral waste facilities, reflecting the updated Rev2 landform material compositions and AMD source materials identified in the detailed geochemical assessment.

The AMD hazard scores for the landforms are as follows:

- Each of the spoil landforms (except Kenmare) poses a Low AMD hazard, with AMD generation rated as Highly Unlikely.
    - The Kenmare spoil landform contains Ramp 72 TSF tailings and associated rejects within the southern end of the existing pit shell, which collectively pose a High AMD hazard, with AMD generation rated as Highly Likely (Figure 3-57).
- NCPP TSF – prior to rehabilitation – has a Moderate-High AMD source hazard with the likelihood of AMD generation from the landform rated as Highly Likely (Figure 3-53). Evidence of AMD has been observed, including oxidation fronts, depleted ANC and acidic contact water.
- Laleham TSF – prior to rehabilitation – has a Moderate-High AMD source hazard with the likelihood of AMD generation from the landform rated as Probable/Likely (Figure 3-54). Field observations indicate sulfide oxidation and acidic drainage within portions of the tailings profile.
- Bottom Dam TSF and rejects area is undergoing environmental and engineering assessment programs, which will guide the rehabilitation and closure planning for this area. Prior to rehabilitation (i.e. currently), this area has been conservatively assigned a Moderate-High AMD source hazard with the likelihood of AMD generation from the landform rated as Probable/Likely (Figure 3-55). Tailings at this facility show strong evidence of AMD and salinity generation, with most samples classified as PAF.
- Ramp 36 rejects dump – prior to rehabilitation – has a Moderate-High AMD source hazard with the likelihood of AMD generation from the landform rated as Probable/Likely (Figure 3-56). The AMD hazard for this landform is driven almost entirely by the rejects, which comprise approximately 98% of the dump.
- AMD generation from residual voids (except Bonnie Doon and Ramp 74) is Unlikely. AMD generation from Bonnie Doon (Figure 3-58) and Ramp 74 (Figure 3-59) is Probable/Likely.
    - The tailings within these voids will be capped/covered at end of mining and no tailings will be exposed post-closure. As such, the potential of AMD generation from the floor of these voids post-closure would be lower. Should these tailings floors become submerged by groundwater (post-closure), the likelihood of AMD generation from the tailings floor of these voids would be lower.
    - The likelihood classifications reflect the updated understanding that both voids contain tailings profiles with active or historical oxidation fronts, although their post-closure behaviour is expected to improve once submerged or capped.

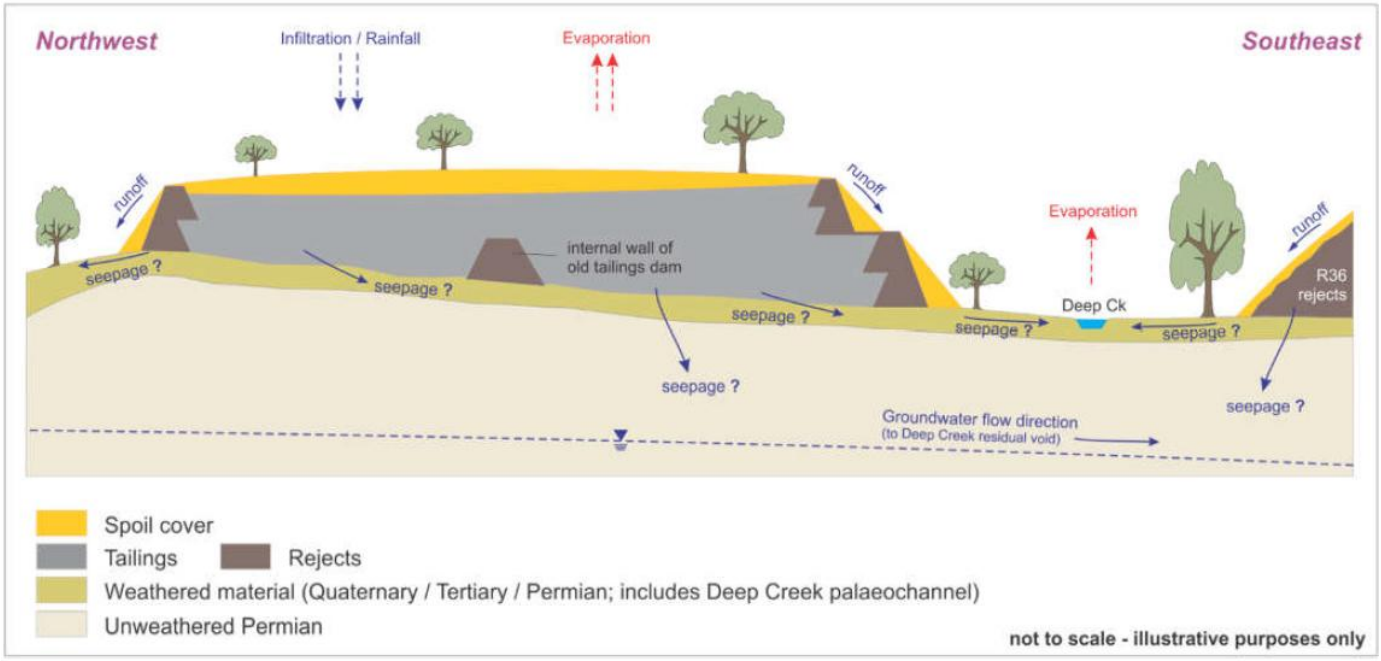


Figure 3-53 Post-closure SPR conceptual facility model for NCPP TSF

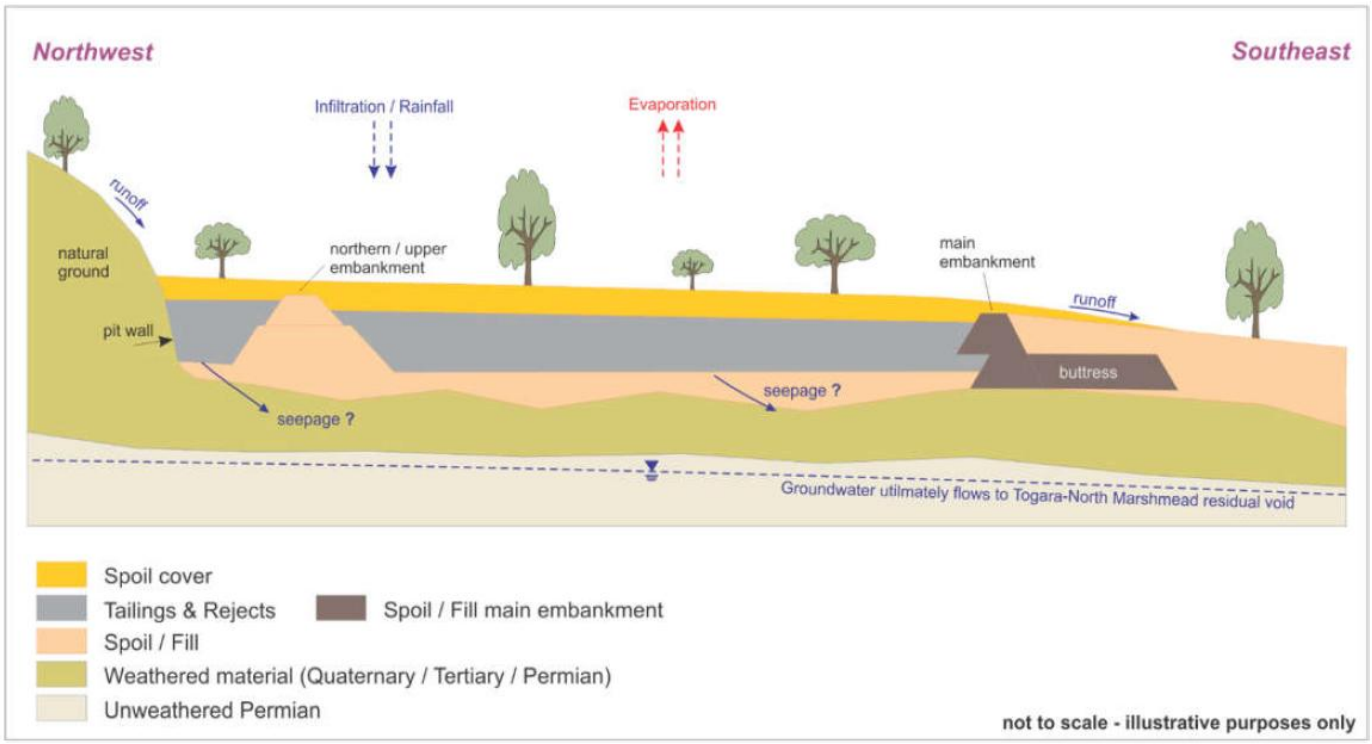


Figure 3-54 Post-closure SPR conceptual facility model for Laleham TSF

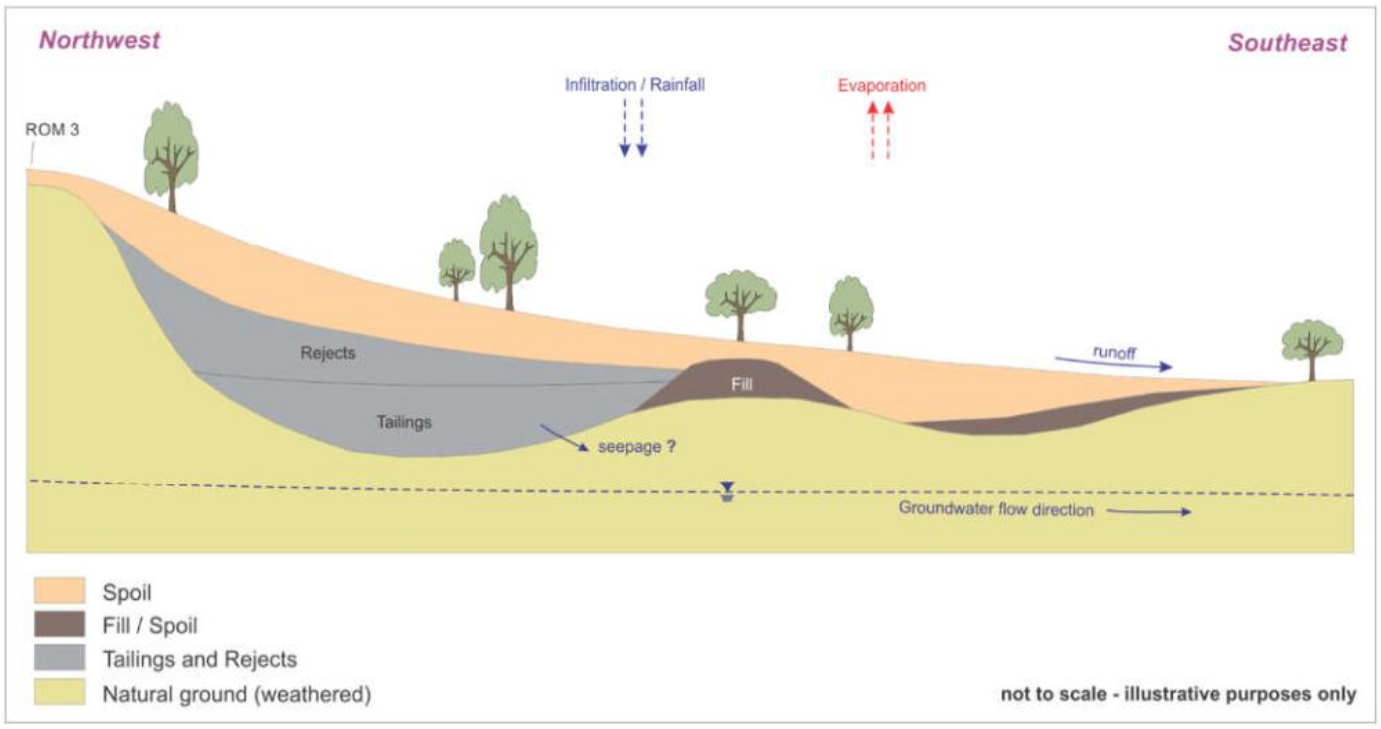


Figure 3-55 Post-closure SPR conceptual facility model for Bottom Dam TSF and rejects

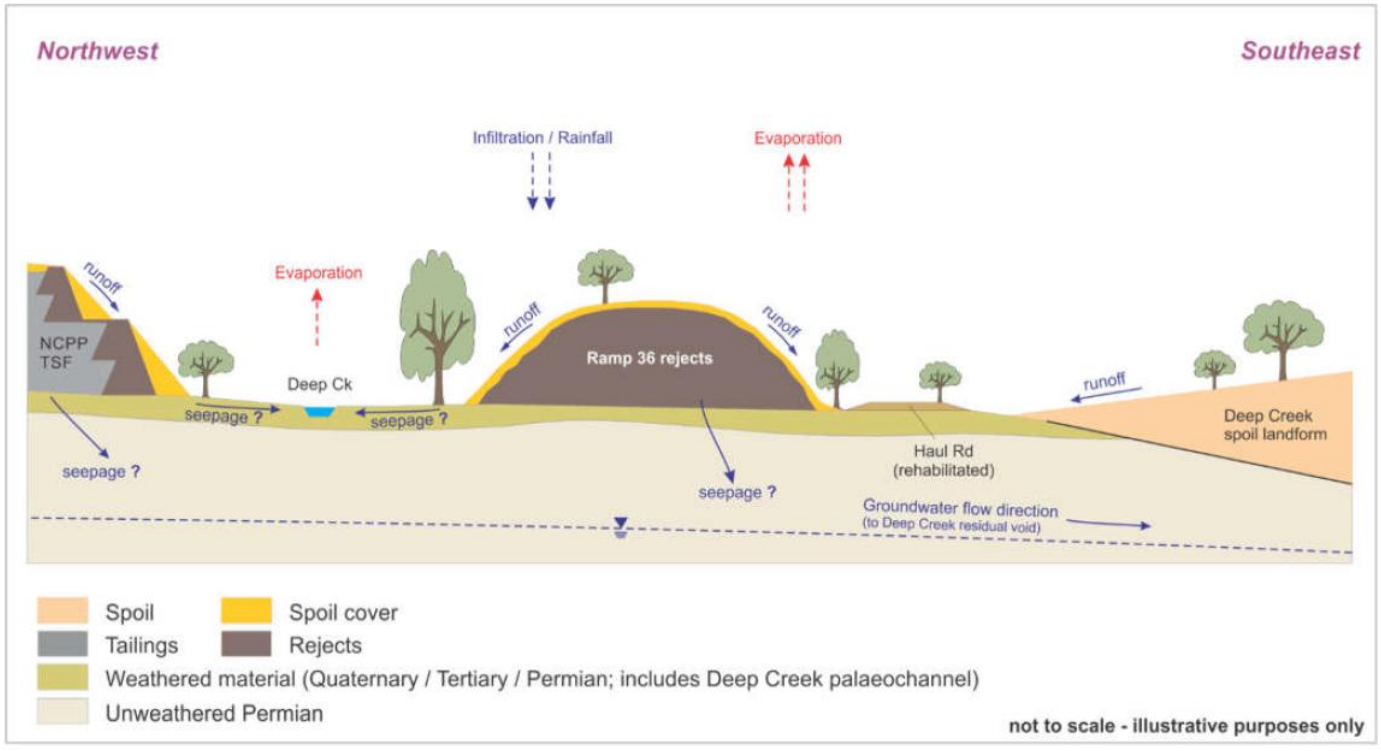


Figure 3-56 Post-closure SPR conceptual facility model for Ramp 36 rejects dump

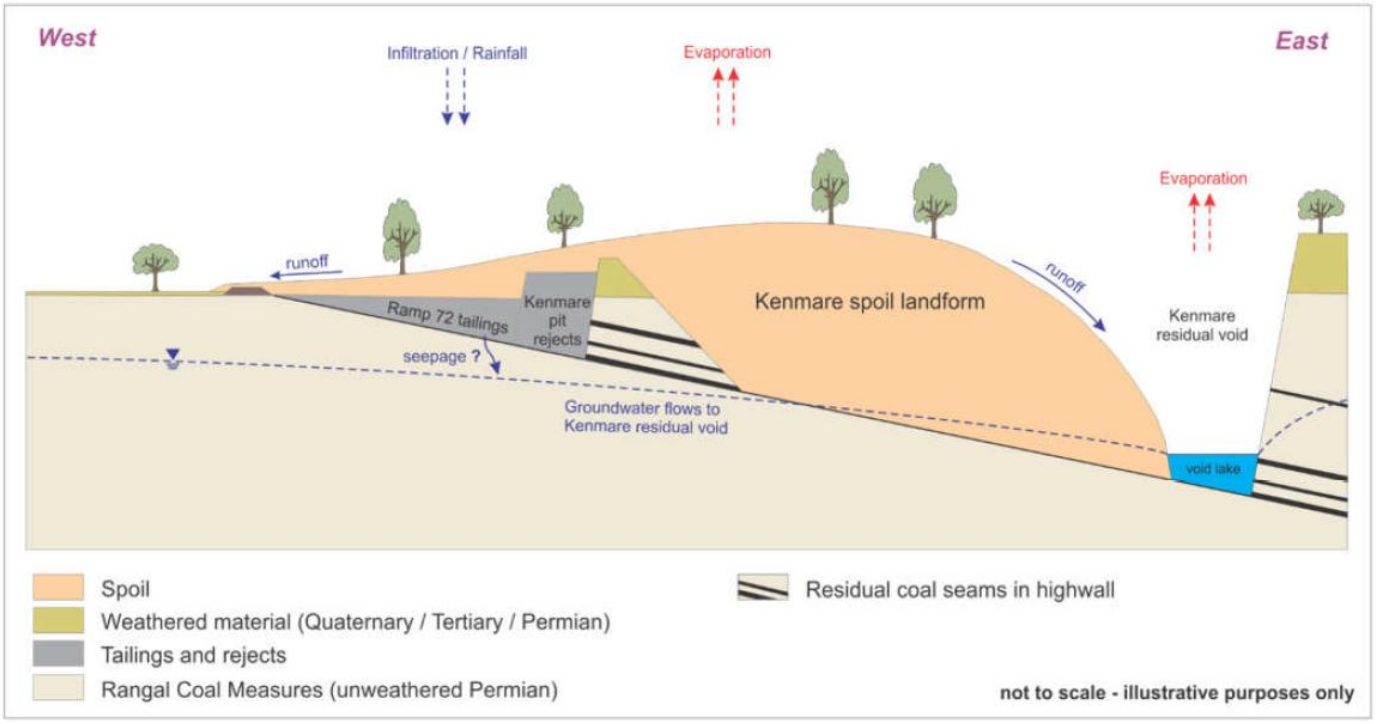


Figure 3-57 Post-closure SPR conceptual facility model for Ramp 72 TSF buried within the Kenmare spoil landform

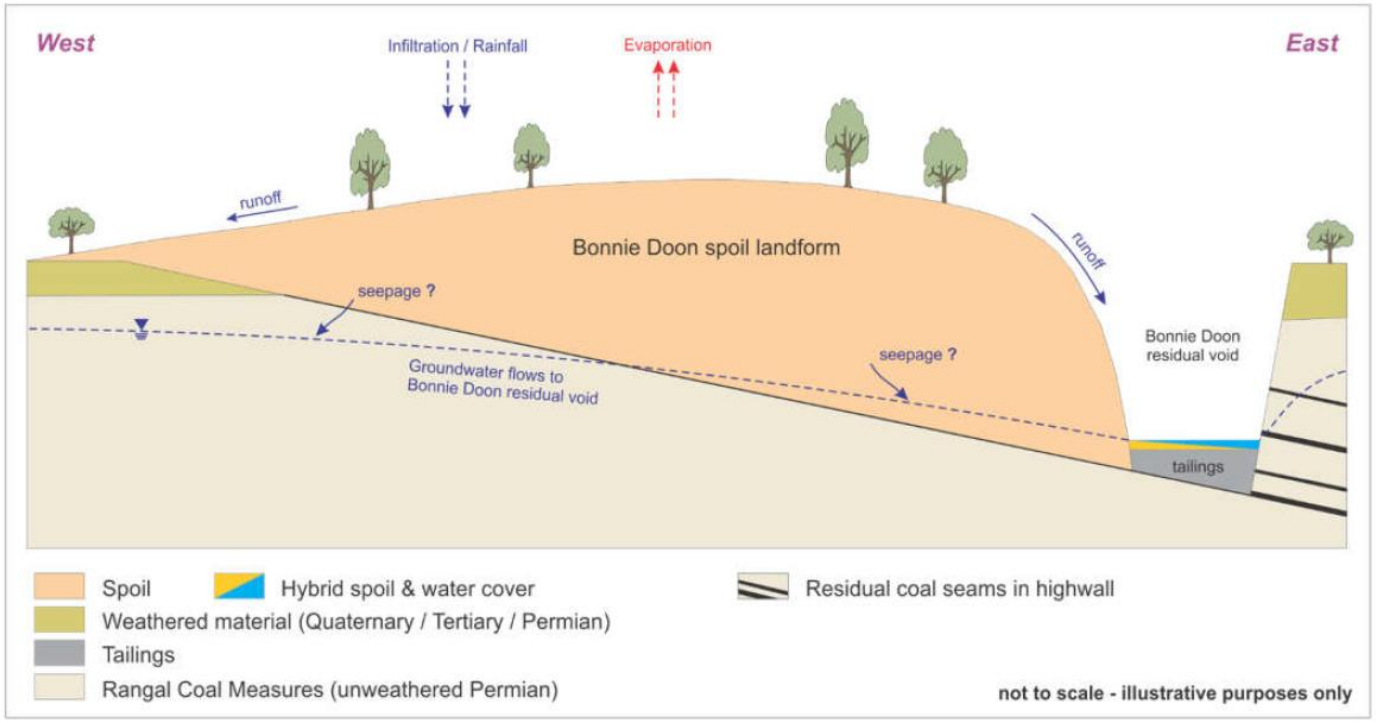


Figure 3-58 Post-closure SPR conceptual facility model for Bonnie Doon spoil landform and in-pit TSF (Bonnie Doon residual void)

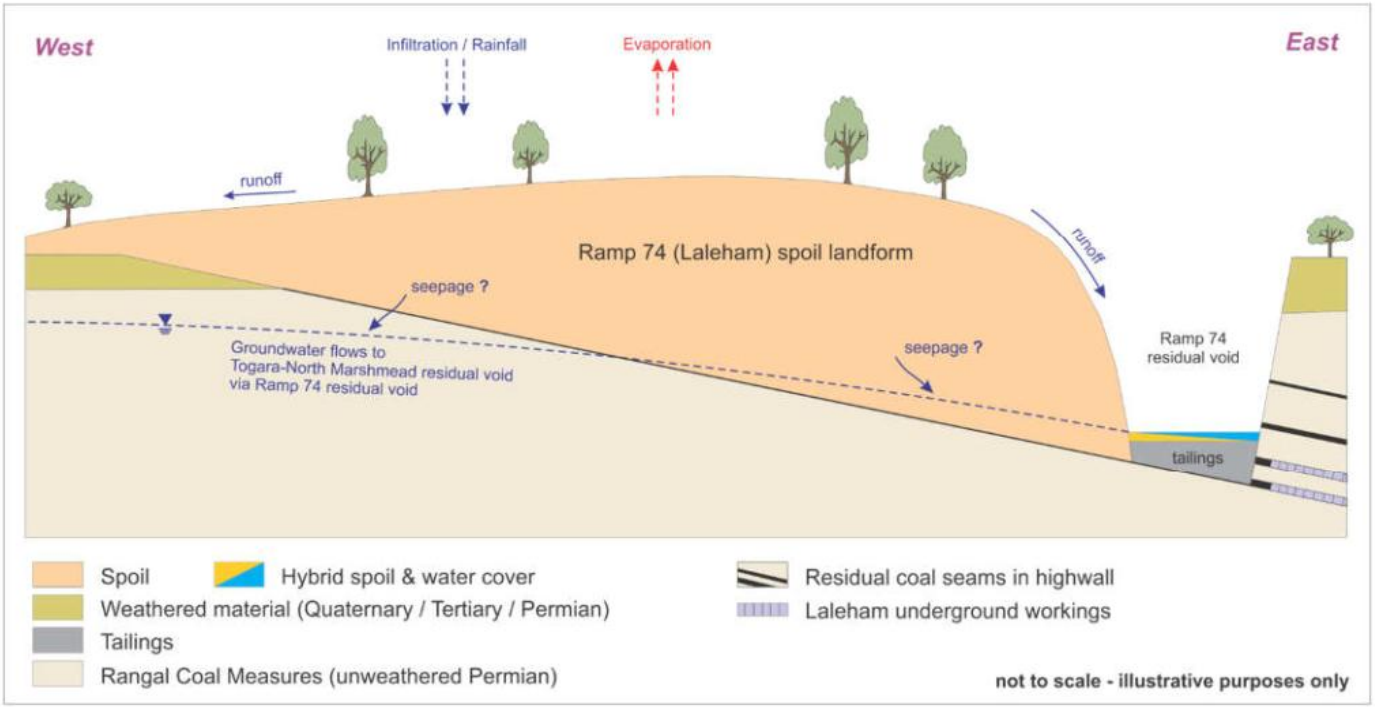


Figure 3-59 Post-closure SPR conceptual facility model for Ramp 74 spoil landform and final void TSF (Ramp 74 TSF)

3.6.1.3.5 Geochemical risk of residual voids

A geochemical source hazard assessment was completed for the walls and floors of the 14 residual voids that will remain at closure. These voids vary in length and depth, and their walls comprise mixtures of weathered and fresh overburden/interburden with localised coal seam exposure. Excluding Bonnie Doon and Ramp 74, the void floors will expose the P & L Lower seam group at closure.

Environmental geochemical data, coal quality data and geological logs informed the assessment of AMD risk. Across the site, approximately 40% of highwall material is weathered and 60% is fresh, ranging from about 25% weathered in northern pits to about 49% in southern pits. Coal exposure makes up only 2-7% of highwall meterage.

Key findings from the void wall and floor assessment are:

- Approximately 3.5-6% of exposed highwall material is PAF (including UC(PAF), PAF-LC and NAF-S). AMD generation from void walls is therefore rated as Unlikely, and any expression of AMD would be localised.
- Excluding Bonnie Doon and Ramp 74, the void floors will be the P & L Lower seam. Under a conservative assumption that all exposed floor material is coal, approximately 3% of exposed floor materials are PAF of some type, giving an AMD likelihood of Unlikely until submerged post-closure. In practice, coal remaining on void floors is expected to be minimal because mining removes coal to the base of the seam.
- Bonnie Doon and Ramp 74 voids have tailings at their floor. Approximately 46% of the Bonnie Doon floor and 72% of the Ramp 74 floor comprise tailings classified as PAF, PAF-LC, UC(PAF) or NAF-S. AMD generation from these tailings floors is rated as Probable/Likely. These tailings will be capped or covered before closure, and once submerged or capped, the likelihood of AMD generation will be lower.

Overall, AMD generation from residual void walls is Unlikely.

AMD generation from void floors is Unlikely for all non-tailings voids and Probable/Likely where tailings occur (Bonnie Doon and Ramp 74) until capped or submerged by water.

3.6.1.3.6 Source-pathway receptor analysis

A detailed description of the CFMs is in Appendix 4.7.

Table 3-28 summarises the potential pathways through which spoil landforms, TSFs, rejects dumps and void walls may contribute run-off or seepage to surrounding surface water features or residual voids. The table consolidates all identified receptors and links them to the relevant surface water, shallow seepage and groundwater pathways, reflecting the post-closure conditions of the site where residual voids act as groundwater sinks.

Table 3-28 Possible pathways and receptors for potential geochemical hazards posed by BWM features

Potential Pathway	Receptor(s)
Spoil landforms	
Surface water run-off	Bonnie Doon Creek west of Ramp 8 and Bonnie Doon spoil landforms, flowing north
	Burngrove Creek and tributaries west of Mimosa-Besgrove spoil landform, flowing north
	Deep Creek flowing west to east between Mimosa-Besgrove and Deep Creek spoil landforms
	Taurus Creek flowing west to east between Deep Creek and Stewarton North spoil landforms
	Emu Creek and unnamed tributaries west of Stewarton North, Stewarton South and Tannyfoil spoil landforms, flowing north into Taurus Creek
	Sirius Creek flowing east to west between the Ramp 74 void and the Togara-North Marshmead spoil landform
	Minor unnamed creeks on both sides of the mine between Blackdown spoil landform and the Ramp 74 void that drain into Sirius Creek
	Rockland Creek flowing east to west between Togara-North Marshmead and South Marshmead spoil landforms
	Rockland Creek flowing northeast to southwest between Comet Downs East and Kennedy West spoil landforms
Seepage via shallow permeable strata	Bonnie Doon Creek via western tributaries
	Burngrove Creek via tributaries west of Mimosa-Besgrove spoil landform
	Deep Creek via tributaries north and northwest of Deep Creek spoil landform
	Taurus Creek via tributaries southwest and south of Deep Creek spoil landform
	Emu Creek via western tributaries near the Stewarton North and Stewarton South spoil landforms
	Sirius Creek via western and southern tributaries
	Rockland Creek via tributaries west, north, east and south of Togara-North Marshmead, South Marshmead, Kennedy and Comet Downs East
	Minor unnamed creeks draining into Sirius Creek
	Residual voids (shallow seepage migrating downward into groundwater sinks)

Potential Pathway	Receptor(s)
Seepage via groundwater	Ramp 8 residual void
	Bonnie Doon residual void
	Mimosa-Besgrove residual void
	Deep Creek residual void
	Stewarton North and Stewarton South residual voids
	Tannyfoil residual void
	South Ballamoo residual void
	Kenmare residual void
	Ramp 74 residual void
	Togara-North Marshmead residual void
	South Marshmead residual void
	Kennedy residual void
	Comet Downs East residual void
TSF/rejects	
Surface water run-off	Deep Creek (NCPP TSF)
	Deep Creek (Ramp 36 rejects dump)
	Sirius Creek (Laleham TSF)
	Sirius Creek (Bottom Dam TSF and adjacent rejects area)
Seepage via shallow permeable strata	Deep Creek (NCPP TSF)
	Deep Creek (Ramp 36 rejects dump)
	Sirius Creek (Laleham TSF)
	Sirius Creek (Bottom Dam TSF and adjacent rejects area)
Seepage via groundwater	Deep Creek residual void (NCPP TSF, Ramp 36 rejects dump)
	Kenmare residual void (Laleham TSF, Bottom Dam TSF at end of mining)
	Togara-North Marshmead residual void (Laleham TSF and Bottom Dam TSF post-closure equilibrium)
	South Marshmead residual void (where applicable)
Void walls	
Surface water run-off	Associated residual void (run-off from void highwalls reporting directly into the void)

3.6.1.3.6.1 SPR results

The SPR has conservatively assumed that shallow permeable strata may provide plausible pathways for downward migration of seepage into deeper groundwater and lateral migration towards nearby creeks. Although their extent and connectivity are uncertain, these shallow strata are not considered final receptors. Any AMD-affected or saline seepage entering them would ultimately migrate downwards into the primary aquifer and report to the residual voids, which act as groundwater sinks, or, where a short pathway exists, to nearby ephemeral creeks.

3.6.1.3.6.1.1 Rehabilitated spoil landforms

For spoil landforms, the dominance of non-carbonaceous overburden, the low AMD hazard of most materials, the very small quantities of rejects and tailings, and the consistent downward hydraulic gradient mean the likelihood of seepage reaching surface water is low. Run-off from rehabilitated spoils will reflect the low salinity and low AMD hazard of the cover materials. A conservative assumption has been applied where buried tailings or rejects are located near landform edges, such as at Kenmare (Ramp 72 tailings and rejects) and the southern Mimosa-Besgrove landform (Ramp 32 rejects), where a shallow seepage pathway may plausibly occur.

- AMD: Low
- Non-oxidative salinity: Low

3.6.1.3.6.1.2 TSFs, rejects landforms and residual voids

Residual voids are the final receptors for seepage from spoil, TSF and rejects landforms and for run-off from void walls. Void walls and floors generally consist of low-hazard non-carbonaceous material with limited coal exposure. Tailings floors at Bonnie Doon and Ramp 74 will be capped and submerged, reducing AMD potential post-closure. Any AMD or salinity inputs are expected to be minor compared to evaporative concentration, which governs long-term void water quality.

Rehabilitated NCPP TSF

- AMD: Low to Medium
- Non-oxidative salinity: Low

Rehabilitated Laleham TSF

- AMD: Low
- Non-oxidative salinity: Low

Rehabilitated Bottom Dam TSF and rejects landform

- AMD: Low
- Non-oxidative salinity: Low

Ramp 36 rejects landform:

- AMD: Low to Medium
- Non-oxidative salinity: Low

Residual voids (effects on void water quality)

- AMD: Low to Low-Medium

3.6.1.3.7 Management and rehabilitation measures

Based on the detailed geochemical assessment of mining waste at BWM by TES (2026), the potential environmental risks associated with rehabilitated landforms are generally low for spoil and higher for landforms containing concentrated tailings or rejects.

Table 3-29 summarises the required geochemical management and rehabilitation measures to mitigate these risks. These measures align with the proposed closure strategy, including spoil placement, burial and encapsulation practices, and engineered cover systems. Concept cover designs are provided in Sections 3.6.1.6.4.1 for spoil and 3.6.1.6.4.2 for tailings.

In summary, rehabilitation requirements at BWM differ according to the AMD hazard of the underlying waste materials. Most spoil landforms contain more than 95% non-carbonaceous overburden and interburden, which poses a low AMD hazard. These landforms do not require engineered AMD controls beyond standard spoil placement, mixing of minor PAF materials with NAF waste, landform reshaping and seeding.

Higher-hazard landforms require specific AMD controls. These include engineered spoil covers for above-ground TSFs and rejects dumps, and hybrid spoil-and-water cover systems for in-pit TSFs. Tailings and rejects within Kenmare landform (Ramp 72 TSF and pit rejects) also require targeted encapsulation due to moderate-high to high AMD hazard. All cover systems will be optimised through additional design analysis prior to implementation.

Table 3-29 Geochemical management and rehabilitation measures to mitigate potential environmental risk by the BWM rehabilitated landforms

Rehabilitated landform	Environmental hazard rating (AMD source hazard)	Management and/or rehabilitation measures
Spoil landforms	Low	No specific AMD measures required beyond standard spoil placement, operational mixing/burial of minor PAF waste, landform reshaping and seeding.
Kenmare spoil landform (with buried Ramp 72 tailings and Kenmare pit rejects)	High	Encapsulation of Ramp 72 tailings and in-pit rejects within the landform; cover with spoil; optimised spoil cover design to manage AMD hazard; ongoing segregation and burial of PAF during operations.
NCPP TSF (stand-alone, above ground)	Moderate-High	Engineered spoil cover; final cover thickness and design to be determined through detailed assessment; run-off to be managed through reshaping and surface water controls.
Laleham TSF (stand-alone, in-pit)	Moderate-High	Engineered spoil cover; cover thickness and design to be optimised; additional spoil placement to augment existing thin cover.
Bottom Dam TSF and ROM 3 rejects	Moderate-High	Relocate ROM 3 rejects to form a rejects cap; engineered spoil cover over tailings and rejects; final cover design to be determined; surface drainage to be managed.
Ramp 36 rejects landform (stand-alone)	Moderate-High	Engineered spoil cover; cover thickness and material selection to be confirmed; reshape and seed landform to reduce erosion and infiltration.
Bonnie Doon NUMA Residual Void (in-pit TSF)	Moderate-High	Hybrid spoil and water cover; tailings to be capped to reduce oxygen ingress; cover design and thickness to be defined in further assessment.
Laleham Ramp 75 NUMA Residual Void (Ramp 74 in-pit TSF)	Moderate	Hybrid spoil and water cover; tailings to be capped; optimal cover thickness to be determined during detailed design.

Relationship with PRCP Schedule
The environmental risks posed by the spoil-related mineral wastes likely to be present at closure are low. As such, no specific AMD management measures (e.g., alkaline amendment or engineered capping systems) are expected to be required to manage mineral waste during rehabilitation and closure. For those mineral wastes with identified environmental hazards rated as moderate to high (TSFs, rejects), conceptual covers have been designed to reduce this risk.

3.6.1.4 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.

3.6.1.4.1 Quality of available resources

A growth media assessment was completed to inform the development of this PRC Plan, with the findings presented in the *Blackwater Mine Materials Characterisation Study* (Landloch, 2025b) provided in *Appendix 4.3 – Material Characterisation*. As part of this work, Landloch (2025b) characterised the rehabilitation resources available at BWM, including soil and spoil materials.

3.6.1.4.1.1 Topsoil

Landloch (2025b) collected 368 samples from 83 topsoil stockpile for analysis. 92 samples were tested for the ‘topsoil suite’ analysis, and for the remaining 276 samples the ‘basic suite’ analysis was conducted. The results categorised stockpiled topsoil for use in rehabilitation into three management groups described as follows.

3.6.1.4.1.1.1 Clay topsoil

Clay topsoils account for 75% of stockpile samples assessed and are evenly distributed across the mine. Generally, the clay soil samples have similar properties, but minor inclusions of sands and loams were observed at some stockpiles. This is likely a result of topsoils from minor texture contrast soil units being stripped with the more dominant clays. There are both light and heavy clay-textured soils at BWM.

In terms of material quality, clay topsoil generally have good nutrient retention and moisture-holding capacity but may require amelioration to address sodicity or salinity where present. Overall, clay topsoils are a high-quality soil material because their fine texture provides strong nutrient retention and water storage, supporting sustained vegetation growth when chemical constraints are managed.

3.6.1.4.1.1.2 Gravelly clay topsoil

Gravelly clay topsoils account for 15% of stockpile samples and are located within the southern portion of the mine. These soils have similar properties to the clay topsoils except for a higher gravel content. The gravelly clay soils are likely to be more erosion-resistant than the clay topsoils.

As a growth medium, they are generally of moderate quality, offering good physical stability and drainage but potentially limited chemical fertility due to sodicity and occasional salinity, which require management to support vegetation establishment and long-term soil function.

3.6.1.4.1.1.3 Loam topsoil

Loam topsoils account for 10% of stockpile samples and are located in the southern portion of the mine. These materials have a degree of variability, but due to the limited volumes present, they have been grouped together to aid their management. They are generally suitable as a growth medium but have moderate to low structural stability, being susceptible to slaking and dispersion. Chemical fertility is a key controlling factor for performance, and surface stability may be limited where vegetation cover is low.

3.6.1.4.1.1.4 Summary

Generally, the stockpiled topsoil is of adequate quality for use as a primary growth medium. The main limitations of using stockpiled soils in rehabilitation are low fertility and, for clay-dominated topsoil, sodicity.

Table 3-30 summarises the key chemical and physical properties of the available soil types at BWM (Landloch, 2025b).

Table 3-30 Summary of key chemical and physical properties for soils at BWM

Analysis	Loam	Clay	Gravelly clay
Chemical properties			
pHw	Strongly acidic to slightly alkaline (4.8-7.7)	Moderate to strongly alkaline (8-9)	Moderate to strongly alkaline (8.1-9)
$EC_{1:5}$ (dS/m)	Low to moderate (0.1-0.3)	Low to moderate (0.2-0.5)	Low to moderate (0.2-0.7)
Chloride (mg/kg)	Very low (<65)	Very low to moderate (60-463)	Very low to high (58-642)
Exchangeable sodium percentage ESP (%)	Non-sodic (0.7-4.7)	Non-sodic to sodic (3.3-13.6)	Non-sodic to Strongly sodic (4.5-16.6)
Total N (mg/kg)	Low (680-1450)	Low to moderate (760-1930)	Low (840-1420)
Available P (mg/kg)	Low to moderate (10-24)	Low to moderate (6-36)	Low (840-1420)
Available K (mg/kg)	Low to moderate (124-232)	Low to moderate (115-270)	Low (125-180)
Total Organic Carbon (TOC) (%)	Low to high (0.8-1.9)	Low to high (0.9-2.1)	Low to moderate (0.9-1.6)
Effective Cation Exchange Capacity (ECEC) (meq/10 g)	Low (3-10.4)	Moderate to high (13.7-27)	Low to high (12-28.2)
Ca/Mg ratio	Low Ca to balanced (2.5-4.6)	Low Ca (1.9-3.6)	Low Ca (1.4-3.4)
Physical properties			
Clay content (%)	10-30	>35	>35
Rock content (%)	10-30	<20	20-50
Dispersion (EAT)	Slightly dispersive to slaking (3b-5)	Slightly dispersive to stable (3b-7)	Slightly dispersive to slaking (3b-5)

Analysis	Loam	Clay	Gravelly clay
Permeability	Moderate	Low to moderate	Moderate
Associated regional soil	SI12 (Sodosol)	MM7 (Dermosol/Vertosol)	MM7 (Dermosol/Vertosol)
Associated SLU	B2v, D5, E1, E2, E3, E4, E5, F1, F2, F3 and S1	A1, B1, B3, C1, C1v, C1gv, D1, D1gv, D2, D3, D4 and D4SV	B2, D4rv, E1 and R1

* Chemical properties for topsoil are based on average 10th and 90th percentile values for all stockpile samples analysed (Landloch, 2025b)

3.6.1.4.1.2 Spoil materials

Landloch (2025b) collated geochemical and physical characterisation data available from multiple spoil assessments previously undertaken at BWM between 1998-2025. The results highlighted the following.

3.6.1.4.1.2.1 Fresh Permian materials

Fresh Permian materials are generally rocky and consist primarily of sandstone and siltstone. It is considered the most suitable waste for placement close to the final rehabilitated surface as a secondary growth media. It also has the potential to be used as rock armour to greatly increase batter slope resistance to erosion and to stabilise steeper areas.

3.6.1.4.1.2.2 Weathered Permian materials

Weathered Permian materials have a lower abundance and smaller rock content than fresh Permian. The rock consists primarily of low-durability mudstone and sandstone. It can be susceptible to capillary rise of salts if profile leaching is limited. Weathered Permian materials are considered suitable for use as a secondary growth material but should be capped with a primary growth material to prevent its exposure at the final rehabilitated surface.

3.6.1.4.1.2.3 Tertiary materials

Tertiary materials are weathered and often highly saline, strongly sodic, and prone to dispersion when compared to the fresh Permian. Placement of Tertiary material close to the final rehabilitated surface is not recommended on steeper gradient slopes (>15%) due to its susceptibility to erosion (including tunnel erosion) and potential toxicities to plant growth. However, targeted testing may identify suitable Tertiary materials that could potentially be used to form a marginal secondary growth medium where required. Monitoring data from lower gradient (≤15%) slopes show that tertiary materials can be used as secondary growth media to support grazing and woodland PMLUs (LEC 2025a, 2025b).

3.6.1.4.1.2.4 Summary

Based on the above, Permian (both fresh and weathered) and Tertiary materials (with targeted testing) have a high potential to be used as secondary growth media, through varying degrees of amelioration. Where primary growth media availability is limited, an ameliorated topsoil/fresh Permian and or Tertiary spoil mix could function as a primary growth media to support a woodland PMLU.

The key chemical and physical properties of BWM spoil are summarised in Table 3-31 (Landloch, 2025b).

Table 3-31 Summary of key chemical and physical properties for spoils at BWM

Analysis	Fresh Permian	Weathered Permian	Tertiary
Chemical properties			
pHw	Strongly alkaline (8.4-9.8, but can be highly acidic)	Strongly acidic to strongly alkaline (5-9.9, can be <5)	Strongly acidic to strongly alkaline (5-9.4, more often strongly acidic)
EC1:5 (dS/m)	Low to extreme (0.19-2.3)	Low to extreme (0.1-3.3)	Low to extreme (0.35-2.2)
Estimated ANC*	Reasonable	Reasonable	N/A
ECEC	Low to adequate	Low to adequate	Adequate
ESP (%)	Non-sodic to strongly sodic (3-30)	Non-sodic to strongly sodic (3-33)	Sodic to strongly sodic (14-30)
Ca/Mg (ratio)	Very low to low Ca, (0.3-1.9)	Very low to low Ca (0.3-1.4)	Very low to low Ca (0.4-2.1)
Fertility	Low to moderate	Low to moderate	Low
Physical properties			
Clay content (%)	20-40	15-45	>35
Rock content (%)	<74	30-60	10-20
Permeability	Moderate	Moderate	Low
Dispersed potential	Moderate to high	Moderate to high	High to extreme
Dispersion risk	Moderate to high	Moderate to high	High

***** ANC estimates were taken from the BMA Blackwater Mine Overburden Quality assessment (GTES, 2007)

3.6.1.4.2 Quantity of available resources

The rehabilitation at BWM requires growth media to support vegetation establishment for the planned PMLUs. As discussed below, sufficient quantities of topsoil are available on-site to support the rehabilitation of all disturbed areas associated with cattle grazing, woodland habitat and watercourse PMLUs.

The volume of topsoil available for rehabilitation includes the existing volume of topsoil on site (5,356,946 m^3 as of the November 2025 survey) plus the future topsoil expected to be generated through ongoing mine progression. Future mine progression is estimated to cover an area of 10,038 ha, which at a conservative 0.15 m topsoil strip depth, equates to 15,057,000 m^3 of future topsoil availability.

This is inclusive of topsoil stripping associated with the proposed BNEP footprint, estimated to generate approximately 3,519,715 m^3 of future topsoil (GT Environmental, 2026).

Taking into account existing available topsoil stockpiles and topsoil recovery through future mine progression (including the BNEP), the total forecast topsoil availability for BWM rehabilitation is approximately 20,413,946 m^3.

The rehabilitation at BWM requires growth media (soil and spoil) to support vegetation establishment for the planned PMLUs. The estimated volume of primary growth media required for rehabilitation of each PMLU is provided in Table 3-32.

The volumes required are inclusive only of disturbance areas where topsoil has previously been stripped, or is planned to be stripped in future according to the current mine plan. These estimates will be updated as required to reflect future changes to the mine plan.

Table 3-32 Required growth media volumes for BWM PMLUs

PMLU	Area requiring growth media (ha)	Primary growth media depth (m)[1]	Primary growth media volume required (m^3)
Cattle grazing	3,567	>0.15	5,350,000
Woodland habitat	13,252	>0.10	13,252,000
Watercourse	136	>0.15	204,000
Total growth media required			18,806,500
Total topsoil available			20,413,946
Balance[2]			1,607,446 (surplus)

[1]*Volumes are based on minimum applications rates as defined in the PRCP Schedule.*

[2]*As described in Section 3.6.1.5.3, additional suitable secondary materials (spoils) are available and may be combined with soils to form an alternative primary growth media to support the rehabilitation of steeper woodland habitat PMLU slopes.*

The above assessment demonstrates that sufficient growth media resources are available to support achievement of PMLUs under the PRCP Schedule.

3.6.1.4.3 Resource management

During mining operations, topsoil is stripped according to the recommended depths from pre-mining soil surveys and in line with the *BWM Topsoil Management Plan* (Whitehaven 2026). The topsoil is either spread directly in rehabilitation areas or stockpiled progressively for later use.

Existing topsoil stockpiles are located throughout the MLs and can be readily accessed for loading and haulage to rehabilitation areas.

Stockpile locations and volumes will vary throughout the life of the operation as stockpiled topsoil is used for rehabilitation and new stockpiles are created as mining advances. The spatial location of stockpiles is recorded in a geographic information system and a volume inventory is maintained.

In terms of applying growth media to the respective PMLUs, topsoil will preferentially be allocated to areas to be rehabilitated under the cattle grazing and watercourse PMLUs.

For the woodland habitat PMLU, various options are available for growth media application to yield the best outcome for the land to be rehabilitated. Through the rehabilitation planning process, the most appropriate growth media composition will be determined to achieve a safe, stable, non-polluting and self-sustaining outcome. This may include the use of topsoil only, or combinations of topsoil with suitable Permian materials (fresh and or weathered), or Tertiary materials, where appropriate.

An assessment of the growth media characteristics will be completed by an AQP to determine the amelioration requirements to suit the revegetation plan (Section 3.6.1.8). The required growth media depth, amelioration options and surface treatment requirements to support the establishment of vegetation for each PMLU are in Table 3-33.

3.6.1.4.3.1 Growth media assessment

In accordance with PRCP Schedule Criteria RM4.1, a growth media assessment will be undertaken by an AQP following growth media stripping to evaluate the physical, chemical, and biological properties of

available materials. Laboratory analysis results will inform the selective placement of soils within rehabilitation areas to optimise landform stability, erosion control, and vegetation establishment.

3.6.1.4.3.2 Growth media treatment

In accordance with PRCP Schedule Criteria RM4.2, where growth media assessments identify limitations, a range of amelioration treatments may be considered to meet requirements, such as the addition of gypsum, fertilisers, or organic matter to enhance suitability for vegetation establishment and long-term ecosystem function.

As discussed in Section 3.6.1.4.1, stockpiled topsoil at BWM has certain limitations such as low fertility and, for clay-dominated topsoil, sodicity. Accordingly, amelioration treatments may be required to ensure the growth media achieves suitable quality for sustainable rehabilitation outcomes.

Potential amelioration practices may include the following:

- Gypsum application to sodic soils to reduce dispersion risk and improve structure. This may occur during stripping or stockpiling to allow adequate time for reaction.
- Nutrient amendments such as nitrogen (urea), phosphorus (diammonium phosphate (DAP) or superphosphate), and potassium fertilisers to address identified nutrient deficiencies.
- Organic amendments (e.g. compost, manures or mulched vegetation) to increase organic carbon, enhance nutrient cycling and promote microbial activity.
- Surface mulching (e.g. hay mulch) to reduce erosion, conserve soil moisture and support vegetation establishment.
- Physical treatments such as contour ripping to improve infiltration and, where appropriate, incorporation of rock fragments to increase soil profile stability.

3.6.1.4.3.3 Growth media application

Prior to growth media placement, landforms will be shaped and stabilised in accordance with PRCP Schedule RM3, ensuring that final grading, drainage controls and erosion protection measures are in place.

Growth media application will be guided by the results of growth media assessments (Section 3.6.1.4.3.1) and any subsequent treatment recommendations (Section 3.6.1.4.3.2). The following practices are generally applied to support effective rehabilitation outcomes:

- Sequencing: Growth media is placed to the target thickness as specified for each PMLU (see Table 3-31).
- Timing: Placement will be avoided during or immediately after heavy rainfall to minimise erosion risk, sediment transport and loss of growth media resource.
- Uniform coverage: Growth media will be spread in an even layer, consistent with rehabilitation objectives and material availability.
- Handling: Growth media will be handled in a manner to avoid unnecessary double handling or compaction where possible.
- Uniform coverage: Media will be applied in an even layer, consistent with rehabilitation objectives and material availability.
- Surface preparation: Contour ripping to a minimum depth of ≥300 mm or other surface treatments may be undertaken to improve infiltration and reduce surface runoff.
- Integration of treatments: Growth media requiring amelioration (e.g., gypsum, fertilisers, organic matter) may be treated prior to placement or incorporated during spreading, as recommended by an AQP.

- Revegetation: Vegetation cover will be established as soon as practicable following placement. Appropriate seed mixes (including sterile cover crops, pasture species, and native trees) will be sown according to the target PMLU.
- Monitoring: Rehabilitated areas will be regularly inspected to assess landform stability, erosion control, vegetation establishment, and weed management. Corrective actions will be implemented where performance criteria are not met.

The required growth media depth, amelioration options and the surface treatment requirements for each PMLU are shown in Table 3-31. These treatments will be applied as part of rehabilitation works where required and as directed by an AQP to ensure the growth media meets the soil quality criteria set out in the milestone targets

Table 3-33 Growth media ameliorant options and surface treatments for the BWM PMLUs

PMLU	Growth media	Ameliorant options	Surface treatments
Cattle grazing	Topsoil – minimum depth of 150 mm is sufficient to store moisture and nutrients to initiate and sustain pasture growth	— Manure — Urea — DAP / MAP — Superphosphate — Potassium fertiliser — Gypsum — Incorporated organic matter — Surface mulching (e.g. hay mulch)	— Ameliorate growth media as recommended by an AQP (if required) — Rip on contour — Direct seed as per seed mixes and rates for cattle grazing revegetation (Section 3.6.1.8.5)
Woodland habitat	Growth media (topsoil, fresh Permian, topsoil/fresh Permian mix) – minimum depth of 100 mm. If using topsoil only maximum depth of 150 mm to limit the effects of competition on woodland species due to the potential loads of exotic pasture species	— Manure — Superphosphate — Potassium fertiliser — Gypsum — Incorporated organic matter — Surface mulching (e.g. hay mulch)	— Ameliorate growth media as recommended by an AQP (if required) — Deep rip on contour to incorporate rock — Direct seed as per seed mixes and rates for woodland habitat revegetation (3.6.1.8.7)
Watercourse	Topsoil – minimum depth of 150 mm to encourage a vegetative cover to provide erosion resistance	— Manure — Superphosphate — Gypsum — Incorporated organic matter — Surface mulching (i.e. hay mulch)	— Ameliorate growth media as recommended by an AQP (if required) — Rip on contour as required — Direct seed as per seed mixes and rates for watercourse revegetation (Section 3.6.1.8.9)

Relationship with PRCP Schedule
Physical and chemical properties of the soil and spoil materials available onsite meet the requirements to establish the PMLUs of cattle grazing, woodland habitat and watercourse. Based on the growth media volumes available at BWM, rehabilitation requirements will be satisfied. Any amelioration requirements will be determined by an AQP.

3.6.1.5 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.

The BWM final landform design presented in this PRC Plan represents a conceptual level design, subject to an iterative refinement process, comprising overburden/spoil, TSF and reject emplacements, along with residual voids. The conceptual landform design will form the basis for the Closure Landform Design Report to be submitted to the administering authority by 1 July 2028 (per PRCP Schedule Condition PRCP12).

The Closure Landform Design Report is a technical document to be prepared by an AQP, and peer reviewed by an independent AQP. It is to include all relevant structures and watercourse diversion designs. The relevant structures at BWM include:

- Overburden/spoil emplacements;
- Waste rock dumps;
- Tailings storage facilities;
- Residual voids; and
- Flood protection landforms.

To meet the requirements of PRCP Schedule Conditions PRCP12 and PRCP13, the Closure Landform Design Report is to:

- Incorporate all relevant structures and watercourse diversion designs.
- Be certified by an independent AQP as safe, erosionally and structurally stable.
- Demonstrate appropriateness to the applicable PMLU or NUMA.
- Contain a suitable level of detail in respect to planned execution timing.
- Have regard to material properties and local conditions as they apply to geotechnical and erosional stability risk.
- Include performance criteria that demonstrates the landform will support the achievement of a stable condition.
- Be maintained and updated as necessary to ensure material changes to the design remain capable of achieving and sustaining a stable condition, with any updates recertified by an AQP (per PRCP Schedule Condition PRCP12).

In addition, permanent watercourse diversions will be subject to the preparation of area-specific Design Plans in accordance with PRCP Schedule Condition PRCP14. For the permanent Sirius Creek diversion, a Design Plan is to be submitted by Whitehaven to the administering authority by 1 July 2030. The Design Plan is to be prepared by a Registered Professional Engineer of Queensland (RPEQ) in accordance with the guideline *Works that interfere with water in a watercourse for a resource activity—watercourse diversions authorised under the Water Act 2000 (OSW/2019/4599)* (DNRME, 2019), or its latest revision.

Design Plans for the remaining permanent diversions will be submitted to the administering authority at least 24 months prior to construction.

Each Design Plan will align with the PMLU identified in the PRCP Schedule, demonstrate that the diversion alignment will achieve a stable condition, and be consistent with the Closure Landform Design Report required under PRCP Schedule Condition PRCP12. The Design Plans will also demonstrate that the diversions will not prevent any flood protection landforms from achieving the outcomes required under PRCP Schedule Conditions PRCP15 and PRCP16, or PRCP Schedule Criteria RM3.12.

The conceptual landform design presented in this PRC Plan has been developed using design criteria derived from a site-specific Water Erosion Prediction Project (WEPP) model and the areas assigned a PMLU have been tested using the SIBERIA landform evolution model with input parameters derived from laboratory-based flume and rainfall simulation and the WEPP model.

Landform design considers the landform development and reshaping of all relevant activity areas after the removal of infrastructure, and prior to placement of growth media and seeding.

All landform designs have been guided by the objectives to achieve long-term erosional stability and be non-polluting whilst supporting the target PMLU.

BWM includes existing progressive rehabilitation areas that have been designed and reviewed based on observed performance. As such, the landform design concept has been informed not only by theoretical modelling and analysis, but also by site-specific experience and observed outcomes. Formal rehabilitation trials are therefore not proposed to test the overall landform design concept, with historical performance providing a suitable basis to inform rehabilitation practices. However, minor refinements to rehabilitation methods may be implemented over time, with site practices adapted as monitoring results and performance outcomes continue to inform the ongoing refinement of the landform design concept.

3.6.1.5.1 Conceptual 3D closure landform design

The conceptual 3D closure landform design for BWM is presented inFigure 3-60.

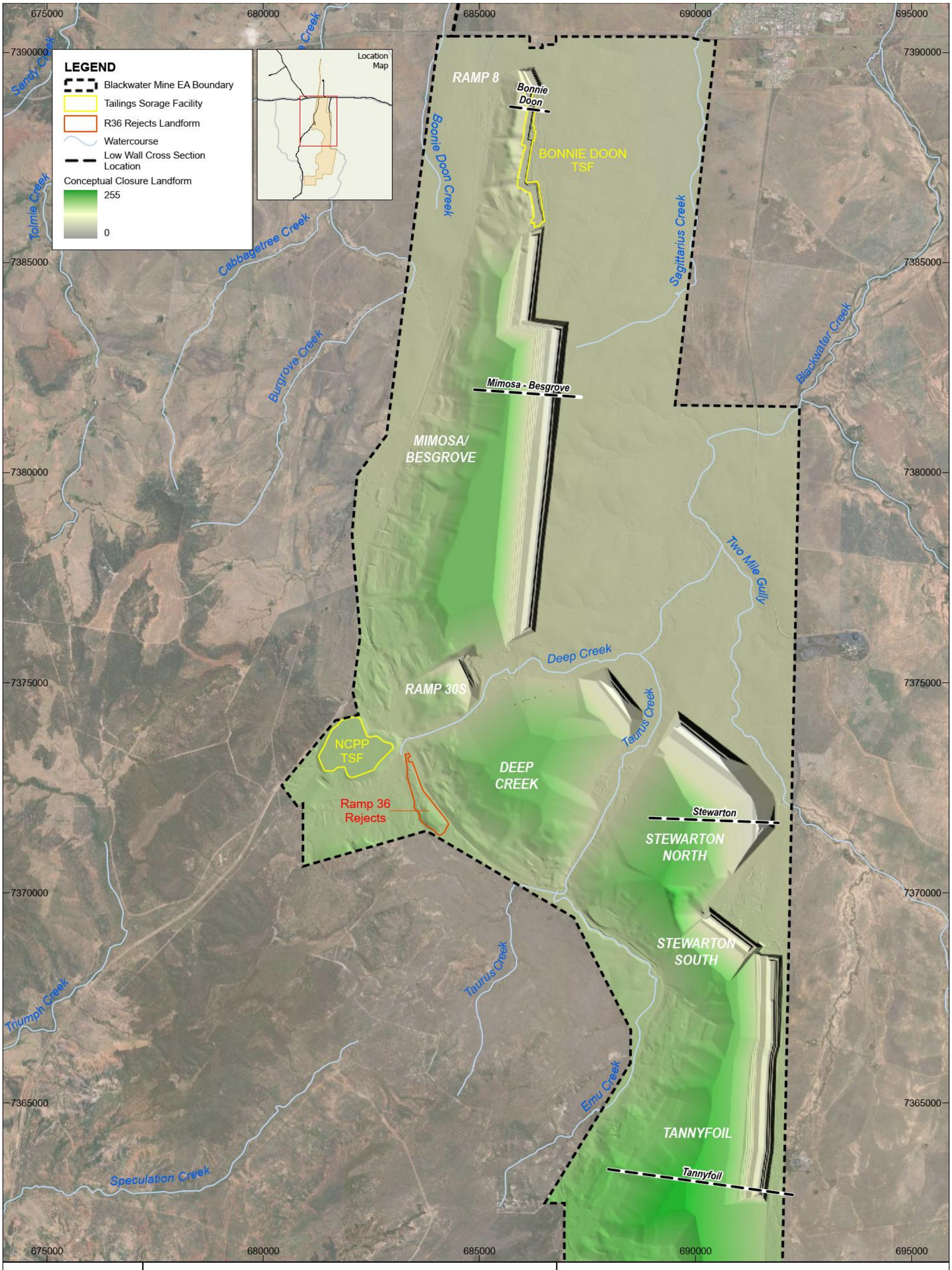


Figure 3-60 BWM conceptual 3D closure landform design (North area)

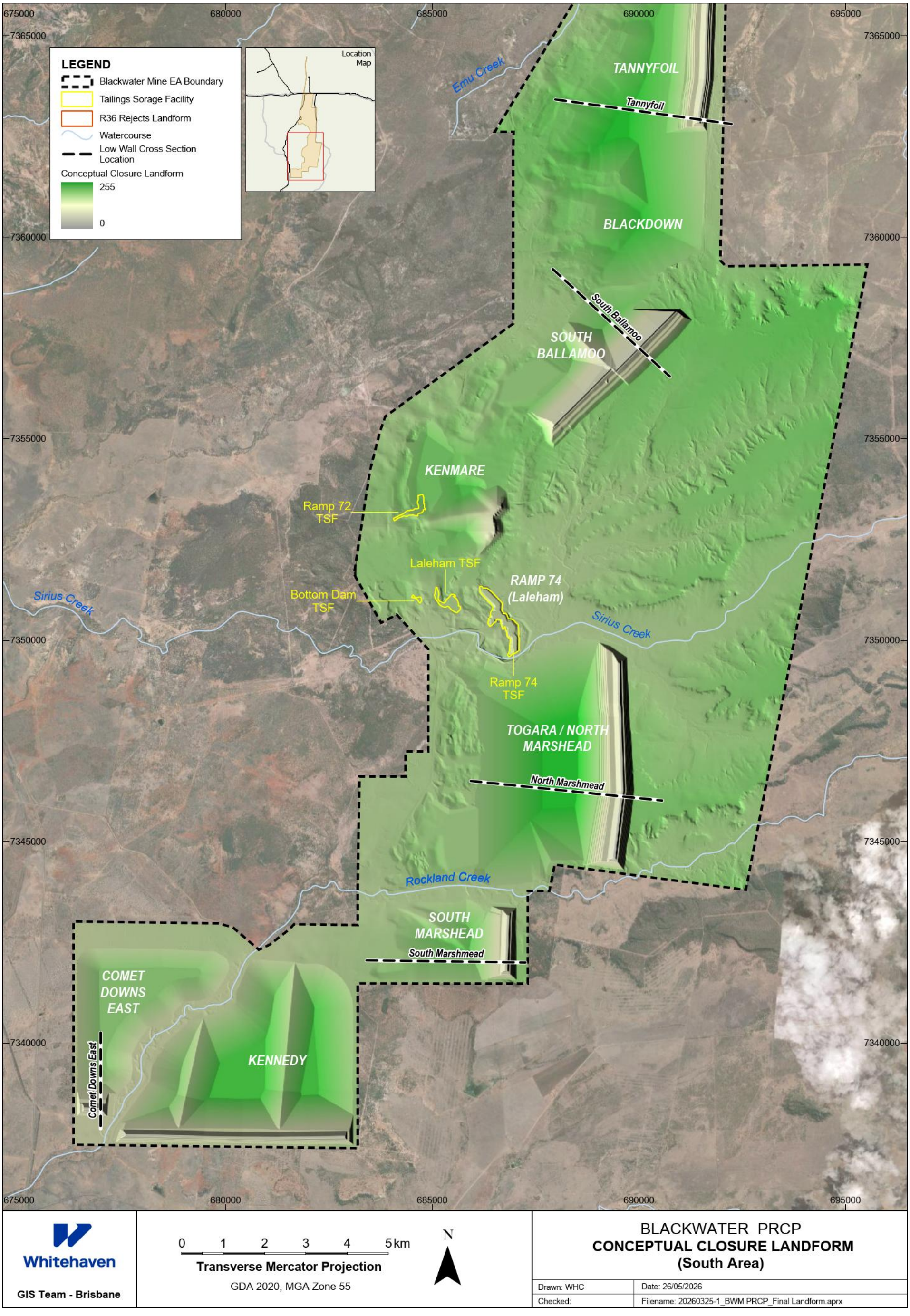


Figure 3-61 BWM conceptual 3D closure landform design (South area)

3.6.1.5.2 Landform design methodology

The following landform design assessments have been undertaken to support the development of this PRC Plan and are provided in *Appendix 4.8 – Landform Design*:

- Erosion and Landform Evolution Simulations to Support Waste Landform Design: Blackwater Mine Landloch, 2026; and
- Landform Evolution Modelling Simulations to Support Tailings Storage Facility Design (Landloch, 2025a).

These assessments also informed the development of the PRCP Schedule conditions that guide landform design and the preparation of the Closure Landform Design Report described above.

In addition to Landloch (2026 and 2025a), the current iteration of the conceptual final landform design has been refined based on the outcomes from the studies listed below, undertaken to support this PRC Plan:

- A geotechnical stability assessment of the highwalls, low walls and end walls of the residual voids (Section 3.6.3.2);
- A voids in flood plain modelling assessment (0); and
- A hydrogeological assessment (3.6.1.1).

The conceptual final landform design current at the time of the PRCP Schedule decision, dated 17 April 2026, incorporated refinements to mining limits to ensure geotechnical stability of the residual voids is achieved (Section 3.6.3.2), refinements to residual void extents to mitigate the risk of flooding (Section 3.6.1.2) and amendments to spoil dump slope angles for erosional stability (Section 3.6.1.5.6).

Overarching landform design is driven by an area's PMLU. Slope gradients on cattle grazing PMLUs must not exceed 25%. 70% are to be equal to or less than 20% and at least 50% are to be equal to or less than 15% (PRCP Schedule Criteria RM3.6). Woodland habitat PMLU slopes must not exceed 30% (PRCP Schedule Criteria RM3.7).

3.6.1.5.2.1 Assessed materials

The rehabilitation materials used in the WEPP erosion and SIBERIA landform evolution modelling in Appendix 4.8 (Landloch 2026 and 2025a) are described in Table 3-34. Landform design must consider the rehabilitation material in conjunction with both the slope grade and a minimum groundcover requirement. The base case design criteria require (PRCP Schedule Criteria RM6.3):

- ≥70% groundcover on slopes constructed to ≤15% using a heavy clay growth media.
- ≥50% groundcover on slopes constructed to ≤15% using a light clay growth media.
- ≥80% groundcover on slopes constructed at >15%, but ≤30%, using a fresh Permian growth media.

Alternative slope grades and groundcover percentage combinations are acceptable where prescribed by an AQP, or comply with the maximum slope grade and length combinations prescribed by *Attachment 10 – Acceptable Material, Slope Grade, Slope Length and Groundcover Combinations for Relevant Structures* of the PRCP Schedule conditions.

Groundcover is defined in the PRCP Schedule conditions as anything in contact with the soil surface including live cover, standing dry cover, organic litter (including leaves, hay, woody debris) or rocks.

Table 3-34 Summary of materials used in the erodibility assessments at BWM

Analysis	Unit	Light Clay Topsoil	Heavy Clay Topsoil	Fresh Permian Waste
Source/reference		*Stockpile 93*	*Stockpile 291b*	*Landloch (2026; 2025a)*
pH_w	-	8.0 Moderately alkaline	8.6 Moderately alkaline	9.0-9.8 Strongly alkaline
$EC_{1:5}$	dS/m	0.4 Moderate	0.24 Low	<1.2 Low to high
ECEC	meq/100 g	23 Moderate	23 Moderate	12-16 Moderate
ESP	%	1.9 Non-sodic	13 Sodic	15-34 Strongly sodic
Clay Content		41	50	14-28
Rock Content		10	10	15-95
Sample Photo	-			

Gravelly clay soils were not considered separate from clay soils in the study due to their similarities.

3.6.1.5.2.2 Landform considerations, criteria and specifications

Landform design considerations are outlined in Table 3-31. These considerations will be further developed through the preparation of the Closure Landform Design Report (PRCP Schedule Condition PRCP12), where they will be refined into the conceptual final landform design criteria and specifications. Given the scale and diversity of rehabilitation works proposed at BWM, it is acknowledged that the conceptual criteria and specifications documented in the Closure Landform Design Report may not be suitable for all locations and may not achieve the required performance outcomes in every area. Where this occurs, area-specific landform design criteria and specifications will be developed by an AQP and documented in the *Work Plan* for the relevant area prior to detailed design and execution (PRCP Schedule Criteria RM3.2). These *Work Plans* will include criteria specifically addressing localised risks within the defined design boundaries. Where departures result in material changes to the broader conceptual closure design, the Closure Landform Design Report will be updated accordingly and the changes certified by an AQP (PRCP Schedule Condition PRCP13). Following the execution of any *Work Plan* that deviates from the Closure Landform Design Report, as-constructed reports (PRCP Schedule Criteria RM3.3), together with the quality assurance outputs described in Section 3.6.1.5.9, will be prepared.

Table 3-35 Landform structures at BWM and proposed designs

Relevant Activities	Landform design considerations
Spoil dumps with PMLUs	— Relevant structures will be developed and/or reshaped such that they are consistent with the Closure Landform Design Report or AQP prepared alternative design (PRCP Schedule Condition PRCP12 and Criteria RM3.1) Alternative designs are documented in As-Constructed Reports (PRCP Schedule Criteria RM3.2). — Maximum dump heights varying from 120 m up to 180 m above ground level to fit the waste scheduled to be mined — 20 m dump lift heights — Erosion and sediment control systems are to be installed in accordance with the AQP certified Closure Landform Design Report (PRCP Schedule Condition PRCP12), or AQP prepared alternative designs (RM3.2) (PRCP Schedule Criteria RM3.4). — Spoil dumps are to achieve a geotechnical stability FOS ≥ 1.5 at the safety bund which includes consideration of flood stress, unless an alternative is justified by an AQP (PRCP Schedule Criteria RM3.5). — For the cattle grazing PMLU at least 70% of slopes are to be ≤20% gradient and at least 50% of slopes are to be ≤15% gradient. No slopes are to be ≥25% gradient (PRCP Schedule Criteria RM3.6). — For the Woodland habitat PMLU slopes are to be reshaped to ≤30% gradient (PRCP Schedule Criteria RM3.7). — Unless an alternative design is prescribed by an AQP, or the maximum slope grade and length combinations as per *Attachment 10 - Acceptable Material, Slope Grade, Slope Length and Groundcover Combinations for Relevant Structures* of the PRCP Schedule conditions are achieved (PRCP Schedule Criteria RM6.4), the following minimum groundcover is achieved for spoil dumps with PMLUs (PRCP Schedule Criteria RM6.3): • Slopes ≤15% constructed with a heavy clay growth media must achieve ≥70% groundcover. • Slopes ≤15% constructed with a light clay growth media must achieve ≥50% groundcover • Slopes >15 and ≤30% constructed with fresh Permian growth media must achieve ≥80% groundcover.
TSFs and rejects landforms with PMLUs	— All tailings and rejects are to be encapsulated by at least 1 m of consolidated non-acid forming (NAF) material, unless an alternative is recommended by an AQP (PRCP Schedule Criteria RM3.9). — In the absence of an AQP designed cover system, the following concept design criteria apply (PRCP Schedule Criteria RM3.10): • NCPP TSF: 1 m minimum thickness layer of weathered Permian and/or Tertiary spoil followed by 2 m minimum thickness of more permeable material. • Ramp 72 TSF: 1.5 m thickness of gravelly spoil or coarse over exposed tailings. Spoil, 3.5 m thick at the top of the ramp, 5 m thick over coarse rejects over the remainder of the TSF, dumped and spread in such a way that dispersive spoil with high fines content is not placed in the outer 1 m of the landform. • Laleham TSF, Bottom TSFs and R36 Rejects Dump: 5 m thickness of spoil dumped and spread in such a way that dispersive spoil with high fines content is not placed in the outer 1 m of the landform. — The final cover surface of TSFs and reject dumps are water shedding and free from surface ponding, unless an AQP certified alternative design is adopted (PRCP Schedule Criteria RM3.11).

Relevant Activities	Landform design considerations
	— The flood protection landform for Ramp 74 must be designed to prevent inundation during a 0.1% AEP flood event, or less likely event if determined necessary by the AQP who conducts the Consequence Category Assessment (CCA) in the Flood Susceptibility and Impact Assessment (PRCP Schedule Criteria RM3.12(a), PRCP Schedule Condition PRCP16). — Flood protection landforms must mitigate the impacts of high-energy flow (≥2.5m/s) against the constructed landforms (PRCP Schedule Criteria RM3.12(b)).
Infrastructure and general areas: — CHPPs and associated infrastructure, — workshop, — buildings, — stockpile areas, — laydown areas, — roads, — mine dams, — drains, — exploration drill holes	With the exception of infrastructure to remain as part of the PMLU, or where infrastructure is agreed to be retained by the landholder as evidenced by a signed landholder agreement, the following are to be completed: — above and below ground services (water, electricity, gas) within 0.5 m of the final landform surface are to be disconnected and removed. All pipelines are to be drained; — buildings, fencing, associated foundations and related materials within 0.5 m of the final landform surface are to be removed and disposed of on-site if they are a type of waste authorised under the EA, or if not authorised under the EA, transported offsite for lawful disposal; — hardstands, concrete, roads and construction materials within 0.5 m of the final landform surface are to be removed and disposed of on-site if they are a type of waste authorised under the EA, or if not authorised under the EA, transported offsite for lawful disposal; — dams dewatered and desilted, and dam liners removed; — surface water drainage infrastructure (including watercourse crossings and culverts) that does not form part of a watercourse PMLU, or NUMA are to be removed; — drillholes, bores (not used for the purposes of monitoring per the PRCP Schedule), sediment ponds and sumps are to be removed; and — areas to be reshaped and be free-draining with all slopes ≤12%.
NUMAs	— The final landform NUMAs have been constructed in accordance with the landform closure design report (PRCP Schedule Condition PRCP12, PRCP Schedule Criteria MM4.1). — NUMA area extents are designed to not exceed the maximum limits defined in the PRCP Schedule (MM1.1). — High-walls and end-walls to remain as the final excavated wall profiles and include benches. — Low walls within NUMAs contain as-dumped angle of repose dragline spoil up from the pit floor, with benching of variable width and reshaped batters above, to the NUMA boundary. — Erosion of the landform within the NUMA area will not negatively impact on the stability of any adjacent rehabilitation areas, or their ability to sustain their PMLU (PRCP Schedule Criteria MM4.3). — The NUMA is safe to humans and livestock (PRCP Schedule Criteria RM4.4). — NUMAs retain flood immunity for 0.1% AEP events, and during a less likely flood event than an 0.1% AEP event for the R74 residual void if required (PRCP Schedule Condition PRCP16(b)(ii)), as confirmed by flood modelling (PRCP Schedule Conditions PRCP 16(b)(ii) and PRCP17, and PRCP Schedule Criteria MM4.7)).

Relevant Activities	Landform design considerations
	— The Closure Landform Design Report (PRCP Schedule Condition PRCP12) is prepared by an AQP and is based on latest flood modelling and materials data prior to construction (PRCP Schedule Criteria MM1.3) — Pit walls and TSFs achieve a minimum FOS ≥ 1.5 at the safety bund (certified by an AQP) (PRCP Schedule Criteria MM1.4). — The landform structures along the high-wall should not be constructed out of dispersive material and will have the same geometry and maintenance requirements as other landforms. — A minimum distance of 50 m is to be designed between the residual void crest and the toe of the safety bund, where against an external perimeter mining lease boundary (PRCP Schedule Criteria MM1.5). — The location of the voids and associated safety bunds does not cause instability or degradation to the land outside the NUMA (PRCP Schedule Criteria MM1.6). — Residual voids must not overtop to the receiving environment (PRCP Schedule Criteria MM1.7).

3.6.1.5.3 Materials available for landform rehabilitation

The landform at BWM utilises materials available on-site that are intended to achieve landform stability. These are generally soils and waste material (spoil), which is discussed in Section 3.6.1.4. Clay soils are the dominant soils across BWM and are generally suitable for use as the primary growth media (Landloch, 2026).

Fresh Permian spoil was also found to be suitable for use as a secondary growth media (i.e. under a primary growth medium, within the effective rooting zone) and in the creation of a soil-rock mixture (1:2 soil:rock). Weathered Permian and Tertiary spoil were found to be unsuitable for plant growth and prone to high rates of erosion and should be capped with a suitable quality soil to prevent exposure in the final rehabilitated surface. These materials should not be used to create the soil-rock mixture for rehabilitation (Landloch, 2026).

Rock (found in fresh Permian spoil) will be utilised on the steeper final landform slopes to improve the erosion resistance by creating a 1:2 soil rock mixture for use as a primary growth medium (discussed further in Section 3.6.1.5.6). Rock will be sourced from the mined overburden and will be used directly in rehabilitation areas or stockpiled when required for the planned rehabilitation. Sufficient quantities of fresh Permian spoil are expected to be available to support the application of soil:rock mixtures. The use of a soil:rock mixture as a primary growth medium will be limited to the woodland habitat PMLU. The woodland habitat PMLU has an estimated topsoil demand of 13.4 Mm^3 (Table 3-32). Applying the 1:2 soil to rock ratio, approximately 26.8 Mm^3 of fresh Permian spoil would be required if all of the Woodland PMLU was to use the soil:rock mixture as the primary growth media. A mining strip 60 m wide is estimated to produce more than 10 Mm^3 of fresh Permian spoil per kilometre of length. The pit length in the middle of the mine is approximately 40 km. Based on these estimates, only a relatively small proportion of the available mining strip length would be required to satisfy this demand.

3.6.1.5.4 Hydrological and hydrogeological assessments

The final landform is to be non-polluting with respect to groundwater and surface water. As such, flooding and hydrogeological assessments on the final landform were completed, as described in Sections 3.6.1.2 and 3.6.1.1 respectively and summarised below.

A final landform flood assessment, including hydrologic and hydraulic modelling, was completed for the closure landform as discussed in (WRM, 2025). Assuming 70% groundcover on rehabilitated landforms, including flood protection landforms, the risk of flood-induced erosion is expected to be low for flood

velocities up to 2.1 m/s (WRM, 2025). As such, the toe of rehabilitated landforms will be located in areas where flood velocities are less than 2 m/s for all events up to the 0.1% AEP and therefore the final landform is expected to remain stable for all flood events up to 0.1% AEP design flood event (WRM, 2025). For events rarer than the 0.1% AEP (e.g. the PMF) severe erosion and scour is likely to occur throughout the catchment with or without alterations to the landscape resulting from mining operations (WRM, 2025). These landforms will be designed by an AQP based on the latest flood modelling and materials data prior to construction (PRCP Schedule Criteria MM1.3).

The hydrogeological assessment identified that the final landform overall will be a groundwater sink, due to inward hydraulic gradients towards the residual voids capturing all potential seepage, the residual (equilibrium) void lake levels will remain below the shallow groundwater bearing units for all but four of the residual voids. Outflows from the four residual voids with net outward fluxes (i.e. Bonnie Doon, Stewarton South, Ramp 30 and Ramp 74) will be towards neighbouring residual voids with equilibrium lake levels at lower elevations and not to areas outside the mining leases. There were no modelled spills to the receiving environment beyond the BWM tenure boundaries, for any residual voids (SLR, 2026a; HydroBalance, 2026).

3.6.1.5.5 Final landform hydrology

A guiding principle for the design of the final landform is to safely shed surface water from the aboveground structures and convey clean, uncontaminated surface water flows towards the receiving waterways via natural drainage paths. Surface water flows from spoil landforms above natural surface level will not be permitted to report to the residual voids. Water collected within the residual void footprints will be retained within the residual voids.

The final landform batters in PLMLU areas have been designed to shed rainfall without the need for permanent berms or water management infrastructure. However, landform surface water drainage control features may be required to safely convey rainfall off the landform. Design and construction of drainage control features will be undertaken during the detailed design phases and will be a primary driver of final landform performance in PMLU areas. Fresh Permian spoil rock will be used as armouring or rip rap.

Designs will incorporate climate change considerations based on the best available guidance at the time. Open channel drains will be designed to ensure flow velocities are within tolerances to avoid scour, whilst remaining high enough to facilitate a sediment transport regime that will prevent excessive deposition and the risk of channel flows breaking out of their intended paths. The risk of surface water infrastructure is highest during the initial years post construction whilst armouring rock settles and vegetation establishes. Drainage structures will be designed and constructed with suitably sized Permian spoil rock that is to be embedded into the underlying subgrade where flow velocities cannot be reduced to rates with low erosion risk, i.e. <2.5 m/s.

The closure monitoring and maintenance program will be critical to the success of the final landform. Regular inspections of surface water drainage controls will identify potential issues and trigger prompt remediation where required. The monitoring and maintenance program will provide a key source of evidence demonstrating the landform is stabilised and is likely to function correctly well into the post-closure phase.

3.6.1.5.6 Long-term landform erosional stability

Material testing, erosion modelling and landform evolution modelling of the spoil dumps and tailings storage facilities have been completed by Landloch to establish acceptable slope profiles for the materials at BWM to ensure long-term landform stability. These reports are provided in Appendix 4.8 (Landloch 2026 and 2025a). The studies included:

- Initial runoff and erosion model simulations for a range of spoil dump landform and tailings storage facility landform options using the Water Erosion Prediction Program (WEPP) over a period of 100 years.

- Derivation of parameters for the SIBERIA landform evolution model (LEM).
- Landform evolution simulations using SIBERIA for the 3D landform (version LF4.4) of the BWM spoil dumps and tailings storage facilities (designed based on the WEPP results) over a period up to 300 years.

Erodibility data for materials considered in the WEPP simulations and SIBERIA landform evolution model simulations indicate that the Blackwater spoil and TSF landforms generally have a low tendency to promote ongoing rill and gully erosion provided the correct slope gradients, surface materials and groundcover levels are achieved (see Table 3-35 above).

For spoil landforms, slopes with gradients of 15% or less covered with light or heavy clay soils and groundcover levels of 50% and 70%, respectively, are not prone to significant gully erosion. Slopes constructed from fresh Permian spoil with gradients greater than 15% also show a low tendency for gully erosion at groundcover levels of 80%. For landforms associated with the South Ballamoo, South Marshmead and Kennedy residual voids, slightly deeper gullies were predicted, and gully erosion should be monitored as part of rehabilitation monitoring to confirm long-term performance. Area-specific Work Plans that adopt alternative gradient and slope lengths may be required in these locations. Area-specific designs will be prepared by an AQP or comply with the grade, slope length and groundcover combinations prescribed in *Attachment 10 - Acceptable Material, Slope Grade, Slope Length and Groundcover Combinations for Relevant Structures* of the PRCP Schedule conditions.

For tailings storage facilities, the Bottom Dam and Laleham TSFs are predicted to have a low tendency for gully erosion provided the correct soils and vegetation cover levels are achieved, while the NCPP TSF is predicted to erode at slightly higher rates due to steeper outer slopes (20% rather than 15%). The increased erosion risk at NCPP can be mitigated by refining slope gradients in affected areas. Embankments of the NCPP TSF where unacceptable erosion rates are predicted to occur will be subject to area-specific Work Plans prepared by an AQP or will comply with the grade, slope length and groundcover combinations prescribed in *Attachment 10 - Acceptable Material, Slope Grade, Slope Length and Groundcover Combinations for Relevant Structures* of the PRCP Schedule conditions.

The modelling results also indicate that average annual erosion rates for both vegetated soil and vegetated fresh Permian waste surfaces reduce through time, showing that rehabilitated landforms are predicted to trend toward increased erosional stability over the long term. Modelling results and figures supporting these conclusions can be found in Appendix 4.8.

3.6.1.5.7 Method of construction

The spoil dumps are constructed using dragline and truck/shovel mining methods. The truck/shovel spoil dumps are constructed using a bench and batter approach. When an area of spoil emplacement has been dumped out and is ready to be progressively rehabilitated, this area will be released for rehabilitation in accordance with the Closure Landform Design Report (PRCP Schedule Condition PRCP12). Where a particular area that has been released for rehabilitation cannot comply with the Closure Landform Design Report, area-specific landform design criteria and specifications will be developed by an AQP and documented in the *Work Plan* for the relevant area prior to detailed design and execution (PRCP Schedule Criteria RM3.2). These *Work Plans* will include criteria specifically addressing localised risks within the defined design boundaries. *Work Plans* will prescribe the target grades and surface water drainage control features required for the rehabilitation area. Surface water drainage features will be designed by an appropriately qualified water engineer. Work Plans will include details such as the volumes and specifications for materials to be used in the construction, including the appropriate surface material based on grade, and the size and durability of armouring rock for drop structures and open channels. Where departures from the Closure Landform Design report result in material changes to the broader conceptual closure design, the Closure Landform Design Report will be updated accordingly and the changes certified by an AQP (PRCP Schedule Condition PRCP13). Following the execution of any Work Plan that deviates

from the Closure Landform Design Report, as-constructed reports (PRCP Schedule Criteria RM3.3), together with the quality assurance outputs described in Section 3.6.1.5.9, will be prepared.

Typically, construction of the final landform will commence with bulk reshaping works to achieve the desired grades and fall directions. Bulk reshaping will be completed with large dozers (D10 or larger). Following bulk reshape, the cover material and/or topsoil will be placed at the specified depths. Topsoil will not be placed within open channel alignments or drop structure footprints. Surface water drainage controls will typically be constructed using smaller machines, more suited to civil construction projects. Open channel and drop structures will be excavated to design and constructed using the materials and methodologies prescribed by the *Work Plan*.

Rehabilitation will be complete when the reshaped and topsoiled landform has been ameliorated, seeded, and planted out per the revegetation specifications outlined in Section 3.6.1.8.

3.6.1.5.8 Waste placement strategy

The results of the SIBERIA LEM simulations indicate that the landforms at BWM generally have a low tendency to promote ongoing rill and gully erosion provided appropriate gradients, surface materials and groundcover levels are achieved.

At groundcover levels of 80% and gradients greater than 15%, slopes constructed from fresh Permian spoil on landforms associated with the Mimosa/Besgrove, Deep Creek, Stewarton/Tannyfoil, Togara/North Marshmead and Comet Downs East residual voids are not prone to significant erosion. For landforms associated with the South Ballamoo, South Marshmead and Kennedy residual voids, fresh Permian spoil-covered slopes also have a low tendency for gully erosion, although predicted gullies are slightly deeper than at other landforms.

Weathered Permian and Tertiary materials were found to be unsuitable as primary growth media and should not be used to create soil-rock mixtures for rehabilitation. They can, however, be used as secondary growth media.

Gradients of 15% or less were not prone to significant gully erosion on all modelled landforms when light and heavy clay soil growth media are used and groundcover levels of 50% and 70%, respectively, are achieved. These materials are the dominant soils across BWM and are suitable for use on rehabilitated spoil and TSF landforms.

The SIBERIA model results also indicate that long-term erosion rates for both soil and fresh Permian waste surfaces reduce through time, indicating increasing erosional stability of the rehabilitated landforms.

3.6.1.5.9 Quality assurance/quality control

The proposed actions referenced in Table 3-35 above are the key controls that will be put in place to manage the landform risks associated with achieving each PMLU at BWM. Quality assurance and quality control processes are in place to ensure the rehabilitated landforms are constructed in accordance with the design principles and detailed design specifications. Monitoring and reporting processes are in place to verify controls and ensure that controls are executed effectively, and any maintenance requirements are captured and managed at an early stage (Section 3.8).

3.6.1.5.10 Trial methodology

Modelling and past performance of landforms have indicated the proposed final landform is intended to achieve long-term stability, provided the appropriate soils are used as primary and secondary growth media and target levels of groundcover are achieved. Monitoring will verify if the landforms are on a trajectory towards achievement of the milestone criteria and eventual certification, or whether corrective actions,

maintenance or changes to the rehabilitation methodology are required. If trials are identified as necessary, they will be designed and implemented to address identified risks or to optimise landform performance.

3.6.1.5.11 Future requirements and commitments

3.6.1.5.11.1 Closure Landform Design Report

As outlined in the PRCP Schedule Conditions PRCP12 and PRCP13, and as discussed in Section 3.6.1.5, a Closure Landform Design Report is to be prepared and submitted to the administering authority by 1 July 2028. The Closure Landform Design Report will be prepared by an AQP and peer reviewed by an independent AQP.

The Closure Landform Design Report is to:

- Incorporate all relevant structures (including spoil and waste rock emplacements, tailings storage facilities, residual voids, flood protection landforms) and watercourse diversion designs.
- Be certified by an independent AQP as safe, erosionally and structurally stable.
- Demonstrate appropriateness to the applicable PMLU or NUMA.
- Contain a suitable level of detail in respect to planned execution timing.
- Have regard to material properties and local conditions as they apply to geotechnical and erosional stability risk.
- Include performance criteria that demonstrates the landform will support the achievement of a stable condition.
- Be maintained and updated as necessary to ensure material changes to the design remain capable of achieving and sustaining a stable condition, with any updates recertified by an AQP (PRCP Schedule Condition PRCP12).

3.6.1.5.11.2 Permanent watercourse diversion Design Plans

In accordance with PRCP Schedule Condition PRCP14, permanent watercourse diversions will be subject to the preparation of detailed, area-specific Design Plans, prepared and certified by an RPEQ.

An RPEQ prepared Design Plan for the permanent Sirius Creek diversion is to be submitted to the administering authority by 1 July 2030. Design Plans for remaining permanent diversions are to be submitted to the administering authority at least 24 months prior to construction.

Each permanent watercourse diversion Design Plan will be prepared in accordance with the guideline *Works that interfere with water in a watercourse for a resource activity—watercourse diversions authorised under the Water Act 2000* (DNRME, 2019), or its latest revision, and will:

- align with the PMLU identified in the PRCP Schedule;
- demonstrate that the proposed diversion alignment will achieve a stable condition;
- be consistent with, and not conflict with, the Closure Landform Design Report required under PRCP Schedule Condition PRCP12; and
- demonstrate that the diversion design will not prevent any flood protection landforms from achieving the outcomes required under PRCP Schedule Conditions PRCP15 and PRCP16, or PRCP Schedule Criteria RM3.12.

3.6.1.5.11.3 Flood susceptibility, impact assessment and flood modelling

As outlined in Section 3.6.1.2.5 and in accordance with the PRCP Schedule Conditions PRCP15, PRCP16, PRCP17 and PRCP18, future flood-related requirements relevant to the detailed design and long-term

performance of the final landform include the preparation of flood susceptibility and impact assessments, associated design responses and updated flood modelling.

These requirements establish the framework for confirming that flood protection landforms, permanent watercourse diversions and associated residual voids can achieve and maintain a stable condition under extreme flood events, based on the best available information at the time of assessment.

Consistent with PRCP Schedule Condition PRCP15, the flood susceptibility and impact assessment will incorporate updated flood modelling and assess potential risks and impacts up to and including the PMF event. The requirement to undertake a CCA applies specifically to the Sirius Creek permanent diversion and the associated R74 residual void, in accordance with PRCP Schedule Condition PRCP15(d).

Where the flood susceptibility and impact assessment identifies the need for new flood protection measures or material modifications to existing flood protection landforms, PRCP Schedule Conditions PRCP16 and PRCP17 require corresponding updates to the Closure Landform Design Report and relevant Design Plans, prepared and certified by an independent AQP.

In addition, PRCP Schedule Condition PRCP18 provides for the submission of updated flood modelling incorporating the as-constructed final landform to confirm long-term flood performance.

Together, these requirements complement the landform design framework established under PRCP Schedule Condition PRCP12 and PRCP Schedule Criteria RM3, and provide an assurance pathway for the detailed design, certification, construction quality assurance and long-term performance of landforms interacting with floodwaters at BWM.

3.6.1.5.12 Limitations and assumptions

The limitations and assumptions of the final closure landform design include:

- The final closure landform is dependent on the mining schedule, which can change due to increased geological knowledge as mining progresses, and market factors. These changes may result in differences to the landform, such as varying heights or ramp locations, but the key considerations to ensure long-term stability, such as slope profiles and materials, will be maintained in the final closure landform design.
- The landform has been designed with maximum dump heights to ensure all modelling is conservative. It is not expected that all areas of the spoil dumps will reach these heights.
- A swell factor of 25% has been assumed for the dump scheduling. This is a standard factor based on experience in the Bowen Basin Angle of repose of the spoil material is 37°.
- Landform evolution modelling has been completed up to 300 years based on the best available inputs at this time.
- Erosion rate thresholds adopted in the landform evolution modelling represent indicative modelling benchmarks and are not, in isolation, intended to be interpreted as statutory rehabilitation completion or surrender criteria.

Due to the size of the spoil dumps and dumping in lifts, the majority of settlement of the ‘constructed’ landforms is expected to occur during placement with only minor settlement expected after rehabilitation. According to ACARP project C19022 (Williams, 2015), spoil settlement consists of three components:

- Self-weight settlement (80% occurs during placement and decreases exponentially with time);
- Collapse settlement (most occurs during placement); and
- Degradation settlement (variable timeframe depending on material, but most may occur during placement and approaches a limit over time).

The landform will be monitored to ensure a free-draining landform is maintained where required.

Relationship with PRCP Schedule

The relevant structures at BWM, including overburden/spoil, TSF and rejects emplacements, residual voids and associated landforms, have been designed at a conceptual level to conservatively represent the final closure landform and minimise risk, with slope geometries and configurations appropriate for the materials available on-site.

The conceptual landform design has been developed to achieve long-term erosional and geotechnical stability, be non-polluting, and support the nominated PMLUs, consistent with the rehabilitation milestone criteria.

The landform design approach is aligned with the requirements of the PRCP Schedule, including the preparation of a Closure Landform Design Report and detailed design plans for relevant structures and permanent watercourse diversions. These requirements establish an assurance pathway for the progressive refinement, detailed design, independent certification and verification of landform performance.

Further assessment and design refinement of relevant structures will be undertaken through the Closure Landform Design Report and subsequent updates, including consideration of flood-related performance and long-term stability.

On this basis, the conceptual landform design for relevant structures provides an appropriate foundation to demonstrate that the final landform can achieve stable condition, with detailed design, construction and verification processes to be confirmed through the PRCP Schedule framework.

3.6.1.6 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. Exposure of waste rock, low-grade ore, heap leach material or tailings can result in chemical reactions that cause an acidic, neutral or alkaline discharge with elevated metal or sulfate concentration. The management of mined and waste material to ensure contaminants are not released to the receiving environment is critical to rehabilitation success.

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 taking into consideration:

- *results from geochemical characterisation*
- *type and physical characteristics of the material being covered (from the material balance developed for the site)*
- *site conditions*
- *availability of suitable cover materials (both quality and quantity)*
- *criteria for discharge (i.e. to protect environmental values)*
- *suitable vegetation.*

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 purpose of a cover system is to provide a stable, reliable and sustainable engineered interface between the receiving environment and a mine waste (INAP, 2017). The type of cover system employed is driven by the risks presented by the underlying waste materials, the final landform design and the cover system objectives. The primary risks relevant to the spoil landforms in the conceptual BWM final landform are erosional instability and a failure to establish suitable vegetation to support the nominated PMLU. These same risks, in addition to managing the moderate to high geochemical risks presented by tailings and rejects (Section 3.6.1.3), also apply the the TSFs and reject storage facilities in the final landform.

3.6.1.6.1 Geochemical basis

A summary of the geochemical characterisation of BWM's mineral waste is provided in Section 3.6.1.3. A more detailed reporting of the geochemical characterisation is presented in TES (2026) and provided as Appendix 4.7. An outcome of the waste characterisation was a geochemical source hazard assessment of the source material types comprising carbonaceous and non-carbonaceous spoil, tailings and rejects. The source hazard score is a formula that takes into account the propensity to generate AMD, the AMD capacity (severity) and the quantity (volume) of material that could produce AMD. The AMD source hazard scores are provided in Table 3-36.

Table 3-36 Source material AMD hazard score

Source Material	AMD Source Hazard Score
Spoil – non-carbonaceous	Low
Spoil – carbonaceous	Low-Moderate
Tailings	Moderate-High - score ranged from Moderate-High to High depending upon the TSF facility, but was generally Moderate-High
Rejects	Moderate to Moderate-High - score ranged from Low-Moderate to Moderate-High depending upon the rejects facility, but was generally Moderate to Moderate-High

Taking into account material quantities (proportions) and expected proportion of PAF and NAF-S materials reporting to each individual landform or facility, the following summaries the risks posed by the final landforms:

- Spoil landforms pose a Low AMD hazard, with AMD generation rated as Highly Unlikely.
- The in pit TSFs (Bonnie Doon, Ramp 72 TSF and Ramp 74 TSF) pose a Moderate-High to High AMD hazard and are considered Probably/Likely to Highly Likely to generate AMD.
- The remaining TSFs (NCPP TSF, Laleham TSF and the Botton Dam TSF and rejects area) pose a Moderate-High AMD hazard with AMD generation rated as Probable/Likely to Highly Likely.
- The Ramp 36 Reject Dump poses a Moderate-High AMD hazard, with AMD generation rated as Probable/Likely.

Spoil landforms are not anticipated to present a geochemical risk to the post closure landscape. TSFs (both aboveground and in pit facilities) and reject dumps do present a geochemical risk to the post closure landscape and require geochemical controls.

3.6.1.6.2 Physical basis

A summary of the physical properties of the spoil materials is provided in Section 3.6.1.4.1.2 and Landloch (2025b), provided as *Appendix 4.8 – Landform Design*. A summary of the physical properties of the tailings and rejects is provided in Henderson Geotech (2024), provided as *Appendix 4.9 – Concept Cover Design*.

Fresh Permian materials are generally rocky and consist primarily of sandstone and siltstone. It has a clay content ranging between 20-40% with a rock content up to 74%. Whilst fresh Permian spoil is considered to be a moderate to high dispersion risk, it is considered the most suitable waste for placement close to the final rehabilitated surface as a secondary growth media and be used as rock armour to greatly increase batter slope resistance to erosion and to stabilise steeper areas. Fresh Permian spoil can also be used to generate a soil:rock mix that can be used as a primary growth medium on steeper slopes.

Weathered Permian materials have a lower abundance and smaller rock content than fresh Permian spoil (30-60%). The rock consists primarily of low-durability mudstone and sandstone. It can be susceptible to

capillary rise of salts if profile leaching is limited and has a moderate to high dispersion risk. Weathered Permian materials are considered suitable for use as a secondary growth material but should be capped with a primary growth material to prevent its exposure at the final rehabilitated surface.

Tertiary materials are weathered and often highly saline, strongly sodic, and prone to dispersion when compared to the fresh Permian. Placement of Tertiary material close to the final rehabilitated surface is not recommended on steeper gradient slopes (>15%) due to its susceptibility to erosion (including tunnel erosion) and potential toxicities to plant growth.

Tailings are generally classified as low liquid limit Sandy Silt and intermediate plasticity Sandy Clay. Tailings from the NCPP TSF tend to contain more sand while tailings from the historic South Blackwater operation contained more silt. However, both fall within the size range encountered across the Bowen Basin and are expected to behave cohesively (like intermediate plasticity clay).

Rejects range from Gravel with sand to a Sandy Gravel. This classification is consistent with field observation that coarse rejects are a non-cohesive non-plastic material exhibiting frictional strength and high permeability. As an unsaturated non-cohesive material, coarse rejects will not experience consolidation settlement overtime. Some settlement is expected as the cover is constructed, and there may be further settlement due to moisture adjustment and particle breakage, but significant movement after the first few year's post cover construction is unlikely.

The tertiary materials, and the weathered Permian materials to a lesser extent, present an erosion risk when exposed on final landform slopes and will not be used to construct the cover system. The more durable rock in the fresh Permian spoil means it can be used as a cover system construction material.

Whilst the physical properties of the rejects suggest they would likely be resistant to erosion, the geochemical properties of both the rejects and tailings mean they are not suitable for use as a cover material.

The physical properties of topsoil are provided in Section 3.6.1.4.1.1

3.6.1.6.3 Cover system objectives

Cover system objectives for spoil landforms are to:

- Minimise erosion potential; and
- Support the establishment and ongoing sustainability of the PMLU.

Cover system objectives for TSFs and reject dumps are briefly summarised as follows, with further explanation provided on an individual facility basis in Table 3-37:

- Minimise interactions between tailings and rejects to the surrounding environment to prevent the release of contaminants to the receiving environment;
- The final cover surface of TSFs and reject dumps are water shedding and free from surface ponding, unless an AQP certified alternative design is adopted (PRCP Schedule Criteria RM3.11);
- Allow shallow infiltration but minimise recharge of tailings moisture from deep infiltration of rainfall;
- To avoid upward movement of solutes from tailings into the vegetation rooting zone;
- To support and spread pressures from anticipated surface loads enough that the bearing capacity of the tailings is not exceeded; and
- To accommodate long-term consolidation settlement in the tailings, such that the first two objectives and surface erosional stability are not compromised.

Cover system objectives for Reject Dumps are to:

- Allow shallow infiltration but minimise recharge of tailings moisture from deep infiltration of rainfall; and

- To avoid upward movement of solutes from tailings into the vegetation rooting zone.

3.6.1.6.4 Conceptual cover system design

3.6.1.6.4.1 Spoil landforms

The conceptual cover system for spoil landforms has been designed to address the cover system objectives and is described below from waste to surface:

- In the case of spoil landforms constructed above TSFs and reject dumps, tailings and rejects are not to be placed within 1 m of the final landform surface.
- Tertiary materials are not to be placed within 1 m of the landform final surface slopes.
- Weathered Permian materials (without amelioration) are not to be placed within 1 m of the landform final surface slopes.
- Growth media placed to a minimum depth of 150 mm on the cattle grazing PMLUs (Section 3.6.1.4.3.3).
- Growth media placed to a minimum depth of 100 mm on the woodland habitat PMLUs (Section 3.6.1.4.3.3).
- Heavy clay topsoil with a minimum of 70% groundcover is to be used on outward facing 15% batters of spoil landforms associated with the Mimosa/Besgrove, Deep Creek and Stewarton/Tannyfoil residual voids(Section 3.6.1.5.2).
- Light clay topsoil with a minimum of 50% groundcover is to be used on outward facing 15% batters of spoil landforms associated with the South Ballamoo, Togara/North Marshmead, South Marshmead, Kennedy and Comet Downs East residual voids (Section 3.6.1.5.2).
- Soil-Permian spoil mix (soil-rock mix, Section 3.6.1.5.3) placed to a minimum depth of 100 mm on the woodland habitat PMLUs on the inward facing 25-30% (low wall) batters of the spoil landforms associated with the Mimosa/Besgrove, Deep Creek, Stewarton/Tannyfoil, South Ballamoo, Togara/North Marshmead, South Marshmead Kennedy and Comet Downs East residual voids.

3.6.1.6.4.2 TSFs and reject dumps

On mounded landforms that do not pond water, the objectives may be achieved by two conceptual earth cover configurations:

- A multi-layer cover comprising (from tailings to surface):
    - Porous, low clay content material placed directly over the waste to limit upward flow;
    - A layer of lower permeability material finished with a mounded top surface so that seepage reaching this layer will tend to move laterally rather than downward;
    - Uncompacted secondary and/or primary growth media shaped to a gently mounded surface, to allow shallow infiltration during rainfall but no surface ponding that would drive deeper seepage; and
    - A primary growth media placed at the specified depth for the proposed PMLU.
- A single cover layer of Category 2 or Category 2-3 spoil (connected matrix of fine-grained material):
    - Spoil loosely placed but thick enough to perform the required functions without specifically differentiated permeability and matric suction properties; and
    - A primary growth media placed at the specified depth for the proposed PMLU.

All tailings and rejects are to be encapsulated by at least 1 m of consolidated non-acid forming (NAF) material, unless an alternative is recommended by an AQP (PRCP Schedule Criteria RM3.9). In situations where it is not practical to construct a mounded cover and prevent ponding, the cover will require a different design approach depending on whether the surface pond is ephemeral or permanent. These cover systems will be within NUMAs.

For ephemeral surface water:

- A multi-layer cover with an engineered very low permeability layer comprising (from base of cover to surface):
    - Porous, low clay content material placed directly over the waste to limit upward flow;
    - A thin compacted clay layer to minimise downward flow;
    - A layer of medium- or coarse-grained spoil (Category 2-3, 3 or 4) to protect the clay layer from drying and physical damage, and to limit entrapment of fauna.

For permanent surface water:

- The water itself will be the cover.

The choice of cover system for each TSF / reject dump depends on the specific situation and hazards, availability of cover materials, and nominated PMLU.

Table 3-37 summarises the conceptual cover designs for the TSFs and reject dumps. Further detail for the conceptual designs is provided in Appendix 4.9 – Concept Cover Design. Detailed cover system designs for TSFs and reject dumps will be prepared by an AQP and must consider the physicochemical properties of the waste material being stored, the availability of suitable cover materials and the specific location, hydrogeology and geometry of each structure. In the absence of an AQP designed cover system, the conceptual cover design criteria listed in Table 3-37 will apply (PRCP Schedule Criteria RM3.10)

Table 3-37 Concept cover designs for rehabilitation and closure of the BWM TSFs and reject dumps

TSF	Rehabilitation objective	Concept cover design	Key design considerations
NCPP	To create a landform that permanently contains tailing solids and limits any release of solutes to levels that will not cause environmental harm and can support a PMLU of grazing.	Stand-alone elevated and mounded landform, with multi-system cover, comprising: — Gravelly fresh Permian base — Clay-rich spoil from Tertiary and weathered overburden as a lower permeability layer — Fresh Permian soil (lower salinity and sodicity) as secondary growth medium layer (subject to chemical amelioration) — Capped with a primary growth medium	Bulk shaping comprising low clay content spoil and/or coarse rejects with low AMD potential will be spread over crusted tailings. Thickness will be as needed to provide a mounded, free-draining subsurface. The spoil/rejects will have minimal compaction to limit moisture suction potential. Selected weathered Permian and/or Tertiary spoil will be spread and compacted to form a lower permeability layer. The surface will be shaped to shed any deep infiltration out of the landform when constructed and after consolidation settlement has occurred. This will require the surface of the layer to extend over the crests of the engineered embankments so that any such drainage would exit the landform. More permeable material such as gravelly fresh Permian spoil will be placed over the low permeability layer. The thickness may vary to maintain separation between the vegetation rooting zone and the low permeability layer, and to allow a final ground surface that will shed rainfall without ponding with slopes not greater than those on rehabilitated spoil emplacement areas. Layer thicknesses will be determined by detailed cover system modelling (hydrological, gas flux and bearing capacity) closer to closure execution and will be informed by characterisation of the specific materials available at the time. At a minimum the cover system will provide at least 1 m of weathered Permian and/or Tertiary spoil followed by 2 m minimum thickness of more permeable material in accordance with PRCP Schedule Criteria RM3.10. Topsoil and erosion management practices are consistent with those on rehabilitated spoil emplacement areas.
Ramp 72	To bury the facility in a larger spoil landform.	Ramp 72 TSF will be buried under a new spoil dump (Kenmare spoil dump), including: — Gravelly spoil or coarse rejects as an initial support layer — General spoil placement (spoil dump construction) — Capped with a primary growth medium	Gravelly spoil e.g., spoil from fresh non-carbonaceous sandstone-siltstone overburden and/or interburden to be spread over the exposed tailings. Layer thicknesses will be determined by detailed cover system modelling (bearing capacity) closer to closure execution and will be informed by characterisation of the specific materials available at the time in accordance with PRCP Schedule Criteria RM3.7. General spoil placed over the TSF during spoil dump construction. Dispersive spoil with high fines content is not to be placed in the outer 1 m of the landform (dispersive spoil can be chemically ameliorated if placed within 1 m of the landform surface). Final surface gradients, topsoil, vegetation and erosion management practices consistent with those on the adjoining rehabilitated spoil areas in the closure landform. At a minimum, the cover system for Ramp 72 will comprise the following layers from the tailings surface to the final surface (PRCP Schedule Criteria RM3.10): — 1.5 m thick layer of gravelly spoil or coarse rejects over exposed tailings. — 3.5 m thick layer of spoil at the top of the ramp. — 5 m thick layer of spoil over coarse rejects over the remainder of the TSF, dumped and spread in such a way that dispersive spoil with high fines content is not placed in the outer 1 m of the landform.
Ramp 74	To create a stable landform that permanently contains tailing solids and limits any release of solutes to levels that will not cause environmental harm.	NUMA within Laleham pit — Hybrid spoil layer/water cover	Spoil will be placed over the tailings, from the northern end of the TSF to nominally 650 m north of the residual void's southern end-wall. The spoil layer will be battered down at an assumed to be angle of 1:3 for planning purposes (to be determined more exactly by stability analyses at detailed design). The spoil layer thickness will be determined by detailed cover system modelling (hydrological, settlement and bearing capacity) closer to closure execution and will be informed by characterisation of the specific materials available at the time. A pit lake will be established south from the spoil batter to act as a permanent water cover over the tailings that are not covered by spoil. At a minimum, combination water/soil cover systems are to be designed and installed as per engineered design plans as certified by an AQP to achieve the following criteria (PRCP Schedule Criteria MM2.1): — Minimum 2m cover thickness, where using spoil; and — Minimum 1m depth permanent water cover, where tailings not covered by spoil.
Laleham	To create a landform that permanently contains tailing solids, limits any release of solutes to levels that will not cause environmental harm, and can support a managed PMLU of grazing.	Single layer spoil cover system capped with primary growth medium	Spoil (including that already placed) to be dumped and spread in such a way that dispersive spoil with high fines content is not placed in the outer 1 m of the landform (PRCP Schedule Criteria RM3.10). This may be achieved by selective placement or by chemically treating the top metre of spoil to reduce sodicity. Layer thicknesses will be determined by detailed cover system modelling (hydrological) closer to closure execution and will be informed by characterisation of the specific materials available at the time. At a minimum the cover system will provide at least 5 m of cover over the tailings in accordance with PRCP Schedule Criteria RM 3.10.

TSF	Rehabilitation objective	Concept cover design	Key design considerations
			Final surface gradients, topsoil, vegetation and erosion management practices consistent with those on the adjoining rehabilitated spoil areas in the mine's closure landform.
Bonnie Doon	To create a stable landform that permanently contains tailing solids and limits any release of solutes to levels that will not cause environmental harm.	NUMA within Bonnie Doon pit — Hybrid spoil layer/water cover	The final tailings elevations in the TSF will be approximately RL160m at the end of Ramp 10, with the surface sloping down to the north and up to the south. Spoil to be placed over the tailings, from the southern end of the TSF to nominally 150 m south of the end-wall at R10. The spoil layer will be battered down at an angle assumed to be 1:3 for planning purposes (to be determined by stability analyses at detailed design). The spoil layer thickness will be determined by detailed cover system modelling (hydrological, settlement and bearing capacity) closer to closure execution and will be informed by characterisation of the specific materials available at the time. At a minimum the cover system will provide at least 1 m of cover over the tailings. A pit lake will be established north from the spoil batter to act as a permanent water cover over the tailings that are not covered by spoil.
Bottom Dam (and ROM 3 Area Rejects)	To create a landform that permanently contains tailing solids, limits any release of solutes to levels that will not cause environmental harm, and can support a managed PMLU of grazing.	Push ROM 3 Area rejects down over the tailings to flatten the slope and fill the existing shallow surface depression Single layer spoil cover system capped with primary growth medium	Spoil to be dumped and spread in such a way that dispersive spoil with high fines content is not placed in the outer 1 m of the landform (PRCP Schedule Criteria RM3.10). This may be achieved by selective placement or by chemically treating the top metre of spoil to reduce sodicity. The spoil layer thickness will be determined by detailed cover system modelling (hydrological and bearing capacity) closer to closure execution and will be informed by characterisation of the specific materials available at the time. At a minimum the cover system will provide at least 5 m of cover over the tailings and rejects in accordance with PRCP Schedule Criteria RM3.10. Final surface gradients, topsoil, vegetation and erosion management practices consistent with those on the adjoining rehabilitated spoil areas in the mine's closure landform.
Ramp 36 Rejects Dump	To create a landform that permanently contains tailing solids, limits any release of solutes to levels that will not cause environmental harm, and can support a managed PMLU of grazing.	Single layer spoil cover system capped with primary growth medium within its existing footprint	Spoil to be dumped and spread in such a way that dispersive spoil with high fines content is not placed in the outer 1 m of the landform (PRCP Schedule Criteria RM3.10). This may be achieved by selective placement or by chemically treating the top metre of spoil to reduce sodicity. The spoil layer thickness will be determined by detailed cover system modelling (hydrological) closer to closure execution and will be informed by characterisation of the specific materials available at the time. At a minimum the cover system will provide at least 5 m of cover over the rejects in accordance with PRCP Schedule Criteria RM 3.10. Final surface gradients, topsoil, vegetation and erosion management practices consistent with those on the adjoining rehabilitated spoil areas in the mine's closure landform.

3.6.1.6.5 Construction material availability

As demonstrated in Section 3.6.1.4.2, the forecast topsoil inventories will be sufficient to construct the primary growth medium layers. As demonstrated in Section 3.6.1.5.3, the volumes of fresh Permian generated by mining are more than enough to supply the material demands for the various cover layers and to manufacture the soil: rock mix as a primary growth medium for steeper slopes.

3.6.1.6.6 Consolidation considerations

Tailings consolidation settlement will vary with tailings depth and water content profile (or conversely, density profile) and with cover thickness. Consolidation is expected to occur over a long timeframe. Conceptually, where relevant, settlement will be accommodated by making the susceptible layers of the cover thicker in the areas where greater settlement is predicted. Increasing the thickness in areas where material settlement is anticipated will allow cover system surfaces to remain mounded after settlement has occurred and to maintain the ability to shed water.

The magnitude and rate of consolidation settlement depend on composition (size grading), existing pre-consolidation, and the disposition of drainage paths, all of which vary within the three-dimensional tailings deposit. Consequently, estimates are not included in the conceptual cover design; rather, settlement will be assessed and allowed for as part of the detailed designs developed no less than three months prior to commencing PRCP Schedule RM3 for the relevant structure. An element of adaptive design revision during the construction phase will also be allowed for.

Coarse rejects do not experience consolidation settlement. Due to the uncompacted nature of the waste, there may be some settlement due to the weight of the cover layer but most of this will occur as the cover is constructed and does not need to be addressed in design.

3.6.1.6.7 QA/QC of cover construction

Quality assurance and quality control (QA/QC) measures will be employed to provide confidence the cover systems have been constructed in accordance with the detailed designs. QA/QC will be achieved by dividing construction into defined lots aligned with cover system construction staging, with inspection and verification completed for each stage prior to progression. The framework will include:

- Development of an approved Quality Assurance and Control Plan as part of the detailed design work for cover system construction;
- Identification of responsibilities through a project organisational chart and the qualifications of key personnel involved in landform construction;
- Inspection and hold points for critical activities such as design, layer thickness, compaction verification testing, slope grades and erosion control works;
- Use of National Association of Testing Authorities (NATA) accredited laboratories for compliance testing of materials and soils; and
- Work Plan sign-off report comprising the documentation and evidence required to demonstrate the landform has been constructed to design.

The QA/QC documentation and evidence will include, but not be limited to:

- Conformance reporting against design specifications;
- Compliance inspection and testing undertaken by appropriately qualified practitioners; and
- Project quality records.

Monitoring and maintenance programs (Section 3.8) will verify that controls are executed effectively and that the landform as a whole will achieve the required rehabilitation outcomes.

Relationship with PRCP Schedule
Waste characterisation investigations concluded spoil landforms are predicted to have a Low geochemical risk and therefore conceptual cover systems have been designed to address risk associated with erosion and supporting vegetation establishment that aligns with the nominated PMLU for the area. Tailings and rejects were determined to have a Moderate-High geochemical risk with these landforms anticipated to have a likelihood of probably to highly likely to generate AMD without geochemical controls. Conceptual cover systems have been designed to address both erosion and vegetation establishment risks as well as geochemical risks. Several conceptual designs have been prepared based on the location, construction and surrounding environment of each TSF and rejects dump. Prior to commencing PRCP Schedule RM3, a detailed design report will be prepared by an AQP for all relevant structures to demonstrate how the final landform will achieve the performance outcomes, including geotechnical stability, erosion resistance, and water quality outcomes consistent with the nominated PMLU and or NUMA.

3.6.1.7 Water management

PRCP Guideline (Section 3.6.1)

The management of surface and groundwater is a key consideration in achieving long-term rehabilitation success. The rehabilitation planning part must include a description of the following:

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

3.6.1.7.1 Context

The landform design for BWM is intended to provide landforms that meet the nominated PMLU and NUMA milestone criteria without the need for ongoing active water management or dewatering. The following key considerations, which are discussed in more detail in the relevant sections of this PRC Plan, have been taken into account in the assessment of ongoing water management requirements post-mining:

- The final landform surfaces will be free-draining where appropriate to prevent impacts, with runoff allowed to flow to the surrounding watercourses or residual voids (Section 3.6.1.5.2).
- All mining-related dams will be decommissioned and removed, and the rehabilitated areas will be free-draining (Section 3.6.1.5.2).
- Residual voids will remain as NUMAs with the final landform as a whole stabilising into a long-term groundwater sink with catchments minimised to what is practical and possible (Section 3.6.3).
- Rehabilitated landforms provide residual void flood protection up to and including a 0.1% AEP flood event (Section 3.6.1.2).
- Spoil landforms are reshaped to minimise erosion and provided with a growth medium for the establishment of the nominated PMLU vegetation (Section 3.6.1.5.2 and 3.6.1.6).
- TSFs and reject dumps are rehabilitated to manage geochemical risk, minimise erosion and provided a growth medium for the establishment of the nominated PMLU vegetation by constructing a cover system, being buried by spoil during mining operations or managed as part of NUMAs (Section 3.6.1.6, 3.6.2 and 3.6.3).

- The final cover surface of TSFs and reject dumps are water shedding and free from surface ponding, unless an AQP certified alternative design is adopted (PRCP Schedule Criteria RM3.11).
- Contaminated land investigations will be undertaken at the completion of mining where required. The identified remediation/management requirements to render the site suitable for the nominated PMLUs will be undertaken (Section 3.6.5.4).
- Conceptual site models that assess SPR linkages have been prepared for relevant technical studies including hydrogeology (Section 3.6.1.1), waste characterisation (Section 3.6.1.3.6) and voids (Section 3.6.3) and show connected exposure pathways from source to off-tenement receptors are unlikely.

3.6.1.7.2 Contaminants and sources

Since BWM operations commenced in 1967, heavy industrial-type activities have occurred on the site. This includes the operation and maintenance of processing facilities, vehicles, and other plant infrastructure required to support the extraction and processing of coal. It also includes the storage, use, and disposal of a variety of hazardous materials.

BWM's facilities have and will continue evolving with modern engineering and environmental standards; however, the duration and nature of the operations increase the likelihood of contaminated land being present at closure. The predominant hazardous materials with potential to cause contamination that could hinder PMLU success and/or materially impact the receiving environment include:

- Hydrocarbons, such as diesel, oils, greases, methyl isobutyl carbinol (MIBC) and other solvents.
- Aqueous film-forming foams from historical use of products containing Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) species of concern.
- Nitrogen associated with explosive formulation.
- Carbonaceous materials.

Current operational water management includes the segregation of mine affected water (MAW) from non-MAW. Water from mine operational areas is collected within on-site mine dams and inactive pits and recycled within the mine operations, or released under the conditions of the EA.

MAW includes:

- Pit water,
- TSF water,
- CHPP water, and
- Runoff from operational areas such as the CHPPs and MIA.

In addition to the hazardous materials listed above, sediment, metals/metalloids, carbonaceous materials and salinity present in mine wastes are also potential contaminants of concern post-closure.

The contaminant sources with potential to impact surface and groundwaters post-closure include:

- Final landforms, including spoil landforms, TSFs and reject dumps;
- Exposed coal and spoils in highwalls, end walls and pit floors;
- Areas previously used for industrial activities; and
- Areas used for mine affected water storage.

The geochemical risk of mine wastes has been assessed in Section 3.6.1.3. The non-carbonaceous spoil at BWM is expected to generate pH-neutral to highly alkaline contact water, typical for spoil in the Bowen Basin. The spoil has low enrichment in total metals and metalloids compared to un-mineralised rocks and is expected to contain low concentrations of soluble metals and metalloids under pH-neutral to alkaline

conditions. Contact water from non-carbonaceous spoil is expected to be non-saline to slightly saline. ESP results show that most samples are sodic or strongly sodic, and Emerson testing indicates that a large proportion is dispersive.

Carbonaceous spoil represents less than 8% of the spoil material at BWM. As a bulk material it is also expected to generate alkaline to highly alkaline contact water. A small volume, mostly associated with coal seams, has a greater potential to generate low-level AMD, however, as a bulk material placed alongside non-carbonaceous spoil, it presents a low risk of generating AMD. Carbonaceous spoil has low enrichment in total metals and metalloids compared to un-mineralised rocks and leachate from carbonaceous spoil is expected to contain low concentrations of soluble metals and metalloids. Contact water from carbonaceous spoil is expected to be slightly saline. Fresh carbonaceous spoil is mostly strongly sodic, while weathered carbonaceous spoil is non-sodic. Around half of the samples show dispersive behaviour.

Tailings and rejects will be encapsulated within the final landform and will not contact surface water. As discussed in Section 3.6.2 approximately half of the samples representing tailing and rejects were assessed as presenting a moderate to high potential to generated AMD. Seepage generated within the TSFs and reject dumps has the potential to impact receiving waters.

Exposed spoils and coal seams in the highwalls and end walls of the residual voids have the potential to influence the water quality of the residual void lakes. Most residual void lake water quality is expected to become concentrated through evaporation to high salinity levels. However, as the landform will act as a groundwater sink, there is no risk of the high concentration migrating away from the residual voids area.

The physical properties of the materials to be used as growth media on the final landforms are discussed in Section 3.6.1.4. Unit vegetation is established and post operation and rehabilitation erosion rates stabilise, the growth media will be a potential source of sediment contamination to waters.

Contaminated land investigations will be undertaken to assess areas for potential contamination. The investigation will assess a range of potential contaminants that are used or generated during operations and will provide an assessment of the risk posed to the PMLUs and the receiving environment. Contaminated areas will be remediated to a level that will not present an unacceptable risk to the establishment and ongoing sustainability of the nominated PMLU. This includes remediation works required to prevent both surface and groundwater quality in the downstream receiving waterways from exceeding water related completion criteria and PRCP Schedule Criteria RM2.

Where water storages have been used to contain MAW, they have the potential to accumulate sediments and therefore present a potential secondary source of contamination. Contaminants of concern within the dams include those potential contaminants listed above, as well as metals and salinity. All mine affected water dams will be dewatered to final voids and the sediments assessed for contaminants of concern. Where necessary, the footprints of MAW water storages will be remediated prior to decommissioning. The final landform will be a free-draining footprint that no longer retains water.

3.6.1.7.3 Pathway and fate of contaminants

3.6.1.7.3.1 Surface water contaminant pathways and fate

Final landform catchments, outside the residual voids, will be free-draining. Surface waters will be conveyed by natural drainage paths and report to the downstream receiving waterways. Contaminants on the surface of the closure landform, including areas previously supporting industrial activities MAW storages and spoil emplacements, have the potential to mobilise through surface water runoff. Toe seepage expressing at the surface of the spoil emplacements can also report to surface waterways.

Surface water runoff generated within the residual void areas will be retained within the voids and mixed with residual void lake waters. Most residual voids will be groundwater sinks. Seepage from the four residual voids with net outward fluxes is drawn towards neighbouring residual voids with a lower lake elevation. Overall, the final landform as a whole is predicted to be a groundwater sink.

Spoil landforms are not expected to present a geochemical risk to surface waters, including pit lakes, post-closure and therefore are not anticipated to impact downstream receptors. Tailings and rejects will be encapsulated and will not contact surface waters.

Temporary erosion and sediment controls measures will be employed to manage sediment laden water during the stabilisation and establishment phases of the rehabilitation process. Temporary controls will only be removed once water quality monitoring demonstrates the sediment load from rehabilitated areas has reduced, complies with the requirements of PRCP Schedule Criteria RM8 (Achievement of post-mining land use water quality) and is representative of the background conditions. Temporary erosion and sediment controls will be subject to a maintenance program whilst operational to ensure they remain functional and capable of managing sediment loads released to downstream receptors.

Contaminated land investigations will identify potential contamination sources and their pathways to downstream receptors. Remediation actions plans, including appropriate validation programs, will be developed and implemented to either remove the contamination source, break the SPR linkage or reduce the impact of contamination so as to comply with the requirements of PRCP Schedule Criteria RM8.

3.6.1.7.3.2 Groundwater contaminant pathways and fate

Contaminants will potentially enter the groundwater system from the sources identified above via seepage through the ground surface. As noted in the discussion of surface water contaminants, mining wastes used to construct the final landform are not considered a geochemical risk and contaminated land investigations, followed by Remediation Action Plans (RAPs) where required, will address risks associated with the historic use of hazardous substances.

Tailings and rejects have the potential to generate AMD impacted seepage. Encapsulations and cover systems (Section 3.6.1.6) will minimise deep infiltration into the tailings or rejects to reduce recharge of the tailings or reject mass. However, hydrological studies (Section 3.6.1.1) predict that the final landform as a whole will behave as groundwater sink, with continued inward hydraulic flow gradients developing towards the residual void area with no groundwater outflow occurring in the long-term. The inward hydraulic gradients are modelled to capture potential basal seepage from the TSFs and reject dumps and draw it towards the residual voids.

Lakes are predicted to form within the residual voids. Most residual void lakes are modelled to stabilise below the base of weathering and will not have hydraulic connection with shallow aquifers. Where a net outflow occurs, groundwater particle tracking indicates flows will be toward a neighbouring residual void lake at a lower elevation. Residual void waters are not expected to move beyond the mining leases.

Similar to seepage from spoil landforms, TSFs and reject dumps, groundwater particle tracking predicts groundwater within the tenement, including those areas containing the MIAs and CHPPs will migrate towards the residual voids post-mining.

3.6.1.7.4 Water management controls

The key water management controls adopted for the rehabilitation and closure of BWM can be classified as source controls, pathway controls or impact controls. Source controls target the potential contaminants at the source. The following water management source controls are used at BWM:

- Contaminated land investigations and RAPs will address contamination sources resulting from the use of hazardous substances during mining operations or the storage of MAW;
- Revegetation programs and grade controls in landform design will contribute towards the control of erosion and subsequent sedimentation loads in runoff waters; and
- Encapsulation and cover systems constructed over the TSFs and reject dumps will prevent tailings and rejects being exposed at the surface and will minimise the generation of seepage from these facilities.

Waste characterisation studies (Section 3.6.1.3) concluded that spoil is not expected to present a geochemical risk and therefore these materials are not considered potential geochemical contamination sources and do not require source controls.

Pathway controls attempt to break the SPR linkages and prevent contamination sources from reaching and impacting receptors. The key pathway control for rehabilitation of the BWM is the final landform acting as a groundwater sink capturing basal seepage from the spoil landforms, TSFs, reject dumps and other supporting areas of the site.

Impact controls mitigate or reduce the potential impacts on receptors to within acceptable levels. Rehabilitation of BWM utilises temporary erosion and sediment control measures to mitigate the impact of sediment laden water on downstream receptors. Sediment control measures shall be installed at discharge points to the receiving environment and will be used until the sediment loads in runoff from rehabilitated areas have reduced and comply with the requirements of PRCP Schedule Criteria RM8 and are representative of background conditions. Sediment controls will be designed, constructed and maintained in accordance with the sites Erosion and Sediment Control Plan

The effectiveness of water management controls will be evaluated in accordance with the closure monitoring and maintenance program (Section 3.8).

3.6.1.7.5 Surface water diversions

BWM has five licensed surface water diversions of mapped watercourses designed and constructed to enable mining within the following watercourses:

- Deep Creek;
- Sirius Creek;
- Taurus Creek;
- Burngrove Creek; and
- Rockland Creeks.

These diversions, some of which have multiple diverted reaches (and multiple water licences), will remain at closure.

The creek diversions were assessed against the EA watercourse PMLU goals of being safe, stable, non-polluting and self-sustaining. The assessment concluded that the Burngrove Creek diversion is expected to progress towards the EA PMLU goals and can be considered permanent in its current alignment. The Deep Creek diversion is not stable in its current configuration and requires lengthening to achieve stability. A concept design prepared by Engeny submitted as *Appendix 4.13 – Deep Creek Diversion Concept Design* shows that lengthening the diversion as part of the Stage 2 diversion achieves a stable permanent alignment. The diversion details and forward work plan commitments for relinquishment of these creek diversions as permanent structures are summarised in Table 3-38.

The Sirius, Taurus and Rockland Creek diversions require realignment and/or rehabilitation to be considered permanent diversions. The forward work plan commitments for the relinquishment of these creek diversions requiring re-alignment to become permanent are summarised in Table 3-39. Permanent diversions are developed and/or reshaped such that they are consistent with the Closure Landform Design Report (PRCP Schedule Condition PRCP12) and Design Plan (PRCP Schedule Condition PRCP14), and the remainder of disturbed land is reshaped appropriately as determined by an AQP (PRCP Schedule Criteria RM3.1).

Diversion concept designs, based on both the DNRME (2019) and ACARP (2014) guidelines, are provided as:

- *Appendix 4.10 – Sirius Creek Diversion Concept Design* (Engeny, 2025a)

- *Appendix 4.11 – Taurus Creek Diversion Concept Design* (Engeny, 2025b)
- *Appendix 4.12 – Rockland Creek Diversion Concept Design* (Engeny, 2025c)
- *Appendix 4.13 – Deep Creek Diversion Concept Design* (Engeny, 2025d)

Prior to commencing any creek diversion rehabilitation construction works, all applicable environmental approvals, including those required under the *Water Act 2000* (Qld), will be obtained. 'As constructed' plans are to be prepared by an AQP that demonstrate the diversions were constructed in accordance with the engineered design plans developed under PRCP Schedule Condition PRCP14.

Table 3-38 Forward work plans for creek diversions retaining their current alignment

Details	Deep Creek	Burngrove Creek
Water licence	609051	40137F
River catchment	Fitzroy River	Fitzroy Basin
Upstream catchment area	23 km^2	20 km^2
Year of construction	1990s (upstream diversion sub-reach) Hatch, 2001 (downstream diversion sub-reach) Engeny, 2018 (Stage 2 Deep Creek Diversion)	Late 1980s and 2012
Diversion length (km)	Current diversion length: 2.5 km Planned diversion length: 3.4 km	8.7 km
Diversion assessment outcome	Deep Creek diversion at Blackwater Mine does not currently achieve, nor is expected to progress towards achieving, the relevant performance criteria and objectives	Diversion in its existing alignment is meeting or will continue progressing towards achieving the EA watercourse PMLU goals. Therefore, in a closure state, the diversion will remain in its current form.
Operational phase	Will be monitored on a regular basis to maintain and/or improve its existing condition and continue to inform the closure landform.	Will be monitored on a regular basis to maintain and/or improve its existing condition and continue to inform the closure state.
Forward work plan – diversion construction	Construction of the Stage 2 Deep Creek Diversion and associated remedial works within the existing diversion will occur in accordance with the BWM EA Schedule J: Deep Creek Diversion	N/A
Forward work plan – infrastructure	Removal of the low-level and haul road crossings and flood protection levees (Ramps 30S and 34S levees cannot be removed until these ramps have been backfilled). This takes into consideration EA Condition E6, which states that: The Rehabilitation Management Plan must ensure the final landform adjacent to Deep Creek (Ramp 30S and Ramp 34S) is consistent with the Functional Design Report: Deep Creek Diversion Functional Design Report dated March 2018 (BW02-ENY-7210-RPT-00002) and allows for any future change in watercourse alignment".	Removal of two access roads- and four rail line crossings Removal and rehabilitation of adjacent haul road and TCP area Removal of the Burngrove Creek Retention Dam.
Forward work plan – final landform	Re-grade, topsoil and revegetate the original diversion batters, and adjacent spoil dumps. (These cannot be undertaken until Ramps 30S and 34S flood protection levees have been removed, aligned to the requirements of EA Condition E6).	N/A

Table 3-39 Forward work plans for creek diversions requiring realignment and rehabilitation

Details	Sirius Creek	Taurus Creek	Rockland Creek
Water licence	52651F	409112WF	57711WF
River catchment	Fitzroy River	Mackenzie River	Fitzroy River
Upstream catchment area	100 km^2	2.2 km^2	80 km^2
Year of construction	1977-1978	2001-2002 (approximately)	1993 (assumed)
Diversion length (km)	1.4 km	2.2 km	Approximately 2 km
Diversion assessment outcome	In its current alignment, the diversion is not able to achieve the objectives that are directly related to the EA PMLU requirements. This led to the development of a concept design for the remediation of the current diversion, resulting in an alternative alignment.	The assessment outcome found that the diversion, in its current alignment, is not able to achieve the defined assessment objectives which are directly related to the EA PMLU requirements. This led to the development of a concept design for the remediation of the current diversion, resulting in an alternative alignment.	The diversion in its current state was assessed in the original framework and found to not achieve a relinquishable state. This triggered the need for a remediation concept design of the diversion which will meet the overall relinquishment objectives.
Operational phase	Will be monitored on a regular basis to maintain and/or improve its existing condition and continue to inform the closure landform (see Section 3.8.3).	Will be monitored on a regular basis to maintain and/or improve its existing condition and continue to inform the closure landform (see Section 3.8.3).	Will be monitored on a regular basis to maintain and/or improve its existing condition and continue to inform the closure landform (see Section 3.8.3).
Forward work plan – diversion design & rehabilitation	The diversion remediation concept has been designed in accordance with the DNRME hydraulic design criteria for permanent diversions (DNRME, 2019) and presents hydraulic parameters within threshold values for 2-year ARI and 50-year ARI events. The geomorphic features, including stream length and grade, for the remediation concept design were chosen to be similar to the natural pre-mining channel, including vegetation of the natural surrounding ecosystem to meet the	The diversion remediation concept has been designed in accordance with the DNRME hydraulic design criteria for permanent diversions (DNRME, 2019) and presents hydraulic parameters within threshold values for 2-year ARI and 50-year ARI events. Programs for monitoring and revegetation/rehabilitation of the diversion will be maintained throughout the operational phase of the mine	The diversion remediation concept has been designed in accordance with the DNRME hydraulic design criteria for permanent diversions (DNRME, 2019) and presents hydraulic parameters within threshold values for 2-year ARI and 50-year ARI events. Programs for monitoring and revegetation/rehabilitation of the diversion will be maintained throughout the operational phase of the mine

Details	Sirius Creek	Taurus Creek	Rockland Creek
	DNRME (2019) guideline objectives for permanent watercourse diversions.		
Forward work plan – infrastructure	Mine infrastructure that interacts with the diversion during operations (Old Cut 4 Dam) and future mine infrastructure will be removed prior to closure.	Mine infrastructure that interacts with the diversion during operations and future mine infrastructure will be removed prior to closure.	As mining progresses in the vicinity of the remediation alignment diversion, the out-of-pit spoil dumps will be progressively reprofiled and regraded to a slope less susceptible to erosion, ensuring a sufficient buffer to the diversion reach. Removal and rehabilitation of adjacent mine infrastructure areas including levees, haul roads and sediment dams.
Forward work plan – final landform	The surrounding landform will be used for potentially 'grazing' and 'woodland' or similar purposes in closure and allows for hydraulic performance, water quality and a sediment transport regime within the diversion that is representative of the natural watercourse reaches. Programs for monitoring and revegetation/ rehabilitation of the diversion will be maintained throughout the operational phase of the mine.	The surrounding landform will be used for potentially 'grazing' and 'woodland' or similar purposes in closure and allows for hydraulic performance, water quality and a sediment transport regime within the diversion that is representative of the natural watercourse reaches.	The surrounding landform will be used for potentially 'grazing' and 'woodland' or similar purposes in closure and allows for hydraulic performance, water quality and a sediment transport regime within the diversion that is representative of the natural watercourse reaches.

3.6.1.7.6 Water storage dams

There will be no water storage dam facilities retained at closure.

3.6.1.7.7 On-going water management

On completion of rehabilitation works, ongoing water management/dewatering is not envisaged to be required due to the following:

- The surface of the closure landform, excluding the residual voids, will be free-draining where required
- Contamination will be remediated and/or appropriately managed
- The residual voids will generally continue to act as long-term sinks capturing and containing any groundwater seepage from the site, and will not overtop or interconnect with groundwater aquifers
- Creek diversions will be re-aligned where required and rehabilitated to form a stable landform that allows relinquishment of the water licences.

3.6.1.7.8 Future requirements and commitments

3.6.1.7.8.1 Closure Landform Design Report

As outlined in the PRCP Schedule Conditions PRCP12 and PRCP13, and discussed in Section 3.6.1.5, a Closure Landform Design Report is to be prepared and submitted to the administering authority by 1 July 2028. The Closure Landform Design Report will be prepared by an AQP and peer reviewed by an independent AQP.

The Closure Landform Design Report is to:

- Incorporate all watercourse diversion designs.
- Be certified by an independent AQP as safe, erosionally and structurally stable.
- Demonstrate appropriateness to the applicable PMLU or NUMA.
- Contain a suitable level of detail in respect to planned execution timing.
- Have regard to material properties and local conditions as they apply to geotechnical and erosional stability risk.
- Include performance criteria that demonstrates the landform will support the achievement of a stable condition.
- Be maintained and updated as necessary to ensure material changes to the design remain capable of achieving and sustaining a stable condition, with any updates recertified by an AQP (per PRCP Schedule Condition PRCP12).

3.6.1.7.8.2 Permanent watercourse diversion Design Plans

In accordance with PRCP Schedule Condition PRCP14, permanent watercourse diversions will be subject to the preparation of detailed, area-specific Design Plans, prepared and certified by an RPEQ.

An RPEQ prepared Design Plan for the permanent Sirius Creek diversion is to be submitted to the administering authority by 1 July 2030. Design Plans for remaining permanent diversions are to be submitted to the administering authority at least 24 months prior to construction.

Each permanent watercourse diversion Design Plan will be prepared in accordance with the guideline *Works that interfere with water in a watercourse for a resource activity—watercourse diversions authorised under the Water Act 2000* (DNRME, 2019), or its latest revision, and will:

- align with the PMLU identified in the PRCP Schedule;
- demonstrate that the proposed diversion alignment will achieve a stable condition;
- be consistent with, and not conflict with, the Closure Landform Design Report required under PRCP Schedule Condition PRCP12; and
- demonstrate that the diversion design will not prevent any flood protection landforms from achieving the outcomes required under PRCP Schedule Conditions PRCP15 and PRCP16 or PRCP Schedule Criteria RM3.12.

3.6.1.7.8.3 Flood susceptibility, impact assessment and flood modelling

As outlined in Section 3.6.1.2.5 and in accordance with the PRCP Schedule Conditions PRCP15, PRCP16, PRCP17 and PRCP18, future flood-related requirements relevant to the detailed design and long-term performance of the final landform include the preparation of flood susceptibility and impact assessments by 1 July 2031, associated design responses and updated flood modelling.

These requirements establish the framework for confirming that flood protection landforms, permanent watercourse diversions and associated residual voids can achieve and maintain a stable condition under extreme flood events, based on the best available information at the time of assessment.

Consistent with PRCP Schedule Condition PRCP15, the flood susceptibility and impact assessment will incorporate updated flood modelling and assess potential risks and impacts up to and including the PMF event. The requirement to undertake a CCA applies specifically to the Sirius Creek permanent diversion and the associated R74 residual void, in accordance with PRCP Schedule Condition PRCP15(d).

Where the flood susceptibility and impact assessment identifies the need for new flood protection measures or material modifications to existing flood protection landforms, PRCP Schedule Conditions PRCP16 and PRCP17 require corresponding updates to the Closure Landform Design Report and relevant Design Plans, prepared and certified by an independent AQP by 1 July 2032.

In addition, PRCP Schedule Condition PRCP18 provides for the submission of updated flood modelling incorporating the as-constructed final landform to confirm long-term flood performance.

Together, these requirements complement the landform design framework established under PRCP Schedule Condition PRCP12 and the rehabilitation milestone criteria in PRCP Schedule Criteria RM3, providing an assurance pathway for the detailed design, certification, construction quality and long-term performance of landforms interacting with floodwaters at BWM.

Relationship with PRCP Schedule
The landform design with residual voids will provide a landscape that does not require any ongoing active water management. The creek diversions will be realigned, where required, and rehabilitated to form a stable watercourse PMLU that allows for the relinquishment of the water licences.

3.6.1.8 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.

3.6.1.8.1 Revegetation objectives

The overall objective of revegetation at BWM is to return previously disturbed land to their intended PMLU by achieving the following:

- Rehabilitated areas are reshaped to support revegetation of plant species known to occur in the region, or on similar landforms and soils;
- Rehabilitated areas are geotechnically safe, stable and non-polluting; and
- Vegetation is self-sustaining after closure and rehabilitation activities are completed.

For the nominated PMLUs specifically, the objectives of revegetation are as follows:

- For the cattle grazing PMLU, the grazing capacity is enhanced after closure and rehabilitation activities are completed;
- For the woodland habitat PMLU, to maximise the self-sustaining capacity of the vegetation through the use of plant species native to the region, on similar landforms, or similar soils, and that are thus adapted to the conditions likely to be experienced within the nominated rehabilitation areas over the long term; and
- For the watercourse PMLU, to maximise the contribution of revegetation to the safe, stable, and sustainable objectives of slope and surface rehabilitation along waterways.

The revegetation objectives and criteria for the PMLUs of cattle grazing, woodland habitat and watercourse are consistent with the rehabilitation requirements of the EA, as transitioned into the BWM PRC Plan and PRCP Schedule. No infrastructure is proposed to support the revegetation plan.

3.6.1.8.2 Site preparation, planning and execution

The site preparation required for rehabilitation activities is clearly detailed in Appendix 4.1 – PRCP Schedule. In addition, a summary of the planning and execution process for individual rehabilitation areas is also summarised below as it relates to individual rehabilitation area.

- Planning:
    - Once an area is available for rehabilitation, a 3D landform design plan of the final landform is developed based on the proposed PMLU and includes overall rehabilitation area 3D design, slope lengths, slope angles, footprint heights and topography.
    - The bulk materials are analysed to determine landform heights, gradients, profiles and material placement.
    - Hydrological assessments are undertaken to inform requirements for temporary and/or permanent erosion and sediment control (ESC) measures
    - Specific landform requirements including drainage and/or material placements strategies are prepared.
    - Spoils and soils or alternative growth media are analysed by AQPs based on target PMLU.

- Spoil and soils or alternative growth media amelioration planning is prepared by AQP considering target PMLU requirements (i.e. land suitability class requirements for cattle grazing and key macro and micronutrients for PMLU).
- Revegetation planning and development including seed procurement, seed storage, revegetation timing, and application planning is completed for each area considering the target PMLU.
- The final rehabilitation plan including approved landform, specific landform requirements, ESC plan, spoil and soils amelioration plans, seed procurement, storage and application are combined into a work package with in built hold points to ensure QA/QC at the completion of each step of the process.

- Execution:
  - Landform development is undertaken in accordance with bulk earth works push plans built in 3D format to be loaded into dozers. Ongoing assessment of the landform development against the 3D plan is undertaken on a regular basis to ensure landform is reshaped in accordance with the approved design. A hold point is required at the completion of landform prior to moving onto surface preparation.
  - Where required, additional landform work requirements (i.e. ESC works) is undertaken including but not limited to temporary construction bunds to prevent off site run off during construction, sediment fencing, rock check drains, and/or temporary or permanent sediment control structures. A hold point is required at the completion of additional landform works prior to moving onto surface preparation.
  - Surface preparation includes:
    - Underlying spoils are treated with ameliorations (e.g. Gypsum) as recommended by AQP. A hold point is required at the completion of treatment of spoils prior to moving onto topsoiling or alternative growth media application.
    - Topsoils or alternative growth media are applied at depths >150mm for cattle grazing and >100mm for woodland habitat and treated with ameliorations (e.g. fertiliser, mulch) as recommended by AQP.
    - Areas are ripped along the contour to improve drainage, effective rooting depth and provide micro-relief to improve erosional stability.
  - Areas are seeded with the required seed mix and rates as listed in Table 32 for cattle grazing, Table 34 and Table 35 for woodland habitats, and Table 36 for watercourse PMLUs. A minimum allowance of 5kg p/ha of cover crop is seeded at the same time to provide early vegetation cover and erosion protection. Seeding is generally conducted off dozers or tractors through attached specialised equipment such as spreaders, customised mechanical seeders, drum seeders, air seeders and/or drones.
  - Where required for additional erosion protection hay mulch is applied to provide surface cover during the initial window of erosion risk prior to vegetation establishment.

3.6.1.8.3 Fauna habitat and use requirements

There are no existing obligations to establish fauna habitat and/or fauna use in the rehabilitation areas for BWM. However, areas adjoining undisturbed threatened fauna species habitats will be rehabilitated to a woodland habitat PMLU wherever possible, and disturbed areas of watercourses will be rehabilitated to a watercourse PMLU. Additionally, select habitat features (e.g. hollow bearing trees, woody debris, logs and rocks) may be salvaged for re-use in rehabilitation areas (E2M, 2026).

Woodland habitat and watercourse revegetation will provide long-term connectivity values for threatened fauna species, including koalas, squatter pigeons and ornamental snakes (Figure 3-17).

3.6.1.8.4 Revegetation seed provenance

The revegetation seed provenance is considered important for all species. Seeds will be sourced as locally as possible from natural populations. Although the local provenance boundary locations may differ between species, seed should ideally be obtained from the Brigalow Belt bioregion.

Proof of provenance will be sought from the seed supplier(s) along with germination and viability certificates and Pure Live Seed (PLS) results for all purchased seeds.

3.6.1.8.5 Cattle grazing revegetation species and seeding rates

Areas of cattle grazing are predominately planned for the lower gradient areas disturbed by mining activities, areas that require shallow rooted species and/or areas where there was significant clearing prior to mining (RA2, RA4).

The growth media for cattle grazing will be pre-stripped topsoil, spread over rehabilitated landforms at a depth ≥ 150 mm, and ameliorated if recommended by an AQP (refer to Section 3.6.1.4). The recommended revegetation species mix for cattle grazing PMLU is based on seeding native and naturalised exotic species that are preferred, palatable and perennial (3P) grasses and legumes cognisant of grazing best management practice (DES, 2022a; Future Beef, 2022). Preferred pasture species have been recommended based on species known to occur on BWM, as well as a selection of pasture species suitable for the soil management group described in Section 3.6.1.4.2 and *Appendix 4.3 – Material Characterisation*.

A seeding rate of 12 kg/ha of pure live pasture seed consisting of at least half (i.e. 6 kg/ha) native grasses and 3 kg/ha of pure live uncoated legume seed (Table 3-40) and 0.5 kg/ha of shade tree species (Table 3-41) is recommended to be applied for the cattle grazing PMLU, unless adjusted by an AQP. All seed mixes will also include 5 kg/ha of Japanese millet *(Echinochloa esculenta*) or similar as a sterile cover crop to protect soils from erosion. The cover crop will establish quickly on the exposed surfaces and work to provide a root system that will stabilise the surface and prevent erosion until new seedlings have been established. The roots will also create pores in the surface to allow water to penetrate the ground, allowing infiltration and reducing overland flow on the surface.

Species availability may vary, however at least four preferred pasture grass species, including two preferred native pasture grasses, and two legumes listed in Table 3-40 are required. The cattle grazing seed mix composition and seeding rates may be adjusted based on the results of ongoing rehabilitation monitoring. Pasture seed mixes are recommended to be sown in the warmer months of the year from September to March, when the probability of rainfall is highest, thereby assisting germination and sustaining establishment.

No seeding or use of Leucaena (Leucaena leucocephala) is proposed at BWM.

Table 3-40 Recommended species list and seeding rates for cattle grazing PMLUs

Scientific name	Common name	Cracking clays and heavy loams / clays	Light loams / sands	Pure live seed1 (PLS) rate (kg/ha)
Astrebla lappulacea, A, squarrosa, A. elymoides	Mitchell Grasses (curly, bull and hoop)	X	-	1-3 (per species)
Bothriochloa bladhii	Forest Blue Grass	-	X	1-3
*Bothriochloa insculpta cvv. Bisset**	Bisset Creeping Blue Grass	X	X	1-2
*Chloris gayana cvv. Callide**	Callide Rhodes Grass	X	X	1-2
*Chloris gayana cvv. Katambora**	Katambora Rhodes Grass	X	X	1-3
Dichanthium sericeum subsp. sericeum	Queensland Blue Grass	X	-	1-3
Digitaria brownii	Cotton Panic	X	X	1-3
Heteropogon contortus	Black Spear Grass	X	X	1-3
*Megathyrsus maximus var. pubiglumis**	Green Panic	-	X	1-2
*Panicum coloratum var. makarikariense**	Bambatsi Panic	X	-	1-2
Panicum decompositum	Native Millet	X	X	1-3
*Urochloa mosambicensis**	Sabi Grass	-	X	1-2
Grass species - Total seed weight coated (kg/ha)				**12**
*Stylosanthes seabrana**	Caatinga stylo	X	-	1
*Macroptilium bracteatum **	Burgundy bean	X	X	1-2
*Stylosanthes hamata**	Caribbean stylo	-	X	1
Rhynchosia minima	Rhynchosia	X	X	2
Legume species - Total seed weight uncoated (kg/ha)				**3**
Echinochloa esculenta	Japanese millet	X	X	5

[1] Where pure live seed (PLS) information is not yet available minimum seeding rates should be 16kg/ha uncoated pasture grasses, 4kg/ha uncoated legume species and 5kg/ha cover crop

** Denotes exotic species*

The inclusion of shade trees aligned to the predominant cattle grazing land types surrounding the BWM are also planned for future cattle grazing rehabilitation areas. Table 3-41 includes key woody vegetation framework trees species as described in representative grazing land management (GLM) types taken from the Fitzroy region GLM land types (Future Beef, 2025). Shade trees are recommended to be included in the cattle grazing seed mix at a minimum rate of 0.5 kg/ha.

Deep-rooted trees are to be removed from the seed list applied to TSFs within a cattle grazing PMLU (per PRCP Schedule Criteria RM6.9).

Table 3-41 Recommended shade tree species for cattle grazing PMLUs

Scientific name	Common name	GLM Land Type (Future Beef, 2025)	Corresponding REs
Blakella citriodora subsp. citriodora	Lemon scented gum	Narrow-leaved ironbark woodlands	RE11.5.9
Corymbia clarksoniana	Clarkson's bloodwood	Poplar box with ironbark/ Narrow-leaved ironbark woodlands	RE11.5.3/11.5.9
Blakella dallachiana	Dallachy's gum	Poplar box with ironbark/ Narrow-leaved ironbark woodlands	RE11.5.3/11.5.9
Eucalyptus crebra	Narrow leaved ironbark	Poplar box with ironbark/ Narrow-leaved ironbark woodlands	RE11.5.3/11.5.9
Eucalyptus melanophloia	Silver leafed ironbark	Poplar box with ironbark	RE11.5.3
Eucalyptus populnea	Poplar box	Poplar box with ironbark	RE11.5.3

3.6.1.8.6 Cattle grazing reference sites

Cattle grazing reference sites have been established at the locations shown in Table 3-42, Figure 3-62 and Figure 3-63. The reference sites were monitored in 2023 and will continue to be monitored, in accordance with the cattle grazing monitoring requirements outlined in Section 3.8.1.4. Existing cattle grazing reference site results have been summarised in Table 3-42 as it relates to the ranges of groundcover, preferred pasture species, dry matter yields, land condition and land suitability classes that have been recorded as a result of ongoing monitoring. Additional or alternative cattle grazing reference sites may be established in the future if area likely to be affected by future planned development.

Land suitability for cattle grazing has been assessed and scored against the criteria under the *Rehabilitated mined land suitability for beef cattle grazing in the Bowen Basin Technical paper 1* (Short, 2023).

An assessment of grazing land condition has been also undertaken in areas of cattle grazing rehabilitation and reference sites in accordance with *Queensland Reef Quality Program Reef Protection Regulations Farming in Reef Catchments Grazing Guide Version 2* (DES, 2022a).

Table 3-42 BWM cattle grazing reference sites

BWM cattle grazing reference sites	
	
Reference Site – BWM_REF01	Reference Site – BWM_REF03
Mean Slope: <2%	Mean Slope: <2%
Total Groundcover: 100%	Total Groundcover: 100%
Trees: *Acacia harpophylla* (brigalow), *Atalaya hemiglauca (whitewood)*	Trees: *None observed*
Shrubs: *Capparis lasiantha, Acacia harpophylla* (brigalow), *Atalaya hemiglauca* (whitewood)	Shrubs: *Capparis lasiantha, Atalaya hemiglauca (whitewood), Citrus glauca (native lime bush), Acacia harpophylla* (brigalow), *Senna artemisioides*
Exotic Grasses: *Cenchrus ciliaris* (buffel grass*) (3P), *Bothriochloa pertusa* (Indian couch*) (2P) Native Grasses: *Aristida sp.* (wiregrasses) (1P)	Exotic Grasses: *Cenchrus ciliaris* (buffel grass*) (3P) Native Grasses: *Aristida calycina* (dark wiregrass) (1P)
Invasive Plants: *Harrisia martinii* (Harrisia cactus*)	Invasive Plants: *Harrisia martinii (Harrisia cactus*)*
Dry matter yield kg/ha: 2800	Dry matter yield kg/ha: 3000
Land Condition: Fair (B)	Land Condition: Fair (B)
Land Suitability Class: 4	Land Suitability Class: 5
Site Limitations: Reference site (REF01) with lower Colwell P to 0.1m (<8 mg/kg) and slightly alkaline at pH 8.7	Site Limitations: Reference site (REF03) has low Colwell P to 0.1m (<5 mg/kg) otherwise the site has no other limiting factors

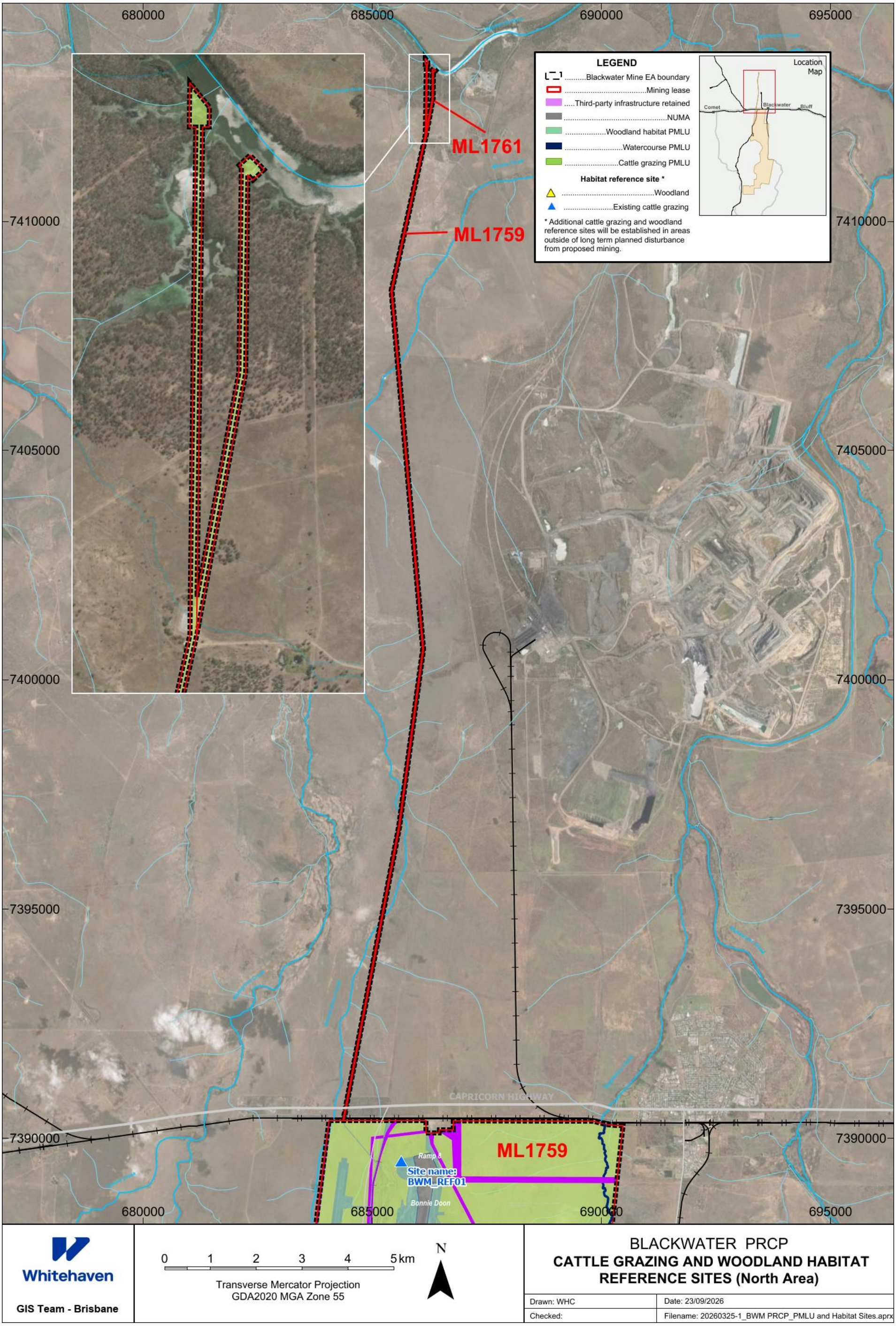


Figure 3-62 BWM cattle grazing and woodland habitat reference sites (North)

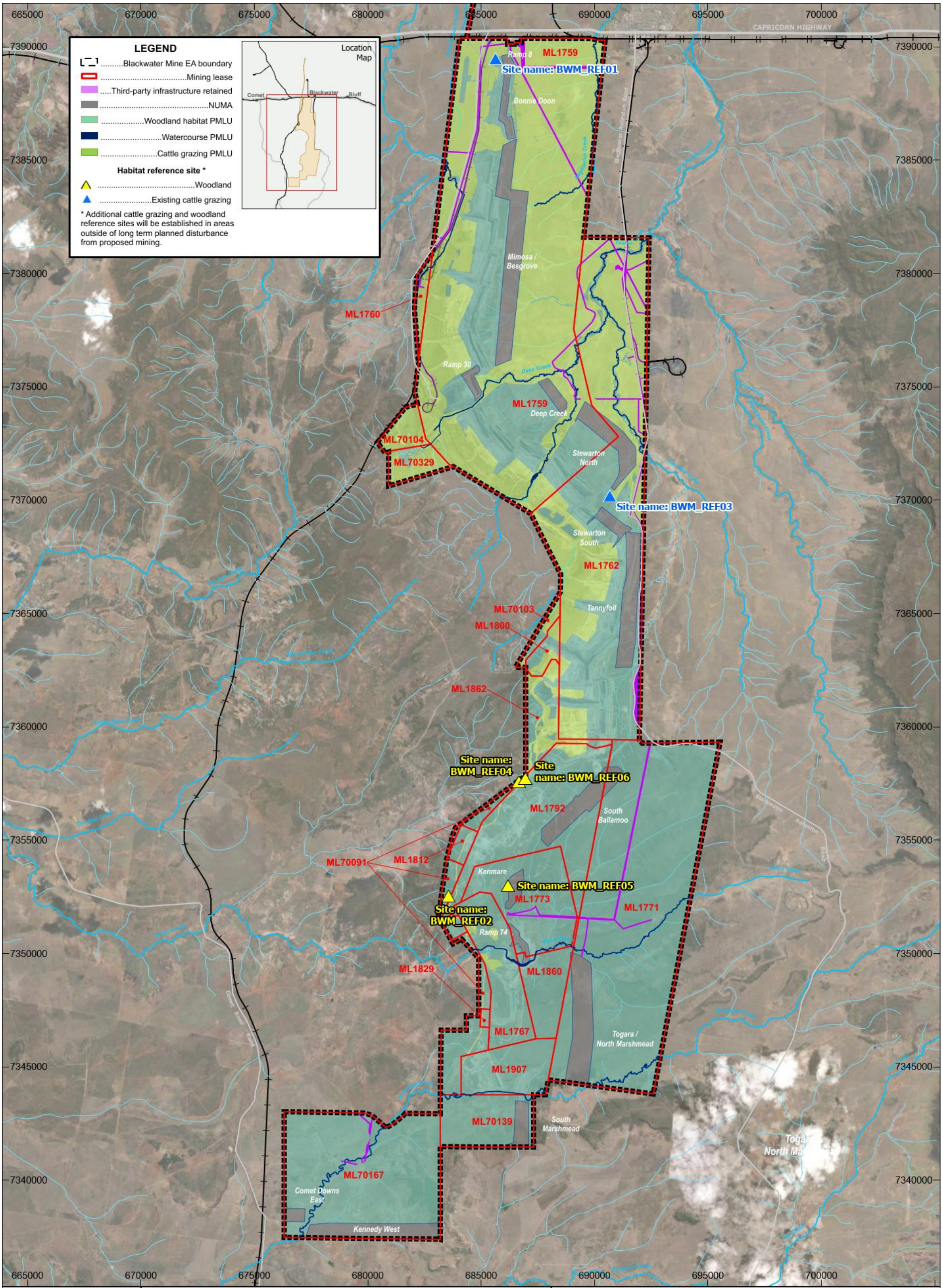


Figure 3-63 BWM cattle grazing and woodland habitat reference sites (North, Central and South)

3.6.1.8.7 Woodland habitat revegetation species and seeding rates

Areas of woodland habitat PMLU are planned on landforms associated with the spoil dumps (RA1) and areas near existing vegetation communities (RA5). The approach to woodland habitat revegetation and the woodland habitat monitoring method discussed in Section 3.8.1, has strongly considered the following recent OQMRC publications:

Evaluating native ecosystem rehabilitation options in Queensland (Spain C., Nuske, Gagen, & Purtill, 2023)

Native ecosystem rehabilitation in Queensland Implications for leading practice (OQMRC, 2023)

For rehabilitation areas on the spoil dumps planned to be returned to a woodland habitat PMLU, BWM has aligned its approach to woodland habitat revegetation to achieve characteristics of the surrounding natural historic regional ecosystems. The spoil dumps are however elevated, sloped anthropogenic landforms comprised of mudstones, claystones, siltstones and sandstones (Section 3.6.1.5). These landforms vary from pre-mining landforms and do not align with any specific land zone under the regional ecosystem framework (Wilson & Taylor, 2012). It is also important to note that much of the topsoil used in rehabilitation is largely contaminated with exotic species including buffel grass (*Cenchrus ciliaris*) and other early colonising non-native forb species making achievement of the target ecosystem approach unrealistic particularly for the ground layer.

Nonetheless, BWM plan to achieve woodland habitat rehabilitation with strong characteristics of surrounding ecosystems.

The southern section of BWM is surrounded by red ironstone and lateritic jump ups associated with land zone 7 and sections of coarse grained sand stones associated with land zone 10 as described by Wilson & Taylor (2012) supporting the following regional ecosystems:

- RE 11.7.1 "*Acacia harpophylla* and/or *Casuarina cristata* and *Eucalyptus thozetiana* or *E. microcarpa* woodland on lower scarp slopes on Cainozoic lateritic duricrust"
- RE 11.7.2 "*Acacia* spp. woodland on Cainozoic lateritic duricrust scarp retreat zone"
- RE11.7.6 "*Corymbia citriodora* or *Eucalyptus crebra* woodland on Cainozoic lateritic duricrust"
- RE11.10.7 *Eucalyptus crebra* woodland on coarse-grained sedimentary rocks

Woodland habitat rehabilitation in the southern section of BWM will target RE11.7.1, RE11.7.2 or RE11.7.6, and is predominantly planned for areas using red loams to gravelly topsoils or growth media consistent with ferrosols and lateritic duricrusts that support the target ecosystem on land zone 7 (Wilson & Taylor, 2012). Areas of spoil dumps with sandstones will target RE11.10.7.

Where woodland habitat aligned to RE11.7.1, RE11.7.2 , RE11.7.6 or RE11.10.7 is not possible due to lack of commercial seed availability, or incompatible soils or spoils, the remaining areas of woodland habitat predominantly in the north of BWM have been planned to target the following regional ecosystems also highly common surrounding the mine occurring on loam substrates with poorer soils that best align with the woodland habitat rehabilitation landforms:

- RE 11.5.3 – *Eucalyptus populnea* and/or *E. melanophloia* and/or *Corymbia clarksoniana* on Cainozoic sand plains and/or remnant surfaces
- RE 11.5.9 *Eucalyptus crebra* and other *Eucalyptus* spp. and *Corymbia* spp. woodland on Cainozoic sand plains and/or remnant surfaces

For RA5, where the final landform is similar to the pre-mining landform, the rehabilitation should aim to achieve a woodland habitat similar to the surrounding regional ecosystem as recommended by an AQP.

As discussed in Section 3.6.1.4, the growth media options for woodland habitat rehabilitation includes pre-stripped topsoil over Tertiary and/or Permian waste rock (spoil) and gravels. Woodland habitat growth media will be ameliorated, if recommended by an AQP, prior to deep ripping and seeding (Section 3.6.1.4). The

growth media depth will be a minimum of 100 mm. Note if topsoil is to be utilised as a standalone growth media (no mix of fresh Permian spoil), the topsoil depth will be between 100mm to 150mm to limit the effects of competition on woodland species due to the potential loads of exotic pasture species (i.e. buffel grass) (Emmerton et al., 2016a) and to provide the best chance of successful establishment of woody species (Emmerton et al., 2016b; Spargo and Doley, 2006).

The following soils and spoils are recommended for the target regional ecosystems:

- Red ferrosols, gravels and lateritic derived materials and/or rocky substrates RE11.7.1, RE11.7.2 and RE11.7.6
- Coarse grained sandstones RE11.10.7
- Sandy loams to clay loams on rocky Tertiary or Permian spoils RE11.5.3, RE11.5.9 and RE11.10.7

The woodland habitat revegetation species are known to occur in the representative regional ecosystems based on their listing in the relevant Regional Ecosystem Technical Descriptions (Queensland Herbarium, 2018). The species selection for the woodland habitat revegetation areas has also considered ecological functional groupings according to the role or function they perform in both rehabilitation and non-mined environments (Emmerton et al., 2016a and 2016b) (Table 3-43).

Short-lived Acacia spp. (i.e. wattles) have been excluded from the species mix, with seeds of intermediate lifespan Acacia spp. reduced, and these species were replaced by increased quantities of key framework tree species and shrubby understorey species to provide longer-term ecosystem resilience, structure and function (Emmerton et al., 2016b). Competitive pasture species have also been excluded from the seed mix and only non-aggressive and native grass species have been recommended (Emmerton et al., 2016b). It is important to note that the woodland habitat seed mix composition and seeding rates may be adjusted based on the results of ongoing woodland habitat rehabilitation monitoring.

Table 3-43 Life form and functional groups assigned to species based on their structural form or ecological function

Life form and functional group	Code	Explanatory notes
Framework trees		
Eucalypt/ Bloodwood (*Corymbia*) species	E/C	*Eucalyptus*, *Corymbia*, and occasionally *Angophora* species (of any height) which can form an upper storey and often form recognisable vegetation communities but may exist within other communities
Non-eucalypt, non-acacia species	NE/NA	Non-eucalypt, non-wattle species (of any height) which can form recognisable communities, or which may exist in isolation and can become part of the upper storey
Long lived acacias	LLA	Wattle species that may form recognisable communities or exist as part of the upper storey in other communities (e.g. *Acacia shirleyi, Acacia rhodoxylon*)
Woody understory components		
Shrubby understorey	SU	A shrub is defined as a woody plant that is multi-stemmed from the base (or within 200mm from ground level)

Life form and functional group	Code	Explanatory notes
		up to 8 m in height or if single-stemmed, less than 2 m tall (Eyre, et al., 2015). Therefore, an understorey shrub may include species that are sometimes regarded as small trees
Groundcover shrubs	GCS	Shrubs which form a groundcover
Vines/creepers	V/C	Vines or creepers that are perennial and have a woody component
Intermediate lifespan acacias	ILA	Sub-dominant wattles (*Acacia spp.*) which do not form a community in undisturbed natural ecosystems but can become dominant in rehabilitation areas
Short lifespan wattles	SLA	Wattles prevalent as an understorey in eucalypt communities with some level of disturbance and are relatively short lived (≤ 10 years)
Introduced woody perennials	IWP	Introduced woody species potentially becoming weeds in some circumstances
Groundcover components		
Competitive pasture grasses	CPG	Aggressive introduced pasture grass species (considered to detract from ecosystem values)
Introduced grasses	IG	Less competitive naturalised species (less aggressive than the CPG group)
Native grasses	NG	Perennial and annual native grasses. Includes grass-like plants (e.g. genera include: *Cyperus, Dianella* and *Lomandra*)

The recommended woodland habitat revegetation species for achieving areas of woodland habitat associated with a natural regional ecosystems on coal mining landforms have been listed in Table 3-44 along with the associated life form and functional group, preferred growth media and recommended seeding rates. Deep-rooted trees are to be removed from the seed list applied to TSFs within a woodland habitat PMLU (PRCP Schedule Criteria RM6.9).

The woodland habitat revegetation plan includes at least 4.5 kg/ha of 'pure live seed' for tree species including mandatory species per RE, 3 kg/ha of 'pure live seed' for woody understory species and 10 kg/ha of 'pure live seed' for grasses, unless adjusted by an AQP. Planting will also include the addition of a sterile cover crop (e.g. Japanese millet or similar) seeded at least 5 kg/ha to provide initial groundcover. Seed availability may vary; however, seed mixes should ensure that at least six species from each of the main revegetation groups (i.e. framework trees, woody understorey and grasses) listed in Table 3-44, are sown at the overall recommended rates to achieve the required species richness.

The revegetation seed mix for RA5 is to be recommended by an AQP based on the location of the rehabilitation in relation to the surrounding regional ecosystems and should consider the species and the rates listed in Table 3-44.

The seed mix rates are based on pure live seed. Pure live seed Pure Live Seed (PLS) (Pedrini, D'Agui, Arya, Turner, & Dixon, 2022) refers to the percentage of viable seeds within a seed lot that are capable of germination, accounting for both purity and germination rate as per Figure 3-64.

$$\text{Pure live seed } (\%) = \frac{\text{Viable seeds } (\%) \times \text{pure seed units } (\%)}{100}$$

Figure 3-64 Pure live seed (%) (Pedrini, D'Agui, Arya, Turner, & Dixon, 2022)

Revegetation species and rates for woodland habitat may be adjusted by an AQP, to ensure continuous improvement of the rehabilitation outcomes, based on the results of ongoing monitoring (Section 3.8). Where additional species listed in the relevant representative RE technical description area available, they may be substituted as recommended by an AQP for non-mandatory species (Queensland Herbarium, 2018).

The preferred seeding timing for woodland habitat is either April/May or September/early October when there is sufficient soil moisture in the profile. Sowing in cooler months offers longer periods of surface moisture resulting from rain events, as well as reduced grass competition. Seeding may be undertaken at other opportune times, such as for unseasonal climatic conditions.

Table 3-44 Recommended species list and seeding rates for woodland habitat PMLUs

Scientific name	Common name	Commercial availability rating[1]	Life form and functional group code[2]	Cracking Clay and heavy loam/ clay topsoil	Light loams/ sand	Pure live seed[3] rate (kg/ha- uncoated weight)	RE11.5.3	RE11.5.9	RE11.7.1	RE11.7.2	RE11.7.6	RE11.10.7
Acacia catenulata	Bendee	L	LLA	X	X	0.5 -1.5	-	-	X	X****	-	-
Acacia harpophylla	Brigalow	L	LLA	X	X	0.5 -1.5	-	-	X	-	-	-
Acacia rhodoxylon	Rosewood	L	LLA	X	X	0.5 -1.5	X	X	X	X****	X	-
Acacia shirleyi	Lancewood	L	LLA	X	X	0.5 -1.5	-	X	X	X****	X	-
Alphitonia excelsa	Red ash	H	NE/NA	X	X	0.2-0.5	X	X	X	X	X	X
Angophora leiocarpa	Smooth barked apple	L	E/C	-	X	0.2-0.5	X	-	-	X	X	X
Atalaya hemiglauca	Whitewood	H	NE/NA	X	X	0.2-0.5	X	-	-	X	X	X
*Blakella citriodora subsp. citriodora**	Lemon scented gum	H	E/C	X	X	0.5 -1.5	-	-	-	X*	X*	-
Corymbia clarksoniana	Clarkson's bloodwood	M	E/C	X	X	0.5-1	X	X	-	X	-	X
Blakella dallachiana	Dallachy's gum	M	E/C	X	X	0.2-0.5	X	X	-	X	-	X
Corymbia erythrophloia	Red bloodwood	H	E/C	X	X	0.2-0.5	X	-	-	X	-	X
Corymbia leichhardtii	Yellow jacket	M	E/C	X	X	0.2-0.5	-	-	-	X	X	-
Corymbia trachyphloia	Brown bloodwood	M	E/C	X	X	0.2-0.5	-	-	-	X	X	-
Blakella tessellaris	Moreton Bay ash	L	E/C	X	X	0.2-0.5	-	-	-	X	-	-
Eucalyptus cambageana	Dawson's gum	H	E/C	X	X	0.2-0.5	-	-	-	X	-	-
Eucalyptus crebra	Narrow leafed ironbark	H	E/C	X	X	0.5 -1.5	X	X*	-	X*	X*	X*
Eucalyptus decorticans	Gum-topped ironbark	L	E/C	-	-	0.1-0.5	-	-	-	X	X	-
Eucalyptus fibrosa subsp. fibrosa	Red Ironbark	M	E/C	X	X	0.1 -1.5	-	-	-	-	X	-
Eucalyptus exserta	Queensland peppermint	H	E/C	-	X	0.3-0.5	-	X	-	X	-	-
Eucalyptus melanophloia	Silver leafed ironbark	H	E/C	X	X	0.5 -1.5	X*	-	-	-	-	X
Eucalyptus thozetiana	Thozet's gum	L	E/C	-	-	0.3-0.5	-	-	X*	X	-	-
Eucalyptus moluccana	Gum topped box	M	E/C	X	X	0.5 -1.5		-	-	-	X	-
Eucalyptus populnea	Poplar box	M	E/C	X	X	0.5 -1.5	X*	-	-	X	X	X
Lysiphyllum carronii	Red bauhinia	M	NE/NA	X	X	0.2-0.5	X	-	-	-		-
Lysiphyllum hookeri	White bauhinia	M	NE/NA	X	-	0.2-0.5	X	-	-	-		-
Ventilago viminalis	Vine tree	M	NE/NA	X	-	0.2-0.5	X		-	--	X	-
Framework tree species - Total seed weight uncoated (kg/ha)						**4.5**						

Scientific name	Common name	Commercial availability rating[1]	Life form and functional group code[2]	Cracking Clay and heavy loam/ clay topsoil	Light loams/ sand	Pure live seed[3] rate (kg/ha- uncoated weight)	RE11.5.3	RE11.5.9	RE11.7.1	RE11.7.2	RE11.7.6	RE11.10.7
Acacia conferta	Crowded-leaf wattle	H	SU	-	X	0.2-0.5	X	X	-	-	X	-
Acacia crassa	Curracabah	L	ILA	X	X	0.2-0.5	-	-	X	X	X	-
Acacia excelsa	Ironwood wattle	L	ILA	X	X	0.2-0.5	X	X	-	-	X	X
Acacia leptostachya	Townsville Wattle	M	SU	-	X	0.2-0.5	-	X	-	-	-	-
Acacia sericophylla	Desert oak	M	ILA	-	X	0.2-0.5	X	-	-	-	-	-
Alectryon diversifolius	Native holly	L	SU	X	X	0.2-0.5	X	-	X	X	X	-
Alstonia constricta	Bitterbark	L	SU	X	X	0.2-0.5		X	-	X		-
Breynia oblongifolia	Coffee bush	L	SU	X	X	0.2-0.5		X	-	X	X	X
Capparis lasiantha, C. canescens, C. loranthifolia.	Wait-a-while	M	V/C	X	X	0.2-0.5	X	X	X	X	X	-
*Cassia brewsteri**	Leichhardt bean	H	SU	X	X	0.3-0.5	X	-	X	-	X	-
Croton insularis	Silver croton	L	SU	-	X	0.2-0.5	-	-	X	X	X	-
Dodonaea triangularis	Triangle hop bush	L	SU	X	X	0.1-0.5	-	-	X	X	X	-
Dodonaea oxyptera	Hop bush	L	SU	X	X	0.1-0.5	-	-	X	X	X	-
*Dodonaea viscosa**	Sticky hop bush	H	SU	X	X	0.2-0.5	X	-	X	-	X	-
Dodonaea filifolia	Thread leaved hop bush	L	SU	X	X	0.1-0.5	-	-	-	X	X	-
Denhamia cunninghamii		L	SU	X	X	0.1– 0.5	X	-	-	-	X	-
Eremophila mitchellii	False sandlewood	L	SU	X	X	0.1-0.5	X	-	X	X	-	X
Erythroxylon australe	Cocaine tree	L	SU	X	X	0.1-0.5	X	X	X	X	-	X
Geijera parvifolia	Wilga	H	SU	X	X	0.1-0.5	X	X	X	X	X	X
Grewia latifolia	Dogs balls	H	SU	X	X	0.2-0.5	X	X		-	X	X
Myoporum montanum, M. acuminatum	Boobialla	H	SU	X	X	0.1-0.5	X	X	X	X	X	-
Philotheca difformis	Small-Leaf Wax-Flower	L	SU	X	X	0.1-0.5	-	-	X	X	X	-
Persoonia falcata	Wild pear	L	SU	X	X	0.1-0.3	X	X	X	X	X	-
Petalostigma pubescens	Quinine	M	SU	X	X	0.3-0.5	X	X	-	X	-	-
Senna artemisioides	Silver cassia	H	SU	X	X	0.3-0.5	X	-	-	-	X	-
Woody understory species - Total seed weight uncoated (kg/ha)						**3**						
Astrebla lappacea	Curly Mitchell grass	H	NG	X	-	1-2	X**	X**	-	-	-	-

Scientific name	Common name	Commercial availability rating[1]	Life form and functional group code[2]	Cracking Clay and heavy loam/ clay topsoil	Light loams/ sand	Pure live seed[3] rate (kg/ha- uncoated weight)	RE11.5.3	RE11.5.9	RE11.7.1	RE11.7.2	RE11.7.6	RE11.10.7
Aristida spp (i.e. A. calycina, A. benthamii, A. latifolia, A. ramosa, A. caput-medusae, A. jerichoensis, A. personata, A. calycina)	Three awned spear grass	M	NG	-	X	1-2	X	X	X	X	X	X
Bothriochloa bladhii subsp. bladhii	Forest blue grass	H	NG	X	X	1-2	X	X	-	X**	-	-
Bothriochloa decipiens var. decipiens	Pitted blue grass	L	NG	X	X	0.5-1	X	-	--	X**	X	X
Bothriochloa ewartiana	Desert bluegrass	L	NG	X	X	0.5-1	X	-	-	-	-	-
Calyptochloa gracillima		L	NG	X	X	0.5-1	-	X	X	X	X	-
Chloris divaricata	Slender Chloris	M	NG	X	X	0.5-1	-	-	X	-	-	-
Chloris truncata	Windmill grass	H	NG	X	X	2-4	X***	X***	X***	X***	X***	X***
Chloris ventricosa	Tall Chloris	M	NG	X		1-2	-	-	X		X	X
Chrysopogon fallax	Golden beard grass	L	NG	X	X	0.5-1	X	X	X	X	X	X
Cymbopogon refractus, C. bombycinus	Barbwire grass	H	NG	X	X	0.5-1	X	X	X	X**	X	X
*Cynodon dactylon var. dactylon**	Couch	H	EG	X	X	2	X***	X***	X***	X***	X***	X***
Dichanthium sericeum subsp. sericeum	Queensland bluegrass	H	NG	X	X	1-2	X	-	-	-	-	-
Dinebra decipiens	Slender cane grass	L	NG	X	X	0.5-1	X		X	X	X	-
Enteropogon acicularis	Curly windmill grass	M	NG	X	X	0.5- 2	X	X	X	X	X	-
Eulalia aurea	Silky brown top	M	NG	X	X	0.5-1	X	-	-	X**	-	-
Heteropogon contortus	Black spears	M	NG	X	X	1-2	X	X	X	X**	X	X
Panicum effusum	Hairy panic	L	NG	X	X	0.5-1	X	X	X	X	X	X
Panicum decompositum	Native millet	H	NG	X	-	1-2	X	X	-	X	-	-
Panicum queenslandicum	Yabila grass	L	NG	X	-	0.5-1	X	X	-	-	--	-
Paspalidium distans	Shot grass	M	NG	-	X	0.5-1	-	-	X	X	X	-
Themeda triandra	Kangaroo grass	H	NG	X	X	1-2	X	X	X	X**	X	X
Triodia pungens	Spinifex	L	NG		X	0.5-1	X	-	-	X	X	-
Grass species - Total seed weight uncoated (kg/ha)						**10**						
Echinochloa esculenta	Japanese millet		Cover crop	X	X	5	-	X***	X***	X***	X***	X***

[1] Commercial availability rating: high (H), medium (M), low (L)

[2] Life form and functional group code: Eucalypt/Bloodwood (Corymbia) species (E/C), Non-eucalypt, non-acacia species (NE/NA), Long lived acacias (LLA), Shrubby understorey (SU), Groundcover shrubs (GCS), Vines/creepers (V/C), Intermediate lifespan acacias (ILA), Short lifespan wattles (SLA), Introduced woody perennials (IWP), Competitive pasture grasses (CPG), Introduced grasses (IG), Native grasses (NG)

[3] Where pure live seed (PLS) information is not yet available minimum seeding rates must be at least 6kg/ha uncoated framework tree species, 4kg/ha uncoated woody understory species, 10 kg/ha uncoated grass species and 5kg/ha cover crop

Scientific name	Common name	Commercial availability rating[1]	Life form and functional group code[2]	Cracking Clay and heavy loam/ clay topsoil	Light loams/ sand	Pure live seed[3] rate (kg/ha- uncoated weight)	RE11.5.3	RE11.5.9	RE11.7.1	RE11.7.2	RE11.7.6	RE11.10.7
** mandatory in relevant RE mix*												
*** medium salinity tolerance (DERM 2011)*												
**** additional grass species to support groundcover and stability from other representative REs*												
***** RE11.7.2 Requires at least 50% or 1.5kg/ha of any combination of Acacia catenulata, Acacia rhodoxylon* and *Acacia shirleyi.*												

3.6.1.8.8 Woodland habitat reference sites

Woodland habitat reference sites have been established in areas of remnant vegetation undisturbed by mining as shown in Table 3-45, Figure 3-62 and Figure 3-63.

A summary of existing woodland habitat reference site results on BWM has been provided in Table 3-45. Additional or alternative woodland habitat reference sites may be established in the future if existing sites are at risk of impact from planned development or additional representative reference sites are required for specific regional ecosystems.

Table 3-45 BWM woodland habitat reference sites

BWM woodland habitat reference sites			
			
Reference Site – BWM_REF02	Reference Site – BWM_REF05	Reference Site – BWM_REF04	Reference Site – BWM_REF06
Mean Slope: 10%	Mean Slope: 10%	Mean Slope: 4%	Mean Slope: 4%
Regional Ecosystem: 11.7.2	Regional Ecosystem: 11.7.2	Regional Ecosystem: 11.5.9/11.5.3	Regional Ecosystem: 11.5.3
Total Groundcover: 93%	Total Groundcover: 95%	Total Groundcover: 100%	Total Groundcover: 100%
Tree Canopy Cover: 69.2%	Tree Canopy Cover: 52.2%	Tree Canopy Cover: 45.2%	Tree Canopy Cover: 30.6%
Tree Species: *Corymbia citriodora* (lemon scented gum), *Acacia shirleyi* (lancewood), *Acacia catenulata* (bendee) *Evidence of recruitment: Yes*	Tree Species: *Acacia shirleyi (lancewood), Corymbia citriodora subsp. citriodora (lemon scented gum), Eucalyptus crebra (narrow leaved ironbark)* *Evidence of recruitment: Yes*	Tree Species: *Eucalyptus crebra* (narrow leaved ironbark), *Eucalyptus populnea* (poplar box), *Acacia rhodoxylon* (rosewood), *Corymbia tessellaris* (Moreton Bay ash) *Evidence of recruitment: Yes*	Tree Species: *Eucalyptus populnea (poplar box), Eucalyptus crebra (narrow leaved ironbark), Acacia excelsa (ironwood), Eucalyptus decorticans* *Evidence of recruitment: Yes*
Shrub species: *Everistia vacciniifolia, Erythroxylon australe* (dogwood), *Acacia shirleyi* (lancewood), *Hovea sp, Phebalium glandulosum, Beyeria viscosa.*	Shrub species: *Everistia vacciniifolia, Eucalyptus shirleyi (silver leaved ironbark), Psydrax oleifolia (psydrax), Geijera parviflora (wilga), Bertya opponens, Croton phebalioides.*	Shrub species: *Erythroxylon australe* (dogwood), *Eremophila mitchellii* (false sandalwood), *Croton insularis* (croton), *Carissa ovata* (currant bush), *Geijera salicifolia, Acacia leiocalyx* (black wattle), *Hakea lorea* (bootlace oak), *Cassia brewsteri* (Leichhardt bean), *Grevillea striata* (beefwood), *Dodonaea viscosa* (hopbush), *Santalum lanceolatum* (sandalwood)	Shrub species: *Dodonaea viscosa (hopbush), Eremophila mitchellii (false sandalwood), Owenia acidula (emu apple), Grewia latifolia, Cassia brewsteri (Leichhardt bean), Erythroxylon australe (dogwood), Petalostigma pubescens (quinine bush), Acacia leiocalyx (black wattle), Psydrax oleifolia (psydrax), Grevillea striata (beefwood), Denhamia cunninghamii*
Exotic Grasses: *Cenchrus ciliaris* (buffel grass*) Native Grasses: *Aristida caput-medusae* (many headed wiregrass), *Aristida calycina* (dark wiregrass), *Cymbopogon refractus* (barbwire grass), *Aristida sp.* (wiregrasses), *Ancistrachne uncinulata* (hooky grass)	Exotic Grasses: *Cenchrus ciliaris (buffel grass*), Cenchrus pennisetformis* Native Grasses: *Aristida calycina (dark wiregrass), Digitaria sp. (finger panic grass), Aristida sp. (wiregrasses), Eragrostis sp. (lovegrasses), Aristida caput-medusae (many headed wiregrass), Entolasia stricta, Ancistrachne uncinulata (hooky grass)*	Exotic Grasses: *Cenchrus ciliaris* (buffel grass*), *Melinis repens (*red natal grass*) Native Grasses: *Aristida calycina* (dark wiregrass), *Aristida caput-medusae* (many headed wiregrass), *Heteropogon contortus* (black spear grass)	Exotic Grasses: *Megathyrsus maximus var. pubiglumis (green panic*), Cenchrus ciliaris (buffel grass*), Melinis repens (red natal grass*)* Native Grasses: *Digitaria brownii (cotton panic), Enneapogon pallidus (nine awn pale bottle washer), Chrysopogon fallax (golden beard grass), Aristida calycina (dark wiregrass), Aristida sp. (wiregrasses), Digitaria sp. (finger panic grass)*
Invasive Plants: *None observed*	Invasive Plants: *Opuntia sp. (tree pear*)*	Invasive Plants: *Harrisia martinii* (Harrisia cactus*), Opuntia stricta (tree pear*)	Invasive Plants: *Harrisia martinii* (Harrisia cactus*), Opuntia stricta (tree pear*)

3.6.1.8.9 Watercourse revegetation species and seeding rates

Watercourse revegetation activities will be implemented to establish riparian vegetation associated with a watercourse PMLU for the following areas:

- Future creek diversions.
- Existing creek diversions requiring additional revegetation activities.
- Natural watercourses that have been disturbed by mining activities.

Existing creek diversions that have previously been revegetated are discussed in Section 3.6.1.7.5 and will be monitored to inform routine maintenance requirements (Section 3.8.2).

The revegetation zones for natural watercourses (Figure 3-65) are defined as follows:

- Upper bank: defines the lateral limits of both sides of the watercourse or diversion. It does not include the land adjacent. The upper bank generally extends down the riparian profile and is dominated by taller Eucalyptus spp, with a mixed woody and grassy understorey.
- Mid bank: occurs between the upper and lower banks and will vary in size depending on the watercourse geomorphology or diversion design. The mid bank may include benches created from high flow events. The vegetation on the mid bank comprises a mix of species including scattered *Eucalyptus spp.*, as well as species that are more adapted to periodic inundation of water and can withstand some disturbance from floods (i.e. *Melaleuca spp*).
- Lower bank (including bank toe) commences at the edge of the low flow channel or stream bed and extends up the bank to the area affected by more regular lower flows. The vegetation in the lower bank is dominated by scattered trees adapted to wetter environments (i.e. Melaleuca spp) and a high ground cover of grasses, reeds, sedges and rushes.

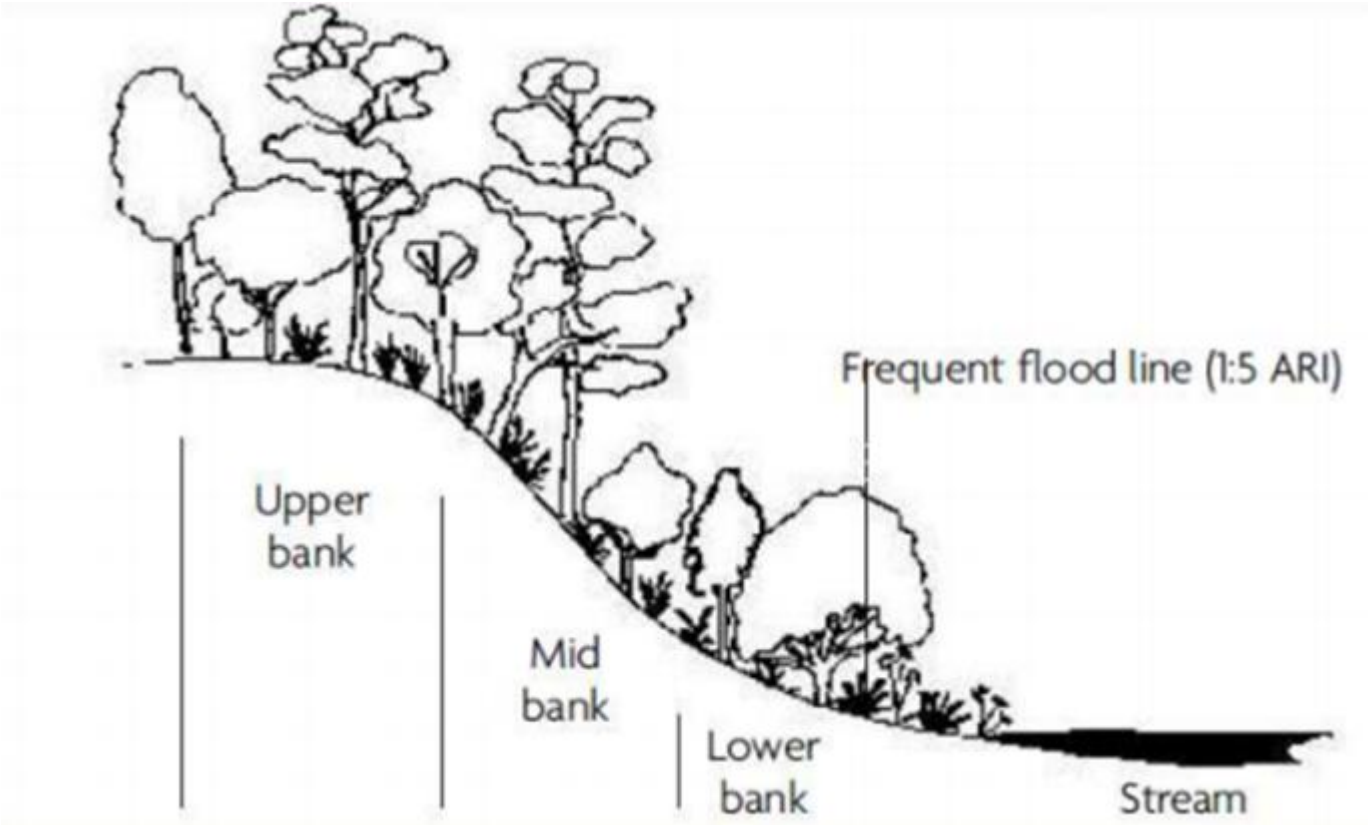


Figure 3-65 Typical riparian revegetation plantings zone (Vegetation Matters, 2014)

Growth media for watercourses will be pre-stripped topsoil, spread over rehabilitated landforms at a depth ≥ 150 mm, and ameliorated if recommended by an AQP (refer to Section 3.6.1.4).

The watercourse revegetation species are based on selecting framework trees, woody understorey and groundcover species associated with the predominant natural watercourse RE 11.3.25 occurring on the BWM site (Figure 3-16).

The recommended watercourse revegetation species and seeding rates are listed in Table 3-46 and Table 3-47. The planned seeding rate for upper and mid banks is 20 kg/ha comprised of 6 kg/ha pure live seed for tree species, 4 kg/ha pure live seed for woody understorey species and 10 kg/ha of pure live seed for grasses and other groundcover species, unless adjusted by an AQP.

The planned seeding rate for lower banks is 15 kg/ha comprised of 5 kg/ha pure live seed for tree species and 10 kg/ha of pure live seed for grass species and other ground species, unless adjusted by an AQP. The revegetation on the lower banks has been designed to establish a higher percentage of ground cover species, including grasses and rushes. Competitive pasture species have been excluded from the seed mix and only non-aggressive grass species are recommended. Short-lived wattle species have also been excluded from the seed mix.

Planting in all revegetation zones will also include the addition of a sterile cover crop (e.g. Japanese millet or similar) seeded at 5 kg/ha, unless adjusted by an AQP.

The preferred seeding timing for watercourse revegetation is August to October. There is a low chance of frost and less likelihood of significant rainfall in this period allowing the best opportunity for vegetation to establish in a relatively non-erosive period.

Table 3-46 Recommended species list and seeding rates for watercourse revegetation – upper and mid banks

Scientific name	Common name	Life form and functional group code[1]	Pure Live Seed[2] rate (kg/ha - uncoated weight)
*Acacia stenophylla***	River Myall	LLA	0.5 - 1
Alphitonia excelsa	Red Ash	NE/NA	0.5 - 1
Angophora floribunda	Rough Barked Apple	E/C	0.5 - 1
Angophora leiocarpa	Smooth Barked Apple	E/C	0.5 - 1
Angophora subvelutina	Broadleaf Apple	E/C	0.5 - 1
*Casuarina cristata***	Belah	E/C	0.5 - 1
Casuarina cunninghamiana, **	River She Oak	NE/NA	0.5 - 1
*Corymbia tessellaris***	Moreton Bay Ash	NE/NA	0.5 - 1
*Eucalyptus camaldulensis *, **	River Red Gum	E/C	1 - 2
Eucalyptus coolabah subsp. coolabah	Coolabah	E/C	1 - 2
Eucalyptus melanophloia	Silver Leaved Ironbark	E/C	0.5 - 1
Eucalyptus populnea	Poplar Box	E/C	0.5 - 1
Eucalyptus tereticornis, **	Queensland Blue Gum	E/C	0.5 - 1
Lysiphyllum hookeri	White Bauhinia	NE/NA	0.5 - 1
Melaleuca bracteata, **	Black Tea Tree	NE/NA	0.5 - 1
Terminalia oblongata	Yellowwood	NE/NA	0.5 - 1
Framework tree species - total seed weight uncoated (kg/ha)			**6**
Acacia excelsa	Ironwood Wattle	ILA	0.5 - 1
Acacia fasciculifera	Scaly Bark	ILA	0.5 - 1
*Cassia brewsteri***	Leichardt Bean	SU	0.5 - 1
Dodonaea viscosa	Sticky Hop Bush	SU	0.5 - 1
Eremophila mitchellii	False Sandalwood	SU	0.5 - 1
Erythroxylum australe	Cocaine Tree	SU	0.5 - 1
Ficus coronata	Creek Sandpaper Fig	SU	0.5 - 1
Ficus fraseri	White Sandpaper Fig	SU	0.5 - 1
Ficus opposita	Sandpaper Fig	SU	0.5 - 1
Grevillea striata	Beefwood	SU	0.5 - 1
Grewia latifolia	Dogs Balls	SU	0.5 - 1
Hakea lorea	Bootlace Oak	SU	0.5 - 1
Mallotus philippensis	Red Kamala	SU	0.5 - 1
Petalostigma pubescens	Quinine	SU	0.5 - 1
Woody understorey species - total seed weight uncoated (kg/ha)			4
Bothriochloa bladhii	Forest Blue Grass	NG	1-2
Cymbopogon refractus	Barbwire Grass	NG	1-2
Capillipedium spicigerum	Scented Top	NG	0.2 - 0.5
*Chloris divaricata or C. Ventricosa**	Slender Chloris, Tall Windmill Grass	NG	1-2
Cynodon dactylon,***	Couch	IG	2
Dichanthium sericeum subsp. sericeum	Queensland Bluegrass	NG	1-2
Digitaria brownii	Cotton Panic	NG	1-2
Eulalia aurea	Silky Brown Top	NG	1-2
Heteropogon contortus	Bunched Speargrass	NG	1-2
Lomandra longifolia	Mat Rush	NG	1-2

Scientific name	Common name	Life form and functional group code[1]	Pure Live Seed[2] rate (kg/ha - uncoated weight)
Panicum effusum	Hairy Panic	NG	1-2
Paspalidium distans	Shot Grass	NG	1-2
Themeda triandra	Kangaroo Grass	NG	1-2
Ground species - total seed uncoated (kg/ha)			10
Echinochloa esculenta	Japanese millet	Cover crop	5

Notes:

[1] Life form and functional group code: Eucalypt/Bloodwood (Corymbia) species (E/C), Non-eucalypt, non-acacia species (NE/NA), Long lived acacias (LLA), Shrubby understorey (SU), Groundcover shrubs (GCS), Vines/creepers (V/C), Intermediate lifespan acacias (ILA), Short lifespan wattles (SLA), Introduced woody perennials (IWP), Competitive pasture grasses (CPG), Introduced grasses (IG), Native grasses (NG)

[2] Where pure live seed (PLS) information is not yet available minimum seeding rates must be at least 6kg/ha uncoated framework tree species, 4kg/ha uncoated woody understory species, 10 kg/ha uncoated grass species and 5kg/ha cover crop

** mandatory in relevant RE mix*

*** medium salinity tolerance (DERM 2011)*

Table 3-47 Recommended species list and seeding rates for watercourse revegetation – lower banks

Scientific name	Common name	Life form and functional group code[1]	Pure Live Seed[2] rate (kg/ha - uncoated weight)
Casuarina cunninghamiana, ***	River She Oak	NE/NA	0.5-1
Melaleuca bracteata, ***	Black Tea Tree	NE/NA	0.5-1
Melaleuca fluviatilis	Weeping Tea-Tree	NE/NA	0.5-1
*Melaleuca linariifolia***	Snow In Summer	NE/NA	0.5-1
*Melaleuca leucadendra ***	Broad-Leaved Tea Tree	NE/NA	0.5-1
Melaleuca viminalis, ***	Red Bottlebrush	NE/NA	0.5-1
Melaleuca trichostachya	Flax-Leaf Paperbark	NE/NA	0.5-1
Lophostemon suaveolens	Swamp Box	NE/NA	0.5-1
Framework tree species - total seed weight uncoated (kg/ha)			5
Bothriochloa bladhii subsp. bladhii	Forest Blue Grass	NG	1-2
Chloris divaricata or C. ventricosa	Slender Chloris, Tall Windmill Grass	NG	1-2
Cymbopogon refractus	Barbwire Grass	NG	1-2
Cynodon dactylon, ***	Couch	IG	2-3
*Cyperus spp. (C. gracilis, C. fulvus)****	Sedge	NG	2-3
Dichanthium sericeum subsp. sericeum	Queensland Bluegrass	NG	1-2
*Lomandra longifolia****	Spiny-Headed Mat Rush	NG	2-3
Paspalidium distans	Shot Grass	NG	1-2
Themeda triandra	Kangaroo Grass	NG	1-2
Ground species - total seed weight uncoated (kg/ha)			10
Echinochloa esculenta	Japanese millet	Cover crop	5

Notes:

[1] Life form and functional group code: Eucalypt/Bloodwood (Corymbia) species (E/C), Non-eucalypt, non-acacia species (NE/NA), Long lived acacias (LLA), Shrubby understorey (SU), Groundcover shrubs (GCS), Vines/creepers (V/C), Intermediate lifespan acacias (ILA), Short lifespan wattles (SLA), Introduced woody perennials (IWP), Competitive pasture grasses (CPG), Introduced grasses (IG), Native grasses (NG)

[2] Where pure live seed (PLS) information is not yet available minimum seeding rates must be at least 6kg/ha uncoated framework tree species, 4kg/ha uncoated woody understory species, 10 kg/ha uncoated grass species and 5kg/ha cover crop

** mandatory in relevant RE mix*

*** medium salinity tolerance (DERM 2011)*

**** bank toe area only*

3.6.1.8.10 Watercourse reference sites

Watercourse reference sites have been established in the existing creek diversions associated with Burngrove-, Taurus, Deep-, Sirius- and Rockland creek diversions as shown in Figure 3-66. Reference sites will be monitored in accordance with the watercourse monitoring requirements outlined in Section 3.8.2. Where revegetation is required in a natural watercourse, a reduced number of reference sites (compared to the IDC method (ID&A, 2001)) will be established due to the reduced impact area. New watercourse reference sites will be established in relatively unmodified upstream sections of each watercourse.

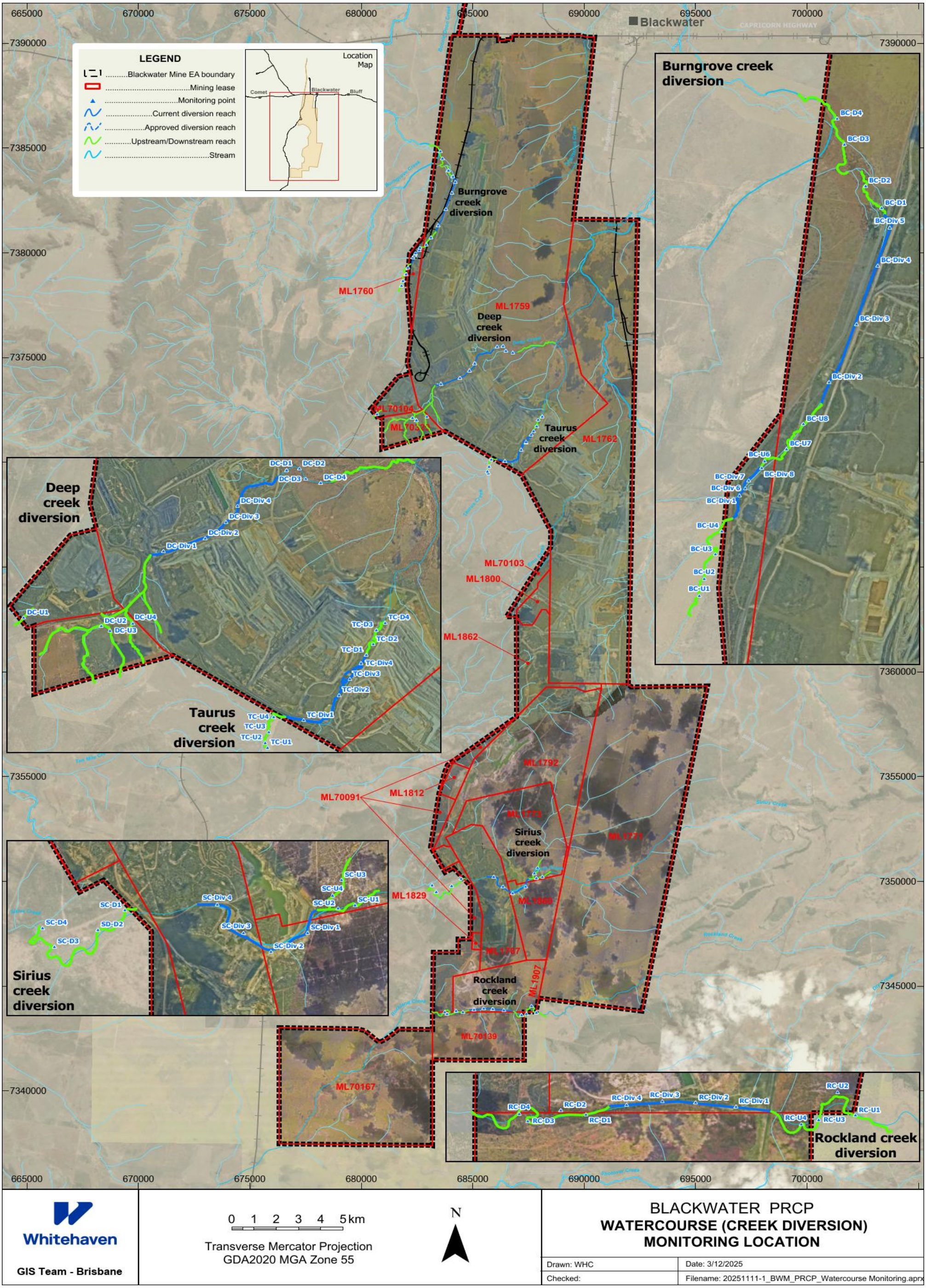


Figure 3-66 BWM watercourse (creek diversion) monitoring locations

Relationship with PRCP Schedule
The revegetation approach for the PMLUs focuses on the selection and establishment of suitable species based on the growth media and rehabilitated landforms. Woodland habitat and watercourse rehabilitation strongly consider the inclusion of framework tree species, woody understorey and grass species from regional ecosystems occurring within or surrounding BWM on similar landforms and substrates. The recommended species will best support achievement of the cattle grazing, woodland habitat and watercourse PMLUs' revegetation objectives.

3.6.2 Tailings storage facilities and rejects

PRCP Guideline (Section 3.6.2)

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

The design for a TSF must include the relevant elements:

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

3.6.2.1 Tailings context

The purpose of a CHPP is to improve the quality of Run-of-Mine (ROM) coal to meet particular product coal specifications. Some of the processes used to achieve this generate fine-grained residue, called tailings, mixed with water. Coal tailings typically consist of sand, silt and clay-sized fragments of rock and coal. Tailings are commonly disposed of by pumping as slurry to permanent storage facilities, which are either earth-embankment dams or in-ground mining voids. Some newer CHPPs produce tailings paste or filter cake instead of slurries but it is often not practical or economical to retrofit such processes to an existing CHPP.

Prior to 2000, the current Blackwater Mine comprised two separately owned and operated mines, each with its own CHPP, and a separate Thermal Coal Plant (TCP) also operating in the northern mining area. The SCPP, located in the southern mining area ceased processing coal in 2008. The NCPP and TCP now process all ROM coal for BWM. As of 2024, about 6% of ROM coal reports as tailings, which is about 0.8 Mtpa.

There are two active TSFs in the northern area of BWM that receive tailings from the NCPP: NCPP TSF and Bonnie Doon TSF (Figure 3-67). The four TSFs in the southern area of BWM; Laleham, Ramp 72, Ramp 74 and Bottom Dam are in-active and have historically received tailings from the SCPP (Figure 3-68). The Ramp 36 Rejects dump is located south-east of the NCPP TSF, south of Deep Creek (Figure 3-68). The Ramp 36 Rejects Dump received rejects between 1967 and 2007. Rejects were also removed from the facility at times, to use in construction of wall lifts on the NCPP TSF. In the future, tailings may be further used to backfill mined-out voids at BWM as per EA condition D6. This would help decrease the NUMA extent (Section 3.4.2). If this occurs, tailings placement and management procedures will follow the same procedures as existing TSFs (Section 3.6.2.3).

Key aspects of the TSFs are provided in Table 3-48. All the TSFs in the southern part of the mine were commissioned while the operation was under different ownership and management. In general, they appear to have met accepted practice at that time but there is little documentation. NCPP and Bonnie Doon TSFs have more comprehensive design documentation and reflect recent improvements in storage practice.

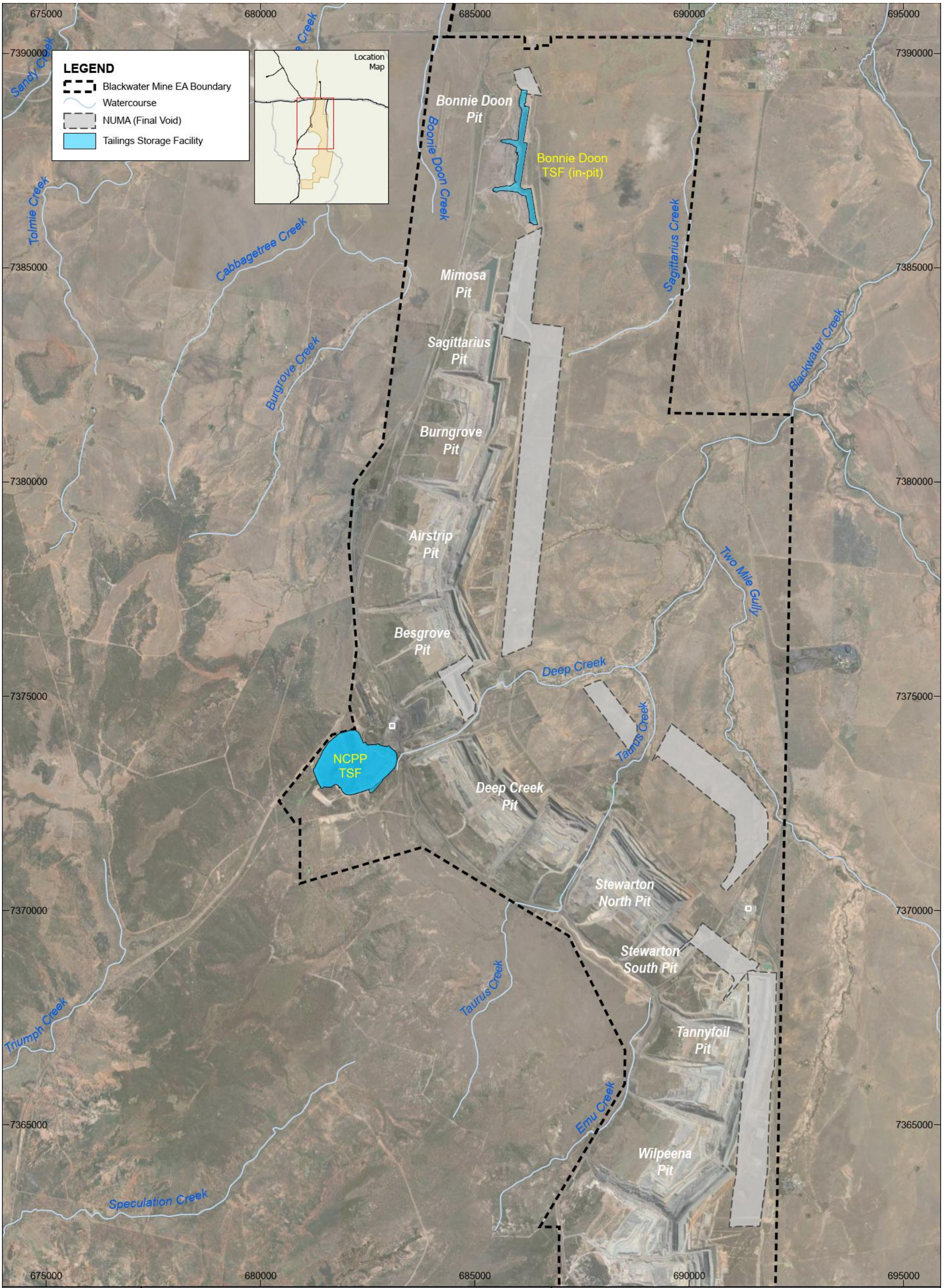


Figure 3-67 BWM TSFs – Northern Area

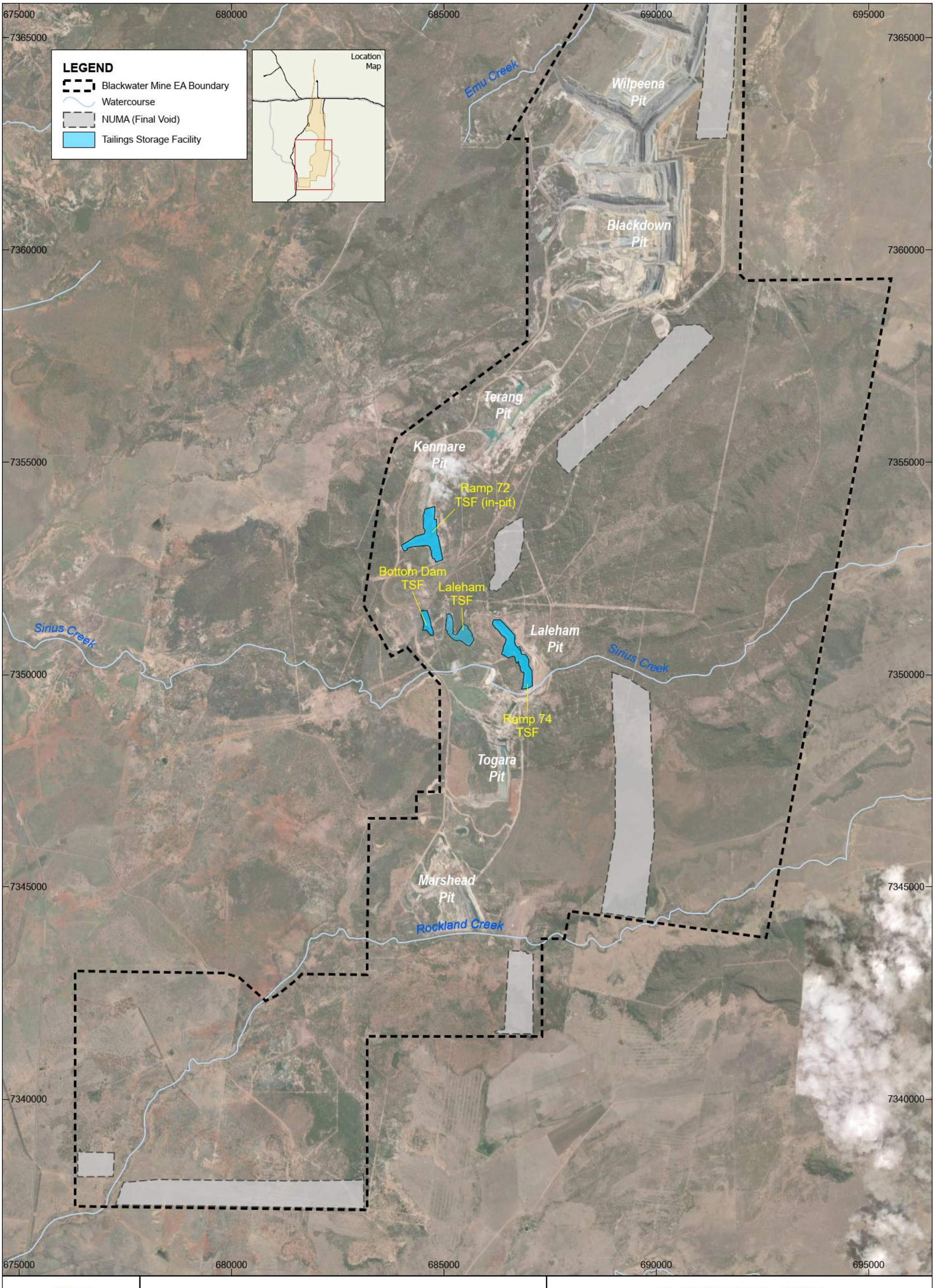


Figure 3-68 BWM TSFs – Southern Area

Table 3-48 Summary of BWM TSFs

TSF name	Storage capacity	Type	Status	Tailings depth (m)	Lining	Spillway location	Cellular design	Design storage allowance	Leak detection	Seepage collection	Progressive rehabilitation
NCPP	~26,000 ML (full capacity)	Turkey's nest	Active (emergency use)	32	Natural foundation	South-west to Deep Creek	Single cell	Not required	By observation and groundwater bore monitoring	Pond at eastern toe	May commence after becoming inactive
Ramp 72	~6,000 ML (current capacity)	In-pit	Inactive	~40	Pit walls	West, near top of ramp	Single cell	1:20 AEP 116 ML		Blanket drain in embankment	Not feasible; will receive spoil from future mining
Ramp 74	5,470 ML (current capacity)	In-pit	Inactive TSF and active water handling	32	Pit walls	Ramp at west	Single cell	1:20 AEP 1,644 ML		N/A (no seepage identified)	May commence when no longer required for water storage
Laleham	2.24 ML (up to spillway invert)	In-pit and hillside embankment	Inactive	9 (in aboveground cell)	Pit walls and natural foundation	East	Two cells	>0.1% AEP		N/A (no seepage identified)	Has commenced
Bonnie Doon	~14,600 ML (design full capacity)	In-pit	Active	60	Pit walls	North-west, on natural ground	Single cell	>0.1% AEP		Dewatering bored will be installed if necessary	Not feasible until tailings deposition ceases
Bottom Dam	N/A	Hillside embankment	Inactive	15	Natural foundation	Pipe culvert to Duck Pond to east	Single cell	>0.1% AEP		N/A (no seepage identified)	Can commence when ROM3 coarse rejects are re-handled

3.6.2.1.1 NCPP TSF

NCPP is an active above-ground (turkey's nest) TSF located at the west and south-west (upslope) of the NCPP and rail loop and bounded by a minor public road at the north-west (Figure 3-67). The TSF is approximately 1.4 km long and 1.7 km wide, with a footprint of about 198 ha. Depth of tailings is up to 32 m. The deposited tailings beach down to a decant pond inside the southern wall of the dam.

The original tailings dam commenced in 1970 and comprised a single earth fill embankment across a northern tributary of Deep Creek. The facility has been raised and extended in various stages since then, with downstream and upstream wall lifts constructed of earth fill and, in recent decades, mainly coarse rejects. A final small raise was constructed in 2022, and active tailings deposition ceased in 2023.The facility remains available for emergency disposal.

The final landform design for the TSF is a stand-alone elevated landform surrounded by undisturbed and rehabilitated land at pre-mining elevation. Rehabilitation planning and designs for the NCPP TSF are influenced by the following:

- Prior to mining and outside the area of mine disturbance, the dominant land use has been low-intensity grazing.
- Footprint constraints, including rail loop to the north, NCPP and MIA to the east, and the ML boundary (with a minor public road and rail line) immediately to the west.
- The Deep Creek diversion is located about 300 m south of NCPP TSF, with the creek channel flowing north to within about 60 m of the eastern wall toe before flowing eastward through a culvert under the main mine haul road.
- Regulated vegetation (endangered regional ecosystem comprising acacia-dominated open forest, woodland or shrublands) is mapped to the south-west of the TSF; regulated vegetation (riverine) is mapped along Deep Creek.
- Geology mapped for the footprint of NCPP TSF is regolith weathered from the Burngrove Formation that stratigraphically underlies the Rangal Coal Measures, with a small area of cemented Tertiary sediment along the western edge. Given this context, the NCPP TSF is unlikely to be hydraulically connected to any significant aquifers.

3.6.2.1.2 Ramp 72 TSF

Ramp 72 TSF is an inactive in-pit (with saddle dam) tailings and coarse rejects storage facility located just north of the former TLO area in South Blackwater. The pit section of the facility is about 950 m long and 150 m wide, while the ramp section is about 650 m long with a width opening from 50 m at the top of the ramp to 160 m where it joins the pit. The depth of tailings ranges from a couple of metres at the top of the ramp to about 40 m in-pit, and the coarse rejects in the southern end are about 16 m thick over the tailings.

Ramp 72 TSF was mined before 1985. Tailings were discharged to the pit from the early 1990s until December 2001. During this time, a 4 m high embankment was constructed at the top (western end) of the ramp to contain the decant pond as the tailings level rose slightly above natural ground level and the decant drained to that end of the ramp. Coarse rejects were dumped into the southern end of the pit over the tailings from about 200 mRL until they reached a couple of metres below pre-mining ground level. In 2010, the embankment was raised 6 m to better contain rainfall runoff from the pit and surrounding catchment. Currently, the tailings and rejects are mainly below ground level, with rainfall and runoff intermittently stored over the wastes behind the above-ground embankment.

Rehabilitation planning and designs for the Ramp 72 TSF are, and will continue to be influenced by the following:

- Prior to mining the land use was mainly low-intensity grazing.

- Footprint constraints, including the mine access/haul road at the west, other mine voids to the north and highwall spoil at the east. (As mentioned above, at closure the Kenmare new residual void will be located further east, with in-pit spoil dumped in between). The southern rail loop is about 1 km to the south-west with an old mine building and the SCPP at the eastern side of the loop.
- In this part of the mine, the pre-mining ground surface and its watercourses drain from east to west, and a natural drainage line flows from the top of the ramp into Sirius Creek, approximately 4 km downstream, to the south-west. The drainage line is mapped as regulated vegetation, specifically as an endangered regional ecosystem comprising remnant acacia-dominated woodland to open forest on gilgai clay plains.

Geology mapped for the footprint of the Ramp 72 TSF is cemented Tertiary sediment (duricrust) on deeply weathered regolith. Planned mining to the east will remove the Tertiary and Permian overburden down to the coal floor. Seepage from Ramp 72 TSF is expected to follow a negative hydraulic gradient eastward through in-pit spoil to the Kenmare residual void.

3.6.2.1.3 Ramp 74 TSF

Ramp 74 is an inactive in-pit TSF within the mined-out Laleham Pit. No tailings are stored above-ground. The pit was mined prior to 2001. The northern half of the pit is aligned roughly north-west to south-east while the southern part is nearly north to south. The northern end-wall is about 1.8 km south-west of the SCPP, with various small mine-affected water dams and Laleham TSF in between.

Ramp 74 TSF is about 1.9 km long and has a footprint of about 41 ha. It is estimated that the depth of tailings varies from about 24 m in the south to 32 m in the north. The beach angle of the tailings is approximately 0.6%.

From December 2001 until 2008, tailings were discharged from the northern end-wall and allowed to beach down toward the southern end. Based on the site geological model, the tailings surface is below the base of weathering except at the location of the pre-mining alignment of Sirius Creek, and it is more than 10 m below spill level. Since tailings deposition ceased, the pit has at times been used to store excess mine-affected water.

The BWM EA Condition D6 allows for tailings disposal in pits or voids. Furthermore, the EA – as the site LOD, supports the retention of residual voids as NUMAs. Hence, the proposed closure outcome for Ramp 74 TSF is a NUMA (Ramp 74 residual void). Although rehabilitation measures are not required for a NUMA, the following have, and will continue to be, considered for conceptualisation of management milestones:

- Prior to mining, the dominant regional land use was low-intensity grazing.
- The facility is not located in close proximity to any third-party infrastructure; a power line easement to the SCPP that passes about 0.4 km north of the northern end-wall is the only nearby key infrastructure. Unmined ground east of the highwall slopes gently toward the pit.
- Prior to mining, Sirius Creek flowed east-to-west across the southern area of the pit. The Sirius Creek diversion was constructed around the southern end-wall. An upgraded creek diversion and associated flood protection structures have been designed largely along the same alignment as the existing temporary diversion and flood protection structures.
- A significant area of land east of the highwall is uncleared woodland mapped as MSES-regulated vegetation (Category B – endangered) comprising sub-dominant shrubby open forest. A smaller area about 1 km south of the TSF (on the other side of Sirius Creek is mapped as high ecological significance wetlands comprising dominant endangered open forest.

The site geological model shows typically a 10-20 m depth of Tertiary Quaternary soil and rock overlying weathered Permian rock with unweathered Permian Rangal Coal Measures generally 20-25 m below pre-mining ground level. The exception is at the original channel of Sirius Creek, where the depth of weathering increases to about 35 m.

The tailings surface is more than 10 m below surrounding ground level and would require more than 5 million cubic meters (Mm^3) of spoil to completely backfill the void. Due to local constraints, no further mining is planned in the vicinity and therefore no new sources of backfill are available. The spoil generated from the Laleham pit has been rehabilitated up to the low wall. Re-disturbing this rehabilitation in an attempt to backfill the voids would have a negative environmental outcome.

3.6.2.1.4 Bonnie Doon TSF

Bonnie Doon is an active in-pit TSF located at the northern end of the mining operations (within the Bonnie Doon Pit). The Bonnie Doon TSF comprises four straight pit sections connected by two ramps (R10 and R12). The TSF is 2.7 km long and has a footprint of about 42 ha. When filled, the depth of tailings will range from about 25 m in the north to 60 m at the southern end. The location of tailings discharge and the decant pond may change throughout the operational life but by closure, the tailings surface will drain toward the north with a beach slope in the order of 1-1.5%.

Tailings deposition commenced in December 2023 and will continue until the tailings reach RL160 m just north of Ramp 10, beaching down from about RL179 m at the southern end of the pit. The maximum tailings elevation was reduced from the level specified in the initial design plan, to keep the operating tailings and decant pond levels below the base of weathering exposed in the highwall (ranging from RL172 m to RL185 m) and allowing the storage facility to perform as a groundwater sink post closure.

Similarly to Ramp 74 TSF, the proposed closure outcome for Bonnie Doon TSF is a NUMA (Bonnie Doon residual void). Although rehabilitation measures are not required for a NUMA, the following have, and will continue to be, considered for conceptualisation of management milestones:

- Prior to mining, the dominant land use was low-intensity grazing.
- There are no notable footprint constraints for the facility. The northern end of the TSF is about 1.5 km south of the Capricorn Highway and 5 km south-west of the town of Blackwater. The two pit ramps run about 1 km down from the main mine access road to the west and the mine's rail line is at the western side of the road.
- Sagittarius Creek is located about 3.7 km east of the TSF highwalls and flows northward. Several unnamed gullies (that are defined drainage features under the *Water Act 2000* (Qld)) collect overland flow from the area east of the TSF and feed it into the creek.
- Regulated vegetation (Category R – GBR riverine) is mapped along the upslope ends of some of those drainage features but there are no other Matters of State Environmental Significance near the TSF.

Geology mapped for the footprint of Bonnie Doon TSF shows most of the highwall edging into the Triassic Rewan Formation overburden overlies the mined Permian Rangal Formation. The exception is at the northern end, where Quaternary alluvium comprising sheetwash and flood-out sheets is mapped.

The final tailings surface will be 20-40 m below surrounding ground level. There is no mining planned close to Bonnie Doon Pit when the TSF is undergoing closure. No close-haul spoil is expected to be produced at the time. Much of the spoil produced from the Bonnie Doon Pit is already under rehabilitation and re-disturbing the rehabilitation to backfill the TSF would be considered a negative environmental outcome.

3.6.2.1.5 Bottom Dam TSF (and ROM 3 Area Rejects)

The ROM 3 Area coarse rejects dump is located against an east-facing natural slope about 0.7 km south of the SCPP. The dump batter is at angle of repose and about 38 m high; the flat top ranges up to 120 m wide and the total footprint is 5.5 ha.

Bottom Dam TSF abuts the eastern toe of the rejects dump. It is bound by sloping ground at the north, a 6 m high earth fill embankment at the east and a spoil dump at the south. The footprint of Bottom Dam TSF is 3.2 ha. Geotechnical drilling suggests that the storage is up to 15 m deep.

Bottom Dam was originally a process water storage forming part of the SCPP water management system, which was in use in the 1970s and 1980s. It received overflow from No.1 Dam (upslope to the north) and then through a culvert to Duck Pond at the east. The TSF also received coal fines and other sediment washed in from No.1 Dam and the rejects dump, but it was not designated as a TSF until after 2012.

The tailings surface is close to the embankment crest level and is relatively flat except for a small sump around the culvert to Duck Pond. Scrubby mid-storey has established over more than half of the tailings surface. Recent geotechnical investigation showed a desiccated surface crust typically 1-2 m thick.

The following have, and will continue to influence rehabilitation considerations for the Bottom Dam TSF and ROM 3 Area Rejects:

- Prior to mining the dominant land use on the mining lease was low-intensity grazing, with significant areas of uncleared woodland.
- Some of the woodland habitat remains in the vicinity of ROM3 Area/Bottom Dam TSF and is mapped as Category B regulated vegetation (endangered and of-concern eucalyptus woodland to open forest).

The Bottom Dam TSF and ROM 3 Area are in the middle of the South Blackwater MIA, with the ROM 3 Area and the SCPP on natural high ground to the west and north respectively. Other mine dams are located immediately to the east, adjacent to the Laleham TSF, with a spoil dump immediately to the south. Natural ground drains to the south-east, towards Sirius Creek.

Geology mapped for the footprint of the TSF is Emerald Formation Tertiary weathered siltstone and claystone. The ridge to the west and north has Tertiary duricrust, and Sirius Creek runs through regolith of Permian Burngrove formation. The Bottom Dam TSF and ROM 3 Area Rejects is not expected to have a direct hydrogeologic connection with Sirius Creek.

3.6.2.1.6 Laleham TSF

Laleham is an inactive TSF with in-pit and above-ground sections, the latter being formed by embankments across a hillslope. It is located about 1.2 km south-east of the SCPP.

The in-pit section was present in 1984, while the embankment was under construction roughly at the same time. The tailings surface was capped with clayey spoil by the end of 1994; however, the exposed (downstream) embankment slope has not been structurally modified since its original construction.

The TSF is approximately 0.4 km long and 0.6 km wide, with a footprint of about 13 ha. The depth of tailings in the in-pit section is not known but the main embankment is about 10 m high. The capped surfaces are generally flat, except for a depression at the eastern side of the above-ground section that was likely caused by tailings consolidation.

Prior to mining, the dominant land use was low-intensity grazing.

The in-pit area of the TSF wraps around the end of a laterised sandstone ridge to the north, which is the highwall of the historical mining area. The facility is further constrained by two small mine water dams (Duck Pond and Fish Bowl) located 100-200 m to the west. The eastern side of the above-ground part of the TSF is bounded by a road around the western toe of the Ramp 74 northern in-pit spoil dump and the Ramp 74 TSF is about 700 m east of Laleham TSF. There are several vegetated spoil dumps around the southern side of the TSF. Sirius Creek is about 25 m from Laleham TSF and flows from east to west on the southern side of the vegetated spoil dumps.

Regulated vegetation is mapped on the sandstone ridge to the north and in an area to the south-west of the TSF. The vegetation on the sandstone ridge is described as an endangered acacia-dominated open forest and vegetation to the south-west is described as of-concern eucalypt open forest.

Geology mapped for the footprint of Laleham TSF is Emerald Formation Tertiary sediment, with Rangal Formation sub-cropping south of Sirius Creek. Over the forty years since tailings were first deposited in-pit, there have been no reports of seepage from the TSF being detected in Sirius Creek. The *Bottom Dam*

Tailings Storage Facility and Sirius Creek Preliminary Hydrogeological Review and Investigation – Revision 3.0 (SLR 2025) supports this position and is provided as Appendix 4.2.

3.6.2.1.7 Ramp 36 Rejects Dump

The Ramp 36 Rejects Dump is a long narrow waste facility located south-east of the NCPP TSF on the southern side of Deep Creek and the western side of the main haul road. It has a footprint of 72 ha with a high mound at the southern end reaching about 30 m above surrounding ground levels. The batters in that area are at angle-of-repose.

It is understood that the facility received coarse rejects over the period 1967-2007 and that rejects were also removed from the facility at times to use in the construction of wall lifts on the NCPP TSF.

3.6.2.2 Tailings and rejects characterisation

Historically, little testing of tailings was undertaken at South Blackwater Mine. There were a few investigations carried out on the northern NCPP TSF but those were done to support the design of wall lifts and were limited in scope and location. Since 2020, geochemical and geotechnical studies have been undertaken at NCPP, Laleham, Ramp 72 and Bottom Dam TSFs to extend the knowledge base for rehabilitation. Ramp 74 and Bonnie Doon TSFs have not yet been sampled because they cannot presently be safely accessed – Ramp 74 contains mine water over the tailings and Bonnie Doon is the main active facility. However, inherent tailings characteristics are dictated by the feed coal and the plant processes, rather than by the storage facility, so results obtained for the other facilities are considered sufficient for planning and preliminary design.

3.6.2.2.1 Geochemical properties

The geochemistry of tailings at Blackwater Mine is described in Section 3.6.1.3. In summary:

- Approximately 55% of the tailings material sampled (703 samples) has moderate to high potential to generate AMD. The remaining tailings have a relatively low potential to generate AMD.
- Approximately 45% of the rejects sampled (398 samples) have a moderate to high potential to generate AMD. The remaining rejects have a relatively low to low-moderate potential to generate AMD.
- The total metal and metalloid concentrations from 56 tailings samples tested are generally low compared to average element abundance in soil in the earth's crust. Most samples showed either significant or minor enrichment of sulfur, consistent with the ABA data. Two (2) aged samples were significantly enriched with arsenic.
- No fresh rejects samples were significantly enriched with metals or metalloids. Four (4) out of 17 aged rejects samples were significantly enriched with sulfur, consistent with the ABA data for these samples.
- Under freshwater leaching conditions about 73% of tailings samples have low soluble metals concentrations and have near-neutral to alkaline pH, including all 39 fresh NCPP tailings samples. The remaining 27% of tailings samples (all aged) have a wide range of soluble metals concentrations under a wide range of pH conditions.
- Under freshwater leaching conditions about 65% of rejects samples have low soluble metals concentrations and have near-neutral to alkaline pH, including all 15 fresh NCPP rejects samples. The remaining 35% of rejects samples (all aged) have a wide range of soluble metals concentrations under a wide range of pH conditions. Most of the aged rejects with lower pH and moderate to elevated soluble metals concentrations were sampled from Ramp 72.

- When exposed to highly oxidising conditions a significant proportion of tailings and all aged rejects samples can produce weakly to highly acidic leachate with elevated soluble metals and metalloid concentrations.

A detailed geochemical assessment of the tailings and rejects is provided in *Appendix 4.7 – Waste Characterisation*.

3.6.2.2.2 Rheological properties

Rheological testing has been carried out on tailings from NCPP, the Laleham TSF and the Bottom Dam TSF. All samples displayed shear thinning behaviour as shear rates increased, with shear viscosity decreasing by about three orders of magnitude over the shear rates investigated. The results are consistent with those obtained on samples from several other coal mines in the Bowen Basin the rheological behaviour is expected to be similar for tailings from other BWM TSFs.

Rheological characterisation primarily relates to pumpability and flow behaviour soon after deposition and therefore has limited relevance to the long-term behaviour in TSFs. It may provide an indication of the relative potential for liquefaction in the period from deposition to closure; however, any tendency to flow behaviour reduces over time as the tailings consolidate past a critical state.

3.6.2.2.3 Geotechnical characteristics

Geotechnical properties for tailings should be considered in the following two groups:

- Those that are inherent to the material regardless of its situation (e.g. particle size distribution, plasticity and specific gravity); and
- In-situ properties that are affected by the inherent characteristics but also by the stress conditions and moisture distribution within the TSF (e.g. moisture content and dry density, settling density, shear strength and consolidation). Stress and moisture are governed by containment, the weight of overlying material, the location of drainage paths, and time since deposition.

While the inherent properties are essentially constant for a particular sample of tailings, in-situ properties may vary with location and time. Some in situ properties may be monitored during the operation of the TSF to assess the effectiveness of deposition practices, but strength and moisture-density profiles are most useful when measured after deposition has finished and close to when detailed rehabilitation works are being designed and undertaken.

Test results for inherent geotechnical properties are presented in Figure 3-69, Figure 3-70 and Figure 3-71. Tailings from the NCPP are typical of the Bowen Basin, with size distributions showing comparable proportions of sand and silt, while samples from SCPP contained significantly more silt and less sand. However, as is also typical of Bowen Basin coal tailings, Atterberg Limits results suggest that about half the material behaves plastically (like clay rather than silt). Consequently, BWM tailings are described as mainly ranging from low liquid limit Silty Sand to intermediate plasticity Silty Clay.

Tailings samples from SCPP had significantly lower specific gravity, indicating a greater proportion of coal in those tailings. This outcome aligns with the observation that tailings from the SCPP are, on average, older and more recent upgrades to the NCPP have improved coal recovery and resulted in less coal being lost as tailings.

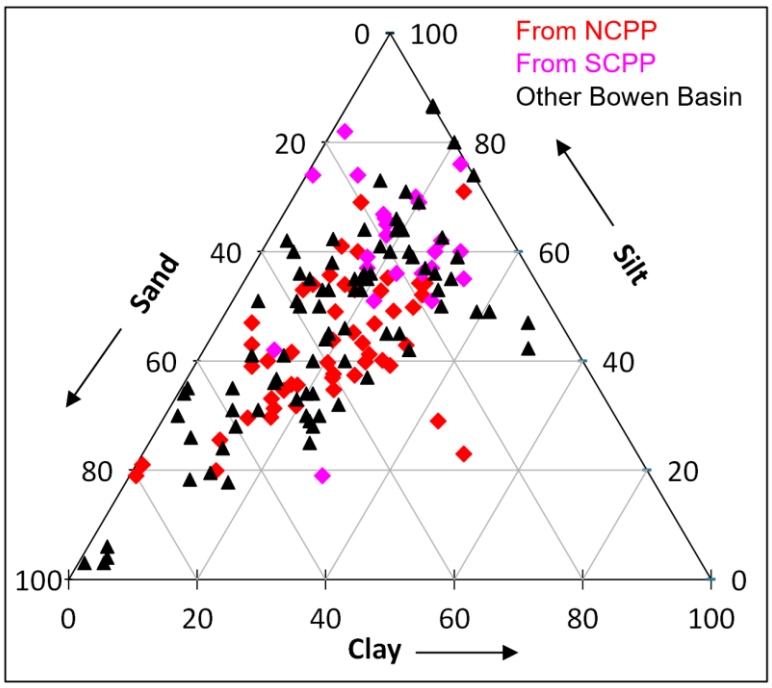


Figure 3-69 Tailings particle size distribution

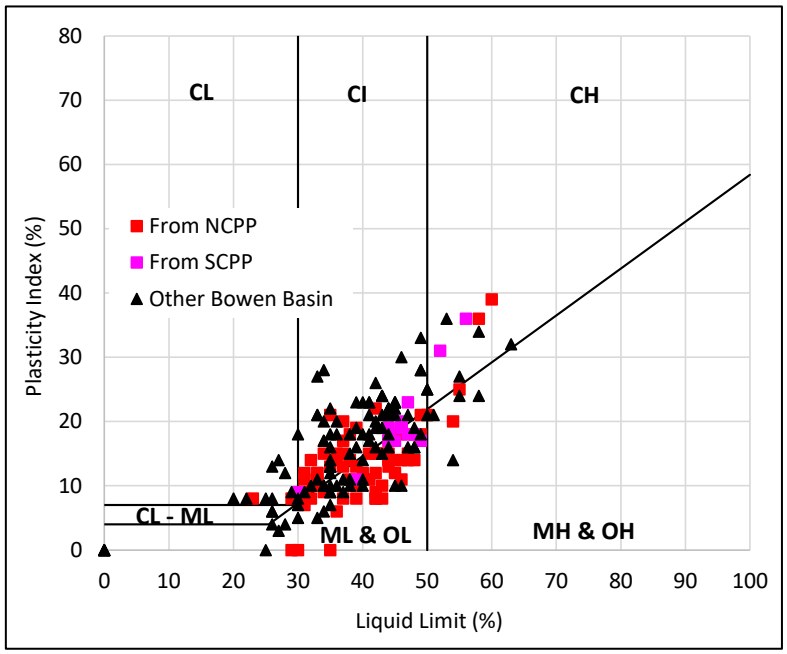


Figure 3-70 Tailings Atterberg limits

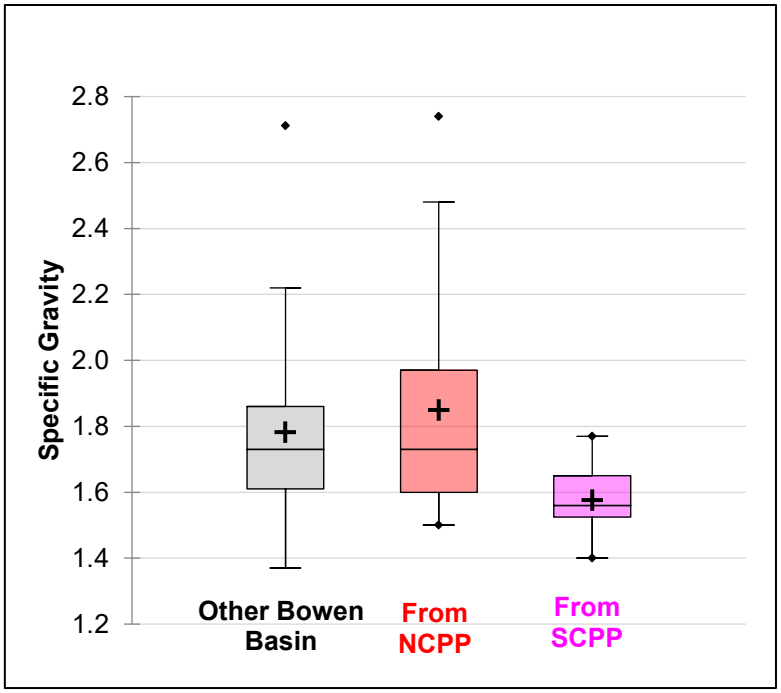


Figure 3-71 Tailings specific gravity

Dry density and moisture content may be used in computations for consolidation settlement but they give only approximate and indirect indication of shear strength. Dry density and moisture content results for tailings samples are provided in Figure 3-72. The higher dry densities for NCPP tailings may reflect sample bias caused by a large proportion of test holes being located close to walls, however, the difference is not sufficient to materially influence the rehabilitation strategy. The higher moisture content values for SCPP tailings may be attributed to the finer size grading and/or less effective dewatering practices during operation.

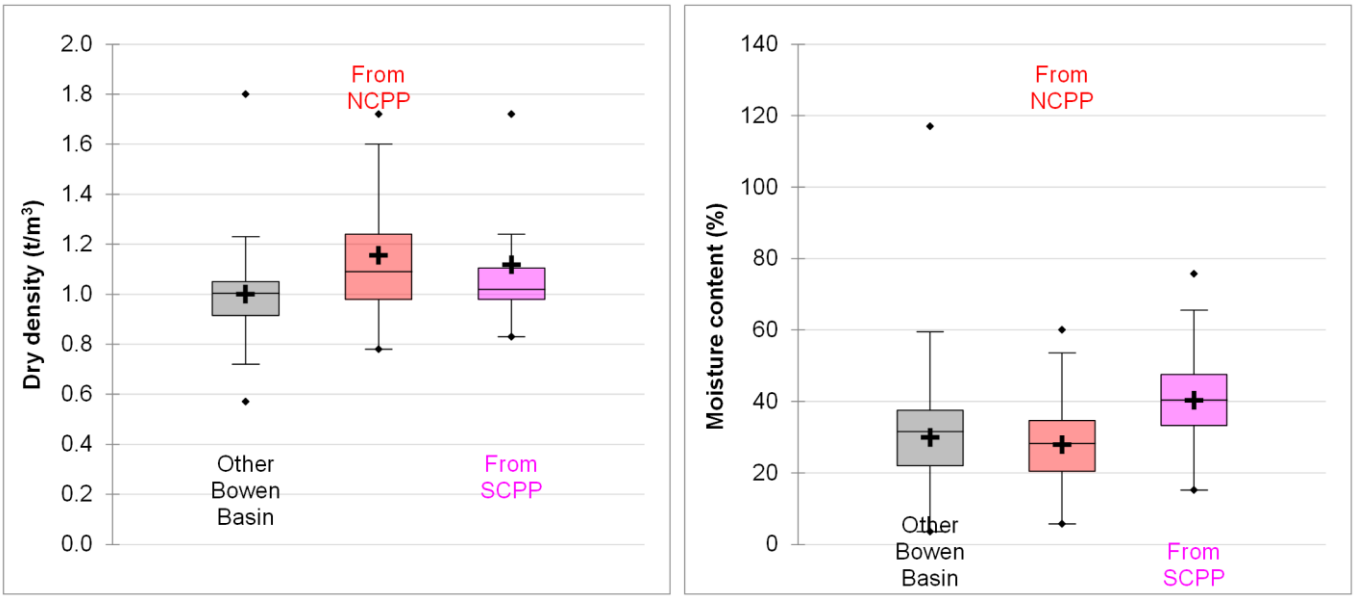


Figure 3-72 Tailings dry density and moisture content

Cone penetrometer testing to provide strength profiles has been carried out on the NCPP TSF, the Laleham TSF, The Ramp 72 TSF and Bottom Dam TSF. Most of the tests were located close to walls, where the tailings are likely to be coarser, shallower, and therefore stronger. Where the tailings surface was exposed, the drier (and stronger) crust was typically 1-2m thick, below which the tailings were variable but typically of soft or firm-stiff consistency. Strength profiles also change with time since deposition as the tailings consolidate and are dewatered. Strength in TSFs varies with location, depth, and time. Testing carried out

significantly in advance of cover construction may be useful for planning purposes, but detailed cover design should be based on testing undertaken closer to closure execution. Construction methodology and scheduling will still need to be adaptable to the actual conditions encountered as variability throughout the emplaced tailings should be expected.

Consolidation and desiccation parameters, obtained from laboratory oedometer tests and soil water characteristic curve (SWCC) tests respectively, are not in situ measurements but are used with other in situ data to predict settlement and densification over time.

Oedometer consolidation tests have been reported for five samples collected form BWM. The results were considered to be close to the median of collated results measured for other coal tailings in the Bowen Basin.

The results of the SWCC testing are provided in Figure 3-73. These indicate a difference between tailings from NCPP and SCPP that would be consistent with the difference in particle size distribution. However, SWCC results are sensitive to sample preparation and test procedures so the outcome of a small number of tests from different laboratories should be treated with caution.

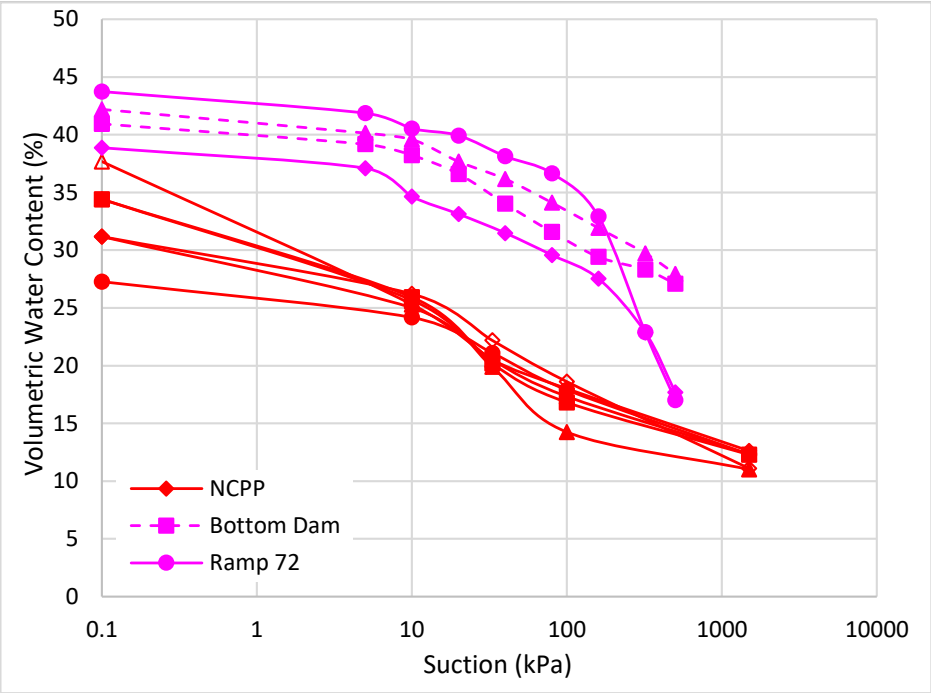


Figure 3-73 Tailings SWCC results

3.6.2.3 Rehabilitation and closure design

The conceptual rehabilitation and closure designs for the TSFs and rejects dumps are facility specific and informed by the particular risks presented by that facility and its characteristics. A facility's characteristics include the physical and chemical properties of both the waste materials themselves and those of the containment structure, as well as the surrounding environment and any potentially sensitive receptors.

In accordance with PRCP Condition PRCP12 (Appendix 4.1 – PRCP Schedule), a landform closure design report is to be prepared by 1 July 2028. The report will demonstrate that the relevant structure (TSF or rejects dumps) and final landform will achieve the performance outcomes described in the PRC Plan and will show the facility's geotechnical stability, erosion resistance, and water quality outcomes are consistent with the nominated PMLU and or NUMA. The design report will be prepared by an AQP and will include evidence that the design has been developed in accordance with accepted industry standards and guidance.

The following sections describe the current conceptual closure designs on a facility by facility basis. In general, all tailings and rejects are to be encapsulated by at least 1 m of consolidated non-acid forming (NAF) material, unless an alternative is recommended by an AQP (PRCP Schedule Criteria RM3.9) and the final cover surfaces are to be water shedding and free from surface ponding, unless an AQP certified alternative design is adopted (PRCP Schedule Criteria RM3.11). Deep-rooted trees are to be excluded from the species mix applied to TSF and reject dump rehabilitation (PRCP Schedule Criteria RM6.9). The cover system type is noted, however, cover system design for all relevant landforms, including TSFs, is discussed in greater detail in Section 3.6.1.6 (Cover Design).

3.6.2.3.1 NCPP TSF

The over-arching objective for rehabilitation of the NCPP TSF is to create a landform that permanently contains tailings, limits the release of solutes to levels that will not cause environmental harm and can support the PMLU. The final landform design for the NCPP TSF is an elevated, stand-alone mounded landform. The design will encourage water to shed rather than pond on the rehabilitated surface. Settlement, in particular differential settlement, will be accommodated by increasing cover thickness in the areas where greater settlement is predicted so to maintain a water shedding profile.

A cover system will be designed to minimise deep infiltration and reduce potential for long-term toe and basal seepage. If basal seepage occurs, it would be drawn towards, and contained within, the Deep Creek and Ramp 30 residual voids (Section 3.6.1.1 and 0). The cover system will be a multiple layer system addressing solute uptake with a capillary break layer and a lower permeability layer to minimise deep infiltration. These layers will be overlaid by a layer of fresh Permian spoil and growth media.

The embankments will be assessed and where necessary reshaping or bulking out would be undertaken to improve either/or structural and erosional stability.

3.6.2.3.2 Ramp 72 TSF

The high-level objective for rehabilitation of the Ramp 72 TSF is to incorporate it within a larger spoil landform with the final landform supporting the proposed PMLU. The final closure landform involves burying the Ramp 72 TSF under a new spoil dump generated by mining further east of the previous pit. The depth of spoil over the tailings and rejects will range from at least 5 m at the top of the ramp in the west to more than 100 m at the current highwall. The closest residual void (Kenmare) will be approximately 1.2 km east of the Ramp 72 TSF. The final spoil landform will be water shedding.

Gravelly spoil or coarse rejects will be spread over the exposed tailings surface to provide an initial support layer prior to placing general spoil and constructing the final spoil landform. Final surface gradients, topsoil thickness and vegetation will be consistent with other spoil landforms rehabilitated to the same post-mining land use (Section 3.6.1.5.2 and 3.6.1.6).

Whilst a significant amount of settlement has likely already occurred, consolidation is expected to continue at diminishing rates throughout the remaining life of the facility and beyond. The additional weight of spoil placed over the top of the facility will trigger a new stage of consolidation. Consolidation will be monitored during construction of the overlying spoil landform, with adjustments made to the final landform to accommodate any settlement that may adversely affect the ability of the landform to shed water or support the proposed PMLU.

3.6.2.3.3 Ramp 74 TSF

The proposed closure outcome for Ramp 74 TSF is a NUMA (Ramp 74 residual void). Therefore, the over-arching objective for closure of the Ramp 74 TSF is to create a safe and stable landform that permanently contains tailings and limits the release of solutes to levels that will not cause environmental harm.

Within the context of this objective, the most significant risks relate to the seepage or spill of tailings contact water. The hydrogeological assessment discussed in Section 3.6.1.1 indicates that the Ramp 74 residual

void will exhibit a net outward groundwater flux, with particle tracking demonstrating that seepage will be drawn east towards the Togara/North Marshmead residual void. This is driven by a lower modelled residual void lake elevation at Togara/North Marshmead, which is predicted to act as a groundwater sink. Seepage from the Ramp 74 TSF is not predicted to impact the receiving environment outside the BWM tenure boundaries.

The residual void water balance modelling discussed in Section 3.6.3 shows the predicted equilibrised average residual void lake level will be approximately 31.9 m below the spill point. Extreme storm event modelling predicts a freeboard of more than 20 m will still be maintained under extreme short-term storm events.

An exclusion bund or similar will be constructed around the perimeter of the Ramp 74 TSF to discourage access by the public and gazing animals. Geotechnical stability analysis indicates the walls of the residual void will achieve a FoS>2 and therefore no additional set-back distances will be required.

3.6.2.3.4 Bonnie Doon TSF

As with the Ramp 74 TSF, the proposed closure outcome for the Bonnie Doon TSF is a NUMA (Bonnie Doon residual void). Therefore, the over-arching objective for closure of the Bonnie Doon TSF is also to create a safe and stable landform that permanently contains tailings and limits the release of solutes to levels that will not cause environmental harm.

As a NUMA in the post closure landscape, the most significant risks relate to seepage or spill of tailings contact water. The hydrogeological assessment discussed in Section 3.6.1.1 predicts the Bonnie Doon residual void will exhibit a net outward groundwater flux, with particle tracking demonstrating that seepage will be drawn north towards the Ramp 8 residual void. This is driven by a lower modelled residual void lake elevation at Ramp 8, which is predicted to function as a groundwater sink. Seepage from the Bonnie Doon TSF is not predicted to impact the receiving environment outside the BWM tenure boundaries.

The residual void water balance modelling discussed in Section 3.6.3 shows the predicted equilibrised average residual void lake level will be approximately 33.5 m below the spill point. Extreme storm event modelling predicts a freeboard of around 21.2 m will be maintained under extreme short-term storm events.

An exclusion bund or similar will be constructed around the perimeter of the Bonnie Doon TSF to discourage access by the public and gazing animals. Geotechnical stability analysis indicates the walls of the residual void will achieve a FoS>2 and therefore no additional set-back distances will be required.

3.6.2.3.5 Bottom Dam TSF and ROM 3 Area Rejects

The high-level objective for rehabilitation of Bottom Dam TSF and ROM 3 Area WSF is to create a landform that permanently contains tailings, limits the release of solutes to levels that will not cause environmental harm and can support the proposed PMLU. The final conceptual closure landform involves pushing the ROM 3 Area rejects down over the Bottom Dam TSF to create a slope abutting the Tertiary ridge with runoff draining freely to the south and south-east.

A simple spoil cover system will be spread over the rejects with a growth medium placed over the spoil. Dispersive spoil with a high fines content will not be used within 1 m of the surface. The final landform will be water shedding and will not pond water.

The construction methodology is to be confirmed by geomechanical analysis closer to execution. The analysis will include estimation of consolidation settlement, after the first layer of rejects has been placed. Topographic (survey) monitoring will continue until an AQP has reviewed the data and confirmed that the predicted remaining differential settlement will not compromise the final surface drainage plan.

3.6.2.3.6 Laleham TSF

The high-level objective for rehabilitation of Laleham TSF is to create a landform that permanently contains tailings, limits the release of solutes to levels that will not cause environmental harm and can support the proposed PMLU. The final closure landform design involves re-handling spoil from some of the smaller nearby dumps to cover the TSF and create a broad mound abutting the natural sandstone ridge, draining south to Sirius Creek.

The tailings surfaces, both in-pit and out-of-pit, have been covered with a minimum of 1 m of spoil. This is understood to have occurred in the early 1990s. There are historically rehabilitated spoil dumps nearby that will be used to construct a layer of general spoil, including the material that is already in place, over the facility. Final surface gradients will facilitate removal of surface water with growth media placement and revegetation works being consistent with other spoil landforms rehabilitated to the same post-mining land use (Section 3.6.1.5.2 and 3.6.1.6).

Whilst a significant amount of settlement has likely already occurred, consolidation is expected to continue at diminishing rates throughout the remaining life of the facility and beyond. The additional weight of spoil placed over the top of the facility will trigger a new stage of consolidation. Consolidation will be monitored during construction of the overlying spoil landform, with adjustments made to the final landform to accommodate any settlement that may adversely affect the ability of the landform to shed water or support the proposed PMLU.

3.6.2.3.7 Ramp 36 Rejects Dump

The high-level objective for rehabilitation of Ramp 36 WSF is to create a landform that limits the release of solutes to levels that will not cause environmental harm and can support the proposed PMLU. The final landform design for Ramp 36 is a stand-alone, elevated landform with a similar footprint to the current facility. Some coarse rejects will be moved within that area to flatten slopes down to the same gradients being applied to spoil dumps (Section 3.6.1.5.2).

Ramp 36 WSF can be re-shaped and covered within its existing footprint as rejects do not require containing embankments. A cover of general spoil is proposed for rehabilitation, with spoil sourced from future mining of the Deep Creek Pits. The purpose of the general spoil cover will be to reduce deep infiltration and minimise the potential for shallow seepage form the landform reporting to receiving waterways. Dispersive spoil with a high fines content will not be used within 1 m of the surface.

Final surface gradients will facilitate removal of surface water with growth media placement and revegetation works being consistent with other spoil landforms rehabilitated to the same post-mining land use (Section 3.6.1.5.2 and 3.6.1.6). The final landform will be water shedding and will not pond water.

Rejects do not experience consolidation settlement. Due to the uncompacted nature of the waste, there may be some settlement due to the weight of the cover layer, however, most of this will occur as the cover is constructed and does not need to be specifically addressed in the design.

3.6.2.3.8 Future requirements and commitments

3.6.2.3.8.1 Closure Landform Design Report

As outlined in PRCP Schedule Conditions PRCP12 and PRCP13, and discussed in Section 3.6.1.5, a Closure Landform Design Report is to be prepared and submitted to the administering authority by 1 July 2028. The Closure Landform Design Report will be prepared by an AQP and peer reviewed by an independent AQP.

The Closure Landform Design Report is to:

- Incorporate all relevant structures including tailings storage facilities.

- Be certified by an independent AQP as safe, erosionally and structurally stable.
- Demonstrate appropriateness to the applicable PMLU or NUMA.
- Contain a suitable level of detail in respect to planned execution timing.
- Have regard to material properties and local conditions as they apply to geotechnical and erosional stability risk.
- Include performance criteria that demonstrates the landform will support the achievement of a stable condition.
- Be maintained and updated as necessary to ensure material changes to the design remain capable of achieving and sustaining a stable condition, with any updates recertified by an AQP (per PRCP Schedule Condition PRCP12).

Monitoring data that has been collected to demonstrate TSF and reject dumps are achieving the performance criteria documented in the Closure Landform Design Report, or as detailed in relevant technical assessments or rehabilitation monitoring reports, is to indicate that the TSFs are on a trajectory to achieve a stable condition (PRCP Schedule Criteria RM6.8).

Relationship with PRCP Schedule
Of the seven tailings and rejects facilities at BWM, four (NCPP, Laleham, Bottom Dam and the Ramp 36 Rejects Area) will remain as above-ground structures in the closure landform with varying degrees of engineered spoil covers. Ramp 72 TSF will be buried beneath the Kenmare spoil landform, and the Ramp 74 and Bonnie Doon tailings are to be managed as the Ramp 74 and Bonnie Doon NUMAs. The concept cover designs detailed in this PRC Plan will be refined to detailed designs no less than three months prior to commencing PRCP Schedule Criteria RM3 for the relevant structure, in accordance with PRCP Schedule Condition PRCP14. The detailed designs will be prepared by an AQP.

3.6.3 Voids

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 works carried out to achieve the post-closure void landform, to ensure construction is consistent with the geotechnical design.

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

A Void Closure Plan was compiled to support the development of this PRCP. The detailed plan, *Void Closure Plan – Blackwater Mine* (ERM, 2026), is provided in *Appendix 4.14 – Void Closure Plan*.

3.6.3.1 Context

As per the EA, a residual void is *"an open pit resulting from the removal of coal and waste rock that will remain following the cessation of all mining activities and completion of rehabilitation processes"*. Therefore,

for this PRCP, a residual void is considered to be the remaining mined out pit below ground level after backfilling.

At BWM, there are 15 residual voids in the final closure landform herein referred to as the BWM residual voids. The residual voids are described below and represented as two separate 3D landforms in Figure 3-60 and Figure 3-61 above:

- Ramp 8
- Bonnie Doon (TSF)
- Mimosa / Besgrove
- Ramp 30
- Deep Creek
- Stewarton North
- Stewarton South
- Tannyfoil
- South Ballamoo
- Kenmare
- Ramp 74
- Togara / North Marshmead
- South Marshmead
- Kennedy West
- Comet Downs East

As set out in Section 3.4 of this PRCP, Section 754(3) and (4) of the EP Act apply to all fourteen residual voids. The NUMA extents are designed to achieve conditions that are safe and structurally stable and includes additional set-backs from the void low-wall, high-wall and end-wall crests if required to achieve wall geotechnical stability (FoS = 1.5), and safety bunds and fences.

3.6.3.2 Geotechnical stability

The Void Closure Plan includes a geotechnical stability assessment of the proposed residual void low-walls, high-walls and end-walls, prepared by Henderson Geotech (2026a; 2026b). The detailed reports, *Long-Term Geotechnical Stability of Highwalls and Endwalls at Blackwater Mine,* and *Assessment of Geotechnical Stability of LF#4.4 Residual Void Lowwalls at Blackwater Mine,* are provided in *Appendix 4.15 – Geotechnical Stability*. The assessment determined the FoS for the residual void walls and, where required, identified appropriate set-back distances to achieve a minimum of long-term FoS of 1.5 for the high-walls, end-walls and low-walls.

3.6.3.2.1 Low-wall stability

A consequence category assessment for the low walls was undertaken in Henderson Geotech (2026b). Eight cross-sections were selected for stability analysis, covering highest spoil, steepest floor dig, and deepest long-term pit lake, as well as large voids with ‘typical’ characteristics, and one of the in-pit TSFs. The assessment concluded there was:

- Negligible consequence for geotechnical instability within the NUMAs;
- Low consequence for geotechnical instability that extends into the Woodland PMLUs; and
- Low consequence for geotechnical instability that extends into the Grazing PMLUs.

Low wall PMLUs are designed to achieve geotechnical stability consistent with a minimum FoS≥1.5 based on current NUMA boundaries. The geotechnical model and/or slope geometry within the NUMA should be reassessed as each pit approaches its final configuration when more detailed spoil characterisation is available and observation may justify changes to the conservative strength parameters applied in this initial stability analyses. During the final stages of operation, void design details can be refined to optimise the final landform and confirm it will achieve the required degree of stability in the long-term.

3.6.3.2.2 High-wall stability

Highwall and endwall stability assessment results for 12 residual voids assessed using the design tool are summarised in Table 3-49 (Appendix 4.15). Results are provided for average fresh Permian wall angles of 50° and 60°.

Three residual voids, Bonnie Doon, Ramp 74 and Comet Downs East were not assessed using the design tool, as site-specific conditions for these voids fall outside the applicability limits of the tool. Bonnie Doon and Ramp 74 have depths of fresh Permian overburden that exceed the design tool limits, as both voids will be partially infilled with tailings, covering a substantial proportion of the fresh Permian strata. In addition, historical auger mining has been undertaken along part of the base of the Ramp 74 highwall, further limiting the applicability of the design tool.

Note that the as-mined design of the residual void high-walls and end-walls do not all meet the minimum FoS and therefore additional set-back distance has been included in the final closure landform design to ensure the minimum FoS is achieved. Set-back distances will determine the boundary of the NUMAs adjacent to the highwalls and endwalls.

Table 3-49 Residual void highwall and endwall setbacks to achieve FoS≥1.5 (design tool)

Residual Void	Set-back Distance from the Wall Toe (m)					
	50°[1]			60°[1]		
	Av.	Range	>90%	Av.	Range	>90%
Ramp 8	104	95-113	111	99	91-96	94
Mimosa/Besgrove	180	120-248	236	176	102-249	236
Deep Creek	146	121-171	169	136	98-180	175
Stewarton North	207	107-295	290	201	89-298	293
Stewarton South	146	113-157	157	124	98-142	138
Kenmare	186	169-198	195	163	147-175	173
Togara/North Marshmead	298	186-389	367	299	193-392	369
South Marshmead	232	194-273	267	213	167-253	249
Kennedy West	149	125-195	173	129	110-183	144
South Ballamoo	356	277-434	423	359	277-438	427
Tannyfoil	148	122-166	163	129	99-161	153
Ramp 30	100	89-107	-	83	76-88	-

Notes:

[1] Average wall angle of fresh Permian overburden
- indicates insufficient data to calculate values

Source: Henderson Geotech (2026a)

3.6.3.3 Void hydrology

3.6.3.3.1 Water balance

A dedicated GoldSim void water balance model was developed by HydroBalance (2026) and documented by WRM in *Progressive Rehabilitation and Closure Planning – Blackwater Mine Final Void Water Balance* (WRM, 2026c), provided as *Appendix 4.16 – Final Void Water Balance.* The model is based on the final closure landform design described in Section 3.6.1.5.

The model simulates conditions over a time period of between 900 and 1,000 years, depending on the timing of closure for each residual void, to assess the long-term water balance and behaviour within the residual voids (*Appendix 4.14 – Void Closure Plan*).

The GoldSim model incorporates the Australian Water Balance Model (AWBM) to estimate daily runoff from daily rainfall. The adopted AWBM parameters are discussed further in Appendix 4.16.

The Australian Government Consistent Climate Scenarios (CCS) project was used to generate climate change adjusted rainfall and evaporation data from an historical climate dataset for the period 1960 and 2024 (64 years). The CCS project provides climate projections as a daily time series across Australia on a 0.05° grid. The grid point closest to the centre of BWM was selected for the assessment.

Groundwater inflow parameters were developed by SLR (2026a) as an output of the hydrogeological assessment.

Key findings are summarised below and provided in Table 3-50

- Most residual voids reach hydrological equilibrium within about 100 to 300 years. A few are slower, with Kennedy and Comet Downs East reaching equilibrium ~400 and ~450 years respectively.
- Mean lake levels vary widely by void, but in most cases remain well below crest levels, providing substantial freeboard, typically 30 to 150 m.
- The smallest freeboard occurs at Comet Downs East, at about 30.8 m. An assessment using the 0.1% AEP 3-day design storm indicates all residual voids retain significant freeboard with the smallest being Bonnie Doon at 21.1 m.
- Several voids, including Bonnie Doon, Ramp 74 and Ramp 30, periodically dry out during extended dry periods and only reach their maximum levels occasionally.
- Ramp 8 and Bonnie Doon are hydraulically linked, with spill only occurring at 188 mAHD to the receiving environment, and an internal crest of 175 mAHD between the two voids.

Table 3-50 BWM Residual void water balance summary

Residual Void	Equilibrium Reached Within	Mean Stabilised Lake Level	Crest Level	Freeboard
Unit	***Years***	***m***		
Ramp 8	200	145.6	188[2]	41.5
Bonnie Doon[1]	150	154.5	188[2]	33.5
Mimosa/Besgrove	200	83.7	200	116.3
Deep Creek	300	134.5	202	67.5
Stewarton North	200	74.0	204	130.0
Stewarton South[1]	100	103.9	232	121.8

Residual Void	Equilibrium Reached Within	Mean Stabilised Lake Level	Crest Level	Freeboard
Unit	*Years*	*m*		
Kenmare	150	218.0	297	79.0
Togara/North Marshmead	300	165.7	271	105.3
South Marshmead	300	171.1	270	98.9
Kennedy West	400	166.4	221	54.6
Comet Downs East	450	191.2	222	30.8
Ramp 74[1]	100	234.1	266	31.9
South Ballamoo	300	141.5	290	148.5
Tannyfoil	250	144.7	237	92.3
Ramp 30[1]	150	143.3	217	73.7

[1] Lake levels in these residual voids cycle between empty at times of extended dry periods and their maximum lake levels

[2] 188 mAHD represents the elevation at which the Ramp 8 and Bonnie Doon residual voids would spill to the receiving environment. The internal crest level between Ramp 8 and Boonie Doon residual voids is 175 mAHD.

Source: WRM 2026c (Appendix 4.16 – Final Void Water Balance*)*

3.6.3.3.2 Groundwater modelling results

Figures 8-18 to Figures 8-32 in Appendix 4.2 illustrate predicted groundwater inflows to residual voids. The inflows are partitioned between that which flows into the residual voids through spoil (primarily on the low-wall side), and that which flows into the residual voids through surrounding natural geological formations via highwalls and end walls that remain exposed to the voids after closure in year 2110.

Early in the simulation, fluxes between voids and adjacent formations are more variable, but most voids act as net groundwater sinks for both spoil and non-spoil groundwater sources. The four exceptions are Ramp 30, Ramp 74, Stewarton South and Bonnie Doon residual voids that show net negative groundwater inflow (i.e. net outwards flux), transferring water to neighbouring voids at small rates (0.2, 2.3, 0.04, and 0.14 ML/day) due to higher lake elevations, creating hydraulic gradients. This movement occurs between voids, not away from the site.

Model results show that spoil contributes between 90% and 100% of the total net groundwater inflow at equilibrium to the voids. Equilibrium groundwater inflows (Appendix 4.2 Table 8-4) account for roughly 0% to 70% of the total volumetric inflow to each void's water balance indicating groundwater is significant for some voids but not always the main factor controlling lake levels. These inflows include water movement between voids, not solely groundwater entering from surrounding formations.

3.6.3.3.2.1 Hydraulic gradients

The residual voids exhibit equilibrium sink behaviour driven primarily by evaporative losses from void lakes, as predicted in the WRM (2026c) water balance model (Appendix 4.16). Evaporation maintains long-term lake levels below surrounding groundwater levels, resulting in a persistent inward hydraulic gradient toward the voids supported by the predicted lake levels in Table 3-51.

Comet Downs East is predicted to have a post-closure lake level approximately 46 m above the base of shallow formations at closure. However, as discussed in Section 3.6.1.1 and 3.6.3.3.2, modelled net negative fluxes are attributed to water movement between connected voids rather than off lease.

Overall, the modelling indicates that residual voids are not expected to act as long-term groundwater sources based on modelling, and groundwater gradients will remain directed toward the voids under post-closure conditions.

Table 3-51 Predicted void lake differences compared to shallow geological formations

Residual Void	Base of Shallow Formation[1]	Difference Between Base of Shallow Formation and Void Lake Level[2]	
		At Closure	Post-closure Equilibrium
Unit	***mAHD***		
Ramp 8	176	29	31
Bonnie Doon	175	12	16
Mimosa/Besgrove	187	103	103
Deep Creek	204	55	65
Stewarton North	204	128	130
Stewarton South	204	105	99
Kenmare	269	52	54
Togara/North Marshmead	251	111	87
South Marshmead	222	83	52
Kennedy West	187	44	26
Comet Downs East	188	-46	-1
Ramp 74	241	7	7
South Ballamoo	251	114	111
Tannyfoil	218	73	75
Ramp 30	210	63	67

Notes:

[1] The lowest elevation of the base of shallow unconsolidated sediments adjacent to the void.

[2] A negative value indicates the void lake level is higher than the base of shallow formations by that value.

Source: SLR (2026)

As shown in Table 3-52, Stewarton South, Ramp 30, Bonnie Doon and Ramp 74 residual voids are predicted to lose void water to adjacent voids via the natural geology between the voids at relatively small rates as discussed above. Each of these voids have predicted lake elevations that are higher than the neighbouring voids, resulting in a hydraulic gradient between the voids that drives this outwards flux from each void to its neighbouring void (also refer to Section 3.6.1.1.4 for particle tracking results):

- Ramp 30 (143 mAHD) → Mimosa/Besgrove (83 mAHD)
- Bonnie Doon (159 mAHD) → Ramp 8 (145 mAHD)
- Ramp 74 (234 mAHD) → Togara/North Marshmead (163 mAHD)
- Stewarton South (104 mAHD) → Stewarton North (74 mAHD)

This outward flux is captured by adjacent voids with lower lake levels and is predicted to not leave the site. The long-term fate of this localised flux is discussed in Section 8.2.6, Appendix 4.2.

Table 3-52 Equilibrium groundwater inflow rates to the residual voids

Residual Void	Spoil Inflow Rate	Tailings Inflow Rate	Natural Geology Inflow Rate	Total Inflow Rate
Unit	***ML/day***			
Bonnie Doon[1]	-0.12	-0.01	-0.01	-0.14
Mimosa/Besgrove	2.38	0.00	0.02	+2.40
Deep Creek	0.79	0.00	0.00	+0.79
Stewarton North	1.23	0.00	0.05	+1.28
Stewarton South[1]	-0.05	0.00	0.00	-0.05
Kenmare	0.49	0.00	0.00	+0.50
Togara/North Marshmead	3.29	0.00	0.03	+3.33
South Marshmead	0.89	0.00	0.00	+0.89
Kennedy West	2.31	0.00	0.04	+2.36
Comet Downs East[1]	0.85	0.00	0.10	+0.94
Ramp 74[1]	-2.33	-0.01	0.01	-2.32
South Ballamoo	1.83	0.00	0.00	+1.83
Tannyfoil	1.51	0.00	0.02	+1.52
Ramp 30[1]	-0.21	0.00	0.00	-0.21
Ramp 8	0.35	0.00	0.02	+0.37
Notes:[1] Negative values indicates outward flux				
Source: SLR (2026)				

3.6.3.3.3 Void water quality

The *Void Closure Plan* (Appendix 4.14) includes an analysis of the void water quality (i.e. geochemical stability) using PHREEQC modelling for nine (9) of the residual voids at BWM. In addition, limnology modelling using General Lake Model (GLM) was done on one representative void (Mimosa/Besgrove) to assess stratification behaviour.

Each void model included inflows and outflows as provided by HydroBalance (2026). Water inflow source terms were defined as follows:

- Rainfall runoff was calculated based on relative proportions of catchment type and corresponding leachate chemistry.
- Groundwater inflows were characterised using median groundwater chemistry from the BWM monitoring network.
- Direct rainfall chemistry was based on regional rainfall data adjusted for charge balance.

The following are the key findings of the PHREEQC modelling:

- pH remains near neutral across all residual voids, ranging from weakly acidic to weakly alkaline, and does not show adverse long-term trends.
- The Mimosa/Besgrove, Ramp 8, Deep Creek, Kenmare, Togara/North Marshmead and Comet Downs East residual void lakes are predicted to experience progressive increases in salinity, with TDS and major ions increasing over time and no indication that these parameters will have stabilised at the end of the modelling period.

  These void lakes show consistent evaporative concentration of solutes and is consistent with the water balance and groundwater modelling results. The residual voids are predominantly terminal systems within the broader void network which drive the retention of solutes to within their zone of influence over time.

  Although increasing salinity of the void lakes presents ecological limitations, the void lakes remain hydrologically contained within the mine footprint and are not expected to result in adverse impacts to surrounding groundwater or surface-water systems based on modelling outcomes.
- Bonnie Doon, Ramp 30 and Ramp 74 residual void lakes will maintain low to moderate salinity and stable water quality conditions over the long term. This reflects their net groundwater outflows which transfer water and solutes to neighbouring voids during the simulation, preventing evapoconcentration of solutes.
- These voids show no persistent increases in TDS or major ions, with concentrations remaining stable or fluctuating in response to climatic cycles rather than accumulation over time.
- Predicted mineral precipitation is minimal or relatively low for all voids, with total precipitated mineral mass less than 1% of median lake water mass where present.

The key findings from the GLM limnology modelling are:

- Residual void lakes are expected to exhibit persistent thermal stratification with seasonal overturn (monomictic behaviour), rather than permanent or meromictic conditions. Thermal stratification develops each summer and breaks down during winter mixing, providing regular turnover of the water column and limiting long-term isolation of deep waters.
- As shown by the PHREEQC modelling, salinity increases progressively over time due to evaporative concentration and groundwater inputs; however, seasonal mixing results in largely uniform salinity profiles, and sustained salinity stratification is not predicted.
- As a result, density stratification is primarily controlled by temperature, with salinity contributing locally to density gradients but not forming stable, long-term chemical layering.
- Overall, stratification strength may increase over time as salinity accumulates, but the system continues to undergo seasonal mixing, however, long-term stabilisation beyond the modelled period remains uncertain.

3.6.3.4 Options for minimising residual void areas and volumes

The extent of final voids at BWM has been progressively minimised through successive mine planning and rehabilitation design iterations (3.4.2). As a result, the total NUMA footprint was reduced between PRC Plan Revision 1 from approximately 3,967 ha to 3,178 ha in PRC Plan Revision 2. PRC Plan Revision 3

incorporates the BNEP and increases the NUMA footprint by 135 ha to 3,313 ha, represents the currently proposed extent having regard to geotechnical, hydrological and safety constraints (refer to Section 3.4.2).

Void minimisation is achieved primarily through progressive backfilling during operations, including systematic backfilling of ramp voids to reduce the number of ramps retained in residual voids. In-pit tailings emplacement at Ramp 74 and Bonnie Doon further reduces residual void areas and volumes. Following the completion of mining, residual void extents will be further reduced through additional backfilling, including partial backfilling where required to prevent flood ingress.

The final extent of backfilling will depend on the mining sequence of the final strips, which may change over the remaining mine life as geological understanding improves and market conditions evolve. Additional reductions to the NUMA footprint beyond the current design are not technically feasible due to void depth and geometry, geotechnical constraints on slope stability and floor reshaping, and the need to maintain acceptable safety margins. Accordingly, the current NUMA footprint represents the lowest practicable extent while meeting geotechnical, hydrological and safety requirements.

3.6.3.5 Final void dimensions and wall angles

Residual void dimensions and wall angles have been optimised through integrated geotechnical assessment, void water balance modelling, hydrogeological assessment and rehabilitation flood modelling. This iterative design process has been developed having regard to the geotechnical, hydrological and rehabilitation design constraints, and supports long-term stability and compatibility with adjacent rehabilitation (refer to Section 3.4).

Indicative residual void dimensions, NUMA surface areas and wall grades are summarised in Table 3-53.

High-wall and end-wall profiles will remain as the final as-mined configuration, comprising multiple mining benches separated by berms, resulting in overall wall angles of approximately 34-46° for high-walls and 32-42° for end-walls. Final wall angles may be refined as mining approaches final pit limits using the most recent geotechnical data.

Low-wall profiles within the NUMA will remain as the final as-dumped spoil configuration, with dragline spoil and truck dump lifts constructed at or near the angle of repose. Offsetting of spoil peaks and dump lifts reduces overall low-wall angles to approximately 17-30°, consistent with OQMRC guidance. These slopes are assessed as geotechnically stable and are not expected to adversely affect adjacent rehabilitated landforms.

Setbacks from void crests have been incorporated where required to achieve a minimum FoS of 1.5, together with safety bunds. Additional setback is required at Togara/North Marshmead and South Marshmead due to local geometry. Low-walls outside the NUMA achieve a minimum factor of safety of 1.5 and do not constrain adjacent rehabilitation outcomes.

Average void dimensions and wall angles, measured from the wall toe to the wall crest at ground level, are shown in Table 3-53.

Table 3-53 Proposed BWM residual void dimensions and overall wall angles

Residual Void	Indicative Length	Indicative Width	Indicative Depth	Crest - Spill Point	NUMA Surface Area	Highwall Grade	Endwall Grade	Low Wall Grade
Unit	***m***			***mAHD***	***ha***	***°***		
Ramp 8	650	360	66	188[1]	26.3	40	40	27
Bonnie Doon	3,000	250	26	188[1]	105	36.5	40	29
Mimosa/Besgrove	10,100	650	176	200	701	42	41	18
Deep Creek	1,600	600	150	202	102	43	16	27
Stewarton North	3,700	800	208	204	334	44	41	20
Stewarton South	1,400	500	140	232	93	41	39	19
Kenmare	1,800	500	122	297	85	20	20	17
Togara/North Marshmead	5,500	850	202	271	511	42	41	20
South Marshmead	1,800	650	162	270	123.4	43.5	40	22
Kennedy West	5,700	700	122	221	357.4	45.5	42	20
Comet Downs East	800	570	132	222	49	44.5	41	20
Ramp 74	2,000	300	32	266	59	34	38	30
South Ballamoo	4,600	1,100	206	290	350	28	32	17
Tannyfoil	6,000	630	122	237	400	36.5	34	19
Ramp 30	1,200	300	78	217	64	34	17	18

Note: [1] 188 mAHD represents the elevation at which the Ramp 8 and Bonnie Doon residual voids would spill to the receiving environment. The internal crest level between Ramp 8 and Bonnie Doon residual voids is 175 mAHD.

Source: Final Landform by WHC

3.6.3.6 Improvement, monitoring and management strategies

A residual void monitoring program will be implemented post-closure, consistent with the site's overall rehabilitation monitoring framework.

Table 3-54 summarises the residual void monitoring program for Improvement Area (IA) 1 and IA 2 under the PRCP Schedule. The program is structured to demonstrate progressive achievement of the PRCP Management Milestones (MM):

- MM1 (structural stability);
- MM2 (cover system);
- MM3 (safety requirements); and
- MM4 (sufficient improvement).

Monitoring activities are designed to verify post-closure performance against model predictions, confirm compliance with these milestone criteria, and provide data to support adaptive management and certification by an appropriately qualified person (AQP).

Table 3-54 Improvement and/or management strategies for the BWM residual voids

Monitoring Element	Description	Relevant PRCP Milestone(s)
Void water levels	— Automated or manual dip readings and groundwater bores to confirm modelled water balance and hydraulic sink behaviour. — Monitoring will verify predicted trends and confirm the void acts as a groundwater sink post-closure. — Data should be reviewed quarterly by the environmental team and certified by an AQP.	MM4.5-MM4.6
Water quality	— Periodic sampling and laboratory analysis to track salinity, pH, metals, major ions and other parameters relevant to closure performance and environmental harm criteria. — Results compared against model predictions and closure performance targets. — Bi-annual monitoring during the initial decade post-closure, then annual.	MM4.5-MM4.6
Slope and wall stability	— Visual inspections to confirm structural stability, erosion or slumping, and compliance with design FoS. — Inspections undertaken annually and after major rainfall events by a geotechnical engineer or AQP.	MM1.6-MM1.7
Cover Systems	— Periodic visual inspections to confirm differential settlement is not leading to erosion or impacting cover functionality. — Inspections undertaken annually and after major rainfall events by an AQP. — Periodic water level survey to verify minimum 1 m depth is maintained where water is used as a cover.	MM2.1 – MM2.2
Safety bunds, fencing and signage	— Periodic inspection of bunds, fencing and safety signage to confirm integrity and continued effectiveness of exclusion controls in accordance with Australian Standards. — Includes annual maintenance and post-storm verification.	MM3.1-MM3.2, MM1.5 – 1.6 and MM4.4
Wildlife use and safety	— Visual and photographic monitoring to identify fauna interaction or hazard potential and guide mitigation measures. — Findings inform adaptive controls to ensure the NUMA remains safe to humans and fauna.	MM4.4
Adaptive management	— Engineering interventions-bench reshaping, erosion control, drainage improvements-plus model recalibration and revision of closure performance criteria or safety controls if monitoring shows deviation from predictions.	MM4.5-MM4.7

Monitoring Element	Description	Relevant PRCP Milestone(s)
	— Actions should be implemented under AQP direction.	
Certification and review	— All monitoring and inspection outcomes reviewed by an AQP to certify achievement of MM1-MM3 and confirm compliance with PRCP Schedule requirements.	MM4.8

Relationship with PRCP Schedule

The 15 BWM residual voids will be managed as NUMAs. Long-term geotechnical stability of low-walls, end-walls and high-walls is designed to be achieved within the NUMA extents. The residual voids are not expected to overtop based on modelled water balance and flood assessment outcomes and are expected to generally stabilise as groundwater sinks post-mining.

Based on the available modelling and assessments undertaken, the residual voids are assessed as not presenting an unacceptable risk of environmental harm outside of the tenement boundary (refer Sections 3.4 and 3.6).

The geotechnical stability and safety requirements, as well as water levels and water quality, will be managed in terms of the management milestones specified in the PRCP Schedule.

3.6.4 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 backfilling)*
- *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.*

The report *Geotechnical Considerations for Closure of Underground Mines at BMA Blackwater* (Byrnes Geotechnical, 2024) was prepared to support the development of this PRC Plan. The detailed report is provided in *Appendix 4.17 – Underground Geotechnical Considerations*.

3.6.4.1 Context

No active underground mining is being undertaken at BWM. The details of the historic underground mining located within the Blackwater MLs is provided in Table 3-55. The location of these workings is provided in Appendix 4.17.

Table 3-55 Summary of historic underground mining at BWM

Underground mine	Operating timeline	Mining method
Kenmare 1 + 2	1994-1997	Longwall
Ramp 74	1969-2001	Pillar extraction Bord-and-pillar
Sirius Creek No. 1 and No. 2	1970s*	Bord-and-pillar
South Ballamoo	1970s*	Bord-and-pillar (headings only)
Clutha Trial mine	1970s*	Single 80 m heading only
Augering works (Ramp 82/84S)	1970s*	Augering – not designed for resource recovery (Byrnes Geotechnical, 2025 – see memorandum provided as an addendum to Appendix 4.17)

*Assumed

For this assessment, only the Kenmare and Laleham historic underground workings were analysed. The other areas were omitted due to the following:

- Sirius Creek No. 1 was a 900 m single entry until it intersected the Aries Seam at about 300 m depth where a line of 18 m wide pillars were formed. Being a single row of pillars, their stability is very high – *it is assessed that these will never collapse and there will be no associated surface subsidence*.
- Sirius Creek No. 2 utilised 2 of 6 m wide roadways with a 15.2 m wide pillar until it intersected the pit bottom at about 200 m depth, at which point pillars were formed on 30 m centres (24 m solids). The limited lateral extent of the pillars, together with their width means that they have high

levels of stability – *it is assessed that these will never collapse and there will be no associated surface subsidence*.

- Ballamoo mine extended about 190 m from the Ballamoo highwall and involved 5 headings. No pillars were formed. The headings were located on 30 m centres with 7 m wide roads and will be buried with backfill as part of the closure landform. As the maximum mining depths were in the order of 50 m, *no pillar instability is anticipated* even when they are buried by backfill.
- Clutha Trial mine was a single 80 m heading. Mining never progressed at this location.
- Augering works (two areas at Ramp 82/82S) were determined to not have been in a highwall location or for the purpose of high resource recovery and were likely conducted for other purposes early in the mine development (possibly to obtain large samples for coal quality testing) (Byrnes Geotechnical, 2025 - see memorandum provided as an addendum to Appendix 4.17). Their location was less than 30 m below the pre-mining surface and historic image analysis indicated the augers were located at 4.5 m centres with an auger diameter of 1.2 m. A simple geotechnical model for pillar stability indicated that any collapse of the auger holes will only extend to a maximum height of 5 m. As such, these augering works were not considered to present a surface subsidence hazard for mine closure.

3.6.4.2 Stability assessment

An assessment of the current and ongoing stability of the underground workings was undertaken to determine the risk of subsidence at closure and, specifically, the impact on the overlying PMLU (of woodland habitat).

For operational reasons, the pillars in the main access roadways (Mains pillars) were designed with high levels of stability and a design life in excess of 50 years. Typically, Mains pillars are dimensioned with a FoS > 2.0, with industry experience agreeing that the probability of failure is better than 1:1,000,000. It is valid to conclude that these Mains pillars have not and will not collapse.

In both legacy pillar mines and longwall mines, some pillars were designed to collapse as an integral part of the mining system. For example, longwall chain pillars and some pillars in pillar extraction mines. These will have already collapsed, and associated surface subsidence was developed. Some pillars have intermediate levels of stability. Typically, during mining operations, the heuristics applied to pillar stability relate to a ratio of pillar strength:pillar load. Typical thresholds used for mine design are presented in Table 3-56.

Table 3-56 Industry pillar stability thresholds

Stability	FoS	Implied probability of collapse (within 50 years)
Immediate collapse	< 1.0	1:1
Short-term	> 1.2	1:10
Pillar formed in advance	> 1.6	1:1,000
Long-term	> 2.11	1:1,000,000

From a rock mechanic perspective, the ultimate strength of a pillar relates to the frictional restraint that can be developed once any cohesive strength is lost (for example by overstressing or weathering). If a very much lower-bound frictional strength of 12° is adopted for coal it would follow that the width-to-height ratio of a coal pillar would need to be 4.7 for the pillar to completely collapse (by lateral displacement) assuming that the loading is purely vertical; this is similar to the upper bound in the database of failed pillars. Based on this, it has been assumed that for the historic bord-and-pillar workings (Laleham) and longwall workings (Kenmare), long-term stability will be present if the FoS is > 1.6 and/or the aspect ratio of the pillars is > 4.7.

Based on the above, Table 3-57 provides the outcomes of the pillar stability analysis for Kenmare and Laleham, indicating that:

- There is some potential for further subsidence above pillars C, F, G, N and P (all Laleham)
- However, due to the depths of cover being mostly in excess of 30 m for both the Laleham and Kenmare portal areas, pot-hole risk is highly unlikely to occur.

Table 3-57 Pillar stability analyses for the Kenmare and Laleham historic underground workings

Location	Depth (m)	Width:Height ratio	FoS
Pillar A Kenmore Mains	110	5.5	3.58
Pillar B Laleham Aries First Workings 1	150	5.0	2.19
Pillar C Laleham Aries First Workings 2	170	3.1	1.14
Pillar D Laleham Aries First Workings 3	160	4.4	1.70
Pillar E Laleham Aries First Workings 4	140	3.9	1.69
Pillar F Laleham Aries First Workings 5	120	2.8	1.58
Pillar G Laleham Aries First Workings 6	130	2.5	1.27
Pillar H Laleham Aries Mains	130	9.2	5.08
Pillar I Laleham Pollux 1 North Mains	170	9.0	3.48
Pillar J Laleham Pollux 303 Panel Split Pillars	150	3.8	1.69
Pillar K Laleham Pollux 3 South Panel Split Pillars	140	3.8	1.99
Pillar L Laleham Pollux 4 South Panel	120	3.8	2.30
Pillar M Laleham Pollux East Headings	80	8.1	6.13
Pillar N Laleham Pollux 111 Panel Split Pillars	165	3.5	1.39
Pillar O Laleham Pollux 1 East	170	8.1	3.03
Pillar P Laleham Pollux 100 Panel Split Pillars	160	2.8	1.16

When considering flooding impacts on pillar stability:

- Laboratory analysis indicates a measurable decrease in uniaxial compressive strength on saturation of coal measure rocks. However, it is assessed that this strength loss will not add materially to the consideration for the stability of the pillars in Laleham.
- There is a possibility of a reduction in the floor strength of the roadways which would result in a reduction in the bearing strength of the pillar floor system. The reduction in roadway floor strength may be relatively small so the impact on pillar stability will be minor unless the impacted layer is very thick and initial floor stability is low. The available information on the Aries and Pollux seams suggests that the floor strengths are well in excess of those that could be associated with this type of failure mechanism.
- Lastly, in contrast to the above, there will be an overall trend for an increase in stability related to a buoyancy effect as the water level rises above the coal seam. The result is that any decrease in stability will be temporary while the material at or below seam level softens and the water level is

such that there is no buoyancy effect. Over time as the water level rises above the coal seam level, buoyancy will dominate and stability will increase beyond that at mine closure. It is valid to include consideration of buoyancy when using the available method to estimate pillar loading.

3.6.4.3 Surface deformations

Mining subsidence results in the following deformation and associated impacts at the surface which can, in turn, impact the functionality of the overlying PMLU (woodland habitat for areas above the underground workings):

- Downward vertical movements.
- Change in surface slope angles.
- Vertical steps and compression humps.
- Surface cracking.

Subsidence prediction assessment of the Kenmare and Laleham historic underground workings indicate that across both areas:

- The level of vertical subsidence, change in slope, and tensile/compressive strains expressed relative to the area defined by the 20 mm vertical subsidence level. The maximum change in slope is 4.8° (8%).
- The nature of the rib parallel cracking associated with both, longwall and pillar extraction shows cracks up to 200-250 mm wide with depths sometimes over 2 m.
- It was observed during the inspection (May 2023) that the cracking does not appear to have adversely impacted vegetation growth. The mining was concluded more than 20 years ago but there is no obvious natural remediation of the cracking; this is attributed to the surface geology – duricrust (Czl) or sandstone/mudstones of the Emerald Formation (Czoem).
- The surface above Laleham extraction panels where the surface geology appears to be Quaternary (Qrc) are shallow linear “trenches” that are interpreted to have been large tensile cracks that have “self-healed” over the years through rainfall and sediment migration.

The above observations by Byrnes Geotech (2023) have since been corroborated by a detailed vegetation and habitat assessment undertaken by Lyngco Environmental Consulting in 2025 (LEC 2025b). The report *Blackwater Coal Mine Underground Mining Surface Cracks and Sinkholes: Assessment of Impacts to Vegetation and Habitat,* is provided as *Appendix 4.18 – Underground Mining Assessment of Impacts to Vegetation and Habitat*. The assessment found no evidence of significant vegetation damage or habitat degradation attributable to subsidence cracking or sinkholes when compared with nearby reference sites.

The assessment comprised an initial desktop analysis followed by field surveys comparing the vegetation and habitat value of sites affected by subsidence surface cracks, and nearby reference sites in the same regional ecosystems. Vegetation and habitat values assessed included vegetation structure and composition, remnant status of vegetation, and habitat suitability for fauna and flora, including species listed under the *Nature Conservation Act 1992* (NC Act).

The assessment found no evidence of significant impacts to vegetation or degradation of fauna habitat attributable to subsidence cracking or sinkholes. Vegetation adjacent to surface cracks exhibited comparable structure, composition and condition to reference sites, with no observed dieback, loss of canopy cover, or reduction in regeneration attributable to cracking.

Additionally, cobar-coolabah (*Bertya opponens*), listed as vulnerable under the *EPBC Act*, was identified at most subsidence sites associated with remnant or high value regrowth vegetation, and potential habitat was identified at many sites for the squatter pigeon (*Geophaps scripta scripta*), yakka skink (*Egernia rugosa*) and short-beaked echidna (*Tachyglossus aculeatus*).

Surface ponding associated with underground mining was assessed in the context of subsidence related changes to surface topography using a conservative, topography-based assessment undertaken by WRM. The assessment utilised 5 m resolution 2024 LiDAR data, provided by external consultants WCL for the BWM PRCP study, together with predicted subsidence contours accompanying the *"Geotechnical considerations for closure of underground mines at Blackwater Mine"* report prepared by Byrnes Geotechnical (Appendix 4.17).

Predicted subsidence depths were applied to the existing LiDAR surface to generate an ultimate 'fully subsided' surface representing both actual and potential future subsidence associated with underground workings. This surface was analysed using digital elevation model (DEM) processing techniques to identify topographic 'sinks' and estimate the maximum potential extent and depth of surface ponding that could occur under a worst-case scenario (see Figure 3-74).

The analysis is intentionally conservative and does not incorporate hydraulic modelling; rather, it identifies the maximum possible ponding based on surface topography alone. Ponding associated with surface infrastructure such as dams, road or rail embankments (ignoring cross-drainage), and mining pits was identified separately, with results filtered to isolate ponding areas coincident with actual or predicted underground subsidence (see Figure 3-75).

The assessment indicates that subsidence-related ponding is localised and shallow, and does not indicate hydraulic connectivity between surface water and underground workings. The persistence of surface ponding demonstrates that surface water is retained within surface depressions rather than draining into underground panels.

Collectively, the subsidence, ponding, vegetation and habitat assessments indicate that the observed and predicted surface deformations are not expected to materially affect the functionality of the woodland habitat PMLU. In particular, the Lyngco Environmental Consulting assessment (Appendix 4.18) found no evidence of significant impacts to vegetation or degradation of fauna habitat attributable to subsidence cracking or sinkholes.

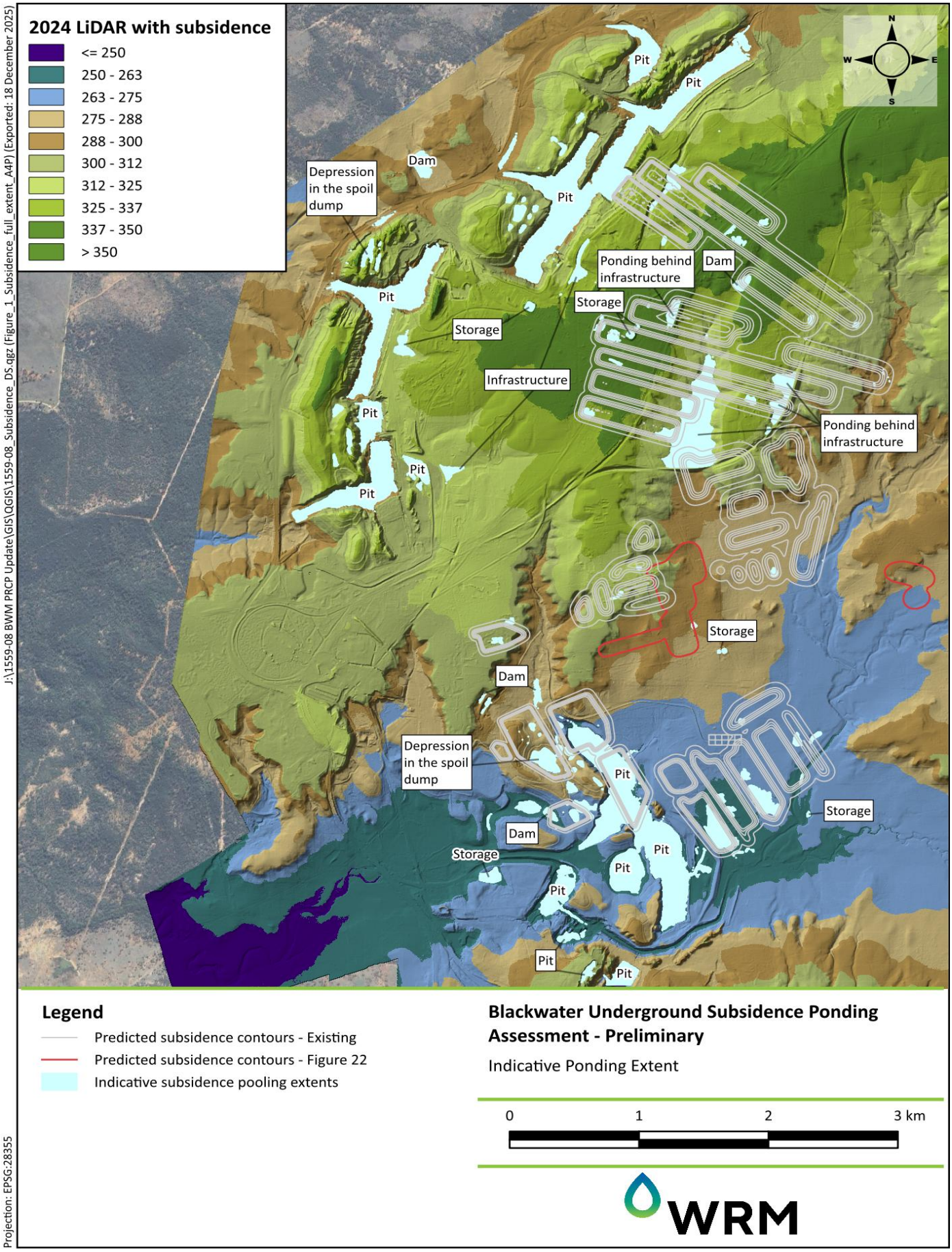


Figure 3-74 BWM underground subsidence assessment - indicative ponding extent (worst-case scenario)

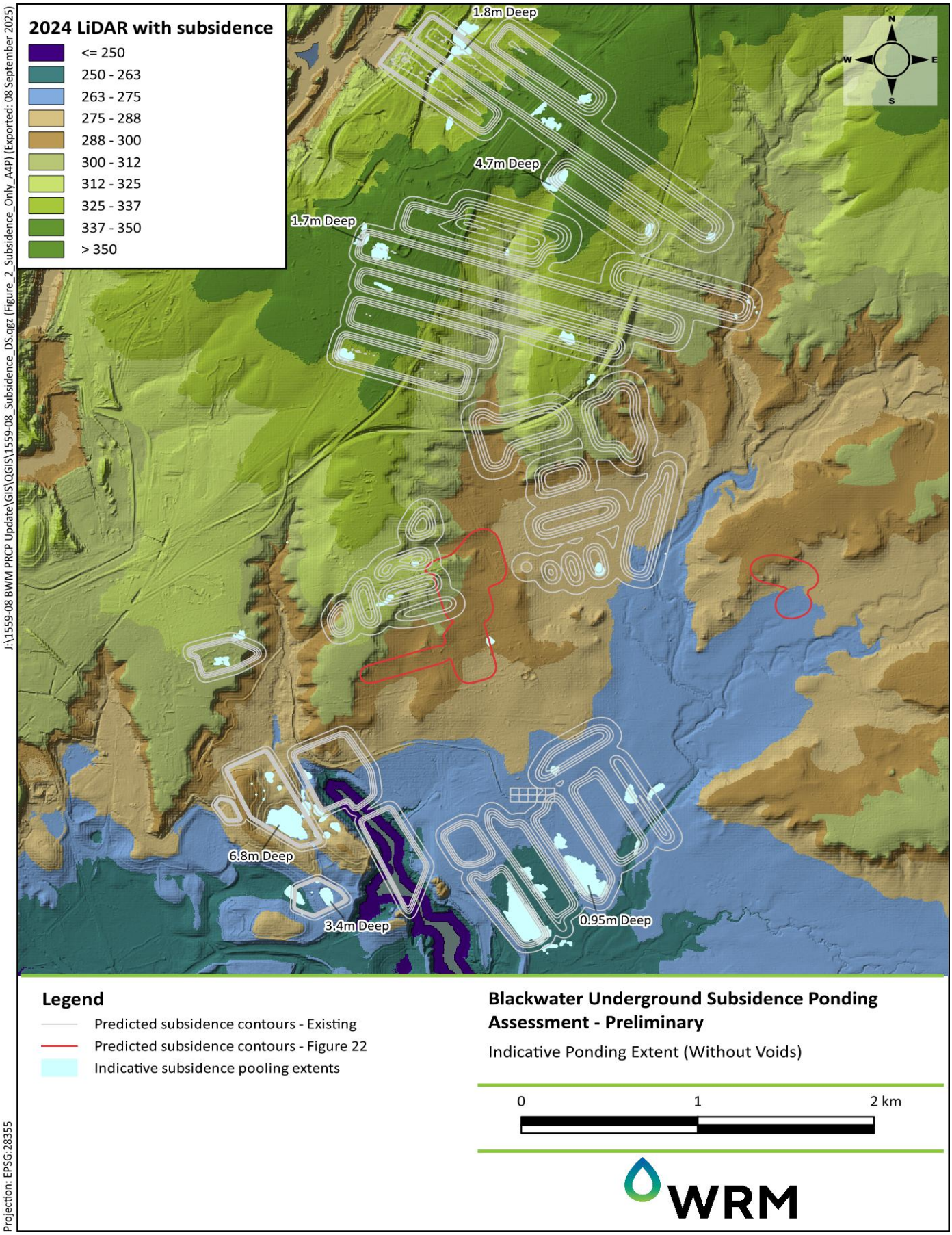


Figure 3-75 BWM underground subsidence assessment - indicative ponding extent (without voids)

3.6.4.4 Hydrogeological interactions

Based on the assessment of water levels recorded in pump holes in May 2023, the following was determined:

- Kenmare 1 workings are flooded - any strength losses due to inundation have already developed, with no hazard of additional collapses.
- Kenmare 2 appears to be flooded (due to minimal separation distance from Kenmare 1) – any strength losses due to inundation have already developed, with no hazard of additional collapses.

Flooding of underground workings is assessed to result in a net increase in long-term pillar stability due to buoyancy effects, consistent with the stability assessment in Section 3.6.4.2. No adverse hydrogeological interactions affecting surface vegetation, habitat or landform stability are predicted to arise from underground mine flooding or subsidence-related surface deformation.

3.6.4.5 Seals and bulkheads

Mine seals are used to manage or limit water and gas flows as well as to control physical access to parts of the mine. For BWM, these are relevant to portal entrances and ventilation shafts.

For Kenmare 1, the Statutory Mine Plan (Plan of Abandonment) submitted to the Mines Department in 2001 shows seals at about 142 m from the portal entrance in both the “Man & Materials” & “Conveyor” drifts. A survey of the “Man & Materials” drift that was conducted on 19 October 2023 showed that the drift has filled (floor to roof) with silt to a distance of about 70 m from the entrance.

The main ventilation shaft for Kenmare 1 is annotated as sealed on the statutory mine abandonment plan and there is a plaque glued to the concrete plug on top of the shaft.

For Kenmare 2, Kenmare 2 retreated the longwall face into an existing surface excavation which has since been incorporated into the surface operation.

The Laleham portals have been either dozed in or dumped over.

Sirius Creek No. 1 was closed soon after opening and the portal entries are no longer visible. Re-excavation is not recommended. At Sirius Creek No. 2, permanent seals appear to have been installed at about 1150 m from the portal entrance in both the Man & Materials and Conveyor drifts. The symbols appear to indicate an “Explosion Proof Stopping” on the statutory mine plans submitted to the Mines Department in 1976.

The Clutha portal is located at the outcrop of the Aries Seam. It was a single entry only, approximately 80 m long. Recommendations for closure include removal of the arches and then backfill using fill sourced from the immediate area. The lagging bords are recommended not to be removed due to safety reasons.

3.6.4.6 Future requirements and commitments

In accordance with the PRCP Schedule, historical underground workings and areas affected by subsidence at BWM will be subject to further assessment and verification to demonstrate achievement of stable conditions and the nominated post-mining land use.

In accordance with PRCP Schedule Criteria RM3.13, an AQP is to undertake a risk assessment to determine appropriate rehabilitation treatments for the historical underground areas. This assessment is to consider:

- erosional stability of in-situ soil types;
- safety risks relevant to the proposed PMLU;
- impacts to existing rehabilitation areas and terrestrial ecological values; and
- potential ecological impacts or stability considerations arising from disturbance associated with rehabilitation activities.

In accordance with PRCP Schedule Criteria RM3.14, where rehabilitation treatments are required, these will be implemented in accordance with design specifications and methodologies prepared and certified by an AQP. The design will be informed by the outcomes of the risk assessment and will consider erosional stability, surface safety risks and ecological impacts.

In accordance with PRCP Schedule Criteria RM6.10, an AQP is to certify that areas affected by subsidence, overland flow or surface runoff overlying historical underground workings will not:

- pose an unacceptable safety or environmental risk,
- prevent achievement of the final land use, and
- adversely affect landform stability, vegetation condition, ecosystem function or habitat values.

Residual subsidence features such as minor cracking, surface depressions or long-term ground movement that do not present such risks will not require remediation.

For areas affected by residual ponding associated with subsidence (e.g. RA5), rehabilitation performance will be assessed in accordance with PRCP Schedule Criteria RM7.8, including demonstration of ecosystem condition using the relevant BioCondition benchmarks (see Section 3.8.1.5.1).

Together, these requirements establish an assurance pathway for assessment, design, implementation and certification of rehabilitation outcomes for underground workings and subsidence-affected areas, consistent with achievement of stable condition under the PRCP Schedule.

Relationship with PRCP Schedule

Most of the underground workings in the Laleham and Kenmare areas have been assessed to be in a stable or improving stability condition, given that underground mining ceased more than 20 years ago and that flooding of the workings has occurred. Geotechnical assessment indicates that the majority of surface subsidence associated with underground mining has already developed, with only limited potential for further minor subsidence in discrete areas and a very low likelihood of progressive collapse or pot-hole formation due to depths of cover generally exceeding 30 m.

Post-closure flooding of the underground workings is assessed to result in a net increase in long-term pillar stability due to buoyancy effects, with no adverse hydrogeological interactions predicted to affect surface landform stability, vegetation or habitat. Conservative assessment of subsidence-related surface ponding indicates that ponding is localised and shallow, does not result in surface-to-underground hydraulic connectivity, and has not resulted in adverse impacts to vegetation or habitat values.

On this basis, current evidence indicates that rehabilitation activities above the underground workings are likely to be limited to monitoring, care and maintenance, provided that ongoing assessments (per Section 3.6.4.6) confirm that subsidence does not present an unacceptable risk to landform stability, safety or achievement of the nominated PMLU.

The approach described above is consistent with the requirements of the PRCP Schedule, including the need for AQP-led assessment, verification and (where required) implementation of rehabilitation measures, as outlined in the PRCP Schedule and Section 3.6.4.6.

3.6.5 Built infrastructure

PRCP Guideline (Section 3.6.5)

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

The rehabilitation planning part must include:

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

3.6.5.1 Context

In accordance with EA condition E21: *"All infrastructure constructed by or for the EA holder during the mining activities including water storage structures, must be removed from the site prior to surrender, except where agreed in writing by the post-mining landowner/landholder". However, the EA further notes that "this is not applicable where the landowner/landholder is also the environmental authority holder"* (Section 3.1.2.13).

Due to the long life of the operation, BWM does not currently have any agreements in place for mining related infrastructure that may have ownership transferred in the future. Should formal agreements for the transfer of mining related infrastructure ownership be required in the future, these will be developed and secured as the mine progresses through the rehabilitation milestones associated with the PRCP Schedule. In the instance that no agreements are in place and the intent is not to retain the infrastructure, rehabilitation will be carried out as defined in the PRC Plan and PRCP Schedule, and in support of the proposed PMLU for the relative area. Table 3-58 details the infrastructure associated with the mining activities at BWM.

Infrastructure not constructed for mining purposes, such as dams for grazing, gates, cattle grates, stock handling/watering areas, access tracks, fire breaks etc, will not be removed as part of rehabilitation works.

Priority will be to repurpose, salvage or recycle any infrastructure to be removed. Demolition and disposal within the mining voids or spoil dumps, will only be undertaken when repurpose, salvage or recycle alternatives are deemed by Whitehaven not to be viable. This approach is in line with the waste and resource management hierarchy outlined in the Queensland Waste Management and Resource Recovery Strategy created under the *Waste Reduction and Recycling Act 2011* (Qld).

The timing of the decommissioning and removal of the infrastructure is based on the proposed timing of the BWM operation, processing of the final coal and rehabilitation activities. 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 PRC Plan and PRCP Schedule.

Table 3-58 Infrastructure associated with the approved BWM activities

Category		Infrastructure
Built infrastructure	Steel, concrete and brick infrastructure	— CHPPs — Conveyors and transfer stations — Stackers and reclaimers — Surge bins and hoppers — Tunnels — Various buildings e.g. administration, crib rooms, warehouse, laboratory, storage, sheds — Workshops — Fuel, oil, chemical and water storage — Fuel and wash bays — Fences

Category		Infrastructure
	Supporting services	— Pipes and pumps — Power lines — Switchyard and substations — Communication and lighting towers — Concrete pads and bitumen — Culverts
Water infrastructure	Supporting services	— Mine-affected water dams — Raw water dams — Sediment dams — Drains

In terms of third-party infrastructure associated with roads, rail, power, water and communications supply to landowners or townships, these areas do not have a defined PMLU and the rehabilitation of these areas is not included in this PRC Plan. These areas have been undisturbed by mining activities and may continue to exist once mining activities have ceased, subject to the owner's discretion. Table 3-59 and Figure 3-20, Figure 3-21, Figure 3-76 and Figure 3-77 outline the third-party owned land and assets (infrastructure) which are located within the BWM mining leases which will not be rehabilitated under this PRC Plan.

In relation to Figure 3-20 and Figure 3-21, it is important to note that the legend and mapping insets within this figure show areas defined as *"Current third-party infrastructure alignment"*. These areas are shown to denote where the potential future realignment of third-party infrastructure may be required to enable mining activities in accordance with the PRC Plan. Any future realignment of these areas, and also potentially other areas not currently defined, would be subject to future agreement between Whitehaven and the relevant owner. For clarity, should future mining activities not progress in these areas, the infrastructure will remain in place and any future decisions, including for decommissioning and rehabilitation, will be at the discretion of the owner.

Table 3-59 Third-party owned land and assets within BWM Mining Leases

Infrastructure Item	Owner/Operator	Relevant Land Tenure/Rights	Within Surface Area Rights?	Authorised under BWM EA (as ERA)?
Bauhinia Railway	Crown lease held by Department of Transport and Main Roads. Subleased to Aurizon Network Pty Ltd.	Aligns with area of Easement KSP257940 held by Aurizon for railway and also Lot 76 HT561, being a Crown lease held by Department of Transport and Main Roads and subleased to Aurizon Network Pty Ltd.	Part	No – railway constructed and used in accordance with Crown lease and sublease held by Aurizon Network Pty Ltd.
	Freehold title owned by Department of Transport and Main Roads. Subleased to Aurizon Network Pty Ltd.	Aligns with Lot 1SP185514 held by the Department of Transport and Main Roads and subleased to Aurizon Network Pty Ltd.	No	No – surface not included in ML over the subject area.
Ergon overhead power 132kV	Ergon Energy Corporation Ltd	Aligns with area of Easement CSP173050 (EMT 708522588) held by Ergon Energy Corporation Ltd for power supply	Yes	No – powerline constructed under authority of registered easement.
Ergon overhead power Thermal Coal Plant 22kV Feeder	Ergon Energy Corporation Ltd	Aligns with Lot 22HT600, which is subject to Lands Lease TL0/231769 held by WHC. Certificate of title for Lot 22HT600 records easement in gross No 708522588 to Ergon Energy burdening Lot 22 on HT600 over easements A and C on SP173050 and easements U AND UU on SP173047. Certificate of title for Lot 22HT600 also records easement in gross No 714916062 to Ergon Energy burdening the land over easements AR and AT on SP255267.	No	No – powerline constructed under authority of registered easement.
Ergon overhead power 66kV	Ergon Energy Corporation Ltd	Aligns with Easement BH456 (EMT 601358555) held by Ergon Energy Corporation Ltd for power supply	Yes	No – powerline constructed under authority of registered easement.
South Blackwater Rail	Crown lease held by Department of Transport and Main Roads. Subleased to QR Network Pty Ltd.	Aligns with Lands Leases 35HT240, 36HT243, 7HT243 held by Department of Transport and Main Roads and subleased to QR Network Pty Ltd.	No	No – railway constructed and used in accordance with Crown lease and sublease held by QR Network Pty Ltd.
Ardurad Road	Central Highlands Regional Council	Public road corridor. Aligns with Compensation Agreement between WHC (subject to assignment from BMA) and Central Highlands Regional Council.	Yes	No – public road subject to road reserve and managed by Council
Sunwater Blackwater pump station to Cook	Sunwater Ltd	Aligns with Lands Lease VAP17084 (PO241302) held by Sunwater Ltd	Yes	No – pump station is subject to terms of lands lease
Yarrawonga Road	Central Highlands Regional Council	Public road corridor. Aligns with Compensation Agreement between WHC (subject to assignment from BMA) and Central Highlands Regional Council	Part	No – public road subject to road reserve and managed by Council
Cook Colliery Rail Loop	Constellation Mining Pty Ltd	Aligns with Lands Lease TL 0/233298 (Lot 30HT640) held by Constellation Mining Pty Ltd	No	No – activities subject to Lands Lease TL 0/233298 (Lot 30HT640) held by Constellation Mining Pty Ltd
Cook Colliery CHPP Access Road	Constellation Mining Pty Ltd	Aligns with Lands Lease TL 0/233298 (Lot 25HT635) held by Constellation Mining Pty Ltd	No	No – activities subject to Lands Lease TL 0/233298 (Lot 25HT635) held by Constellation Mining Pty Ltd
South Blackwater Rail	South Blackwater Coal Pty Ltd, Constellation Mining Pty Ltd	Aligns with Lands Lease TL 0/234784 (Lot 9HT545) held by South Blackwater Coal Pty Ltd, road reserve for Blackwater Rolleston Road, Lands Lease TL 0/233298 (Lot 27HT637) held by Constellation Mining Pty Ltd, Lands Lease TL 0/233298 (Lot 6SP179577) held by Constellation Mining Pty Ltd	No	No – rail activities carried out under authority of lands lease.
Blackwater-Rolleston Road	Central Highlands Regional Council	Aligns with the road reserve for Blackwater Rolleston Road and Lands Lease TL 0/233298 (Lot 6/SP179577) held by Constellation Mining Pty Ltd	No	No – public road subject to road reserve and managed by Council
Blackwater Mine Railway	Freehold title owned by Department of Transport and Main Roads. Subleased to QR Network Pty Ltd.	Aligns with Lot 22HT562 held by the Department of Transport and Main Roads and subleased to QR Network Pty Ltd.	No	No – surface not included in ML over the subject area.
PowerLink Overhead Power 132kV	Powerlink / Ergon Energy Corporation Ltd	Infrastructure located within easements EMT 602656588 and EMT 602656587 held by Ergon Energy Corporation Ltd for power supply.	Yes	No – existing infrastructure for power supply unrelated to mining activities.

Infrastructure Item	Owner/Operator	Relevant Land Tenure/Rights	Within Surface Area Rights?	Authorised under BWM EA (as ERA)?
Ergon Overhead Power 22kV	Ergon Energy Corporation Ltd	Does not fall within any easements shown in existing spatial data.	Yes, in parts	No – where powerlines do not link to mine infrastructure
Ergon Overhead Power 66kV	Ergon Energy Corporation Ltd	Aligns with easement EMT602811179 held by Ergon and does not appear to relate to mining operations or infrastructure.	Yes, in parts	No – existing infrastructure for power supply unrelated to mining activities.
Ergon Overhead Power 66kV	Ergon Energy Corporation Ltd	Do not fall within any easements shown in existing spatial data but do not appear to relate to mining operations or infrastructure.	Yes, in parts	No – existing infrastructure for power supply unrelated to mining activities.
Taurus Road	Central Highlands Regional Council	Subject to compensation agreement with Council for works within road corridor.	Yes	No – public road subject to road reserve and managed by Council
MountainView Homestead access Road	Whitehaven Blackwater Pty Ltd	Private access road to homestead owned by WHC	Yes	No – road is for access to homestead and not associated with mining activities.
Humboldt Comet Road	Central Highlands Regional Council	Subject to compensation agreement with Council for works within road corridor.	Yes	No – public road subject to road reserve and managed by Council
MountainView Homestead	Whitehaven Blackwater Pty Ltd	Privately owned by WHC	Yes	No – Existing homestead not affected by mining operations

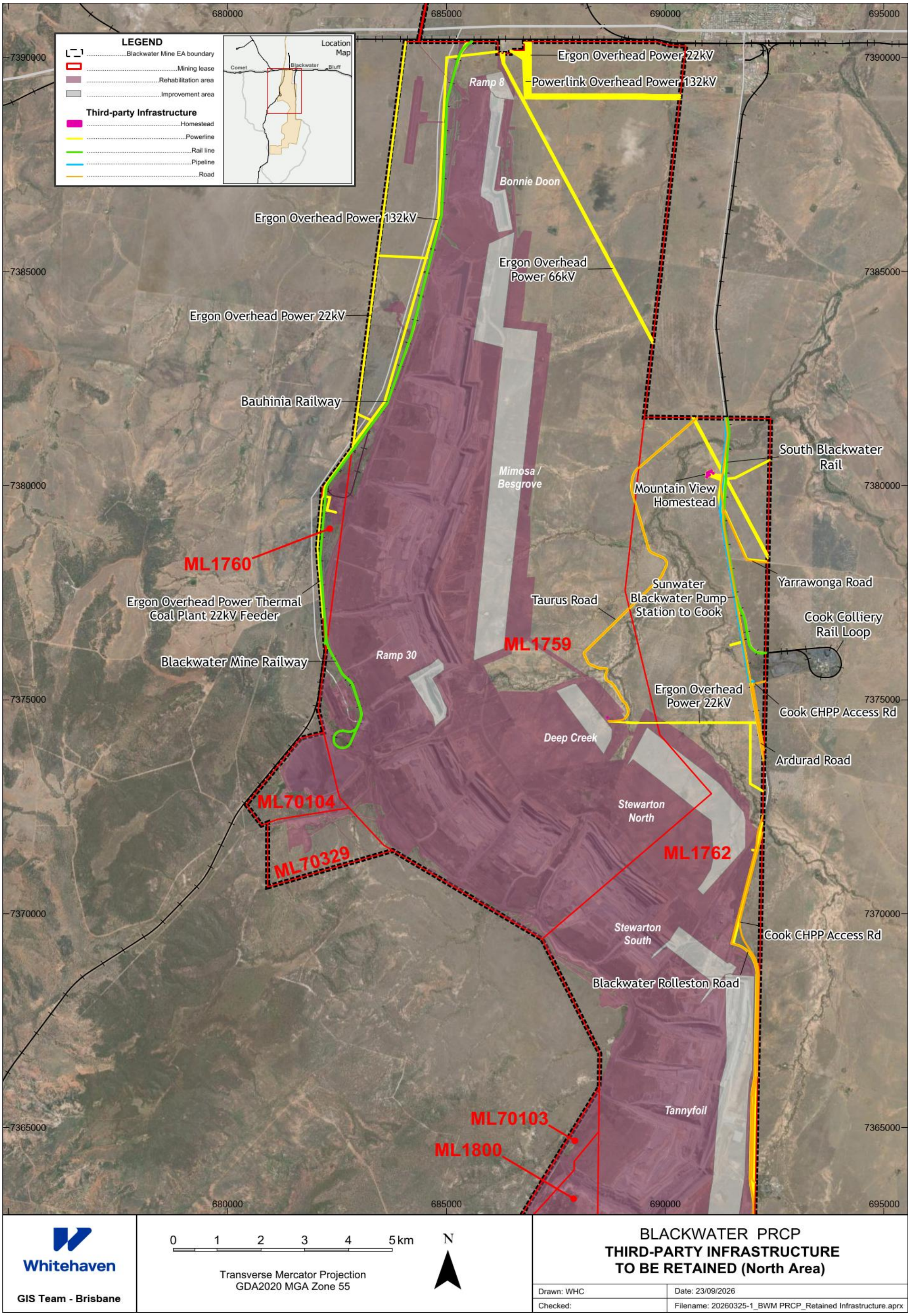


Figure 3-76 Third-party infrastructure to be retained (BWM North and Central)

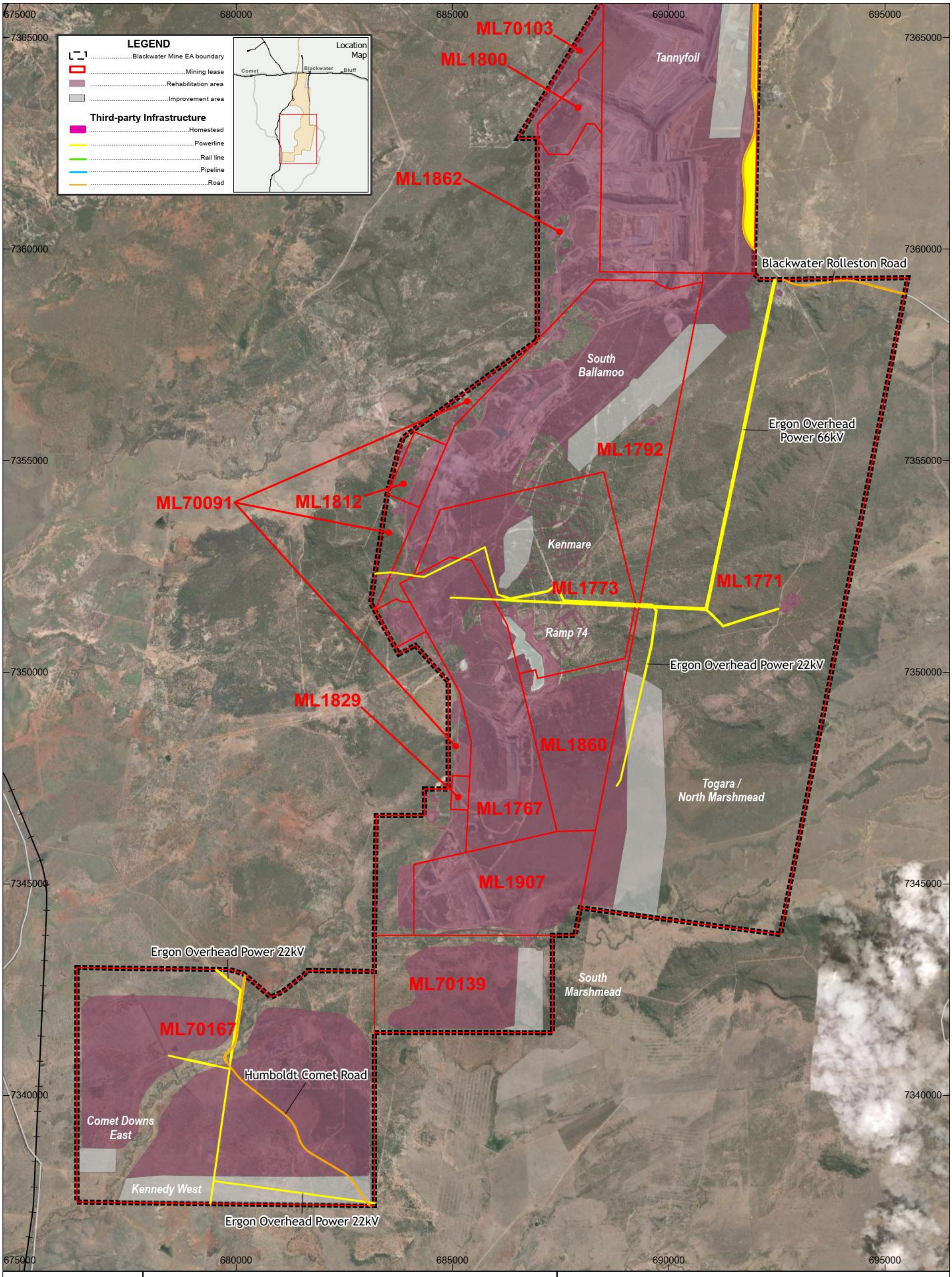


Figure 3-77 Third-party infrastructure to be retained (BWM Central and South)

3.6.5.2 Built infrastructure

Decommissioning of the built infrastructure with no beneficial use to the PMLU will follow the resource management hierarchy and will include:

- Disconnecting services
- Removing surface built and service infrastructure through salvage or recycling activities, or demolishing and burying in the mining voids or spoil dumps
- Removing below-ground built and service infrastructure to a depth of 0.5 m below the surface and recycling, or burying in the mine void or spoil dumps, or covering to a minimum depth of 0.5 m to enable the establishment of the PMLUs
- Removing concrete to a depth of 0.5 m below the surface and recycling, or burying in the mine void or spoil dumps, or covering to a minimum depth of 0.5 m to enable the establishment of the PMLUs
- Removing bitumen and recycling, or burying it in the mining voids or spoil dumps
- Disposing of demolition-related putrescible and hazardous wastes at an appropriately licenced facility.

3.6.5.3 Water infrastructure

Decommissioning of the water-related infrastructure constructed for the mining activities with no beneficial use to the PMLU will include:

- Removing any remaining water to the residual voids or in accordance with:
    - EA F25: “Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority and deposited into artificial water storage structures, such as farm dams or tanks, or used directly at properties owned by the environmental authority holder or a third party (with the written consent of the third party with agreed water quality limits)”.
- Disposing of mine dam sediment according to the results of an assessment by an AQP
- Removing any mine dam liners
- Breaching mine dam walls and reshaping of the area to make it free-draining.

3.6.5.4 Contaminated land

Mining operations at BWM commenced in 1967, prior to the enactment of modern environmental legislative requirements and standards. Therefore, pre-mining baseline contaminated land data and records pertaining to historical environmental incidents/management from the earlier BWM operations are not available.

Operations at BWM since the commencement of mining/exploration have included heavy industrial activities and supporting infrastructure including the following:

- Drilling/exploration
- Extraction and processing of coal
- Chemical storage
- Waste storage and disposal
- Sewage treatment
- Operation of a variety of plant/equipment and maintenance workshops
- Laydown yards and scrap yards

- Petroleum product storage and dispensing
- Explosive production, storage and use
- Mineral waste (tailings, rejects) storage and disposal

The nature of these types of operations, which include the storage, handling, use and disposal of hazardous materials, particularly over BWM's historical and planned operations, have the potential to result in the contamination of land. Lot 5 on SP199760, Lot 5 on HT620, Lot 6 on SP185517, Lot 6 on HT204, Lot 12 on SP185512, Lot2237 on PH1600, Lot 15 on HT304 and Lot 24 on CP855505, are listed on the Queensland Environmental Management Register for a range of notifiable activities including:

- Chemical storage
- Landfill
- Petroleum product or oil storage
- Engine reconditioning works
- Mine wastes
- Abrasive blasting
- Scrap yards
- Waste storage, treatment or disposal
- Explosive production or storage
- Metal treatment of coating

At the time of the contaminated land searches (October 2023), the searched properties were not listed on the Queensland Contaminated Land Register and did not have Site Management Plans attached to the register listings.

The current BWM EA provides for the conditional on-site disposal of various wastes including:

- Rejects and tailings
- Water or sediment containing hydrocarbons
- Bulk rubber
- Inert waste.
- Poly-pipe and other plastic
- Fibreglass
- Treated and untreated timber
- Asphalt
- Asbestos

Current management of contaminated land is undertaken in accordance with the *EP Act (1994)* and the EA conditions that require the reporting of releases of hazardous contaminants and monitoring of surface water, sediment and groundwater on a regular basis. Due to the operational heavy industrial nature of the site, it is anticipated land contamination will require assessment, remediation and/or management upon completion of mining operations in accordance with the PRCP Schedule Criteria for RM2.

3.6.5.4.1 Contaminated land assessment

In accordance with the EA, during operations, contaminants must not be released in a manner that constitutes 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.

At completion of mining operations and prior to landform development (re-profiling / reshaping), surface preparation and revegetation, a contaminated land assessment will be undertaken in accordance with the *EP Act 1994* and the PRCP Schedule Criteria for RM2. . The contaminated land investigation will assess the site for the presence of contamination with the potential to adversely impact the nominated PMLUs and/or environmental values.

In accordance with PRCP Schedule Criteria RM2.1, contaminated land investigations (including investigation, remediation and validation) will be undertaken in accordance with the EP Act, supported by a site investigation report, and where required, a validation report and/or draft Site Management Plan.

Consistent with PRCP Schedule Criteria RM2.2, contaminated and hazardous materials will be remediated in situ or removed and disposed of at an approved landfill, with waste tracking information recorded and submitted. For clarity, disposal of wastes or contaminants undertaken in a manner authorised under the EA is regulated as an approved operational activity and is therefore excluded from the contaminated land investigation requirements. Any residues or impacts arising solely from EA authorised disposal activities are not considered 'contaminated land' for the purposes of closure assessments and will not be subject to PRCP Schedule RM2 investigation obligations.

In accordance with PRCP Schedule Criteria RM2.3, a Contaminated Land Auditor will certify that no contamination unsuitable for the nominated PMLUs remains or is occurring.

Relationship with PRCP Schedule
Surface infrastructure not beneficial to the PMLU will be decommissioned and removed. Below-ground infrastructure will be removed if required to a depth of 0.5 m or covered to enable the establishment of the PMLU. At the completion of mining operations and prior to final landform development and shaping, contaminated land investigations will be undertaken to identify the presence and extent of any contamination that may adversely affect the nominated PMLUs or environmental values. Where contamination is identified, remediation and/or management measures will be implemented to address risks to the nominated PMLUs and environmental values, and to support achievement of a stable condition. Consistent with the PRCP Schedule, contaminated land investigations, remediation and validation will be undertaken in accordance with the *EP Act*, and outcomes will be demonstrated through appropriate documentation and independent certification. On this basis, the approach to contaminated land provides an appropriate mechanism to identify, manage and verify contamination risks, such that land is suitable for the nominated PMLUs and able to achieve stable condition in accordance with the PRCP Schedule.

3.7 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.

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.

3.7.1 Identifying, assessing and treating risks

3.7.1.1 Risk methodology

A risk-based approach to BWM PRC Planning has been undertaken in terms of the methods described in Figure 3-78.

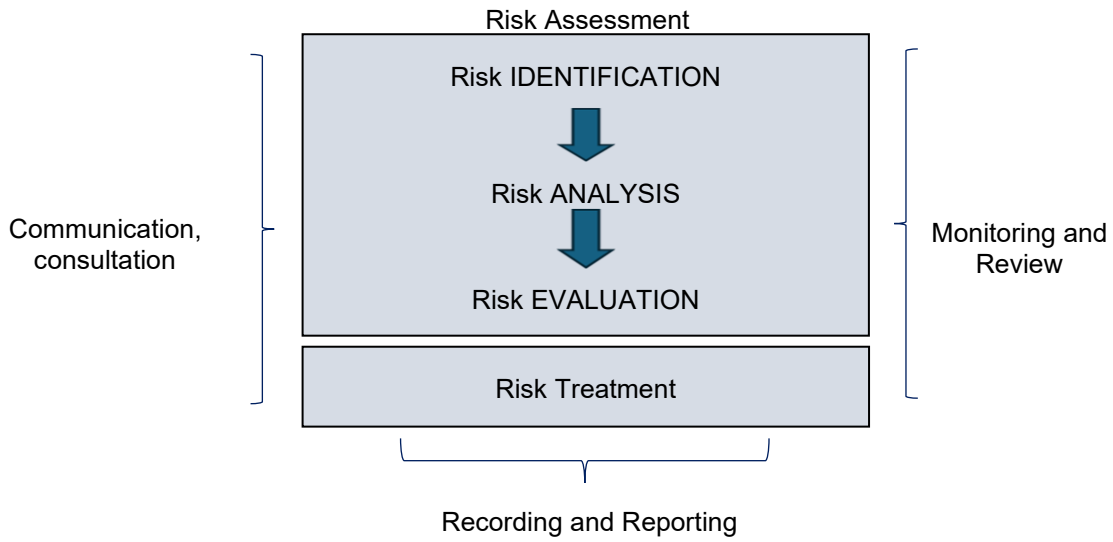


Figure 3-78 ISO 31000-compliant risk-based approach followed for the BWM PRC Plan

3.7.1.2 Risk identification

The risk event – *failure to achieve a stable condition for land described as a post-mining land use* - was assessed in accordance with the ISO 31000 methodology described in Figure 3-78 above. A *stable condition* is defined under section 111A of the EP Act as land that:

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

For BWM, the assessed PMLUs include cattle grazing, woodland habitat and watercourse (Section 3.2.3).

In addition, the risk event - *NUMA does not achieve safe and structurally stable condition or causes environmental harm* - was assessed in accordance with the ISO 31000 methodology outlined in Figure 3-78 above.

The full risk assessment is provided in *Appendix 4.19 – Risk Assessment*.

3.7.1.3 Risk analysis, evaluation and relevant treatments

The Whitehaven risk matrix, control effectiveness and risk management action tables are presented in Figure 3-79.

Risk Matrix

			Consequence Rating				
			1. Negligible	2. Minor	3. Medium	4. Major	5. Catastrophic
Likelihood	The unwanted event occurs one or more times per year and is expected to occur.	5. Almost certain	M	M	H	C	C
	The unwanted event has occurred at WHC and is likely to reoccur within five years.	4. Likely	L	M	H	H	C
	The unwanted event has occurred within industry; or could happen within ten years.	3. Possible	L	L	M	H	H
	The unwanted event has occurred at some time; or could happen within twenty years.	2. Unlikely	L	L	M	H	H
	The unwanted event has never been known to occur; or is highly unlikely to occur within twenty years.	1. Rare	L	L	L	M	H

Control Effectiveness

		Description
Effectiveness Rating	Effective	• Controls are well designed and appropriate for the risk. • Controls are largely "preventative" and address the root causes. • Management believes that they are always effective and reliable. • Nothing more to be done except review and monitor the existing control. • An effective control does not mean the risk has been eliminated; rather it means the control is designed and executed as intended.
	Improvement Required	• Most controls are designed correctly and are in place and effective. • Controls may only treat some of the root causes of the risk, and/or are not currently effective and/or there may be an over-reliance on "reactive" controls. • Management has doubts about operational effectiveness and reliability. • More work is required to improve operating effectiveness.
	Ineffective	• Significant control gaps or no credible control. • Either controls do not treat root causes, are non-existent or, if they exist, they are ineffective. • Management has no confidence that any degree of control is being achieved due to poor control design. • Very limited or no operational effectiveness.

Risk Management Action

		Control effectiveness trigger	Action required when minimum control effectiveness requirement not met	Escalation & approval of treatment plan	Acceptance authority
Residual Risk Rating	Critical	Improvement Required Ineffective	Risk treatment plan must be in place immediately. Risk reviewed monthly by Risk Owner.	Report to ARMC and Managing Director for review and approval of the treatment plan.	CEO/MD
	High	Improvement Required Ineffective	Risk treatment must be considered. Risk reviewed quarterly by Risk Owner.	Report to ARMC and Managing Director. Report to Executive General Manager for review and approval of associated treatment plan.	EGM
	Moderate	Improvement Required Ineffective	Risk treatment must be considered. Risk reviewed annually by Risk Owner.	Report to General Manager for review and approval of associated treatment plan.	GM
	Low	Ineffective	No risk treatment required. Risk reviewed annually by Risk Owner.	Report to Risk Owner.	Risk Owner

Figure 3-79 Whitehaven risk matrix, control effectiveness and risk management action tables

Table 3-60 and Table 3-61 below, provides detailed information on the risk analysis, evaluation and risk treatments identified for the BWM PMLUs and NUMAs across the relevant scenarios. For each scenario, worst-case outcomes were assessed, preventative and mitigating controls were identified, and resultant residual risk ratings were determined.

Table 3-60 Necessary risk treatments identified to achieve a stable condition for the PMLUs

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
PMLU Scenario 1: Landform failure	
Reasons for selecting treatment option	Achieve a stable condition for the proposed final landform
Responsibility for plan	— Approval: Mine planning — Implementation: Site operations
Proposed actions	— Ongoing materials characterisation undertaken by AQP — Growth media assessment by an AQP to determine ameliorant and physical treatment requirements — Landform designed by an AQP for materials available onsite and what can be achieved based on their properties — All major earthworks undertaken in accordance with design specifications by an AQP — PMLU selected based on what is most appropriate for landform and materials — No contour banks on slopes — Landforms to be shaped as free-draining — Groundcover of vegetation and rock to provide erosion resistance — Construction governance (work packs to be developed) — Ongoing rehabilitation monitoring undertaken by AQP and timely maintenance undertaken as required
Resource requirements	— Available material inventory — Erosion modelling if required — Equipment — Survey — Rehabilitation monitoring data — AQP to undertake growth media assessment
Performance measures and constraints	— Comparison against design — Tracking against milestone criteria
Reporting and monitoring	Rehabilitation monitoring
Risk timing and scheduling	From commencement of rehabilitation activities to final achievement of PMLU
PMLU Scenario 2: Altered hydrogeological conditions (to modelled/assumed conditions), based on interaction of groundwater with spoil dumps. (For all areas, excluding TSFs (PMLU11 & 12))	
Reasons for selecting treatment option	Studies and analysis performed show that these treatments achieve a stable condition for the proposed final landform
Responsibility for plan	— Approval: Mine planning — Implementation: Site operations
Proposed actions	— Ongoing groundwater monitoring to be undertaken in accordance with EA conditions — Implementation of remediation and/or management plans based on the monitoring, as required to reduce potential groundwater impact risks and re-establish any impacted ecosystems

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
	— Regular review and calibration of site groundwater model — Mine affected water dams to be decommissioned and rehabilitated (including investigation for potential contamination and groundwater impacts undertaken by AQP). — Appropriate management, placement, and monitoring of waste (spoil, rejects) during operations — Landforms constructed as per AQP design specifications to minimise the potential for flooding of the residual voids — Residual void catchments to be designed by AQP and constructed such that they act as groundwater sinks into perpetuity — Pre-defined backfill planning to be aligned with site-wide source-sink retention
Resource requirements	Monitoring bores maintained and monitoring undertaken
Performance measures and constraints	Operational EA condition for groundwater contaminant trigger levels
Reporting and monitoring	— Monitoring at defined frequency — Reporting under existing EA requirements
Risk timing and scheduling	From establishment of landforms with sampling as per PRCP monitoring program
PMLU Scenario 3: Alteration of surface water systems	
Reasons for selecting treatment option	Studies and analysis performed show that these treatments achieve a stable condition for the proposed final landform
Responsibility for plan	— Approval: Mine planning — Implementation: Site operations
Proposed actions	— Mine affected water dams to be decommissioned and rehabilitated (including investigation for potential contamination and groundwater impacts undertaken by AQP). — Ongoing surface water and receiving environment monitoring to be undertaken in accordance with EA conditions — 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 — Rehabilitation of disturbed areas will be undertaken as soon as possible after land become available — Rehabilitation and monitoring of disturbed reaches of creeks undertaken — Appropriate management, placement, and monitoring of waste (spoil, tailings, rejects) during operations — Landforms constructed as per AQP design specifications to minimise the potential for flooding of the residual voids — Erosion and sediment control systems installed per ESC Plan — Any loss of hazardous contaminants that cause contaminated land/environmental harm will be reported and investigated/remediated 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 additional controls/measures that reduce the potential for

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
	surface water impacts and/or re-establishment of impacted ecosystems where appropriate — Rehabilitated landforms and watercourses that do not attain a stable state will be repaired and revegetated — Ongoing geochemical testing to continue to verify low likelihood of AMD reporting to surface water will be undertaken by AQP
Resource requirements	— AQP to undertake surface water sampling — Sampling equipment and infrastructure to allow collection of samples during runoff events
Performance measures and constraints	Surface water (rainfall runoff) milestone criteria and WQO
Reporting and monitoring	— Monitoring when surface water flows are available — Reporting under existing EA requirements
Risk timing and scheduling	During runoff events
PMLU Scenario 4: Creek diversions not achieving closure objectives	
Reasons for selecting treatment option	Studies and analysis performed show that these treatments will achieve a stable condition for the proposed watercourse PMLU
Responsibility for plan	— Approval: Site operations — Implementation: Environment team
Proposed actions	— Creek diversion remediation concept designs to be progressed to functional designs and as constructed plans (by an AQP) when rehabilitation of surrounding areas commences — Construction of any remediation diversion channels in line with the final functional designs provided by an AQP — Removal and remediation of any mine infrastructure that presents an unacceptable risk to the diversion attaining a relinquishable state (i.e. culverts and dams) — Rehabilitation of surrounding landforms — Surface water monitoring to be undertaken — Creek diversion monitoring to relevant IDC standard and maintenance to be undertaken — Growth media and spoil assessment (where required) by an AQP to determine ameliorant and fertiliser requirements.
Resource requirements	— AQP to progress concept designs to functional designs, including flood modelling — Creek diversion monitoring and maintenance — Collection and analysis of water samples
Performance measures and constraints	— Watercourse geomorphic index and riparian vegetation index milestone criteria — Surface water (rainfall runoff) milestone criteria and WQO
Reporting and monitoring	— Creek diversion monitoring — Surface water quality data

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
Risk timing and scheduling	As scheduled frequencies from commencement of rehabilitation activities to final achievement of PMLU
PMLU Scenario 5: Contaminated land impacting on environmental receptors, rehabilitation and attainment of PMLUs	
Reasons for selecting treatment option	Studies and analysis performed show that additional works are required to reduce contaminated land risks and to achieve a stable condition for the proposed final landform
Responsibility for plan:	— Approval: Site operations — Implementation: Site operations
Proposed actions	— Ongoing contaminated land assessments as required to identify and verify sources — Hazardous substance assessment and approval process — Environmental Authority conditions and Australian Standards govern hazardous substance use, storage and management requirements — Cleaning up of spills upon identification — Remediation or management of residual contamination — Investigate and remediate contamination incidents — Ongoing surface water and groundwater monitoring providing an earlier indication of contamination — Management of operational activities to limit any potential contamination — All imported hazardous materials to be stored and used in accordance with relevant standards and removed from site on completion of operations — Infrastructure inspections and ongoing maintenance of plant, measures and equipment — At the completion of operations all stored hazardous materials and infrastructure within the MIA and CHPP, that have the potential to release contaminants to environmental receptors, will be either remediated in-situ, disposed of on-site as authorised under the Environmental Authority, or removed and disposed of at an approved landfill, with waste tracking information recorded and submitted. — Contaminated Land Investigation where required, completed in accordance with the Environmental Protection Act 1994, including a site investigation report, and where required, a Validation Report and/or a draft Site Management Plan. — Removal of primary or secondary sources — Restrict site usage of hazardous materials — Undertake ongoing monitoring to manage contaminated land risks
Resource requirements	— SQP to undertake contaminated land investigations and oversee ongoing monitoring requirements — Sample collection, laboratory analyses and engineering controls
Performance measures and constraints	Attainment of surface water milestone criteria and a site suitability statement
Reporting and monitoring	Contaminated land investigation report and reporting of water quality as per the PRCP Schedule

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
Risk timing and scheduling	Contaminated land Investigation at closure and water sampling as per PRCP monitoring program
PMLU Scenario 6: Flooding influences on rehabilitation and final landforms	
Reasons for selecting treatment option	Studies and analysis performed show that these treatments achieve a stable condition for the proposed final landform
Responsibility for plan	— Approval: Mine Planning — Implementation: Site operations
Proposed actions	— Flood modelling for 0.1% Annual Exceedance Probability (AEP) by AQP informing landform design — Establishment of landforms to AQP design specifications that are stable and provide appropriate level of flood protection to the residual voids (0.1% AEP flood event (extremely conservative). — Removal of surface water drainage infrastructure from watercourses (crossings and culverts), decommissioning of dams and remediation of contaminated material where required — Installation of energy dissipation measures (e.g. rock lining) where there are modelled high-energy flows ≥2.5 m/s, as determined by an AQP — Establishment of vegetation suitable for the environment and reduces erosion risks — Assessment of landform failure by AQP and required rectification works upon safe access to site immediately after a flood event. Assessment to include identification of measures that would limit potential for ongoing impacts. — Re-engineering of landforms by AQP 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. — Ongoing monitoring of landform stability and rehabilitation success to be undertaken
Resource requirements	AQP to undertake monitoring of final landforms when required post flood events
Performance measures and constraints	No flooding damage to landforms up to a 0.1% AEP event
Reporting and monitoring	Rehabilitation monitoring
Risk timing and scheduling	As per PRCP monitoring program
PMLU Scenario 7: Rehabilitated landforms result in alteration of flood hydrology upstream and downstream	
Reasons for selecting treatment option	Studies and analysis performed show that these treatments achieve a stable condition for the proposed final landform. Flood modelling indicated some variability when compared to pre-mining flows.
Responsibility for plan	— Approval: Mine planning — Implementation: Site operations
Proposed actions	— Removal of surface water drainage infrastructure that would adversely interfere with stream hydraulics (crossings and culverts) and decommissioning of dams — Flood modelling for 0.1% AEP by AQP to inform landform design

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
	— Landform design to AQP design specifications with consideration of water balance and catchment size — Establishment of landforms to AQP design specifications that are stable and provide appropriate level of flood protection to the residual voids (0.1% AEP flood event (extremely conservative) — Installation of energy dissipation measures (e.g. rock lining) where there are modelled high-energy flows ≥2.5 m/s, as determined by an AQP — Reduction of catchment with landform and rehabilitation — Undertake monitoring and maintenance works where required — 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.
Resource requirements	AQP to undertake monitoring of rehabilitation area post flood event
Performance measures and constraints	No unacceptable damage to infrastructure or ecosystems as a result of final landform
Reporting and monitoring	Not required
Risk timing and scheduling	Not required
PMLU Scenario 8: Insufficient or inappropriate growth media and rock resources required for rehabilitation activities	
Reasons for selecting treatment option	Studies and analysis performed show that these treatments achieve a stable condition for the proposed final landform
Responsibility for plan	— Approval: Mine Planning — Implementation: Site operations
Proposed actions	— Growth media surveys and mapping to be undertaken by AQP (growth media management system) — Review the growth media and rock resource quantities periodically during operations to ensure sufficient volumes for the rehabilitation needs (material balance for mine and rehab planning) — Implement rehabilitation prescriptions including amelioration to address requirements for growth media, rock, seed and management for the PMLU (work packs) — Management of topsoil and rock stockpiles and application during rehabilitation. — Execution governance (compliance to plan work packs) — Ongoing monitoring of landform stability and rehabilitation success to be undertaken — Maintenance to be undertaken as identified by monitoring (e.g. repair erosion areas, retest growth media and revegetate).
Resource requirements	— Topsoil inventory — Burden model — Survey — Rehabilitation monitoring data — AQP to undertake growth media assessment

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
Performance measures and constraints	Tracking against milestone criteria
Reporting and monitoring	Rehabilitation monitoring
Risk timing and scheduling	From planning of soil stripping to final achievement of PMLU
PMLU Scenario 9: Inadequate and/or inappropriate management of mineral waste in general spoil landforms	
Reasons for selecting treatment option	Studies and analysis performed show that these treatments achieve a stable condition for the proposed final landform
Responsibility for plan	— Approval: Mine Planning — Implementation: Site operations
Proposed actions	— Material characterisation through exploration drilling and ongoing geochemical testing — Mine planning strategy for life of mine mineral waste management (placement and cover requirements) — Mine planning haulage model (including material categorisation) for life of mine mineral waste management — Material placement tracking system (Corvus) — Monitoring of rehabilitation to be undertaken to confirm stability and identify requirements for rectification works. — Rehabilitation maintenance and/or corrective actions to be undertaken as identified by rehabilitation monitoring — Residual void catchments to be designed by AQP and constructed such that they act as groundwater sinks into perpetuity — If further testing is required in addition to what has already been completed for BWM, spoil materials tested and characterised by AQP to have buffering capacity (high neutralising ANC) — Post-capping QA/QC by AQP to be undertaken — Ongoing groundwater modelling to validate particle tracking is still going to the voids — If further testing is required in addition to what has already been completed for BWM, material characterisation by AQP (outcomes to be stored into GeoBank) in line with Whitehaven Materials Standards — Remove and / or cover undesirable materials as identified in the material characterisation program — Sampling of course and fine rejects from processing plant to be undertaken where required — If further testing is required in addition to what has already been completed for BWM, sampling of overburden / interburden to be undertaken — Appropriate material placement and selective handling during operations to be described and followed — Management of operational activities to limit any potential contamination — Appropriate water quality monitoring for surface and groundwater to enable tracking of processes affecting water quality during operation and into closure — Undertaking appropriate fate and transport modelling during operations

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
	— If further testing is required in addition to what has already been completed for BWM, geochemical testing to continue to verify low likelihood of AMD reporting to surface water — Audit of mineral waste disposal locations and practices to be undertaken
Resource requirements	— Data from waste characterisation — Mineral waste sampling data — Rehabilitation monitoring data — Surface and groundwater monitoring data — Geochemical monitoring data
Performance measures and constraints	Tracking against surface water milestone criteria
Reporting and monitoring	— Rehabilitation monitoring — Waste characterisation sampling and analysis — Surface and groundwater monitoring
Risk timing and scheduling	Throughout operations to final achievement of PMLU
PMLU Scenario 10: Inadequate and/or inappropriate revegetation	
Reasons for selecting treatment option	Analysis performed show that these treatments achieve a stable condition for the proposed final landform
Responsibility for plan:	— Approval: Environment team — Implementation: Site operations
Proposed actions	— Landform constructed as per AQP design specifications and suited to relevant PMLU — Growth media assessment by an AQP to determine any treatment requirements — Procurement of seed aligned to growth media, landforms and PMLU as per PRCP Schedule requirements — Schedule revegetation activities at optimal time of year — Execution governance (compliance to plan work packs) — Ongoing rehabilitation monitoring and maintenance undertaken
Resource requirements	— Rehabilitation and reference site monitoring data — Seeds — AQP to undertake growth media assessment
Performance measures and constraints	— Tracking against milestone criteria
Reporting and monitoring	Rehabilitation and reference site monitoring
Risk timing and scheduling	From rehabilitation seeding to final achievement of PMLU
PMLU Scenario 11: Failure of TSF and rejects rehabilitation (landform and function).	
Reasons for selecting treatment option	Studies and analysis performed show that these treatments are what is recommended to achieve a safe and structurally stable condition for the proposed final landform
Responsibility for plan:	— Approval: Site operations

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
	— Implementation: Dam Engineers
Proposed actions	— Material characterisation to understand short-term and long-term geochemical behaviour — Mine planning strategy for life of mine mineral waste management (placement and cover requirements) — Mine planning haulage model for life of mine mineral waste management — Material placement tracking system (Corvus) — TSF and reject cover systems designed by an AQP to be erosional stable, geotechnically stable, supportive of the PMLU and effective in mitigating the potential for migration of contaminants to the receiving environment. — Ongoing periodic monitoring by appropriately qualified persons to ensure alignment with rehabilitation milestones and PMLU requirements — Remediation works where evidence through ongoing monitoring suggests that PMLU requirements may not be achieved — Surface and groundwater monitoring — In situ geochemical monitoring — TSF closure management plan — If further testing is required in addition to what has already been completed for BWM, material characterisation by AQP (outcomes to be stored into GeoBank) in line with Whitehaven Materials Standards — Remove and / or cover undesirable materials as identified in the material characterisation program — Sampling of course and fine rejects from processing plant to be undertaken where required — Appropriate material placement and selective handling during operations to be described and followed — Management of operational activities to limit any potential contamination — Undertaking appropriate fate and transport modelling during operations — If further testing is required in addition to what has already been completed for BWM, geochemical testing to continue to verify low likelihood of AMD reporting to surface water — Audit of mineral waste disposal locations and practices to be undertaken
Resource requirements	— Monitoring program — Waste characterisation sampling and analysis — Surface and groundwater monitoring
Performance measures and constraints	— Comparison against design — Tracking against milestone criteria
Reporting and monitoring	As per the PRCP Schedule
Risk timing and scheduling	Throughout operations to final achievement of PMLU
PMLU Scenario 12: Failure of TSF and rejects cover system resulting in ongoing seepage (NCPP, Laleham and Bottom Dam TSFs; R36 rejects)	

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
Reasons for selecting treatment option	Studies and analysis performed show that these treatments are what is recommended to achieve a safe and structurally stable condition for the proposed final landform
Responsibility for plan:	— Approval: Environment team — Implementation: Site operations
Proposed actions	— Material characterisation to understand short-term and long-term geochemical behaviour — Mine planning strategy for life of mine mineral waste management (placement and cover requirements) — Mine planning haulage model for life of mine mineral waste management — Material placement tracking system (Corvus) — TSF and reject cover systems designed by an AQP to be erosional stable, geotechnically stable, supportive of the PMLU and effective in mitigating the potential for migration of contaminants to the receiving environment. — Residual void catchments to be designed by AQP and constructed such that they act as groundwater sinks into perpetuity — Cover system design trials — Water balance and groundwater modelling to validate the TSF is a sink — Monitoring of the cover after significant rainfall during operation of the mine — Perform groundwater monitoring in line with TARP requirements — Perform surface water monitoring in line with TARP requirements
Resource requirements	— Monitoring program data — Waste characterisation sampling and analysis — Surface and groundwater monitoring
Performance measures and constraints	— Comparison against design — Tracking against milestone criteria
Reporting and monitoring	As per the PRCP Schedule
Risk timing and scheduling	Throughout operations to final achievement of PMLU

The risk treatments for each scenario that are necessary for achieving a safe and structurally stable NUMA are in Table 3-61.

Table 3-61 Necessary risk treatments identified to achieve a safe and structurally stable NUMA that does not cause environmental harm

Aspect	Risk treatment
Risk event: NUMA does not achieve safe and structurally stable condition or causes environmental harm	
NUMA Scenario 1: Void walls do not achieve geotechnical stability	
Reasons for selecting treatment option	Studies and analysis performed show that these treatments achieve a safe and structurally stable condition for the NUMA
Responsibility for plan	— Approval: Mine planning — Implementation: Site operations

Aspect	Risk treatment
Proposed actions	— Geotechnical assessment to be completed by AQP — Pit wall designs based on geotechnical assessment and flood modelling completed by AQP (as required) — Pit walls constructed per AQP designs, with non-dispersive materials. — Pit floor treatments as required during operations to improve low-wall stability. — Geotechnical monitoring during operations. — Updated geotechnical assessment to be completed as mining approaches final limits and wall design and NUMA extent adjusted if required. — NUMA extents designed to include the required FOS limit. — Bunding, fencing and signage placed at FOS limit.
Resource requirements	Geotechnical assessment
Performance measures and constraints	Tracking against milestone criteria
Reporting and monitoring	Geotechnical monitoring
Risk timing and scheduling	From final mining to relinquishment
NUMA Scenario 2: Uncontrolled access to NUMA areas	
Reasons for selecting treatment option	Studies and analysis performed show that these treatments achieve a safe and structurally stable condition for the NUMA
Responsibility for plan	— Approval: Site operations — Implementation: Site operations
Proposed actions	— Safety bund, fencing and signage placed at FOS limit where required to restrict access — Compliance checks as part of ongoing monitoring to be undertaken
Resource requirements	Monitoring and maintenance
Performance measures and constraints	Tracking against milestone criteria
Reporting and monitoring	Document visual inspection
Risk timing and scheduling	From final mining to relinquishment
NUMA Scenario 3: Uncontrolled flooding into residual voids	
Reasons for selecting treatment option	Studies and analysis performed show that these treatments achieve a safe and structurally stable condition for the NUMA
Responsibility for plan	— Approval: Mine planning — Implementation: Site operations/dam engineer
Proposed actions	— Flood modelling completed by AQP confirms the residual void will not be inundated by floodwaters up to and including the 0.1% AEP events — Pit wall designs are based on geotechnical assessments conducted by AQP which consider floodwaters against creek-side batter/s (where relevant) — Flood mitigation (partial backfill and/or landform structures) designed to correct flood event and outside of the predicted failure slope assessed with a suitable FOS by an AQP — Installation of energy dissipation measures (e.g. rock lining) where there are modelled high-energy flows ≥2.5 m/s, as determined by an AQP

Aspect	Risk treatment
	— Regular ongoing monitoring and compliance checks to be undertaken — Review and recalibration of flood model following flood events to be undertaken by AQP
Resource requirements	Flood modelling
Performance measures and constraints	Tracking against milestone criteria
Reporting and monitoring	Document visual inspection
Risk timing and scheduling	From final mining to relinquishment
NUMA Scenario 4: Water in the void causes environmental harm outside of the mining tenure (due to pit lake)	
Reasons for selecting treatment option	Studies and analysis performed show that these treatments achieve a safe and structurally stable condition for the NUMA
Responsibility for plan	— Approval: Mine planning — Implementation: Site operations
Proposed actions	— Maximum area of each NUMA limited to the extents as defined in the approved PRCP Schedule — Clean water separation included in landform design by AQP — TSF cover systems designed by an AQP to be erosionally stable, geotechnically stable and effective in mitigating the potential for migration of contaminants to the receiving environment — Ongoing groundwater modelling to validate predicted flows completed by AQP — Ongoing water balance modelling to validate predicted lake levels completed by AQP — Catchment area minimised where possible and practicable to do so — Flood mitigation designed to provide protection for a 0.1% AEP event — Ongoing groundwater quality and level monitoring until relinquishment — Ongoing water quality monitoring — Containment of potential sediment because of erosion from the low-wall within the residual voids to be undertaken — Rectification works on impacted ecosystems or bores — Installation of engineering controls to limit potential for ongoing impacts
Resource requirements	Groundwater and void lake water balance modelling
Performance measures and constraints	Tracking against milestone criteria
Reporting and monitoring	— Groundwater level and quality monitoring — Water quality monitoring
Risk timing and scheduling	From final mining to relinquishment

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).

3.7.2 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 EA holder, who have planned or commenced rehabilitation trials. Existing EA holders can provide details of any rehabilitation trials that have occurred prior to the submission of the proposed PRC plan.

BWM has supported and participated in extensive research programs and trials targeting specific rehabilitation activities over many years, however no rehabilitation trials are currently underway. Current rehabilitation practices will be executed in line with the PRCP rehabilitation milestone criteria for each PMLU.

3.8 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 remote sensing, 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.

3.8.1 Rehabilitation monitoring program

This section outlines the monitoring methods used to assess the progress and performance of ongoing rehabilitation at BWM. These methods will be applied to demonstrate achievement of rehabilitation milestones, and ultimately attainment of the desired PMLUs. The schedule for monitoring, reporting, and review associated with the BWM rehabilitation and improvement milestones is provided in Table 3-77 at the end of this section.

3.8.1.1 Purpose

The purpose of rehabilitation monitoring at BWM is to assess and ensure the rehabilitation strategies, designs and treatments achieve acceptable rehabilitation outcomes, including fulfilling statutory and corporate compliance requirements. In addition, implementation of the rehabilitation monitoring program provides an opportunity to identify improvements of both rehabilitation processes, execution and monitoring methodologies as well as inform ongoing maintenance programs.

The objective of the rehabilitation monitoring program is to validate if the current state of mine rehabilitation is progressing towards achieving the intended PMLU and relevant rehabilitation criteria. This is achieved by assessing a range of rehabilitation functional characteristics. These characteristics are then assessed against key performance indicators to provide a detailed understanding of current rehabilitation performance and trajectory, i.e. is rehabilitation condition likely to improve or decline over time.

3.8.1.2 Monitoring schedule

3.8.1.2.1 Rehabilitation monitoring

There are two phases of rehabilitation monitoring undertaken at BWM, conducted under the Rehabilitation Monitoring Program – Initial and Major Monitoring Methodology (WHC-QLD-PRO-COAL):

1. Initial monitoring, undertaken at newly established rehabilitation sites (Year 1 or within 12 months of rehabilitation being completed, and year 2), to categorise the site, develop baseline data and identify any risks to rehabilitation success;
2. Major monitoring, conducted approximately two years after initial monitoring (Year 3 and Year 5) to provide a detailed assessment of the current state of rehabilitation, and then conducted every five years.

Monitoring is undertaken on an annual basis for the first three-years to primarily the trajectory of rehabilitation as it relates to stability, vegetation establishment and achieving initial surface requirements (PRCP Schedule Criteria RM6). This approach allows a timely assessment of rehabilitation post initial seeding and provides critical information to determine if rehabilitation is on track towards achieving surface requirements or if maintenance is required.

Additional rehabilitation parameters are included into the monitoring program in years three, five, ten and five-yearly thereafter, to assess and track the performance of rehabilitation in relation to achievement of surface requirements (PRCP Schedule Criteria RM6) and achievement of the PMLU to a stable condition (PRCP Schedule Criteria RM7). The phased approach of the monitoring program enables regular analysis of rehabilitation monitoring data, including multi-year comparison of trends.

Monitoring of cattle grazing and woodland habitat reference sites is also undertaken for the parameters listed in Table 3-62 and is implemented as per the monitoring schedule from Year 3.

Table 3-62 Cattle grazing, woodland habitat and watercourse PMLU monitoring schedule and measured rehabilitation parameters

Rehabilitation parameter	Monitoring schedule				
	Year 1	Year 2	Year 3	Year 5	Year 10+ (5-yearly thereafter)
Cattle grazing and woodland habitat PMLUs					
Landform and erosion	✓	✓	✓	✓	✓
Soil and spoil	✓	-	✓	✓	✓
Vegetative groundcover	✓	✓	✓	✓	✓
Invasive plants	✓	✓	✓	✓	✓
Cattle grazing PMLU					
Grazing Land Suitability Assessment	✓	-	✓	✓	✓
Land Condition	-	-	✓	✓	✓
Woodland habitat and watercourse PMLU					
Species richness	✓	✓	✓	✓	✓
Tree stem count/basal area	-	-	✓	✓	✓
Tree height	-	-	✓	✓	✓
Tree canopy and shrub cover	-	-	✓	✓	✓
Recruitment	-	-	✓	✓	✓

Rehabilitation monitoring on BWM has been undertaken since 2018 in accordance with the *Rehabilitation Monitoring Program – Initial and Major Monitoring Methodology (WHC-QLD-PRO-COAL)* and associated subsequent versions to determine the performance of rehabilitation against the updated EA completion criteria

for a cattle grazing and woodland habitat PMLU. Prior to 2018, monitoring was undertaken under a different methodology and compared to different completion criteria.

As explained in Section 3.1.4.2, BWM has 2,871 ha of existing rehabilitation, where a total of 1,497 ha has been monitored between 2018-2024. Upcoming rehabilitation monitoring programs will focus on assessing areas not yet monitored as well as new areas ≤3 years old.

3.8.1.2.2 Surface water monitoring

During operations, surface water monitoring will continue as per the applicable EA conditions.

Under PRCP Schedule RM7 (achievement of post-mining land use to a stable condition), surface water runoff from representative rehabilitation areas will be monitored during surface flow events, when safe to do so to provide an early indication of rehabilitation performance. Surface water quality results will be compared, for interpretation purposes only, against the interim trigger levels specified in PRCP Schedule Attachment 7.

In addition, surface water monitoring within the receiving environment downstream of completed rehabilitation areas will commence no later than one year prior to the completion of the PRCP Schedule Criteria in RM7. Monitoring will occur monthly during flow at locations determined by an AQP in accordance with Attachment 6 of the PRCP Schedule. Surface water quality results will be compared against interim trigger levels specified in PRCP Schedule Attachment 7 for interpretation purposes only, and in accordance with PRCP Schedule Criteria RM7.6.

Under PRCP Schedule RM8 (achievement of post-mining land use water quality), surface water quality will be monitored monthly during flow at downstream receiving environment locations for a minimum of five (5) consecutive years prior to surrender, for the parameters specified in PRCP Schedule Attachment 7. Surface water quality results will be assessed against the interim trigger levels in accordance with PRCP Schedule conditions RM8.1 to RM8.4, including requirements for upstream/downstream comparison and exceedance response.

Further details on surface water monitoring requirements, parameters and assessment criteria is provided in Section 3.8.3 below.

3.8.1.2.3 Groundwater monitoring

During operations, groundwater monitoring will continue as per the applicable EA conditions.

Groundwater monitoring of the BWM rehabilitated areas will be established under PRCP Schedule RM7 (achievement of post-mining land use to a safe, stable, non-polluting and self-sustaining condition). Monitoring will commence no later than one year prior to the completion of PRCP Schedule RM7.

During the PRCP Schedule RM7 milestone, groundwater quality will be monitored quarterly at locations hydraulically downgradient of completed rehabilitation areas, with monitoring locations determined by an AQP to be representative of groundwater flow paths. Monitoring results will be compared for interpretation purposes only, against the interim trigger levels specified in PRCP Schedule Attachment 9.

As per PRCP Schedule RM8 (achievement of post-mining land use water quality) groundwater quality monitoring will be undertaken quarterly for at least five (5) consecutive years after the commencement of RM8. Thereafter, the monitoring results will be assessed to determine if there is a need to continue quality monitoring to demonstrate achievement of PRCP Schedule RM8. Groundwater quality will be monitored and assessed against the interim trigger levels specified in PRCP Schedule Attachment 9 and in accordance with RM8.5 to RM8.7, including requirements relating to exceedances and demonstration of stable conditions.

Under PRCP Schedule RM8, groundwater levels will be monitored twice per year and for a minimum of 5 consecutive years.

Further details on groundwater monitoring requirements, parameters and assessment criteria is provided in Section 3.8.4 below.

3.8.1.3 Methodologies

The monitoring program has been designed to obtain accurate and meaningful data that provides a snapshot of current rehabilitation performance. The data is sufficient to provide feedback to operational personnel on the effectiveness of rehabilitation construction methods, identify rehabilitation remediation and maintenance requirements, develop and continually refine rehabilitation criteria, provide an understanding of the trajectory of rehabilitation and to satisfy regulatory requirements.

The initial and major monitoring involves assessment of three key rehabilitation indicators:

- Vegetation,
- Soil, and
- Erosion.

These are discussed in more detail the following sections.

3.8.1.3.1 Rehabilitation monitoring site establishment

Permanent rehabilitation monitoring sites (plots) are established as part of initial rehabilitation monitoring (Year 1) and will be assessed during all phases of rehabilitation monitoring. The permanent field monitoring sites will be selected using the following criteria:

- Representative of rehabilitation slope
- Accessible (vehicle access preferred)
- Low risk of site being disturbed by mining activity in the future
- Selection of suitable reference sites for cattle grazing, woodland habitat and watercourse PMLUs.

3.8.1.3.2 Landform and erosion monitoring

Landform condition and erosion will be assessed during all rehabilitation monitoring phases (Table 3-62). Prior to field monitoring, a desktop assessment will be undertaken using LiDAR data and aerial imagery to develop a Digital Elevation Model (DEM). This model will be used to assess rehabilitated slopes against the approved landform design (Year 1) and to support ongoing monitoring of landform development over time.

The desktop analysis will identify areas of potential concern, such as:

- ponding or drainage issues resulting from dump settlement
- areas of deposition (where the ground level has increased over time),
- active erosion features, such as developing rills or gullies.

Field-based erosion monitoring will also be undertaken at permanent monitoring sites, as well as any new areas identified in the desktop assessment. If erosion is present, an erosion monitoring transect will be established by running a 50 m tape perpendicular to the slope across the identified erosion feature (as detected in the LiDAR analysis).

For each erosion transect, the following parameters will be recorded:

- Erosion severity
- Erosion type
- State of erosion

Erosion severity will be rated in accordance with Table 3-63, which is also included in Attachment 3 of the PRCP Schedule (Appendix 4.1). Erosion severity is assessed as per the revised *Australian Soil and Land Survey Handbook* (CSIRO, 2024).

Table 3-63 Erosion Classification Framework

Erosion Classification	Erosion Severity		
	Minor[1]	Moderate[1]	Severe[1]
Sheet Erosion	Shallow soil deposits downslope	Active[3] sheet erosion including indicators such as exposure of roots, moderate soil deposits in downslope sediment traps	Active[3] sheet erosion including loss of surface horizons, exposure of subsoil horizons, pedestalling, root exposure, substantial soil deposits in downslope sediment traps
Rill[6]	<7 active[3] rills / 50 m transect[5]	7-15 active[3] rills / 50 m transect[5]	>15 active[3] rills / 50 m transect
Gully Erosion	Stabilised[4] gullies 30 cm -100 cm isolated, linear, discontinuous and restricted to primary or minor drainage lines	Active[3] gullies 30 cm - 100 cm deep, linear, continuous and restricted to primary and minor drainage lines	Active[3] gullies >100 cm depth
Tunnel Erosion	No tunnel erosion[2]	No tunnel erosion[2]	Tunnel erosion present
Mass Movement	No mass movement[2]	No mass movement[2]	Mass movement present

Notes:
[1] State of Erosion from definitions: NCST(2024) Australian Soil and Land Survey Field Handbook 4th edition. The National Committee on Soil and Terrain. CSIRO Publishing, Collingwood, Australia.
[2] No Erosion: no evidence of any erosion types.
[3] Active: Once or both of the following conditions apply: evidence of sediment movement; sides and/or floors of erosion form are relatively bare of vegetation.
[4] Stabilised: One or both of the following conditions apply: no evidence of sediment movement; sides and/or floors of erosion form are revegetated.
[5] The erosion monitoring transect is established by running a 50 m tape at an angle perpendicular to the slope (i.e. along the contour).
[6] Rill frequency assessed over the entire rehabilitation area (not only features that intersect and existing monitoring transect).

3.8.1.3.3 Soil and spoil monitoring

Where additional soil and spoil monitoring is required, the parameters detailed in

Table 3-64 will be analysed. Soil profile pits or cores will be located within close proximity to the permanent rehabilitation monitoring sites.

Soil profile pits or cores will be collected to characterise both surface and sub-surface conditions. Surface sampling depth refers to the layer at 0-10 cm; and sub-surface sampling depth refers to layers at 10-30 cm, 30-60 cm and 90-100 cm (or to refusal where applicable).

Table 3-64 Soil and spoil analysis parameters for rehabilitation monitoring

Category	Analyte	Purpose of analyte	Depth	
			Surface	Sub-surface
Acidity/alkalinity	pH	Identify anomalies that may affect plant growth and sustainability.	✓	✓
Salinity	EC	Identify leaching profile. High salinity can lead to poor vegetation germination and establishment, reduced plant growth and vigour.	✓	✓

Category	Analyte	Purpose of analyte	Depth	
			Surface	Sub-surface
Exchangeable cations	CEC	Major factor in soil fertility. Controls soil stability, nutrient availability and buffers soil's chemical properties.	✓	✓
	ESP	ESP is a measure of the abundance of Na ions on the soil's cation exchange complex. Sodicity in soils can lead to slaking and dispersion which impact soil structure and stability.	✓	✓
Organic matter	Organic carbon	An indicator of soil nutrient stores and a contributor to improvements in soil structure. Increases in organic carbon is a key indicator of rehabilitation success.	✓	-
Major elements	Total nitrogen	Indicator of soil nutrient store and is also a major plant nutrient.	✓	-
	Nitrate-Nitrogen (Available nitrogen)	Nitrate is one of the primary forms of nitrogen that plants can readily absorb and utilize for growth.	✓	-
	Extractable phosphorous (Colwell method)	Indicator of phosphorous readily available to plants.	✓	-
	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.	✓	-

3.8.1.3.4 Groundcover

Groundcover will be assessed at the permanent rehabilitation monitoring sites as part of all monitoring events. Groundcover type is recorded as either live cover (with species recorded), standing dry cover, organic litter (including leaves, hay and woody debris (i.e. logs or dead timber)), rocks, or bare ground. The percentage of total groundcover (anything in contact with the soil surface) is calculated.

3.8.1.3.5 Species diversity and vegetation composition

Species diversity and vegetation composition will be assessed at the permanent rehabilitation monitoring sites as part of all monitoring events. All germinants present at the time of monitoring will be identified to the species level where possible, and species richness will be assessed by recording the total number of flora species accumulating across the length of the monitoring plot. A total species list will be generated for the monitoring site.

3.8.1.3.6 Invasive plants

An invasive plant is a prohibited or restricted matter under the *Biosecurity Act 2014* (Qld) 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 listed in Schedule 2, Part 2 (Restricted matter – invasive biosecurity matter) of the *Biosecurity Act 2014* (Qld).

Invasive plants will be assessed at the permanent rehabilitation monitoring sites and reference sites as part of all monitoring phases. The presence and percent cover of invasive plants, calculated as a percentage of the total vegetation cover, will be recorded at each site. Of particular focus for BWM will be the following:

- Leucaena (*Leucaena leucocephala*) stem density assessment, which will be assessed by counting the number of Leucaena stems > 2 m in height within the monitoring plot.
- Parthenium (*Parthenium hysterophorus*) percent cover, with rehabilitated areas assessed against a target of ≤10% cover.

As discussed with the administering authority, Parthenium weed is widespread within Central Queensland grazing landscapes and commonly occurs in regional ecosystems at abundances ranging from approximately 3% to 50% cover (Queensland Herbarium, 2018). Parthenium frequently contaminates topsoil stockpiles and can initially establish rapidly following soil placement, outcompeting sown pastures before gradually reducing as competitive native and exotic pasture species establish.

Early targeted herbicide control combined with longer term suppression through competitive pasture establishment is considered best practice management and aligns with surrounding land use. Given the species' annual life cycle, ubiquity in the region, and the ecological context of grazing land rehabilitation, maintaining Parthenium at or below 10% cover is considered achievable and environmentally appropriate.

3.8.1.4 Cattle grazing specific rehabilitation parameters

3.8.1.4.1 Existing cattle grazing areas

3.8.1.4.1.1 Land condition assessment

For existing cattle grazing rehabilitation areas, grazing land condition will be assessed at the permanent cattle grazing rehabilitation monitoring sites from Year 3; this allows at least two seasons after seeding for pasture species to establish. Land condition is defined as “the capacity of grazing land to respond to rain and produce useful forage” (DES, 2022a). Indicators of land condition include “the proportion of organic ground cover, density of desirable perennial pasture species (i.e. grasses that are preferred, palatable and perennial, (3P) for cattle), extent of erosion and presence of weeds” (DES, 2022a).

Land condition will be assessed and rated Good (A), Fair (B), Poor (C) or Degraded (D) as described in the *Queensland Reef Protection Regulations Farming in Reef Catchments Grazing Guide* (DES, 2022a) and summarised in Table 3-65. Land condition requires monitoring of the following aspects:

- Vegetative groundcover – calculated as the percentage of soil surface covered by live cover, standing dry cover and organic litter (including leaves, hay and woody debris).
- Pasture condition – including estimated % dry matter (DM) yield of preferred pasture species, annual grasses, undesirable grasses and other weeds.
- Soil condition and erosion – assessed as per Section 3.8.1.3.2.

Table 3-65 ABCD Land Condition Framework (Figure 3) (DES, 2022a)

Land condition	Land condition features
Good - A	A condition land has all the following features: — most land types in good condition will typically have at least 50% and often above 70% ground cover at the end of the dry season — good density of perennial grasses dominated by those species considered to be 3P grasses for that land type, little bare ground (less than 30 % in most years) — few weeds and no significant infestations — good soil condition: no erosion, good surface condition
Fair - B	B condition land has at least one or more of the following features, but otherwise is similar to A condition land: — land types will typically have at least 50% ground cover and less than 70% in most years at the end of the dry season — some decline of grasses that are 3P grasses, increase in other species (less favoured grasses, weeds) and/or bare ground (more than 30% but less than 50% in most years) — some decline in soil condition, some signs of previous erosion and current susceptibility to erosion
Poor - C	C condition land has one or more of the following features, but otherwise is similar to B condition land: — land with poor or degraded condition will typically have less than 50% ground cover at the end of the dry season — general decline of grasses that are 3P grasses, large amounts of less favoured species and/or bare ground (greater than 50% in most years) — obvious signs of past erosion and/or current susceptibility to erosion is high
Degraded – D	D condition land has one or more of the following features: — generally less than 20% ground cover — general lack of any perennial grasses or forbs — severe erosion or scalding, resulting in hostile environment for plant growth often no long-term ability to carry stock

For rehabilitation to achieve a safe, stable and self-sustaining cattle grazing PMLU, land condition must be assessed as Good (A) or Fair (B). When land is in a Poor (C) or Degraded (D) condition, maintenance measures must be identified and implemented to improve the land condition.

3.8.1.4.1.2 Pasture condition

Pasture condition will also be assessed at the permanent rehabilitation monitoring sites from Year 3. The density and coverage of 3P grasses (preferred, palatable, perennial) is a key indicator of pasture condition (DES, 2022a). Pasture condition monitoring will be undertaken in accordance with the Stocktake GLM method (Department of Agriculture and Fisheries, 2021). The assessment includes an estimate of the percentage DM yield in kg/ha comprised of 3P pasture species versus the percentage DM yield in kg/ha of annual and undesirable grasses. Based on the monitoring data, pasture condition will be rated per the condition indicators in Table 3-66.

Table 3-66 Pasture condition assessment table

Condition rating	Condition indicators			
	Preferred pasture species		Annual grass % DM yield	Undesirable grasses and other weeds % DM yield
	% DM yield	Crown cover		
Excellent (A) - 1	> 80%	Dense and plants healthy	< 20%	< 20%
Good (B) - 2	60-80%	High to moderate density and some plants unhealthy	20-39%	20-29%
Poor (C) - 3	10-59%	Moderate to low density and some plants dead	40-70%	30-80%
Very poor (D) - 4	< 10%	Sparse and many plants dead	> 70%	> 80%

3.8.1.4.2 Planned cattle grazing areas

3.8.1.4.2.1 Land suitability assessment

For planned cattle grazing rehabilitation areas, grazing condition will be assessed using a land suitability assessment as per the grazing rule-set for land suitability assessment of sustainable beef cattle grazing on land rehabilitated after open-cut coal mining in the Bowen Basin, Queensland (referred to as the grazing rule-set), developed by Short (2023) (Table 3-67). This grazing rule-set details the land use limitations, considering "the inherent properties of the land that are used to assess land use requirements (and hence determine land suitability)" (DSITI & DNRM, 2015) to provide land suitability classification to cattle grazing on Queensland coal mine rehabilitation. Land suitability decreases progressively from Class 1 (suitable - rehabilitation capable of attaining maximum grazing productivity) to Class 5 (unsuitable - rehabilitation that is not suitable for cattle grazing).

The land suitability assessment, according to the grazing rule-set outlined in Table 3-67, will be undertaken at Year 1 to assess if soil ameliorants are working or if further treatments may be required. Ongoing grazing land suitability assessments will be undertaken as part of monitoring events from Year 3, allowing vegetation to establish. Based on the monitoring data, land suitability class will be rated 1 to 5 as per the soil limitations and land attributes in Table 3-67.

Within the BNEP study area (which represents a portion of the broader PRCP area), soils have been assessed as generally moderately to marginally suitable for cattle grazing (primarily Classes 3 and 4, with some Class 5 areas), reflecting inherent limitations such as sodic and dispersive subsoils, low fertility, moderate to low plant available water capacity, and erosion susceptibility. These constraints indicate that while grazing is an appropriate PMLU, achieving higher suitability classes will require targeted soil management, pasture establishment and ongoing monitoring to address land condition and productivity limitations.

Table 3-67 Grazing rule-set: land suitability class for cattle grazing on rehabilitation (Short, 2023)

Limitation	Indicator	Unit	Land Suitability Class				
			1	2	3	4	5
			Suitable			Unsuitable	
Water availability	PAWC in effective rooting depth (ERD)	mm/0.6m	>75	75-60	<60-40	<40-30	<30
Nutrient supply	Available-P at 0-0.1 m	mg/kg	>20	20-14	<14-8	<8-4	<4
	pH at 0-0.1 m	-	7.3 – 6.6	<6.6-6.0; >7.3-7.9	<6.0-5.6; >7.9-8.4	<5.6-5.0; >8.4-9.0	<5.0 or >9.0
Soil physical factors	Surface soil structure	-	Fine (peds < 10 mm)	Coarse (peds >10 mm)	Surface crust	Very hard setting	Massive
Salinity	ECe at ERD (0-0.6 m)	dS/m	<2	2-4	>4-10	>10-16	≥16
Rockiness	Gravel, 20 – 60 mm Cobble, 60 – 200 mm Stone, 200 – 600 mm Boulders, >600 mm	%	<20 <10 <2 0	20-50 10-20 2-10 <2	>50-70 >20-50 >10-20 2-10	>70-85 >50-75 >20-50 >10-20	>85 >75 >50 >20
Topography (slope)	Slope gradient	%	<5	5-10	>10-15	>15-20	>20
	Micro-relief, vertical	m	Nil ripping furrows (0)	Regular ripping furrows (<0.2 m)	Regular ripping furrows (0.2-0.4 m)	Regular ripping furrows (>0.4-0.6 m)	Regular ripping furrows (>0.6 m)
Water erosion, surface soil	Slope (exchangeable sodium percentage, ESP at 0.1 m: <6)	%	<5	5-8	>8-12	>12-18	>18
	Slope (ESP at 0.1m: 6-14)	%	<3	3-6	>6-10	*>10-12*	*>12*
	Slope (ESP at 0.1 m: >14)	%	<1	1-2	>2-4	*>4-6*	*>6*
Sub-soil erosion	ESP at 0.5 m	%	<6	6-14	>14-23	*>23-34*	*>34*
Potentially acid forming (PAF) materials	Strongly acid conditions (pH <4.5) within (x) m depth (D3/D4 threshold immediately beneath the root zone)	-	>3	3-2	<2-0.9	*<0.9-0.6*	*<0.6*

3.8.1.5 Woodland habitat specific rehabilitation parameters

3.8.1.5.1 BioCondition assessment

A modified BioCondition assessment will also be undertaken for all future woodland habitat, utilising a modified approach aligned with *BioCondition – A condition assessment framework for terrestrial biodiversity in Queensland assessment manual – version 2.2* (BioCondition Assessment Manual) (Eyre, et al., 2015). The modification is a reduced transect plot (50 m x 10 m) for recording the following site-based condition attributes (Eyre et al., 2015):

- Tree canopy height (m)
- Tree canopy cover (%) (50 m transect)
- Shrub canopy cover (%) (50 m transect)
- Native species richness (trees, shrubs, grasses, forbs and other) (50 x 10 m plot)
- Organic leaf litter (five 1 x 1m quadrats)
- Native perennial grass cover (five 1 x 1m quadrats)
- Non-native plant cover (50 x 10 m plot)

The following site-based condition attributes are excluded from the assessment due to the length of time required to achieve results being less than the planned overall outcome of PMLU to a safe, stable, non-polluting and self-sustaining condition:

- Coarse woody debris
- Large trees
- Sub-canopy or emergent layers

As a guide it is best to aim for at least two sites per rehabilitation area.

The BioCondition Assessment Manual scoring tables will be used to determine the site-based attribute scores, whereby the 'benchmarks' in the scoring refers to the combined representative REs averaged benchmarks detailed in Table 3-68 (noting the representative REs are as per Section 3.1.2.10.1 and the revegetation objectives in Section 3.6.1.8.8).

In accordance with the criteria in PRCP Schedule RM6, a BioCondition assessment will be completed by an AQP using the methodology outlined in the latest version of the Queensland Herbarium's BioCondition Assessment Manual. Modified BioCondition assessed under PRCP Schedule RM6 must demonstrate achievement of an overall score of ≥15 out of a possible 60 for:

- Woodland habitat PMLUs, assessed against the hybrid RE benchmark as defined in PRCP Schedule Attachment 5; and
- Watercourse PMLUs, assessed against the relevant representative RE benchmark as defined in PRCP Schedule Attachment 5.

In accordance with PRCP Schedule RM7, an AQP completed BioCondition assessment that demonstrates achievement of the following overall scores is required:

- ≥33 out of 60 for Woodland habitat PMLUs, assessed against the hybrid RE benchmark in PRCP Schedule Attachment 5;
- ≥30 out of 60 for the watercourse PMLUs, assessed against the relevant representative RE benchmark in PRCP Schedule Attachment 5; and
- ≥15 out of 60 for areas affected by residual ponding from former underground working subsidence, assessed against the relevant representative RE benchmark in PRCP Schedule Attachment 5.

Table 3-68 Modified BioCondition benchmarks for Woodland and Watercourse Regional Ecosystems

BioCondition Accessible Attribute	Maximum score for Attributes	RE11.5.3	RE11.5.9	RE11.7.2	RE11.7.6	RE11.7.1	RE11.3.25	RE11.10.7	RE11.3.27 (ponded areas only)
Recruitment of woody perennial species in ecologically dominant layer (%)	5	100	100	100	100	100	100	100	NA
Native plant species richness - trees	5	6	3	3	4	4	4	6	NA
Native plant species richness - shrubs	5	6	6	4	5	8	4	6	NA
Native plant species richness - grasses	5	6	9	5	10	8	8	7	2
Native plant species richness - forbs	5	10	11	5	16	9	13	9	10
Tree canopy height (m)	5	16	17	15	25	20	23	18	NA
Tree canopy cover (%)	5	20	25	40	40	27	34	40	NA
Shrub canopy cover (%)	5	3	10	4	11	10	7	8	NA
Native grass cover (%)	5	19	26	15	23	20	35	20	11
Organic litter (%)	5	20	30	20	52	20	21	53	4
Non-native plant cover (%)	10	0	0	0	0	0	0	0	0
Maximum score	60	≥33	≥33	≥33	≥33	≥33	≥30	≥33	≥30

3.8.1.5.2 Ground cover

Groundcover will be assessed at the permanent rehabilitation monitoring sites as part of all monitoring events.

The percentage of total groundcover (anything in contact with the soil surface) is calculated.

For groundcover, the following BioCondition site-based attributes will be assessed and recorded (noting the total sum of cover will equal 100%):

- Native ground cover (shrubs, grasses and forbs);
- Non-native plant ground cover (exotic grass, exotic other);
- Organic litter (fine and coarse organic material, such as fallen leaves, twigs and branches);
- Rock; and
- Bare ground.

3.8.1.5.3 Species richness

All woody species are recorded for each survey plot. Species richness will be assessed at the permanent rehabilitation monitoring sites as part of all monitoring phases. Species richness includes a full floristic assessment and count of trees, shrubs, grasses and other ground species at each site. Exotic species are also recorded separately whilst assessing species richness.

3.8.1.5.4 Tree canopy height

Tree canopy height and height range will be assessed at the permanent rehabilitation monitoring sites from Year 3. Tree canopy height (measured to the top of the highest leaves) refers to the median canopy height for trees in the canopy layer (Eyre, et al., 2015).

3.8.1.5.5 Tree and shrub canopy cover

Tree canopy cover will be assessed at the permanent rehabilitation monitoring sites from Year 3. Canopy cover is recorded using the line intercept method at each monitoring site. The crown of each tree (single-stemmed woody plant greater than 2 m tall) (Eyre, et al., 2015) is recorded and summed as a total canopy distance and converted to a percent cover.

Shrub cover will be assessed at the permanent rehabilitation monitoring sites from Year 3. The crown of each shrub (i.e. woody plant that is multi-stemmed from the base (or within 200 mm from ground level) or if single stemmed, less than 2 m tall) (Eyre, et al., 2015) is recorded using the line intercept method and summed as a total shrub distance and converted to a percent cover at each monitoring site.

3.8.1.5.6 Recruitment

Recruitment will be assessed at the permanent rehabilitation monitoring sites from Year 3. Recruitment is assessed as the proportion of woody perennial canopy (<10 cm diameter at breast height (DBH)) and shrub species that are regenerating. The dominant canopy and shrub species are identified and then the proportion of these species which are observed in a juvenile state are recorded.

3.8.1.5.7 Invasive plants

As described in Section 3.8.1.3.6, ‘restricted’ invasive plants will be assessed at the permanent rehabilitation monitoring sites and reference sites as part of all monitoring phases. The presence and percent cover of invasive plants, calculated as a percentage of the total vegetation cover, will be recorded at each site.

3.8.2 Watercourse monitoring

Watercourse monitoring will be undertaken at BWM to assess the performance of creek diversions and rehabilitated watercourses disturbed by mining activities. Monitoring will be conducted under the Watercourse PMLU (RA3) at the reference sites described in Section 3.6.1.8.10 and depicted in Figure 3-66. Watercourse monitoring aims to evaluate whether rehabilitated watercourses have achieved a stable condition (PRCP Schedule RM7).

Watercourse monitoring will include the modified BioCondition method as described in 3.8.1.5.1 with results scored against RE11.3.25 as listed in Table 3-69.

Watercourse monitoring will also be undertaken in accordance with the Index of Diversion Condition (IDC) methodology which is outlined in the *Monitoring and Evaluation Program for Bowen Basin River Diversions* (ID&A, 2001). The IDC is a quantitative monitoring method used to measure the geomorphic and riparian vegetation condition of creek diversions; however, it can be utilised for both diverted and rehabilitated reaches of watercourses. For rehabilitated watercourses, a modified IDC method, with a reduced number of monitoring points within each reach, is required due to the reduced impact area.

The BWM watercourse monitoring schedule is provided in Table 3-69. The monitoring schedule indicates the IDC parameters are measured in Year 1, Year 2, Year 5 and then 5-yearly thereafter.

The IDC methodology encompasses:

- Visual inspection of the diversion/rehabilitated watercourse and upstream and downstream reaches (i.e. reference sites).
- Assessment of geomorphic index and riparian vegetation index at nominated monitoring points within the diversion/rehabilitated watercourse, upstream and downstream reaches.
- Determination of reach-averaged geomorphic index and riparian vegetation index and overall IDC scores for the diversion/rehabilitated watercourse, upstream and downstream reaches.
- Comparison of the geomorphic index and riparian vegetation index and overall IDC scores for the diversion/rehabilitated watercourse reaches to the relative upstream and downstream reaches.

Table 3-69 Watercourse PMLU monitoring schedule and measured rehabilitation parameters

Monitoring parameters		Monitoring schedule			
Parameter	**Monitoring details**	**Year 1**	**Year 2**	**Year 5**	**Year 10+ (5-yearly thereafter)**
Groundcover					
Groundcover	Groundcover (%)	✓	✓	✓	✓
Geomorphic index parameters					
Stream width	Width of high flow channel (m) Width of active channel (m) Width of low flow channel (m)	✓	✓	✓	-
Bank condition	Presence of erosion	✓	✓	✓	✓
Piping of banks	Presence of piping on the banks	✓	✓	✓	✓
Bed condition	Presence of aggradation or degradation within the channel bed	✓	✓	✓	✓
Spoil piles	Proximity of spoil dumps in relation to the monitoring point	✓	✓	✓	✓
Recovery	Presence or absence of benches with/without vegetation	✓	✓	✓	✓
Instream structures	Stability of each identified instream structure	✓	✓	✓	✓
Riparian vegetation index parameters					
Riparian zone	Width of riparian zone (m)	✓	✓	✓	✓
Structural intactness	Over-storey, understorey and ground cover (% density)	✓	✓	✓	✓
Regeneration	Presence or absence of regeneration on banks	-	✓	✓	✓
Longitudinal continuity	Assess the gaps in the riparian vegetation corridor along the banks	✓	✓	✓	✓

3.8.3 Surface water monitoring

In accordance with the approved PRCP Schedule, interim surface water quality trigger levels (*Attachment 7 – Interim Surface Water Quality Trigger Levels*) and interim groundwater quality trigger levels (*Attachment 9 – Interim Groundwater Quality Trigger Levels*) have been specified by the administering authority to support demonstration of stable condition under the EP Act. While Whitehaven does not agree with the administering authority's approach to the derivation of these trigger levels, this position has been formally communicated through written memoranda provided during the assessment process. Notwithstanding this, surface water and groundwater monitoring results will be assessed against these interim trigger levels in accordance with the PRCP Schedule requirements. Whitehaven recognises the interim nature of these trigger levels and will refine these through the collection of site-specific data in accordance with PRCP Schedule Condition PRCP22.

Surface water monitoring will be undertaken and assessed against the rehabilitation acceptance criteria listed in the PRCP Schedule, as summarised in Table 3-70.

Table 3-70 Surface water monitoring milestone criteria

PRCP Schedule Rehabilitation Milestone Reference	Description of PRCP Schedule Criteria
RM7 (achievement of post-mining land use to a stable condition)	During the RM7 milestone, surface water collected from representative areas of rehabilitation during surface flow events will be monitored when it is safe to do so. To provide an early indication of rehabilitation performance, surface water quality results will be compared for interpretation purposes only, against the interim trigger levels specified in PRCP Schedule Attachment 7. Surface water monitoring within the receiving environment, downstream of completed rehabilitation areas, will commence no later than one year prior to the completion of RM7. Monitoring will occur monthly during flow and when safe, at locations determined by an AQP in accordance with the PRCP Schedule (Attachment 6). Surface water quality results will be compared, for interpretation purposes only, against the interim trigger levels specified in PRCP Schedule Attachment 7 and in accordance with PRCP Schedule Condition RM7.6.
RM8 (achievement of post-mining land use water quality)	During the RM8 milestone, surface water quality will be monitored monthly during flow for at least five (5) consecutive years prior to surrender at the downstream monitoring locations specified in the PRCP Schedule (Attachment 6). Surface water quality results will be assessed against the interim trigger levels identified in the PRCP Schedule (Attachment 7) and in accordance with PRCP Schedule conditions RM8.1 to RM8.4. Where exceedances are identified, investigation, assessment and response actions will be undertaken in accordance with the PRCP Schedule.

The interim trigger levels are used to support demonstration of stable condition and will be refined over time using site-specific data in accordance with PRCP Schedule Condition PRCP22.

Table 3-71 Summary of key surface water quality data for the BWM monitoring network

Quality characteristics (units)	Unit	Trigger level	Comment on trigger level
pH	pH Units	6.5 – 8.5	WQO
Electrical Conductivity	µS/cm	366 / 275	Site-specific Mackenzie River tributaries / Comet River tributaries – 80th percentile
Turbidity	NTU	400	Site-specific – 80th percentile
Sulphate	mg/L	14 / 6	Site-specific Mackenzie River tributaries / Comet River tributaries – 80th percentile
Ammonia	mg/L	0.15	Site-specific – 80th percentile
Nitrate	mg/L	0.8	Site-specific
Fluoride	mg/L	0.4	Site-specific
Aluminium	µg/L	1,097	Site-specific – 95th percentile
Antimony	µg/L	9	ANZG 2018
Arsenic	µg/L	13	ANZG 2018
Boron	µg/L	100	Site-specific – 95th percentile
Cadmium	µg/L	0.2	ANZG 2018
Iron	µg/L	530	Site-specific – 80th percentile
Manganese	µg/L	412	Site-specific – 95th percentile
Mercury	µg/L	0.06	ANZG 2018
Molybdenum	µg/L	5	Site-specific – 95th percentile
Nickel	µg/L	11	ANZG 2018
Selenium	µg/L	5	ANZG 2018
Uranium	µg/L	0.5	ANZG 2018
Vanadium	µg/L	6	ANZG 2018
Zinc	µg/L	8	ANZG 2018
Total recoverable hydrocarbons (C6-C9)	µg/L	20	
Total recoverable hydrocarbons (C10-C36)	µg/L	100	
Major ions (mg/L) Calcium, chloride, potassium, magnesium, sodium, bicarbonate, carbonate		For interpretation purposes	
Hardness (mg/L)		For interpretation purposes	

Notes:

- *All metals and metalloids must be measured as 'dissolved' (from analysis of a field filtered sample) and total (unfiltered).*
- *Interim trigger levels for metals and metalloids apply to dissolved results.*
- *ANZG (2018) Aquatic ecosystem protection for moderately disturbed system (95% protection).*
- *WQO – Mackenzie River southern tributaries and Comet River Eastern tributaries*
- *Assessment of turbidity to consider post-first flush only.*

3.8.3.1 Surface water monitoring schedule

As the watercourses at BWM are ephemeral, 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.

Accordingly, surface water monitoring will be undertaken during surface flow events when water is present and it is safe to do so, consistent with the PRCP Schedule.

Monitoring will be undertaken for the analytes specified in Table 3-71 which is consistent with PRCP Schedule Attachment 7.

For receiving environment monitoring locations, sampling will be undertaken on a monthly basis during periods of flow, where flow conditions occur, in accordance with PRCP Schedule requirements. Monitoring will commence no later than one year prior to the completion of PRCP Schedule RM7.

Sampling under the PRCP Schedule will supplement the surface water monitoring completed by external third-parties under the Fitzroy Basin Receiving Environment Monitoring Program (EA Conditions RR1, RR2).

3.8.3.2 Surface water sample locations

Surface water sampling in the receiving environment will be undertaken in accordance with the locations listed in Table 3-72 and shown in Figure 3-80, when safe to do so after suitable rainfall events. This is consistent with PRCP Schedule (Attachment 6). Per PRCP Schedule Criteria RM7.6 an AQP is to determine receiving environment monitoring locations are representative of completed upstream rehabilitation areas.

As a consequence of progressively rehabilitating spoil dumps, downstream receiving waters monitoring locations may not always be representative of the surface water runoff from the discrete rehabilitated land subject to the milestone criteria. Therefore, it may be more representative to collect samples directly down gradient of the rehabilitated land (i.e. toe of slope or drainage feature) utilising a water collection device (such as a bucket or flue). The method of sample collection and/or the water collection device may change as required to account for improved technologies, or to improve the effectiveness of the monitoring program.

The surface water monitoring locations may be amended as required to account for changes to upstream land uses and stream dynamics, to improve the effectiveness of the monitoring program to measure progressive rehabilitation areas, and to support the refinement of monitoring locations and associated interim trigger levels using site-specific data in accordance with PRCP Schedule Condition PRCP22.

Table 3-72 Rehabilitation surface water monitoring locations

Monitoring points	Receiving waters location description	Latitude (GDA2020)	Longitude (GDA2020)
Upstream background monitoring points			
UMP1	Upstream Burngrove Creek, 5km from RP1	-23.685442	148.786577
UMP2	Upstream Taurus Ck 3300m U/S of RP2	-23.76985	148.82968
UMP5	Upstream Sirius Ck 2200m U/S of RP5 & 8	-23.949568	148.842866
UMP6	Upstream Rockland Creek, 3.5km from RP6	-24.006466	148.834899
UMP7	Upstream Deep Ck U/S of RP3	-23.75315	148.77936
UMP8	Upstream Two Mile Gully U/S of RP4	-23.79681	148.85192
Downstream monitoring points			
DMP1	Downstream Burngrove Creek, 2.5km from RP1	-23.631288	148.782969
DMP3	Downstream Speculation Ck	-23.902163	148.785195
DMP4	Downstream Sirius Creek	-23.95363	148.79383
DMP5	Downstream Rockland Creek	-24.007041	148.799663
DMP7	Far Downstream Two Mile Gully	-23.715032	148.872814
DMP8	Downstream Taurus Ck	-23.67032	148.876505
DMP9	Far Downstream Rockland Creek	-24.076739	148.722475
DMP10	Downstream Deep Creek	-23.70886	148.85567

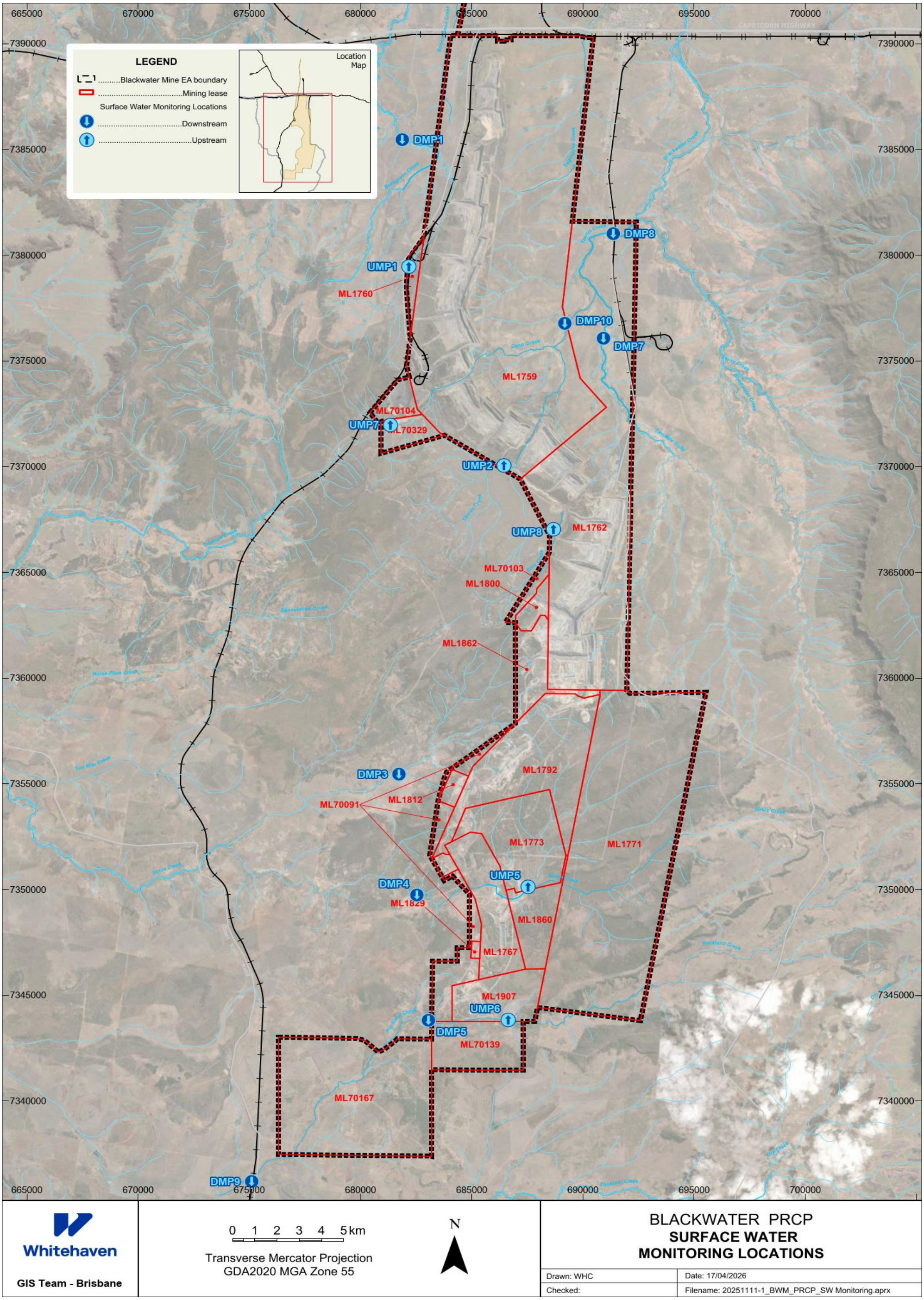


Figure 3-80 BWM rehabilitation surface water monitoring locations

3.8.4 Groundwater monitoring

In line with the Queensland Government Guideline: *Progressive Certification for Resource Activities* ESR/2022/5900 v1.03), EA conditions inclusive of 'deep drainage' water quality will be "addressed holistically for a site at surrender". The objective and acceptance criteria for groundwater are not considered relevant to the progressive rehabilitation of discrete packages of rehabilitated land due to the scale and nature of groundwater aquifers.

Consistent with this approach, groundwater quality objectives for rehabilitation will be assessed at the whole-of-site scale per PRCP Schedule RM8. Interim groundwater quality trigger levels specified in the PRCP Schedule (Attachment 9), will, however, be monitored for interpretation purposes, commencing no later than one year prior to the completion of PRCP Schedule RM7.

Groundwater monitoring during operations will continue as per the applicable EA conditions.

The following rehabilitation milestones and criteria proposed for groundwater monitoring under the PRC Plan and PRCP Schedule are summarised in Table 3-73.

Table 3-73 Groundwater monitoring milestone criteria

PRCP Schedule Rehabilitation Milestone Reference	Description of PRCP Schedule Criteria
RM7 (achievement of post mining land use to a stable condition)	During the RM7 milestone, groundwater monitoring network features will be installed and monitoring will commence at least one year prior to the completion of RM7. Sampling will be in undertaken quarterly at locations hydraulically downgradient of completed rehabilitation areas, as determined by an AQP. Monitoring results will be compared for interpretation purposes only, against the interim trigger levels specified in the PRCP Schedule (Attachment 9) and RM7.7.
RM8 (achievement of post-mining land use water quality)	During the RM8 milestone, groundwater quality monitoring will be undertaken quarterly for at least five (5) consecutive years after the commencement of RM8. Groundwater quality will be monitored at the locations specified in PRCP Schedule and will be assessed against the interim trigger levels specified in PRCP Schedule Attachment 9 and in accordance with RM8.5 to RM8.7. Where interim trigger levels are exceeded, investigation, assessment and response actions will be undertaken in accordance with the PRCP Schedule. Groundwater levels will be monitored twice per year and for a minimum of 5 consecutive years under RM8.

3.8.4.1 Groundwater quality and levels

Groundwater quality monitoring will be undertaken to support demonstration of a stable condition under the PRCP Schedule, having regard to the interim trigger levels specified in PRCP Schedule Attachment 9.

In addition, groundwater monitoring and management at BWM is governed by the existing Groundwater Monitoring and Management Program (GMMP), which has been developed in consultation with the administering authority and is implemented under the requirements of the EA. The GMMP provides the site-wide framework for how groundwater is characterised, monitored, assessed and managed throughout operations, rehabilitation and closure.

Under the EA, the GMMP must be reviewed every two years by an AQP to ensure it continues to meet all regulatory requirements. The GMMP includes the following:

- a hydrogeological conceptual model for the site
- identification of all potential groundwater contamination sources
- identification of environmental values that may be impacted by authorised activities
- assessment of groundwater levels and flow paths across all hydrogeological units
- monitoring to detect changes in groundwater quality and levels attributable to site activities
- monitoring to determine compliance with groundwater quality criteria established under the relevant regulatory framework
- analysis of groundwater quality trends
- assessment of groundwater and surface water interaction
- documented sampling and analysis methods and QA/QC procedures
- bore construction details, including ground surface RL and screen intervals
- a structured review process to drive continual improvement.

The PRC Plan for BWM adopts the existing GMMP monitoring network to support groundwater monitoring for rehabilitation and closure. Assessment of groundwater quality for the purposes of demonstrating achievement of PRCP Schedule milestones will be undertaken in accordance with the interim trigger levels specified in Attachment 9.

Interim groundwater quality trigger levels have been specified in the approved PRCP Schedule (Attachment 9) by the administering authority. These trigger levels will be applied in accordance with the PRCP Schedule, noting their interim nature and the requirement under PRCP Schedule Condition PRCP22 to refine these values based on site-specific data.

Whitehaven has provided technical memoranda to the administering authority regarding the derivation and application of these interim trigger levels. Notwithstanding this position, the PRC Plan reflects the approved PRCP Schedule requirements.

However, ongoing adjustments to the groundwater monitoring network may occur through the GMMP review process to ensure the program remains fit for purpose, reflects site hydrogeological conditions, and continues to meet environmental objectives as the site progresses toward closure.

In terms of the groundwater level monitoring, under the PRC Plan the focus will be on the relationship between the Permian groundwater level recovery and the void lake levels. Groundwater level/gradient trends over time will be assessed against the more dynamic pit lake levels to demonstrate that residual voids are progressing to a stabilised state, where they will act as ongoing sinks for groundwater thus minimising the potential for an unacceptable risk of environmental harm.

Due to the timeframes involved in the stabilisation of the void lakes and groundwater levels surrounding the mining voids, the groundwater level monitoring intends to show progress towards the development of long-term sinks. Demonstrating the progress towards the development of long-term sinks is to be done through the assessment of trends and comparison to groundwater and void lake water balance model predictions by AQPs.

The groundwater monitoring locations, level and quality requirements for monitoring under the PRC Plan are included in the PRCP Schedule (see RM7, RM8, and Attachments 8 and 9).

3.8.4.2 Groundwater monitoring schedule

Due to the long timeframes required for stabilisation of void lakes and surrounding groundwater systems, the purpose of post-mining groundwater monitoring (levels and water quality) is to demonstrate progress toward the development of long-term groundwater sinks and stable water quality conditions, rather than to confirm their full attainment. Progress will be evaluated through trend analysis and comparison of monitored

groundwater levels and water quality against groundwater and void-lake water balance model predictions, undertaken by an appropriately qualified person (AQP).

As outlined in Section 3.8.1.2.3 groundwater monitoring will be established under PRCP Schedule RM7 with at least one year of sampling undertaken. Under PRCP Schedule RM8 groundwater quality will be monitored quarterly for at least five (5) consecutive years, with the results compared against the interim trigger levels specified in PRCP Schedule Attachment 9 and RM8.5 to RM8.7. Thereafter, groundwater results will be assessed to determine if there is a need to continue groundwater monitoring to demonstrate achievement of RM8. The groundwater quality interim trigger levels stated in the PRCP Schedule must not be exceeded for three (3) consecutive sampling events within the five-year period immediately prior to surrender.

Groundwater levels will be monitored twice per year for a minimum of 5 consecutive years per RM8.

3.8.4.3 Groundwater monitoring locations

As explained in Section 3.8.4.1, the PRC Plan for BWM adopts the existing GMMP monitoring network to support groundwater monitoring for rehabilitation and closure, with groundwater quality assessment undertaken in accordance with the PRCP Schedule (RM7, RM8 and Attachments 8 and 9).

The groundwater monitoring bore network for the PRC Plan and PRCP Schedule is presented in Table 3-74 and Figure 3-81. These are consistent with PRCP Schedule Attachment 8.

Table 3-74 Rehabilitation groundwater monitoring bore locations

Bore Name	Location	Latitude (GDA2020)	Longitude (GDA2020)	Monitored Aquifer
BG-1	MB14 West Bonnie Doon	-23.610428	148.804513	Burngrove Formation
BG-2	SE corner of ML1762, downgradient MB for Blackwater Creek catchment	-23.638561	148.807897	Burngrove Formation
BWM_MB02_01	Central. East, monitor downgradient from existing pits. Co-located with 02_02	-23.835476	148.882626	Permian inter/over burden
BWM_MB02_02	Central. East, monitor downgradient from existing pits. Co-located with 02_01	-23.835468	148.882499	Permian Coal
BWM_MB03_01	North. NE corner ML1762, monitor downgradient from existing pits, Blackwater Ck catchment. Co-located with 03_02	-23.665680	148.884891	Alluvium
BWM_MB03_02	North. NE corner ML1762, monitor downgradient from existing pits. Co-located with 03_01	-23.665626	148.884920	Rewan Formation
BWM_MB12_01	Kenmare UG and adjacent east of Terang Pit Ramp 64/66	-23.895626	148.846277	Tertiary sediments
BWM_MB12_02	Kenmare UG and adjacent east of Terang Pit Ramp 64/66	-23.895670	148.846376	Permian Coal
BWM_MB14_01	Red Dams, south of Lower Red Dam wall on inside corner of lease boundary	-23.937460	148.807469	Permian inter/over burden
BWM_MB14_02	Red Dams, south of Lower Red Dams wall on inside corner of lease boundary	-23.946911	148.806127	Permian inter/over burden
BWM_MB15_01	East of Ramp 80	-23.947011	148.806129	Tertiary sediments
BWM_MB17_01	ML70139 south, south of Marshmead Pit, to be mined out by FY30	-23.970678	148.835662	Basalt
BWM_MB17_02	ML70139 south, south of Marshmead Pit, to be mined out by FY30	-23.946711	148.806292	Tertiary sediments
MB1	East of Bonnie Doon	-23.745972	148.798273	Permian Coal
MB18	East Ramp 46, north of BLW Administration area	-24.011000	148.810088	Permian inter/over burden
MB19BWM01P	Far NE corner of BLW ML1759, near BLW township	-24.010981	148.810167	Permian Coal
MB19BWM02A	Far NE corner of BLW ML1759, near BLW township	-23.739944	148.777611	Permian inter/over burden
MB19BWM08P	East Ramp 46, north of BLW Administration area	-23.614502	148.827470	Permian Coal
MB19BWM27P	North. East, Co-located with 07A, 25P and VWP19BWM01	-23.762676	148.879409	Permian Coal
MB20BWM03P2	Southeast of Bonnie Doon	-23.586810	148.862287	Permian Coal
MB21	South of Duck Pond	-23.586055	148.864266	Tertiary Sediments
BWM_MB164_01	Downgradient Red Dam	-23.763045	148.879552	Tertiary sediments
BWM_MB125_02	Upgradient Red Dam	-23.709180	148.854548	Tertiary sediments
BWM_MB168_01	Downgradient NCPP TSF	-23.614244	148.827917	Weathered Coal (RCM)
BWM_MB172_02	Upgradient NCPP TSF	-23.943795	148.816910	Sandstone (Burngrove)

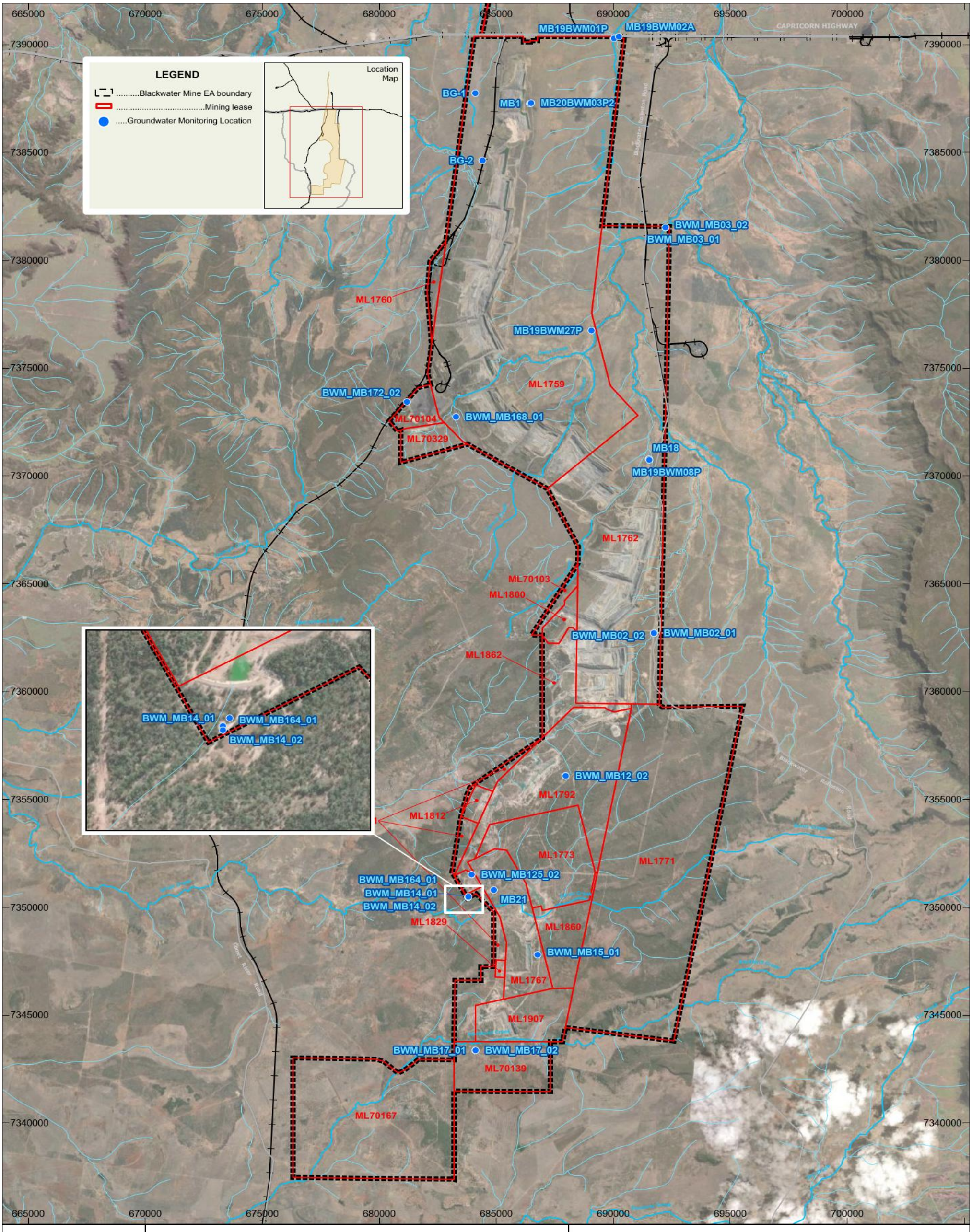


Figure 3-81 BWM rehabilitation groundwater monitoring locations

3.8.5 Remote sensing and technology

The current rehabilitation monitoring program is highly dependent on the capture and analysis of field data. Future advances in monitoring could include developments in remote sensing, technology and/or digital data capture which may be incorporated into the program, wherever practical.

3.8.6 Achievement schedule

3.8.6.1 PMLUs

The timing of the rehabilitation milestones specific to achievement of surface requirements (PRCP Schedule RM6) and achievement of PMLUs to a safe, stable, non-polluting and self-sustaining condition (PRCP Schedule RM7) is summarised in Table 3-75. Timeframes differ between PMLUs to reflect establishment needs and natural development trajectories of each land type.

For clarity, PRCP Schedule Condition PRCP21 provides that the requirements for achievement of progressive rehabilitation certification do not include the requirements of PRCP Schedule RM7.5-7.8 and RM8.

For the cattle grazing PMLU, PRCP Schedule RM6 is proposed to be achieved within a five-year timeframe following completion of revegetation (PRCP Schedule RM5). Following the completion of PRCP Schedule RM6 it is estimated a further 10-years is required for achieve PRCP Schedule RM7.

For the woodland habitat and watercourse PMLUs, PRCP Schedule RM6 is planned to be achieved within a five-year timeframe following the completion of revegetation under PRCP Schedule RM5. A further 20-years is estimated to achieve the completion of PRCP Schedule RM7. This timeframe allows adequate time for natural recruitment, structural development and ecological maturation, consistent with rehabilitation monitoring data.

Earlier rehabilitation certification may occur where PMLU values are demonstrated sooner. Consistent with PRCP Schedule Condition PRCP21, progressive rehabilitation certification can be sought upon satisfaction of the completion of RM6/RM7 rehabilitation milestones (as applicable), without the requirement to meet the PRCP Schedule Criteria identified in RM7.5-7.8 and RM8.

Table 3-75 Time for achievement of surface requirements and PMLUs rehabilitation milestones

PRCP Schedule Rehabilitation Milestone Reference	Rehabilitation milestone	Milestone achievement timeline after revegetation (in PRCP Schedule)
RM6 (all PMLUs)	Achievement of surface requirements	5-years
RM7 (Cattle Grazing PMLU)	Achievement of post-mining land use to a safe, stable, non-polluting and self-sustaining condition	Up to 10-years
RM7 (Woodland Habitat and Watercourse PMLUs)	Achievement of post-mining land use to a safe, stable, non-polluting and self-sustaining condition	Up to 20-years

3.8.6.2 NUMAs

The timing of the management milestones specific to achievement of sufficient improvement (MM3) is listed in Table 3-76.

Table 3-76 Time for achievement of sufficient improvement for NUMA management milestones

Milestone reference	Management milestone	Milestone achievement time (in PRCP Schedule)
MM3	Achievement of sufficient improvement	Aligned with achievement of neighbouring PMLUs (PRCP Schedule RM7) to ensure maximum monitoring period.

3.8.7 Data analysis and reporting

Rehabilitation monitoring data will be collected and analysed by an AQP and assessed against the milestone criteria as provided in Table 3-77.

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 corrective actions or maintenance.

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

3.8.8 Quality assurance and quality control

A dedicated QA/QC process will be followed as part of BWM's ongoing rehabilitation monitoring. The process provides for the initial execution of the rehabilitation in accordance with the rehabilitation plan, followed by verification of the execution against the rehabilitation plan.

Based on the verification outcomes, allowance is made for the implementation of corrective actions, as needed. All rehabilitated areas then undergo rehabilitation monitoring; and subsequent execution of maintenance actions identified through the monitoring. This process allows for a repetitive execution-verification-corrective action-monitoring QA/QC approach, to ensure rehabilitation areas progress on a trajectory towards achievement of milestone criteria and eventual certification.

3.8.9 Maintenance

Maintenance will be implemented when monitoring identifies issues with the rehabilitation, or when milestone criteria are not being met. To select the most appropriate corrective actions, rehabilitation monitoring data will be analysed to identify the likely cause/s. Required maintenance/corrective actions will be entered into Whitehaven's work management system for actioning and record management.

To support ongoing operations, temporary and/or minor disturbance activities may be required within rehabilitated areas in some circumstances. This temporary and/or minor disturbance may occur without a PRC Plan Amendment and will be managed as part of maintenance works. Temporary and/or minor disturbance can occur within rehabilitated areas to the extent reasonably necessary for road and access tracks, fences, underground services, low-impact telecommunications facilities, electrical sub-stations, transmission grid works and supply network works, storage depots, pipelines, groundwater bores, monitoring and investigations, exploration, or similar minor infrastructure and ancillary facilities associated with these activities.

Maintenance works will be planned and executed as soon as practicable and within at least six months of the completion of the temporary and/or minor disturbance within rehabilitated areas. Maintenance works may include removing infrastructure, reshaping the area, reestablishing growth media (e.g. respreading stripped topsoil/replacement of spoil), applying seed mix aligned to the PMLU, weed control or managing erosion. These rehabilitated areas will continue to be monitored as per the monitoring program outlined in this section.

It is understood that BWM are undertaking ongoing maintenance of rehabilitation areas based on prioritised works recommended from annual monitoring. From a maintenance perspective, BWM is currently undertaking a Leucaena management program targeting areas of high density Leucaena identified during the 2022-2024 monitoring program. It is expected ongoing maintenance including control of outliers of

Leucaena, erosion control and reseeding will follow on from the weed management programs in cattle grazing PMLU areas returned from monitoring with rehabilitated land in Poor (C) or Degraded (D) condition based on the results of annual monitoring.

Table 3-77 Schedule of monitoring, reporting and review for rehabilitation and management milestones

PRCP Schedule Criteria Reference	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
RM1 Infrastructure decommissioning and removal					
Redundant services (water, electricity, gas, etc.) disconnected and removed to within 0.5 m of final landform surface. All pipelines drained.	Trained and competent person/s to review services documentation, complete visual inspection and document.	Once, upon closure.	Arrange disconnection by an AQP.	Services inspection report. Internal.	Upon receipt of report.
Redundant buildings demolished and removed to within 0.5 m of final landform surface. Dispose of materials on site (where authorised under the EA), or off-site for lawful disposal.	Trained and competent person/s to complete visual inspection and document.	Once, upon closure.	Arrange removal by an AQP.	Inspection report. Internal.	Upon receipt of report.
All hardstand, concrete and bitumen within 0.5 m of the final landform surface removed. Dispose of materials on site (where authorised under the EA), or off-site for lawful disposal.	Trained and competent person/s to complete visual inspection and document.	Once, upon closure.	Arrange removal by an AQP.	Inspection report. Internal.	Upon receipt of report.
Mine water dams decommissioned.	Trained and competent person/s to conduct visual inspection, review of water and sediment monitoring records, review of legal agreements/ licencing in place and document.	Prior to decommissioning/ relinquishment (water and sediment quality), visual inspection to be conducted upon completion of decommissioning where applicable (structures).	Arrange remediation of contaminated sediment and decommissioning by an AQP.	Water management decommissioning report. Internal.	Upon completion of sediment remediation and inspection by an APQ or RPEQ (where applicable).
Water infrastructure removed (including watercourse crossings and culverts).	Trained and competent person/s to conduct visual inspection, review of water and sediment monitoring records, review of legal agreements/ licencing in place and document.	Prior to decommissioning/ relinquishment (water and sediment quality), visual inspection to be conducted upon completion of decommissioning where applicable (structures).	Arrange remediation of contaminated sediment, arrange decommissioning (if involving RPEQ) by an AQP.	Water management decommissioning report. Internal.	Upon completion of sediment remediation and inspection by an APQ or RPEQ (where applicable).
Earthworks and other features decommissioned (drillholes, bores, sediment ponds and sumps).	Trained and competent person/s to conduct visual inspection, review of water and sediment monitoring records, review of legal agreements/ licencing in place and document.	Prior to decommissioning/ relinquishment (water and sediment quality), visual inspection to be conducted upon completion of decommissioning where applicable (structures).	Arrange remediation of contaminated sediment, arrange decommissioning (if involving RPEQ) by an AQP.	Water management decommissioning report. Internal.	Upon completion of sediment remediation and inspection by an APQ or RPEQ (where applicable).
Waste has been removed off-site, or disposed of on-site where authorised under EA EPML00717813.	Trained and competent person/s to review waste documentation and conduct visual inspection.	Once, upon closure.	Arrange removal and/ or disposal onsite by an AQP.	Waste removal report. Internal.	Upon receipt of report.
Underground related surface and access-point infrastructure removed to within 0.5 m of final landform surface, in accordance with AQP recommendations.	Trained and competent person/s to review complete visual inspection and document.	Once, upon closure.	Arrange removal by an AQP.	Inspection report. Internal.	Upon receipt of report.
RM2 Identification and remediation of contaminated land					
Contaminated Land Investigation Document completed in accordance with the *Environmental Protection Act 1994*, including: 1. Site Suitability Statement confirming the suitability of the property for the PMLUs; and 2. Audit Certification.	Review water and soil quality assessments and monitoring to identify any contamination.	Once, upon closure.	Arrange a preliminary site investigation (PSI) by an AQP. Arrange detailed site investigation (DSI) by an AQP if identified as required in the PSI. Arrange remediation or management of contaminated land if identified in the PSI/ DSI.	Contaminated Land Investigation Document. Internal.	Upon receipt of the Contaminated Land Investigation Document and site suitability statement.
Contaminated Land Investigation Document including a Site Investigation Report and, where required, a Validation Report and/or a draft Site Management Plan. Contaminated Land Auditor certifies that no contamination unsuitable for the PMLU remains or is occurring.	Review Site Validation Report.	Upon receipt of Site Validation Report.	Arrange continued remediation if required.	Site Validation Report and/ or Site Management Plan. Internal.	Upon auditor sign off, confirming the land does not present an unacceptable risk to proposed future land uses or the environment.

PRCP Schedule Criteria Reference	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
RM3 Bulk earthworks and landform reshaping					
Construction of landforms completed to achieve design intent: 1. Relevant structures and permanent diversions developed and/or reshaped consistent with the Closure Landform Design Report (PRCP12) and Design Plan (PRCP14). For disturbed land that does not appear in the closure landform design report, this is to be reshaped appropriately as determined by an AQP. 2. All major earthworks are undertaken, and erosion and sediment control systems installed, in accordance with the detailed design specifications provided by an AQP. 3. As-Constructed report/s prepared that details and justifies all variations to designs, including a certification that such variations will not affect design performance. 4. Erosion and sediment control systems installed per detailed design specifications, with installation verified by an AQP. 5. Constructed landforms achieve a Factor of Safety (FOS) of ≥ 1.5 at the safety bund, unless an alternative is justified by an AQP. 6. For the cattle grazing PMLU: a. Landforms reshaped with 70% of slopes ≤20% gradient. b. At least 50% of slopes ≤15% gradient. c. No slopes ≥ 25% gradient. 7. For the woodland habitat PMLU: a. Landforms reshaped with ≤30% gradient. 8. For the watercourse PMLU: a. As constructed plans prepared by an AQP demonstrate that diversions are constructed in accordance with engineered design plans per PRCP Schedule Condition PRCP14. b. Disturbed natural watercourse bed and banks returned to a profile similar to the pre-disturbance condition if known. 9. For Tailings Storage Facilities (TSFs) and reject dumps: a. All tailings and rejects encapsulated with at least 1 meter of consolidated non-acid forming (NAF) material, or as recommended by an AQP. b. Detailed cover systems prepared by an AQP are to consider the physicochemical properties of the waste material being stored, the availability of suitable cover materials and the specific location, hydrogeology and geometry of each structure. In the absence of an AQP designed cover system, the criteria in PRCP Schedule Criteria RM3.10 is to be applied.	Visual inspection by AQPs (where required) and trained and competent person/s during construction and documented, survey/ LiDAR of landform and document.	Throughout all landform development activities under RM3 and upon completion of final landform.	Re-shape landform to design specifications and or AQP recommendations prior to applying growth media (PRCP Schedule RM4).	As constructed landform report/s; geotechnical report/s; erosion and sediment control report/s; flood mitigation measures report. Internal.	Upon completion of re-shaping and associated report.

PRCP Schedule Criteria Reference	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
10. Cover surface is to be free draining and does not display surface ponding, unless an AQP certified alternative design is being used. 11. Flood protection landforms for residual voids identified in PRCP Schedule Condition PRCP15(b) are designed to: a. Prevent inundation during a 0.1% AEP flood event, or if PRCP16(b)(ii) is triggered, a less likely event than an 0.1% AEP. b. Mitigate the impacts of high-energy flow (≥2.5m/s) against the constructed landforms, using energy dissipation measures and considering surface roughness to increase erosional resistance to ensure landform stability. 12. For historical underground areas: a. An AQP certified risk assessment is completed to determine appropriate rehabilitation treatments. The risk assessment is to consider erosional stability of insitu soil types, safety risks relevant to the proposed PMLU, impacts to either existing rehabilitation areas or otherwise the terrestrial ecological values, and potential ecological impacts or erosional stability considerations from any disturbance caused from the future rehabilitation activities. b. All historical underground areas rehabilitated in accordance with detailed design specifications and methodology as prescribed and certified by an AQP. The rehabilitation designs must have regard for the risk assessment to be completed for PRCP Schedule Criteria RM3.13 and it is to consider erosional stability, surface safety risks, impacts to either existing rehabilitation areas or otherwise the terrestrial ecological values, ecological values and potential ecological impacts from any disturbance caused by future rehabilitation activities.					
RM4 Surface preparation					
Assessment of growth media health and suitability and the development of an amelioration plan is completed by an AQP prior to placement on the landform.	An AQP will scope and complete soil sampling, review NATA accredited soil laboratory documentation and rehabilitation records.	No more than six (6) months prior to use of growth media and upon completion of amelioration.	Arrange completion of assessment and/ or ameliorate/ re-ameliorate.	Amelioration plan. Internal.	Upon receipt of report.
Any amelioration/ fertilisation recommended as a result of the growth media health and suitability assessment have been applied at the recommended rates.	Composite soil sampling, review amelioration documentation, rehabilitation records.	Upon completion of amelioration.	Re-ameliorate or ameliorate.	Amelioration assessment report. Internal.	Upon receipt of report.
In areas where topsoil has previously been removed, topsoil and or growth media is in place at a minimum depth of: a. 150 mm for the cattle grazing PMLU and watercourse PMLU; and b. 100 mm for the woodland habitat PMLU.	Trained and competent person/s to complete visual inspection and document.	Upon completion of placement.	Re-place or place growth media to specifications.	Growth media inspection report. Internal.	Upon re-placement.

PRCP Schedule Criteria Reference	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
Rip on contour at a minimum depth of ≥300 mm.	Trained and competent person/s to complete visual inspection and document.	Upon completion of growth media placement.	Rework to specifications; re-place growth media if required.	Internal.	Upon rework.
RM5 Revegetation					
Seed mix constitutes target flora species for each PMLU, as provided in Section 3.6.1.8 and Appendix 4.1 (PRCP Schedule): 1. For the cattle grazing PMLU: a. At least four (4) species of 3P (preferred, palatable and perennial) grasses, including at least two (2) native species for grasses, two (2) native shade tree species, and two (2) legume species are to be seeded per cattle grazing rehabilitation area, or at rates recommended by an AQP. b. Shade tree species are to be excluded from seed mixes applied to TSFs and reject dumps. 2. For the woodland habitat PMLU: a. Include at least six (6) species from revegetation lists for framework trees, woody understorey (shrub) species grass species, or at rates recommended by an AQP. b. Shade tree species are to be excluded from seed mixes applied to TSFs and reject dumps. 3. For watercourse PMLU: a. Complete seeding in accordance with recommended watercourse species mixes for upper, mid banks and lower banks.	Trained and competent person/s to review supplier credentials and seed mix specification against the Revegetation Plan (part of PRCP) and rehabilitation records.	Prior to seeding.	Re-seed or seed according to specifications. Seek alternative supplier if does not meet standards required or not reliable.	Revegetation report (including documentation of seed mix applied, seeding timing and method, and seed mix rates). Internal.	Upon completion of re-seeding.
Seed mix is applied in accordance with the recommended seeding rates for each PMLU 1. For cattle grazing PMLU: a. Minimum seeding rates of at least 12 kg/ha of pure live grass seed, 0.5 kg/ha of shade tree and 3 kg/ha of pure live uncoated legume seed are to be applied, unless adjusted by an AQP. b. All seed mixes are to include 5 kg/ha of Japanese millet *(Echinochloa esculenta)* or similar as a sterile cover crop to protect soils from erosion, unless adjusted by an AQP. 2. For woodland habitat PMLU: a. Minimum seeding rates of 4.5 kg/ha of pure live seed for tree species, 3 kg/ha of pure live seed for woody understorey species and 10 kg/ha of pure live seed for grasses to be applied, unless adjusted by an AQP. b. All seed mixes are to include 5 kg/ha of Japanese millet *(Echinochloa esculenta)* or similar as a sterile cover crop to protect soils from erosion, unless adjusted by an AQP.	Trained and competent person/s to review application rates, timing and methodology (e.g., applicator used) and rehabilitation records.	Prior to seeding.	Re-seed or seed according to specifications.	Revegetation report (including documentation of seed mix applied, seeding timing and method, and seed mix rates). Internal.	Upon completion of re-seeding.

PRCP Schedule Criteria Reference	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
3. For watercourse PMLU: a. Minimum seeding rates for upper and mid banks of 6 kg/ha pure live seed for tree species, 4 kg/ha of pure live seed for woody understorey species and 10 kg/ha of pure live seed for grasses and other ground species, unless adjusted by an AQP. b. Minimum seeding rates for lower banks of 5 kg/ha pure live seed for tree species and 10 kg/ha pure live seed for grasses and other ground species, unless adjusted by an AQP. **c.** All seed mixes are to include 5 kg/ha of Japanese millet *(Echinochloa esculenta)* or similar as a sterile cover crop to protect soils from erosion, unless adjusted by an AQP.					
RM6 Achievement of surface requirements					
Weeds comprise <5% of total vegetation groundcover, with the exception of *Parthenium hysterophorus* which must not exceed 10% of vegetation groundcover and be assessed by an AQP as appropriately managed.	An AQP to complete rehabilitation monitoring, as outlined in Section 3.8.1.	As per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.	Arrange corrective actions as required.	Rehabilitation monitoring report. Internal.	Upon completion of corrective actions and as per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.
An AQP certifies that there is no evidence of moderate or severe erosion, as defined in the PRCP Schedule.	An AQP to complete rehabilitation monitoring, as outlined in Section 3.8.1.	As per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.	Arrange corrective actions as required.	Rehabilitation monitoring report. Internal.	Upon completion of corrective actions and as per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.
The following minimum groundcover is achieved for relevant structures*: 1. For slopes ≤15% constructed with heavy clay growth media, groundcover must achieve ≥70%. 2. For slopes ≤15% constructed with light clay growth media, groundcover must achieve ≥50%. 3. For slopes >15 and ≤30% constructed with fresh Permian growth media, groundcover must achieve ≥80%. *Alternative slope grades and groundcover percentage combinations are acceptable where prescribed by an AQP, or the maximum slope grade and length combinations as per PRCP Schedule *Attachment 10 – Acceptable Material, Slope Grade, Slope Length and Groundcover Combinations for Relevant Structures* are achieved.	An AQP to complete rehabilitation monitoring, as outlined in Section 3.8.1.	As per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.	Arrange corrective actions as required.	Rehabilitation monitoring report. Internal.	Upon completion of corrective actions and as per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.
The following additional criteria for the cattle grazing PMLU applies: **1.** The groundcover required by PRCP Schedule Criteria RM6.3 is vegetative groundcover, with at least 50% of vegetative dry matter is comprised of pasture species as listed in Attachment 2 of the PRCP Schedule (Appendix 4.1).	An AQP to complete rehabilitation monitoring, as outlined in Section 3.8.1.	As per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.	Arrange corrective actions as required.	Rehabilitation monitoring report. Internal.	Upon completion of corrective actions and as per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.
The following additional criteria for the woodland habitat and watercourse PMLUs apply:	An AQP to complete rehabilitation monitoring, as outlined in Section 3.8.1.	As per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.	Arrange corrective actions as required.	Rehabilitation monitoring report. Internal.	Upon completion of corrective actions and as per the rehabilitation monitoring

PRCP Schedule Criteria Reference	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
1. Woodland habitat: Modified BioCondition assessment demonstrates achievement of an overall score of ≥15 out of a possible 60 for the hybrid regional ecosystem as defined in the PRCP Schedule. 2. Watercourse: Modified BioCondition assessment demonstrates achievement of an overall score of ≥15 out of a possible 60 for the representative regional ecosystem as defined in the PRCP Schedule.					schedule outlined in Section 3.8.1.2.
The following additional criteria applies to TSFs: 1. Monitoring data is collected as described in the Closure Landform Design Report (PRCP12) or as detailed in relevant technical assessments or rehabilitation monitoring reports. 2. No deep-rooted trees are present.	Collection of data to occur as described in the Closure Landform Design Report, or relevant technical assessments or rehabilitation monitoring reports. Visual inspection of the TSFs by AQPs (where required) and or trained and competent person/s for presence of deep-rooted trees.	As described in the Closure Landform Design Report, or relevant technical assessments or rehabilitation monitoring reports.	Arrange corrective actions for the collection of monitoring data as required. Arrange corrective actions for the removal of deep-rooted trees as required.	Internal.	Upon completion of corrective actions.
The following additional criteria applies to underground workings / historical subsidence areas: 1. AQP certifies areas affected by subsidence, overland flow or surface runoff overlying historical underground workings do not pose an unacceptable safety or environmental risk, do not prevent achievement of final land use and do not adversely affect landform stability, vegetation condition, ecosystem function or habitat values. 2. Where relevant, ecosystem condition is to be demonstrated using the appropriate BioCondition assessment. *Note: Residual ponding, surface depressions, cracking or minor long-term ground movements that do not present such risks are acceptable and do not require remediation.*	An AQP to complete rehabilitation monitoring, as outlined in Section 3.8.1, including where relevant, BioCondition assessments undertaken in accordance with 3.8.1.5.1. Review AQP final certification.	Rehabilitation monitoring as outlined in Section 3.8.1.2. AQP certification to occur following the completion of all rehabilitation works associated with underground workings / historical subsidence areas.	Arrange corrective actions as required.	Rehabilitation monitoring report. AQP certification. Internal and external (upon final certification).	Upon completion of corrective actions as per the rehabilitation monitoring schedule outlined in Section 3.8.1.2, or as defined by an AQP conducting the certification.
RM7 Achievement of PMLU to a stable condition					
Risk assessment completed by an AQP confirms safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use.	Review AQP certification.	Upon receipt of certification.	Arrange corrective actions as required.	Internal.	Upon completion of corrective actions.
Rehabilitation is assessed as geotechnically stable by an AQP minimum FOS ≥1.5 at the safety bund, unless an alternative is justified by an AQP.	Geotechnical inspection by AQP.	Upon completion of geotechnical inspection.	Arrange remediation as required.	Geotechnical report. Internal.	Upon completion of remediation.
Any remaining infrastructure rehabilitated or removed in accordance with PRCP Schedule Criteria RM1.	Trained and competent person/s to complete visual inspection and document.	Once, upon closure.	Arrange disconnection by an AQP.	Services inspection report. Internal.	Upon receipt of report.
An AQP certifies that land is erosionally stable and a. There is no moderate or severe erosion present (as defined in PRCP Schedule Attachment 3: Erosion Classification Framework); and b. All other erosion requiring intervention has been remediated and does not impact achieving the PMLU.	An AQP to complete rehabilitation monitoring, outlined in Section 3.8.1.	As per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.	Arrange corrective actions as required.	Rehabilitation monitoring report. Internal.	Upon completion of corrective actions and as per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.

PRCP Schedule Criteria Reference	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
Surface water runoff is collected and monitored from representative areas of rehabilitation during surface flow occurs and when safe to do so. Monitoring results are to be compared, for interpretation purposes only, to the interim trigger levels provided in Attachment 7 of the PRCP Schedule.	An AQP to review surface water quality data.	When representative rehabilitation areas are complete and when surface flows occur.	Arrange corrective actions as required.	Surface water monitoring report. Internal.	Upon completion of corrective actions and as per the surface water monitoring schedule outlined in Section 3.8.3.
Surface water in the receiving environment, downstream of completed rehabilitation areas, is monitored monthly during flow and when safe to do so. Monitoring must occur no later than one year prior to the completion of PRCP Schedule RM7, at the locations defined in Attachment 6 of the PRCP Schedule and at representative areas as defined by an AQP (RM7.6). Monitoring results are to be compared, for interpretation purposes only, to the interim trigger levels provided in Attachment 7 of the PRCP Schedule.	An AQP to review surface water quality data.	Monitoring is to commence at least one year prior to the completion of PRCP Schedule RM7. Monthly monitoring during flows is to occur thereafter.	Arrange corrective actions as required.	Surface water monitoring report. Internal.	Upon completion of corrective actions and as per the surface water monitoring schedule outlined in Section 3.8.3.
Groundwater quality, hydraulically downgradient of completed rehabilitation areas, is monitored quarterly at the locations defined in Attachment 8 of the PRCP Schedule. Monitoring is to commence no later than one year prior to the completion of PRCP Schedule RM7, Monitoring results are to be compared, for interpretation purposes only, to the interim trigger levels provided in Attachment 9 of the PRCP Schedule. An AQP must determine the downgradient monitoring locations that are representative of groundwater flow paths from completed rehabilitation areas.	An AQP to review groundwater quality data.	As per the surface water monitoring schedule outlined in Section 3.8.4.	Arrange corrective actions as required.	Surface water monitoring report. Internal.	Upon completion of corrective actions and as per the groundwater monitoring schedule outlined in Section 3.8.4.
The following additional criteria applies to residual ponding in subsidence areas (RA5): 1. Modified BioCondition assessment demonstrates achievement of an overall score of ≥15 out of a possible 30 for RE11.3.27c as defined in Attachment 5 of the PRCP Schedule.	An AQP to complete rehabilitation monitoring, as outlined in Section 3.8.1.	As per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.	Arrange corrective actions as required.	Rehabilitation monitoring report. Internal.	Upon completion of corrective actions and as per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.
The following additional criteria applies for existing rehabilitation cattle grazing PMLU areas (RA7): 1. At least 60% of vegetative dry matter is comprised of 3P pasture species as listed in Section 3.6.1.8.5. 2. Grazing land condition is assessed as Good (A) condition if ungrazed, or Fair (B) if under a grazing regime as per the ABCD Land Condition Framework (DES 2022a). 3. Leucaena >2m high: stem density is <250 stems per hectare (1 per 40m^2) mean total area.	An AQP to complete rehabilitation monitoring, as outlined in Section 3.8.1.	As per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.	Arrange corrective actions as required.	Rehabilitation monitoring report. Internal.	Upon completion of corrective actions and as per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.
The following additional criteria applies for future rehabilitation cattle grazing PMLU areas (RA2, RA4): 1. At least 60% of vegetative dry matter is comprised of 3P pasture species as listed in Section 3.6.1.8.5. 2. Land suitability class is assessed in accordance with the '*Rehabilitated mined land suitability for cattle grazing in the Bowen Basin (Short 2023)*.' Land suitability assessed by AQP is ≤3 or if ≥4 is not different from pre-mining and/or if ≥4 is limited by the same limiting factors present in representative reference sites. 3. Leucaena >2m high: stem density is <250 stems per hectare (1 per 40m^2) mean total area	An AQP to complete rehabilitation monitoring, outlined in Section 3.8.1.	As per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.	Arrange corrective actions as required.	Rehabilitation monitoring report. Internal.	Upon completion of corrective actions and as per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.

PRCP Schedule Criteria Reference	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
The following additional criteria applies for existing rehabilitation woodland habitat PMLU areas (RA6): 1. Species richness: native tree species ≥2; native shrub species ≥3; native grass species ≥4*. 2. Tree canopy cover: ≥16%. ** Existing rehabilitation may contain a mixture of native and exotic grass species*	An AQP to complete rehabilitation monitoring, outlined in Section 3.8.1.	As per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.	Arrange corrective actions as required.	Rehabilitation monitoring report. Internal.	Upon completion of corrective actions and as per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.
The following additional criteria applies for future rehabilitation woodland habitat PMLU areas (RA1, RA5): 1. Modified BioCondition assessment by an AQP confirms achievement of an overall score of ≥33 out of a possible 60 for the relevant representative regional ecosystem as defined in PRCP Schedule Attachment 5 - Modified BioCondition Benchmarks for Woodland and Watercourse Regional Ecosystems.	An AQP to complete rehabilitation monitoring, outlined in Section 3.8.1.	As per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.	Arrange corrective actions as required.	Rehabilitation monitoring report. Internal.	Upon completion of corrective actions and as per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.
The following additional criteria applies for watercourse PMLU areas (RA3): 1. Index of Diversion (IDC) assessment confirms: a. Riparian vegetation index is greater or equal to upstream or downstream values. b. Geomorphic index is greater or equal to upstream or downstream values. c. Modified BioCondition assessment by an AQP confirms achievement of an overall score of ≥30 out of a possible 60 for the relevant representative regional ecosystem as defined in PRCP Schedule Attachment 5 - Modified BioCondition Benchmarks for Woodland and Watercourse Regional Ecosystems.	An AQP to complete rehabilitation monitoring, outlined in Section 3.8.1.	As per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.	Arrange corrective actions as required.	Rehabilitation monitoring report. Internal.	Upon completion of corrective actions and as per the rehabilitation monitoring schedule outlined in Section 3.8.1.2.
RM8 Achievement of post-mining land use water quality					
Surface water quality results monitored monthly during flow for at least five (5) consecutive years at, but not limited to, the monitoring locations specified in Section 3.8.3 and PRCP Schedule (Attachment 6), for the interim trigger levels listed in Section 3.8.3 and PRCP Schedule (Attachment 7), for three (3) consecutive results.	An AQP to review surface water quality data in respect to PRCP Schedule Criteria requirements. Exceedances must be actioned as outlined in PRCP Schedule RM8.2 to RM8.4.	As per the PRCP Schedule and surface water monitoring schedule outlined in Section 3.8.3.	Arrange corrective actions and regulator notifications as required by the PRCP Schedule.	Surface water monitoring report. Internal; external if results exceedances occur.	Upon completion of corrective actions and as per the surface water monitoring schedule outlined in Section 3.8.3.
Groundwater quality results monitored quarterly for at least five (5) consecutive years prior to surrender at, but not limited to, the monitoring locations specified in Section 3.8.4 and PRCP Schedule (Attachment 8), for the interim trigger levels listed in Section 3.8.4 and PRCP Schedule (Attachment 9), for three (3) consecutive results.	An AQP to review groundwater quality in respect to PRCP Schedule Criteria requirements. Exceedances must be actioned as outlined in PRCP Schedule RM8.7.	As per the PRCP Schedule and groundwater monitoring schedule outlined in Section 3.8.4.	Arrange corrective actions and regulator notifications as required by the PRCP Schedule.	Groundwater monitoring report. Internal; external if results exceedances occur.	Upon completion of corrective actions and as per the groundwater monitoring schedule outlined in Section 3.8.4.
Groundwater level monitored twice per year for a minimum of five (5) consecutive years.	An AQP to review groundwater level data in respect to PRCP Schedule Criteria requirements.	As per the PRCP Schedule and groundwater monitoring schedule outlined in Section 3.8.4.	Arrange corrective actions and regulator notifications as required by the PRCP Schedule.	Groundwater monitoring report Internal; external if results exceedances occur	Upon completion of corrective actions and as per the groundwater monitoring schedule outlined in Section 3.8.4.
MM1 Achievement of structural stability					

PRCP Schedule Criteria Reference	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
The following is to be adhered to in regards to NUMA area extents, design and locations: 1. The maximum area of each NUMA per the PRCP Schedule must not be exceeded. 2. A minimum distance of 50 m is to be designed between the residual void crest and the toe of the safety bund, where against an external perimeter mining lease boundary. 3. The location of the voids and associated safety bunds are not to cause instability or degradation to the land outside the NUMA. 4. Residual voids must not overtop to the receiving environment.	Mine planning, survey/ LiDAR assessments, and AQP assessments (where required) confirm NUMAs meet PRCP Schedule requirements.	Ongoing, during mining operations.	Arrange corrective actions as required.	Internal.	Upon completion of corrective actions.
Pit wall landforms are geotechnically stable when floodwater is against the creek-side batter and are not constructed with dispersive material.	Geotechnical inspection and confirmation by AQP.	Throughout landform development activities and upon completion of final landform.	Arrange remediation as required.	Geotechnical report. Internal.	Upon completion of remediation.
Closure Landform Design Report (required by PRCP12) has been updated by an AQP based on the latest flood modelling and materials data prior to construction.	Review of AQP certification/s	Upon receipt of certification/s	Arrange remediation as directed by AQP	Relevant AQP reports Internal	Upon completion of remediation
Pit walls and TSFs achieve a minimum FoS ≥ 1.5 at the safety bund as certified by an AQP.	Geotechnical inspection by AQP.	Throughout landform development activities and upon completion of final landform.	Arrange remediation as required.	Geotechnical report. Internal.	Upon completion of remediation.
MM2 Installation of cover system					
Engineered design plans for cover systems (water/ spoil) have been designed by an AQP, to achieve the following criteria: 1. Minimum 2 m cover thickness, where using spoil; and 2. Minimum 1 m depth permanent water cover, where tailings not covered by spoil.	Review AQP design.	Upon completion of AQP design.	Re-design hybrid cover systems as required.	Cover system report. Internal.	Upon completion of re-design.
An AQP has certified that the cover system is built/ installed as designed and has completed an 'As Constructed' engineering report for each cover system.	Visual inspection by an AQP during construction.	Upon construction of cover systems.	Re-shape covers to design specifications prior to applying growth media, as required.	'As Constructed' engineering report. Internal.	Upon completion of cover systems.
An AQP demonstrates with modelling that the cover system is in place post-closure.	Review of AQP modelling report	Upon receipt of modelling report	Arrange rectification / completion of actions as directed by AQP	Relevant AQP reports Internal	Upon completion of rectification / actions
MM3 Achievement of surface requirements					
Access to residual voids is restricted by a competent safety bund or equivalent landform to prevent access, and are constructed to the following specifications: 1. Constructed from competent non-weathered, non-dispersive material; 2. Minimum height of 2 m; 3. Minimum base width of 4 m; 4. 1 in 3 batters; and 5. Positioned at the geotechnical offset or a 15 m offset, whichever is greater.	Visual inspection by an AQP	Annually	Re-construct as required	Void safety controls monitoring report Internal	Annually, and upon re-construction

PRCP Schedule Criteria Reference	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
Access to highwalls is restricted by fencing and safety signage designed and installed in accordance with Australian standards current at the time of installation.	Visual inspection by an AQP	Annually	Re-install fencing as required	Void safety controls monitoring report Internal	Annually, and upon re-installation
MM4 Achievement of sufficient improvement					
Certification by an independent AQP is required to confirm the following: 1. The final landform has been constructed in accordance with the landform closure design report. 2. The NUMAs will not present an unacceptable risk of environmental harm. 3. Erosion of the landform within the NUMA will not negatively impact on the stability of any adjacent rehabilitation areas, or their ability to sustain their PMLU. 4. The NUMA is safe to humans and livestock. 5. The water level and quality in the final voids does not, and will, not cause environmental harm to the receiving environment, as demonstrated by groundwater level, surface water and groundwater quality monitoring and modelling. 6. AQP demonstrates with water quality, water level and modelling data that residual voids (treated as a system), act as groundwater sinks post-closure and will not cause environmental harm through the release of contaminants from void lakes beyond the tenure boundaries post closure. 7. NUMAs retain flood immunity as follows: a. For all NUMAs except the R74 residual void, a 0.1% AEP event; b. For the R74 residual void, a flood event less likely than a 0.1% AEP event if required per PRCP Schedule Condition PRCP16(b)(ii), as confirmed by flood modelling updated based on that undertaken in accordance with PRCP17.	Review of AQP certification/s	Upon receipt of certification/s	Arrange remediation as directed by AQP	Relevant AQP reports Internal	Upon completion of remediation

3.9 References

ACARP. (2014). *Criteria for functioning river landscape units in mining and post-mining landscapes* (ACARP Project C20017). Alluvium Consulting.

AMIRA. (2002). *ARD Test Handbook – AMIRA Project P387A: Prediction & Kinetic Control of Acid Mine Drainage*. Egi and Ian Wark Research Institute.

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia.

BMA. (2008). *Blackwater Environmental Management Plan*. BHP Minerals Australia.

BMA. (2020). *Residual Void Investigation. BHP Minerals Australia*, Closure Planning.

Bowen, H.J.M. (1979). *Environmental Geochemistry of the Elements*. Academic Press, New York.

Barnett, B., Townley, L., Post, V., Evans, R. H., Richardson, S., Werner, A., Boronkay, A. (2012). *Australian Groundwater Modelling Guidelines - Waterlines Report Series No. 82*. Commonwealth of Australia.

BoM. (2023). *Climate for Moranbah*. Retrieved from Bureau of Meteorology: http://www.bom.gov.au/climate/data/

Byrnes Geotechnical. (2024). *Geotechnical considerations for closure of underground mines at BMA Blackwater.* Report prepared for BMA.

Byrnes Geotechnical. (2025). *Augering Ramp 8 Memo*. Prepared for WHC Blackwater Mine on 18 August 2025.

CHRC. (2019). *Planning and Development Information. State of Queensland*. https://www.chrc.qld.gov.au/building-planning-projects/development/planning-scheme/central-highlands-regional-planning-scheme/ (date retrieved: 26 Sep 2024).

Department of Agriculture and Fisheries. (2021). *Introducing the Stocktake GLM App*. Retrieved from Stocktake: https://stocktakeglm.com.au/

Department of Resources. (2023). *Queensland Globe: https://qldglobe.information.qld.gov.au/*, accessed 7 August 2023.

DES. (2018). *Monitoring and Sampling Manual Environmental Protection (Water) Policy*. Brisbane: Department of Environment and Science Government.

DES. (2022a). *Queensland Reef Quality Program Reef Protection Regulations Farming in Reef Catchments Grazing Guide Version 2*. Brisbane: Office of the Great Barrier Reef, Environmental Policy and Programs.

DES. (2022b, September 12). *Environmental reports online*. Retrieved from WildNet records—Conservation significant species list: https://www.qld.gov.au/environment/management/environmental/environmental-reports-online/

DES. (2022c, September 12). *Regional ecosystem mapping*. Retrieved from https://www.qld.gov.au/environment/pollution/management/environmental-reports-online/

DES. (2022d, September 12). *Matter of state significance (MSES).* Retrieved from https://www.qld.gov.au/environment/pollution/management/environmental-reports-online/

DES. (2022e, September 06). *Maps of environmentally sensitive areas*. Retrieved from https://environment.des.qld.gov.au/management/maps-of-environmentally-sensitive-areas/

DES. (2022e, January 31). *Progressive certification for resource activities*. Retrieved from https://environment.des.qld.gov.au/__data/assets/pdf_file/0025/259081/rs-gl-progressive-certification.pdf/

DESI. (2024). *Guideline - Progressive rehabilitation and closure plans (PRC Plans)*. Department of Environment, Science and Innovation.

DNRME. (2019). *Guideline: Works that interfere with water in a watercourse for a resource activity – watercourse diversions authorised under the Water Act 2000*, OSW/2019/4599, Version 2.00.

Douglas Partners. (1998). *Groundwater Report on Humboldt, Marshmead and South Marshmead Mines*. South Blackwater.

DPM Envirosciences. (2026). *Blackwater North Extension Project – Aquatic Ecology and Groundwater-Dependent Ecosystems Assessment.* Report prepared for Whitehaven Blackwater Pty Ltd. 10 April 2026.

DSITI & DNRM. (2015). *Guidelines for Agricultural Land Evaluation in Queensland (2nd ed).* Brisbane, Queensland: Queensland Government.

E2M. (2026). *Blackwater North Extension Project – Terrestrial Ecological Assessment.* Report prepared for Whitehaven Blackwater Pty Ltd. 09 April 2026.

EcoServe and LAMR. (2006). *A review of habitat values for biodiversity and species of conservation significance BMA Blackwater mine*. Brisbane: EcoServe and LAMR Pty Ltd.

Emmerton, B. R. (1999). *Spoil Characterisation and Assessment for Northern Pits*, Blackwater Mine.

Emmerton, B., Erskine, P., Baumgartl, T., & Burgess, J. (2016a). *Re-establishment of species diversity after rehabilitation of open cut mines in the Bowen Basin mining precinct of Queensland*. Brisbane.

Emmerton, B., Erskine, P., Baumgartl, T., & Burgess, J. (2016b). *Woody species re-establishment on rehabilitated open cut mines in the Bowen Basin mining precinct of Queensland*. Brisbane.

Engeny. (2025a). *PRCP Concept Design Report - Sirius Creek Diversion*. Brisbane: Engeny.

Engeny. (2025b). *PRCP Concept Design Report - Taurus Creek Diversion*. Brisbane: Engeny.

Engeny. (2025c). *PRCP Concept Design Report - Rockland Creek Diversion*. Brisbane: Engeny.

Engeny. (2025d). *PRCP Concept Design Report - Deep Creek Diversion*. Brisbane: Engeny

ERM (2026). *Void Closure Plan Blackwater Mine*. Prepared for Whitehaven Coal Pty Ltd by Environmental Resources Management Pty Ltd. October 2026.

Future Beef. (2022). *Legume BMP in the Brigalow Belt. Retrieved from Future Beef:* https://futurebeef.com.au/resources/legume-bmp-in-the-brigalow-belt/.

Future Beef. (2025b). *Fitzroy region GLM land types*. Retrieved from Future Beef: https://futurebeef.com.au/resources/fitzroy.

GT Environmental. (2026). *Soils and Land Suitability Assessment Blackwater North Extension Project.* Report prepared for Whitehaven Coal.

Gunn et al. (1967). *Lands of the Isaac - Comet Area, Queensland,* CSIRO Land Research Series No.19.

Henderson Geotech. (2024). *Concept Cover Designs for Waste Storage Facilities at Blackwater Mine*. August 2024.

Henderson Geotech. (2026a). Long-Term Geotechnical Stability of Highwalls and Endwalls at Blackwater Mine. March 2026.

Henderson Geotech. (2026b). *Assessment of Geotechnical Stability of LF#4.4 Residual Void Lowwalls at Blackwater Mine*. May 2026.

HydroBalance. (2026). *BWM_PRCP_Rev3_FV_Outputs_HYDROBALANCE.xslx*. Date received: 20 May 2026.

ID&A Pty Ltd. (2001). *Monitoring and Evaluation Program for Bowen Basin River Diversions.* Australian Coal Association Research Program. Program No. C9068. February 2001.

IESC. (2018). *Information Guidelines Explanatory Note: Uncertainty Analysis - Guidance for Groundwater Modelling within a Risk Management Framework*. Commonwealth of Australia.

Landloch. (2025a). *Landform Evolution Modelling Simulations to Support Tailings Storage Facility Design: Blackwater Mine*. Prepared for Whitehaven Coal Limited by Landloch Pty Ltd. November 2025.

Landloch. (2025b). *Blackwater Mine – Material Characterisation Study.* Prepared for Whitehaven Coal Limited by Landloch Pty Ltd. December 2025.

Landloch. (2026). *Landform Evolution Modelling Simulations to Support Rehabilitation Landform Design: Blackwater Mine*. Prepared for Whitehaven Coal Limited by Landloch Pty Ltd. April 2026.

LEC. (2025a). *Blackwater Coal Mine Rehabilitation Monitoring Report 2025.* Prepared for Whitehaven Coal Limited. Lyngcoln Environmental Consulting, Brisbane.

LEC. (2025b). *Blackwater Coal Mine Underground Mining Surface Cracks and Sinkholes: Assessment of Impacts to Vegetation and Habitat.* Prepared for Whitehaven Coal Limited. Lyngcoln Environmental Consulting, Brisbane.

Neldner, V. W. (2023). *Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland*. Version 7.0. Brisbane: Queensland Herbarium.

Pedrini, D'Agui, Arya, Turner, & Dixon (2022). *Seed quality and the true price of native seed for mine site restoration.*

Queensland Herbarium. (2018). *Regional Ecosystem Technical Descriptions - Brigalow Belt. Brisbane: Department of Environment and Science*. Department of Science, Information Technology, Innovation and Arts, Brisbane.

Queensland Herbarium (Version 2.2) *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual.* Department of Science, Information Technology, Innovation and Arts, Brisbane.

Short. (2018). *Land Suitability Assessment (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).* Emerald, Qld: Highlands Environmental.

Shields, P.G., Gillespie, R.L. & Cannon, R.S. (1991). *Dawson/Callide Districts Field Manual,* in (J.A. Elsol ed.) Land Management Manual Dawson/Callide Districts, Queensland Department of Primary Industries Training Series QE 91003.

SLR. (2026a). *Blackwater Mine PRC Plan Hydrogeology Assessment – Revision 3*. Report prepared for Whitehaven Coal Ltd, 620.040199.00017. 14 May 2026.

SLR. (2026b). *Blackwater North Extension Project, Groundwater Modelling Technical Report*. Report prepared for Whitehaven Coal Ltd, 640.031809.00001. 9 April 2026.

Spain, Nuske, & Gagen. (2023). *Evaluating methods for assessing native ecosystem mine rehabilitation success – Technical Paper*.

S.S. Papadopulos & Associates Inc. (2018). *Mod-PATH3DU code for particle tracking.*

State of Queensland. (2024). *Environmental Protection Act 1994*. Queensland Government.

State of Queensland. (2023). *Environmental Protection Regulation 2019*. Queensland Government.

State of Queensland. (2023). *Mineral and Energy Resources (Financial Provisioning) Act 2018* (Queensland). Queensland Government.

State of Queensland. (2022). *Water Act 2000 Water Plan (Fitzroy Basin) 2011*. Queensland Government.

Terrenus Earth Sciences. (2026). *Blackwater Mine Environmental Geochemical Characterisation and Risk Assessment of Mineral Waste*. Report 25-063-206 / R001. Prepared for Whitehaven Blackwater Pty Ltd. 14 May 2026.

Whitehaven Coal Limited. 2026. *Whitehaven BWM Topsoil Management Plan.*

Williams, D. (2015). *Bulking and Subsequent Self-Weight and Saturation Settlements, and Geotechnical Stability of Deep Coal Mine Spoil Piles*. (ACARP C19022).

Wilson, P., & Taylor, P. (2012). *Land Zones of Queensland. Brisbane: Queensland Herbarium,* Queensland Department of Science, Information Technology, Innovation and the Arts.

WRM. (2019). *Flood modelling and risk assessment Daunia Mine*. 1583-01-B1.

WRM. (2026a). *Blackwater Mine Progressive Rehabilitation and Closure Plan - Final Landform Flood Assessment*. Report 1559-08-F1. Prepared for Whitehaven Coal Limited by WRM Water & Environment Pty Ltd. 28 May 2026.

WRM. (2025b). *Blackwater Mine Progressive Rehabilitation and Closure Plan – Voids in Floodplain Modelling*. Report 1559-08-E1. Prepared for Whitehaven Coal Limited by WRM Water & Environment Pty Ltd. 28 May 2026.

WRM. (2026c). *Progressive Rehabilitation and Closure Planning – Blackwater Mine. Final Void Water Balance.* Report 1559-10-D1. Prepared for Whitehaven Coal Limited by WRM Water & Environment Pty Ltd. 20 May 2026.

WRM. (2026d). *Blackwater North Extension Project, Surface Water Assessment.* Report 1559-06-03. Prepared for Whitehaven Blackwater Pty Ltd. 17 April 2026.

4 Appendices and attachments

Appendix 4.1 – PRCP Schedule

Legislative Requirement

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

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

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 remote sensing, 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.

4.1.1 Spatial Information

The following spatial information has been prepared and submitted with this PRCP in accordance with the guideline 'Spatial Information Submission' (ESR/2018/4337 Version 6.00) (DES 2024):

- Location and maximum extent of disturbance footprint for the mine life;
- PMLU and NUMAs for the area within the resource tenure/s;
- Rehabilitation and improvement areas within the resource tenure/s (for a 10-year period minimum);
- Any sensitive receptors under the EA;
- Extent of floodplain; and
- Existing rehabilitation.

The administering authority requires that the shape files and the associated attribute information are submitted in a defined format (schema) to ensure consistency in the data being received from sites across Queensland. The schema requirements outlined in Attachment 1 of the PRCP approved form have been followed, and each geometry type has been submitted in a separate file. Files have been named in accordance with the guideline 'Spatial Information Submission' (ESR/2018/4337 Version 6.00) (DES 2024).

4.1.2 PRCP Schedule

A copy of the PRCP Schedule is provided in the following sections of this Appendix. Accompanying maps are also provided as required by the PRCP Guidelines

Whitehaven

Appendix 4.2 – Hydrogeology Assessment

Whitehaven

Appendix 4.3 – Material Characterisation

Whitehaven

Appendix 4.4 – Community Consultation Plan and Register

Whitehaven

Appendix 4.5 – Voids in Floodplain Modelling

Whitehaven

Appendix 4.6 – Rehabilitation Flood Assessments

Whitehaven

Appendix 4.7 – Waste Characterisation

Appendix 4.8 – Landform Design

This appendix includes the following reports:

- *Report: Landform Evolution Modelling Simulations to Support Rehabilitation Landform Design: Blackwater Mine (Landloch, April 2026)*
- *Report: Landform Evolution Modelling Simulations to Support Tailings Storage Facility Design: Blackwater Mine (Landloch, November 2025)*

Whitehaven

Appendix 4.9 – Concept Cover Design

Whitehaven

Appendix 4.10 – Sirius Creek Diversion Concept Design

Whitehaven

Appendix 4.11 – Taurus Creek Diversion Concept Design

Whitehaven

Appendix 4.12 – Rockland Creek Diversion Concept Design

Whitehaven

Appendix 4.13 – Deep Creek Diversion Concept Design

Whitehaven

Appendix 4.14 – Void Closure Plan

Whitehaven

Appendix 4.15 – Geotechnical Stability

This appendix includes the following reports and memorandums:

- *Report: Henderson Geotech (2026a). Long-Term Geotechnical Stability of Highwalls and Endwalls at Blackwater Mine. March 2026.*
- *Report: Henderson Geotech (2026b). Assessment of Geotechnical Stability of LF#4.4 Residual Void Lowwalls at Blackwater Mine. May 2026.*

Whitehaven

Appendix 4.16 – Final Void Water Balance

Whitehaven

Appendix 4.17 – Underground Geotechnical Considerations

This appendix includes the following reports and memorandums:

- *Report: Geotechnical considerations for closure of underground mines at BMA Blackwater (Byrnes Geotechnical, 2024)*
- *Memorandum: Augering Ramp 82/84S (Byrnes Geotechnical, 2025)*

Whitehaven

Appendix 4.18 – Underground Mining Assessment of Impacts to Vegetation and Habitat

Whitehaven

Appendix 4.19 – Risk Assessment