

Daunia Mine

PROGRESSIVE REHABILITATION AND CLOSURE PLAN

Date: 07 April 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.

Term / Abbreviation	Description
3D	Three-dimensional
3P	Perennial, productive and palatable (3P) grasses
ABCC	Acid buffering characterisation curve
Administrating authority	Department of Environment, Tourism, Science and Innovation (Queensland)
AEP	Annual exceedance probability
AHD	Australian height datum
AMD	Acid and metalliferous drainage (AMD). Includes acid/acidic drainage (AD), pH- neutral metalliferous drainage (NMD) and sulphide-derived saline drainage (SD) – and/or any combination of these
ANC	Acid neutralising capacity
Appropriately qualified person (AQP)	Means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relating to the subject matter using the relevant protocols, standards, methods or literature
ARR	Australian Rainfall and Runoff (guideline)
BBAC	Barada Barna Aboriginal Corporation
BMA	BHP Mitsubishi Alliance
BOM	Bureau of Meteorology
CCP	Community Consultation Plan
CEC	Cation exchange capacity
CHPP	Coal handling and preparation plant
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. <i>*see relevant structures definition below for DNM specific relevant structures</i>
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSM	Conceptual site model
DAP	Diammonium phosphate
DEM	Digital elevation model
DES	Department of Environment and Science (Queensland) (the administrating authority between December 2017 to December 2023)

Term / Abbreviation	Description
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)
DNM	Daunia Mine
DoR	Department of Resources (Queensland) (previously referred to as the Department of Natural Resources, Mines and Energy)
EA	Environmental Authority (in terms of the <i>Environmental Protection Act 1994</i> , Queensland)
EAT	Emerson Aggregate Test
EC	Electrical conductivity
ECEC	Effective cation exchange capacity
EP Act	<i>Environmental Protection Act 1994</i> (Queensland)
EPP (Water)	Environmental Protection (Water) Policy 2009
ERA	Environmentally relevant activities (in terms of the <i>Environmental Protection Act 1994</i> , Queensland)
ERC	Estimated Rehabilitation Cost
ESP	Exchangeable sodium percentage
ERD	Effective rooting depth
ESA	Environmentally sensitive area
ESP	Exchangeable sodium percentage
FFA	Flood frequency analysis
Fine rejects	More commonly known as tailings
FOS	Factor of safety
GDE	Groundwater dependant ecosystems
GED	General environmental duty
GLM	Grazing land management OR the General Lake Model
GMA	Groundwater management area
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
ha	hectare = 10,000 m ²
HVR	High value regrowth

Term / Abbreviation	Description
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
Interburden	Mineral (mining) waste located between mined coal seams.
IPCC	Intergovernmental Panel on Climate Change
IRC	Isaac Regional Council
LEM	Landform Evolution Model
LGA	Local Government Area
LOD	Land outcome document
LSA	Land suitability assessment
MAW	Mine-affected water
MERFP Act	Mineral and Energy Resources (Financial Provisioning) Act 2018 (Queensland)
MIA	Mine industrial area
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)
MPA	Maximum potential acidity
MPR	Mixed plant rejects
MSES	Matter of state environmental significance
NAF	Non-acid forming
NAG	Net acid-generation
NAPP	Net acid-product potential
NATA	National Association of Testing Authorities
NC Act	Nature Conservation Act 1992 (Queensland)
NMD	Neutral and metalliferous drainage
NUMA	Non-use management area
Overburden	Mineral (mining) waste located above coal seams
PAF	Potentially acid forming
PFAS	Perfluoroalkyl and polyfluoroalkyl substances

Term / Abbreviation	Description
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 - - the rehabilitation planning part – PRC Plan, and - the approved part - PRCP Schedule that includes milestones and conditions” (PRCP Guideline, 2024)
PRCP Guideline	Progressive Rehabilitation and Closure Plan Guideline (2024) (DES, Queensland)
QA/QC	Quality assurance/quality control
Qld	Queensland
QR	Queensland Rail
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)
RCM	Rangal Coal Measures
RCP	Representative Concentration Pathway
RE	Regional ecosystems
Rejects	Coarse sand to cobble-sized rock material produced during coal processing
Relevant structure	For DNM this relates to overburden/spoil emplacements, waste rock dumps, residual voids/depressed landforms and flood protection landforms/levees.
Residual void	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
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
RRR	Residual risk rating (with reference to risk assessments)
SD	Saline drainage
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
SMP	Site Management Plan
SMU	Soil mapping unit

Term / Abbreviation	Description
Spoil	Rock material overlying and between ‘target’ coal seams, which will report as waste
Spoil dumps	Landform containing mine waste or mineral waste. Also may be referred to as waste rock dumps
SPR	Source-pathway-receptor
SRTM	Shuttle Radar Topography Mission
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.
Stable condition	see section 111A of the <i>Environmental Protection Act 1994</i> .
STAC	Smart Transformation Advisory Council
Suitably qualified and experienced 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.
Tailings	Very fine to medium grained sand, silt and clay-sized material produced during coal washing
TDS	Total dissolved solids
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.
VL	Vermont Lower coal seam
VM Act	Vegetation Management Act 1999 (Queensland)
Waste coal	Sub-economical coal that reports to the spoil dumps as waste
WBNM	Watershed Bounded Network Model
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

Term / Abbreviation	Description
WQO	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 Daunia Mine (DNM), owned by Whitehaven Daunia Pty Ltd (Whitehaven).

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).

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 DNM, 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 DNM from BMA, and on 29 January 2025 the EA was successfully transferred from BMA to Whitehaven by the administering authority.

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) (as former owners of DNM) was a ‘mining EA holder’, as, at the commencement of the MERFP Act, it was the holder of the DNM EA, which authorised mining activities at the DNM (section 750, EP Act).

A Transition Notice for DNM was issued to BMA by the administering authority, dated 25 November 2020. The Transition Notice required submission of the DNM PRCP and PRCP schedule by 1 July 2023. On 29 June 2023, BMA submitted a PRC Plan and PRCP Schedule application to the administering authority for assessment. The Chief Executive considered the application to not be properly made. Following an internal review, appeal to the Land Court and subsequent appeal to the Land Appeal Court, the application was determined to be properly made on 5 March 2025.

During the period between submission of the application by BMA and the application being determined as properly made, Whitehaven acquired the DNM from BMA. Whitehaven became the holder of the DNM EA on 24 January 2025, with the DNM EA being reissued on 29 January 2025 to reflect same. On 3 February 2025, Whitehaven, with the consent of BMA, submitted a request to change the application to reflect that Whitehaven was now the applicant for the proposed PRC Plan and PRCP Schedule. DETSI approved the change application by way of notice dated 6 February 2025.

On 16 April 2025, DETSI issued an Information Request Notice to Whitehaven, requesting further information necessary to assess the PRCP application. A response to the information request was due by 24 November 2025.

On 24 November 2025, Whitehaven submitted a Change Application and an updated PRC Plan and a revised PRCP Schedule. Following submission, Whitehaven and DETSI continued to consult on aspects of the PRC Plan and PRCP Schedule. On 18 February 2026, the administering authority issued a notice to Whitehaven advising of its decision to approve with conditions or amendments the proposed PRCP Schedule for the plan under section 172(3)(a) of the EP Act. All conditions and amendments made by the administering authority were agreed to in writing by Whitehaven on 16 February 2026.

On 23 March 2026, Whitehaven submitted an updated PRC Plan to ensure alignment with the agreed PRCP Schedule. On 23 March 2026 the PRCP Schedule was issued by the administering authority.

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

2.3 Scope

This PRC Plan applies to DNM, a metallurgical coal mine located in the Bowen Basin, Queensland, operated by Whitehaven. DNM 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. The DNM EA is the primary Land Outcome Document (LOD) for the purposes of rehabilitation and NUMA authorisation, with conditions relevant presented in Sections 3.3 and 3.4 of this plan. These have been transitioned into the PRCP Schedule.

For the purposes of the PRCP, DNM comprises the areas covering Mining Leases (ML) ML1781, ML70115 ML 70116 and MLA 700085. 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 DNM 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 these 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 Daunia West Infrastructure Project

The scope of this PRC Plan includes the Daunia West Infrastructure Project (DWIP), which comprises the construction and operation of an Out-of-Pit Dump (OOPD) and associated infrastructure located to the west of, and immediately adjacent to, ML 1781. An application for a new mining lease (MLA 700085) has been lodged to secure tenure for the OOPD.

The OOPD is required to accommodate overburden and interburden from ongoing DNM operations, thereby addressing insufficient short-haul dump capacity within the existing footprint. No rejects will be disposed to the OOPD.

The selected location for the OOPD reduces haul distances relative to previously considered sites, thereby lowering diesel consumption and associated greenhouse gas emissions, and reducing dust and noise

along haul routes. Location selection also avoided sensitive ecological values, including mapped koala and greater glider habitat, and preferentially utilises areas already disturbed by existing land uses.

The DWIP infrastructure forms part of the operational footprint relevant to this PRC Plan. Rehabilitation obligations for the OOPD area are reflected in the proposed Appendix 4.1 – PRCP Schedule, with detailed design and mitigation measures to avoid or minimise environmental impacts addressed in the relevant sections of this PRC Plan.

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 transitioned into the PRC Plan and PRCP Schedule. For DNM, the relevant LODs are listed below:

- EA (EPML00561913) – the primary LOD for DNM.
- *Coordinator-General's evaluation report for an environmental impact statement, Bowen Basin Coal Growth Project: Daunia Mine*, dated October 2009.

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

- Identified rehabilitation and closure outcomes in the LOD (EA EPML00561913)
- 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 NUMA
- Identified milestones to achieve the PMLUs and manage the NUMA
- Identified milestone criteria for showing success or completion of the PMLU or NUMA
- 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.

2.5 Knowledge base refinement

Compilation of this PRC Plan has been supported by the rehabilitation and closure-related knowledge base for DNM 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 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 DNM develops over the life of the operation, it will be used to inform ongoing refinement of the plans for rehabilitation and closure, as well as this PRC Plan as required.

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	3.1.4.1
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	3.1.2.7
• land stability (pre-existing land degradation/erosion and predisposition to ongoing stability issues)	3.1.2.8
• vegetation communities and ecological data (including existing regional ecosystem mapping)	3.1.2.9
• fauna presence and populations	3.1.2.10
• pre-mining land use	3.1.2.11
• identification of underlying landholders	3.1.2.12
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	
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	3.1.4.1
• size, shape and design of mine features/infrastructure (e.g. waste rock dump design)	3.1.4.1

PRCP Statutory Guideline Requirements		Section in PRCP
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)(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, Appendix 4.4
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

PRCP Statutory Guideline Requirements	Section in PRCP
• 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, Appendix 4.4
• how the community will be engaged	3.2, Appendix 4.4
• proposed consultation frequency	3.2, Appendix 4.4
• what information will be released for community consultation	3.2, Appendix 4.4
• how feedback/comments will be considered	3.2, 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
• 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)	3.4.3, 3.6.3.2, 3.6.3.3.2, 3.6.3.4, 3.6.3.5, Appendix 4.2, Appendix 4.8, Appendix 4.9 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

PRCP Statutory Guideline Requirements		Section in PRCP
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
any relevant safety features		3.4.2
- 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)		3.4.3, 3.6.3.6, 3.6.3.7, 3.6.3.8, 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) 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.		3.5
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.		3.6, 3.8

PRCP Statutory Guideline Requirements	Section in PRCP
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.	3.6.3, 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, 3.6.1.13.6.1.1.3
locating groundwater recharge and discharge locations locally and regionally	3.1.2.5, 3.6.1.1
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	3.1.2.5.4
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
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:	
consider the location of domains in relation to potential flood levels	3.6.1.2, 3.6.1.2.1
consider alteration of flow upstream and downstream	3.6.1.2, 3.6.1.2.6
model flood levels (including probable maximum flood levels) for a range of design storm events	3.6.1.2, 3.6.1.2.2, 3.6.1.2.3
develop a flooding risk profile	3.6.1.2, 3.6.1.2.7
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, 3.6.1.4.1, 3.6.1.4.2
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, 3.6.1.4.2, 3.6.1.4.3
an assessment to determine the need for ameliorants and fertilisers	3.6.1.4, 3.6.1.4.3
the relationship between soils and vegetation ecosystems for the PMLU and rehabilitation methodology	3.6.1.4
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, 3.6.1.3.1
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
Landform design must include a waste placement strategy	3.6.1.5.6

PRCP Statutory Guideline Requirements	Section in PRCP
Describe how mine waste streams can be classified confidently based on environmental risk and management requirements	3.6.1.3.2, 3.6.1.3.3, 3.6.1.3.4
Describe the generation of block models and estimation of the volume of mine waste based on waste type (i.e. level of environmental risk)	3.6.1.3.3
Provide recommendations for the management and mitigation of waste streams to manage environmental risk and achieve proposed rehabilitation methods and objectives.	3.6.1.3.5
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	3.6.1.3.3, 3.6.1.3.4
Landform Design The final landform design must include:	
3D design plans of the final landform	3.6.1.5
method of determining landform design	3.6.1.5.1
modelling predicting the long-term stability of the final landform design	3.6.1.5.1
method of construction	3.6.1.5.4, 3.6.1.5.5, 3.6.1.5.6
Quality Assurance/Quality Control (QA/QC) requirements	3.6.1.5.7
trial methodology to verify the predicted success of the final landform design	3.6.1.5.8
limitations and assumptions of the landform design	3.6.1.5.9
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	3.6.1.5.1
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	3.6.1.5.1
whether the landform is ‘water-retaining’ or ‘water-shedding’, considering rainfall patterns, and intensity, and the composition and texture of the waste	3.6.1.5.1, 3.6.1.5.2
the identification of materials available for landform rehabilitation including their ability to achieve the required landform design outcomes	3.6.1.4, 3.6.1.5.1
erosion assessments to determine landform heights, gradients, profiles, and material placement	3.6.1.5.1.5, 3.6.1.5.1.6, Appendix 4.7
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	3.6.1.5.3, 3.6.1.5.4, Appendix 4.7
settling and subsidence over time, which may impact the availability of areas for rehabilitation	3.6.1.5.9
hydrological and hydrogeological assessments	3.6.1.5.2
a waste placement strategy developed to mitigate environmental and rehabilitation risks during the construction and decommissioning phase	3.6.1.5.6

PRCP Statutory Guideline Requirements	Section in PRCP
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	3.2, 3.3.2, 3.4.4, Appendix 4.4
monitoring to determine performance of control measures (i.e. liners or seepage collection systems)	3.6.1.5.6, 3.6.1.5.7, 3.8.8
Provide an analysis of future stability based on the factors described above (e.g. landform evolution modelling).	Appendix 4.7
Cover Design	
The cover design should include:	
identification and specification of the objectives of the cover system	3.6.1.6
a detailed description of the design including the thickness of each layer	3.6.1.6.4, 3.6.1.6.5
a detailed description of construction methodology including any proposed staging of the cover system	3.6.1.6.4, 3.6.1.6.5
a quantitative assessment that identifies the location and quantity of proposed capping material available on site	3.6.1.4, 3.6.1.5.1, 3.6.1.6.4, Appendix 4.7
proposed QA/QC for the construction of the cover system including the timely implementation of corrective actions where deviations from the design are identified	3.6.1.5.7, 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	3.6.1.7.3, 3.6.1.7.4
surface water diversions and long-term management requirements	3.6.1.7.4, 3.6.1.7.5
dewatering requirements	3.6.1.7.1, 3.6.1.7.2, 3.6.1.7.6
on-going water management and reduction requirements (i.e. treatment)	3.6.1.7.6
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	3.6.1.8.2, 3.6.1.8.5, 3.6.1.8.7, 3.6.1.8.10, Appendix 4.1
Identify species of conservation significance	3.1.2.9, 3.6.1.8.2,
Identify fauna habitat or use requirements, including monitoring and management plan	3.1.2.10, 3.6.1.8.3
Include evidence and justification for analogue sites of the monitoring plan	3.1.4.2, 0, 3.6.1.8.9, 3.6.1.8.12,
Describe works for establishing and managing revegetation	3.6.1.8
Identify appropriate plant/seed mixes and their source	3.6.1.8.4, 3.6.1.8.5, 3.6.1.8.8, 3.6.1.8.11, Appendix 4.1

PRCP Statutory Guideline Requirements	Section in PRCP
Identify seed density application rate and timing of seeding	3.6.1.8.4, 3.6.1.8.5, 3.6.1.8.8, 3.6.1.8.11, Appendix 4.1
Identify proposed locations of any infrastructure required to protect revegetation	N/A
Identify the growth media suitable to sustain the PMLUs and their availability	3.6.1.4
Identify topsoil depth requirements	3.6.1.4, 3.6.1.8.5, 3.6.1.8.7, 3.6.1.8.10
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
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	N/A – no tailings at DNM
Specific gravity testing. The specific gravity of tailings affects their hydraulic sorting down the tailings beach, and their settling and consolidation	N/A – no tailings at DNM
Atterberg limit testing to determine the plasticity of the tailings, which affects their settling, consolidation and desiccation on atmospheric exposure	N/A – no tailings at DNM
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	N/A – no tailings at DNM
Settling testing of the tailings used as an indicator of the settling density of the tailings	N/A – no tailings at DNM
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	N/A – no tailings at DNM
Consolidation testing of the tailings to estimate their consolidated density and saturated hydraulic conductivity	N/A – no tailings at DNM
Soil water characteristic curve testing to assess the unsaturated behaviour of the tailings on desiccation and calculate the unsaturated hydraulic conductivity function	N/A – no tailings at DNM
Instrumented column testing of the tailings to assess their settling, self-weight consolidation and desiccation	N/A – no tailings at DNM
- 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	N/A – no tailings at DNM

PRCP Statutory Guideline Requirements	Section in PRCP
○ design storage allowance ○ spillway location ○ designing TSF for progressive rehabilitation	
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)	3.6.3.6
• proposed final dimensions of the void (i.e. depth, length and width)	3.6.3.7
• 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, 3.6.3.5, 3.6.3.3, 3.6.3.4, 3.6.3.5, Appendix 4.6, Appendix 4.8, Appendix 4.9
• proposed final slope angles of high wall, low wall and end walls of each final void	3.6.3.2, Appendix 4.9 (Tables 9-2 to 9-5)
• 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	3.6.3.4
• a water balance study including an assessment of void surface and groundwater interactions such as: ○ groundwater lowering/reduction in hydraulic head (from new voids e.g. caves/karst systems) ○ cones of depression and associated impacts ○ the drainage and flooding behaviours of surface waters in the vicinity of the void ○ the potential extent of flooding and implications of interactions with the void ○ a conceptual model that incorporates all projected inflows, outflows, and recharge rates ○ water storage and long-term water balance ○ each of the major water fluxes into and out of the void ○ the sources of surface water within the mine catchment that are likely to influence the water quality in the void ○ predicted water quality in the long term including potential stratification	3.6.3.3.2
	3.6.1.1.3, 3.6.3.4
	3.6.3.4
	3.6.1.2, 3.6.1.2.6
	0, 3.6.1.2.2, 3.6.1.2.3
	3.6.1.5.2
	3.6.3.3.1, 3.6.3.3.2
	3.6.1.1, 3.6.1.7.3.2, 3.6.3.4, Appendix 4.2
	3.6.3.3, 3.6.3.5, 3.6.1.7.2, 3.6.1.7.3
	3.6.3.5
• a 3D void design plan	3.6.1.5
• rehabilitation strategies	3.6.3.8, 3.6.1.4, 3.6.3.7, 3.6.3.8, Appendix 4.9
Underground mining The rehabilitation planning part must include:	
• a geotechnical study	N/A – no underground at DNM
• 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	N/A – no underground at DNM

PRCP Statutory Guideline Requirements	Section in PRCP
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	
the development of a hydrogeological conceptual model	N/A – no underground at DNM
subsidence analysis and modelling and a subsidence vegetation/habitat impact assessment	N/A – no underground at DNM
consideration of how potential entries to underground workings will be sealed (i.e. through some form of capping or back filling)	N/A – no underground at DNM
how surface ponding and cracking will be mitigated	N/A – no underground at DNM
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	N/A – no underground at DNM
Built Infrastructure	
The rehabilitation planning part must include:	
Identification of infrastructure that will be decommissioned and the methods for decommissioning	3.6.5
A description of infrastructure that will remain post rehabilitation and the identification of ongoing maintenance requirements	3.6.5
Evidence of agreement for any infrastructure that will have ownership transferred	3.6.5
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 4.10
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 4.10
Determine what risks need to be managed and prioritised.	3.7.1, Appendix 4.10
Risk treatment must detail:	
the reasons for selecting the treatment option	3.7.1, 3.7.1.3, Appendix 4.10
those responsible for the approval and implementation of the plan	3.7.1, 3.7.1.3, Appendix 4.10
proposed actions	3.7.1, 3.7.1.3, Appendix 4.10
resource requirements	3.7.1, 3.7.1.3, Appendix 4.10
performance measures and constraints	3.7.1, 3.7.1.3, Appendix 4.10
reporting and monitoring requirements	3.7.1, 3.7.1.3, Appendix 4.10
timing and scheduling	3.7.1, 3.7.1.3, Appendix 4.10
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.	
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, 3.8.5, 3.8.8

PRCP Statutory Guideline Requirements	Section in PRCP
○ 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
○ monitoring that enables the repeatable collection of relevant statistically valid data	3.8.1.3, 3.8.1.4, 3.8.1.5, 3.8.1.6, 3.8.2, 3.8.3
○ monitoring using appropriate quality assurance and data management processes and systems	3.8.1.3, 3.8.1.4, 3.8.1.5, 3.8.1.6, 3.8.2, 3.8.3, 3.8.7
○ regular analysis of site data including multi-year comparison trends and bench-marking against analogue/reference sites	3.8.1, 3.8.1.2, 3.8.5, 3.8.8
○ contingency strategies if monitoring data indicates milestone criteria are not being met	3.8.6, 3.8.7, 3.8.8, Appendix 4.1
○ post-closure monitoring to ensure milestone criteria has been demonstrated	3.8.1.3, 3.8.1.4, 3.8.1.5, 3.8.1.6, 3.8.2, 3.8.3, Appendix 4.1
○ intent of monitoring reports, such as provision of results and key findings	3.8.6, 3.8.7, 3.8.8, Appendix 4.1
• Describe the processes and activities that will be used to determine the biophysical state of rehabilitation and closure	3.8.8
• 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).

3.1.1 Project description

3.1.1.1 Geographic location

DNM is a metallurgical coal resource located approximately 25 km east, south-east of the town of Moranbah in the Bowen Basin, and approximately 170 km south-west of Mackay (Queensland) (Figure 3-1 DNM location map).

The mine is directly to the east of the Poitrel Mine (owned by Stanmore Resources Limited (Stanmore)) and south of the Millennium Mine (owned by MetRes Pty Ltd).

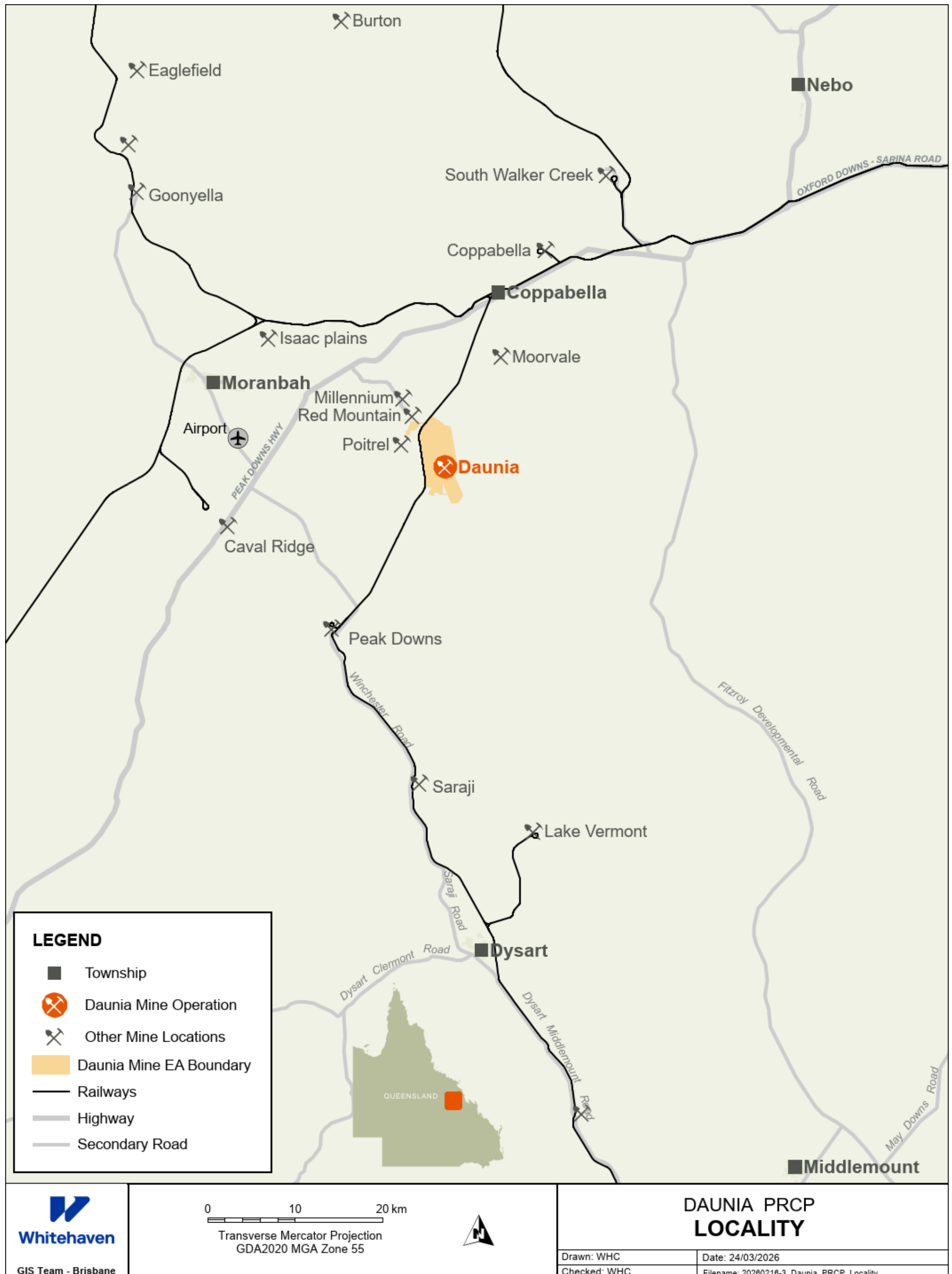


Figure 3-1 DNM location map

3.1.1.2 Mining tenements

DNM operates on the Mining Leases (MLs) provided in Table 3-1 and illustrated in Figure 3-2. The DNM MLs span 2,816 hectares (ha), with coal mining activities occurring on ML 70115, ML 1781 and ML 70116. The coal handling and preparation plant (CHPP) is located on ML 70116, which is a joint ML subject to a Joint Tenement Agreement between Whitehaven Daunia Pty Ltd and Stanmore SMC Pty Ltd, executed on 17 March 2024. Both the DNM EA (EPML00561913) and the Poitrel Mine EA (EPML00963013) refer to ML 70116. This treatment is consistent with ML 70116 in the DNM Estimated Rehabilitation Cost (ERC) calculation approved by the administering authority on 18 February 2025.

As described in Section 2.3.1, MLA 700085 is subject to a lodged application for the DWIP OOPD.

This PRC Plan and associated PRCP Schedule applies to the ML and MLA tenement areas listed in Table 3-1 and reflected in Figure 3-2.

Table 3-1 DNM mining tenements

Lease number	Permit name	Date granted	Total area (ha)	Lease expiry
ML 1781	Daunia	22 Dec 1983	2,234.0	31 Dec 2031
ML 70115	Daunia East	28 Aug 1997	361.4	31 Dec 2031
ML 70116 (part)	Red Mountain	08 July 2004	754.0	31 Dec 2031
MLA 700085	Daunia West	TBA ¹	504.0	15-year term ¹

¹Mining Lease Application in progress

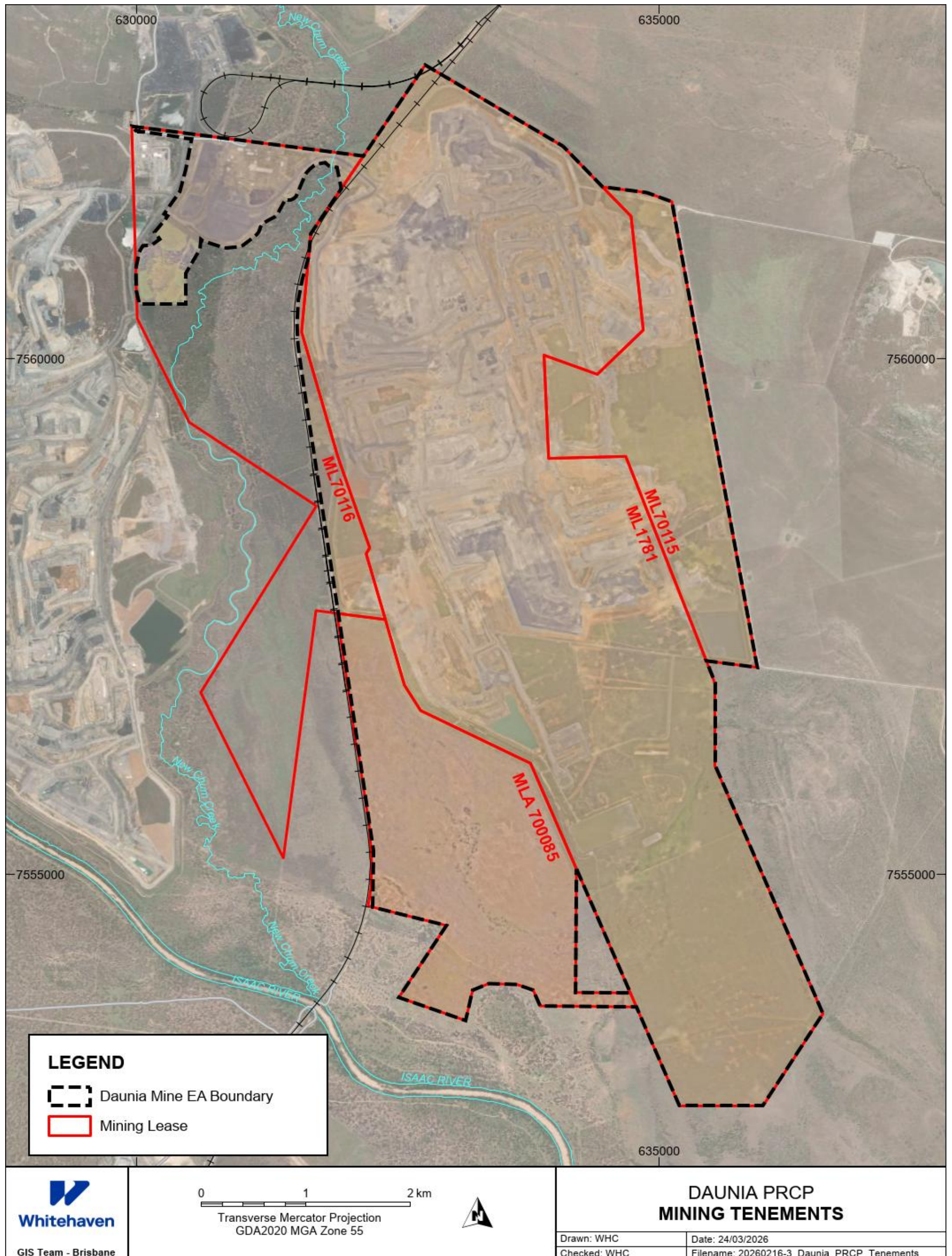


Figure 3-2 DNM mining tenements

3.1.1.3 Primary mine features and infrastructure

The current primary features and infrastructure at DNM are summarised in Table 3-2. The current site layout is shown in Figure 3-3.

Table 3-2 Primary mine features and infrastructure at DNM

Mine domain	Mine feature name
Pits and spoil dumps	— Atlas West/East1 — Calypso Central1 — Skoll1 — Titan North/Central/West1/East — Pandora — Daunia West
Stockpiles	— Run-of-mine (ROM) coal stockpiles — Coal stockpiles — Topsoil stockpiles — Rock stockpiles
Dams	— Mine water dams — Raw water dams — Sediment dams
Processing infrastructure	— Coal handling and preparation plant (CHPP) — Conveyors and transfer stations — Stackers and reclaimers — Surge bins and hoppers — Tunnels
General infrastructure	— Administration, crib, warehouse and various buildings — Workshop — Fuel, oil, chemical and water storage — Fuel and wash bays — Sewage treatment plant — Pipes and pumps — Power lines — Switchyard and substations — Communications and lighting towers — Fences
General disturbance	— Access roads — Haul roads — Drains — Exploration — Laydown areas
Rail infrastructure	— Rail line (owned by Queensland Rail (QR))

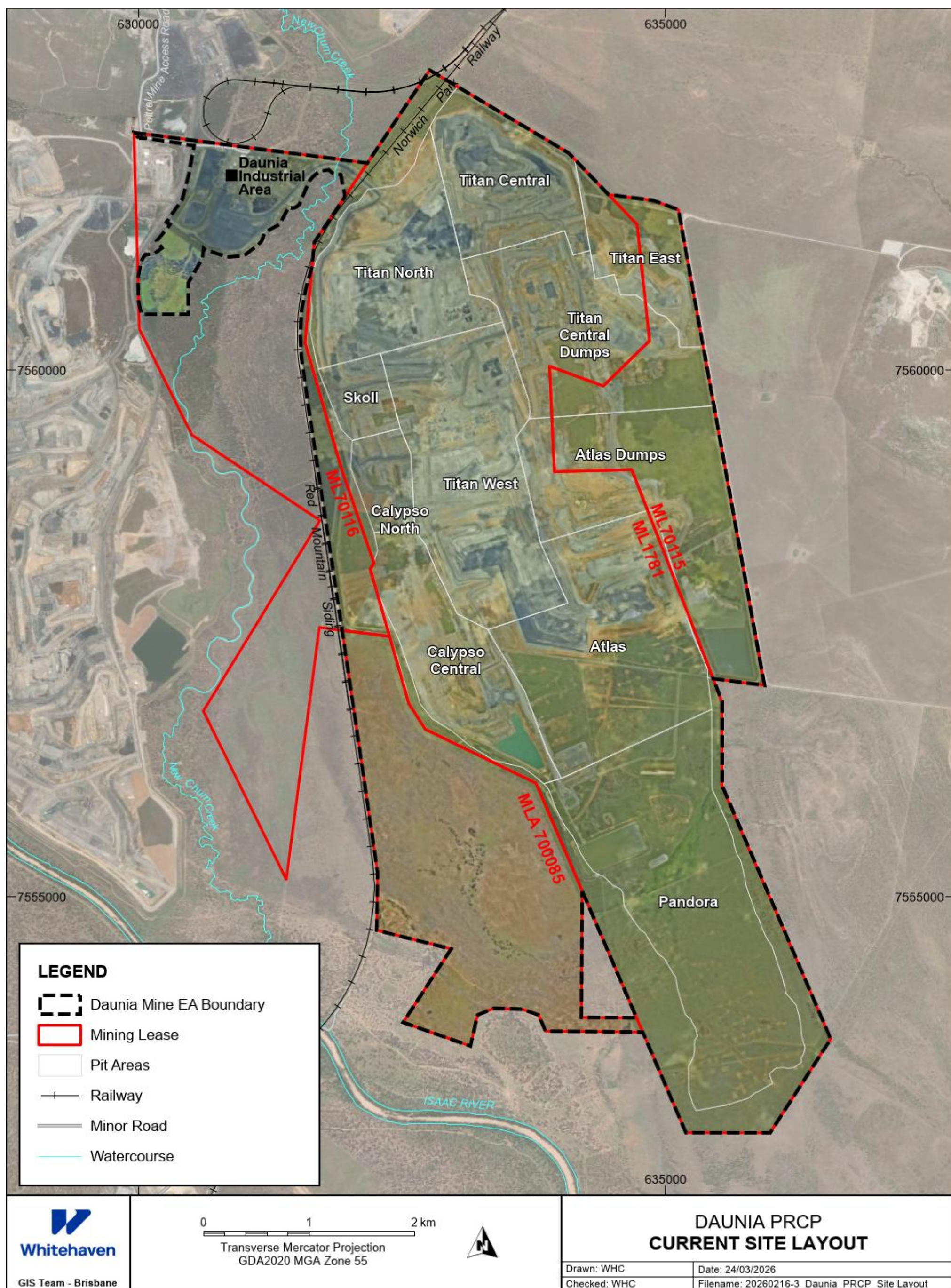


Figure 3-3 DNM site layout

3.1.1.4 Type of mining operation

DNM is an open cut strip mine using truck and shovel and dozer fleets. Due to the formation of the coal deposit, strips are orientated and progress in multiple directions.

Mining activities at DNM involve the removal and stockpiling of topsoil, drilling and blasting of overburden and interburden, mining of overburden and interburden by truck and shovel fleets, and mining of the coal by truck and shovel fleets. The majority of the overburden and interburden is placed in spoil dumps within the mined out void of the previous strips.

Coal is hauled from the pits to the CHPP ROM area, or to designated stockpiles. The coal is processed at the CHPP and the product coal is conveyed to the train load-out (TLO) on the adjacent Red Mountain Infrastructure (RMI) site (Stanmore SMC Pty Ltd). Fine rejects from the CHPP are dewatered via belt press filters. The fine and coarse rejects are hauled and co-disposed within the spoil dumps.

Product coal is transported by rail to the Dalrymple Bay Coal Terminal for export.

3.1.1.5 Proposed duration of the operation

Operations at DNM commenced in 2013. The approved areas within the EA are planned to be mined at current mining rates until 2042. Variations to the planned mining rates due to business or market conditions, or refined resource information may change the proposed duration of the operation, and as a result, when necessary, a PRCP amendment would be submitted to the administering authority (currently DETSI).

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

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

3.1.2.1 Site topography

DNM lies within the northern area of the Queensland Bowen Basin. The topography of DNM is generally of low relief and dominated by flat to gently undulating rural plains. Elevations across DNM ranges from approximately 240 m Australian Height Datum (AHD) in the north to 190 m in the south, grading southwest towards New Chum Creek and the Isaac River.

The regional topography of the Bowen Basin is dominated by flat to gently sloping landforms and low rolling hills, flanked by the Cherwell Range in the west and the Connors Range in the east Figure 3-4.

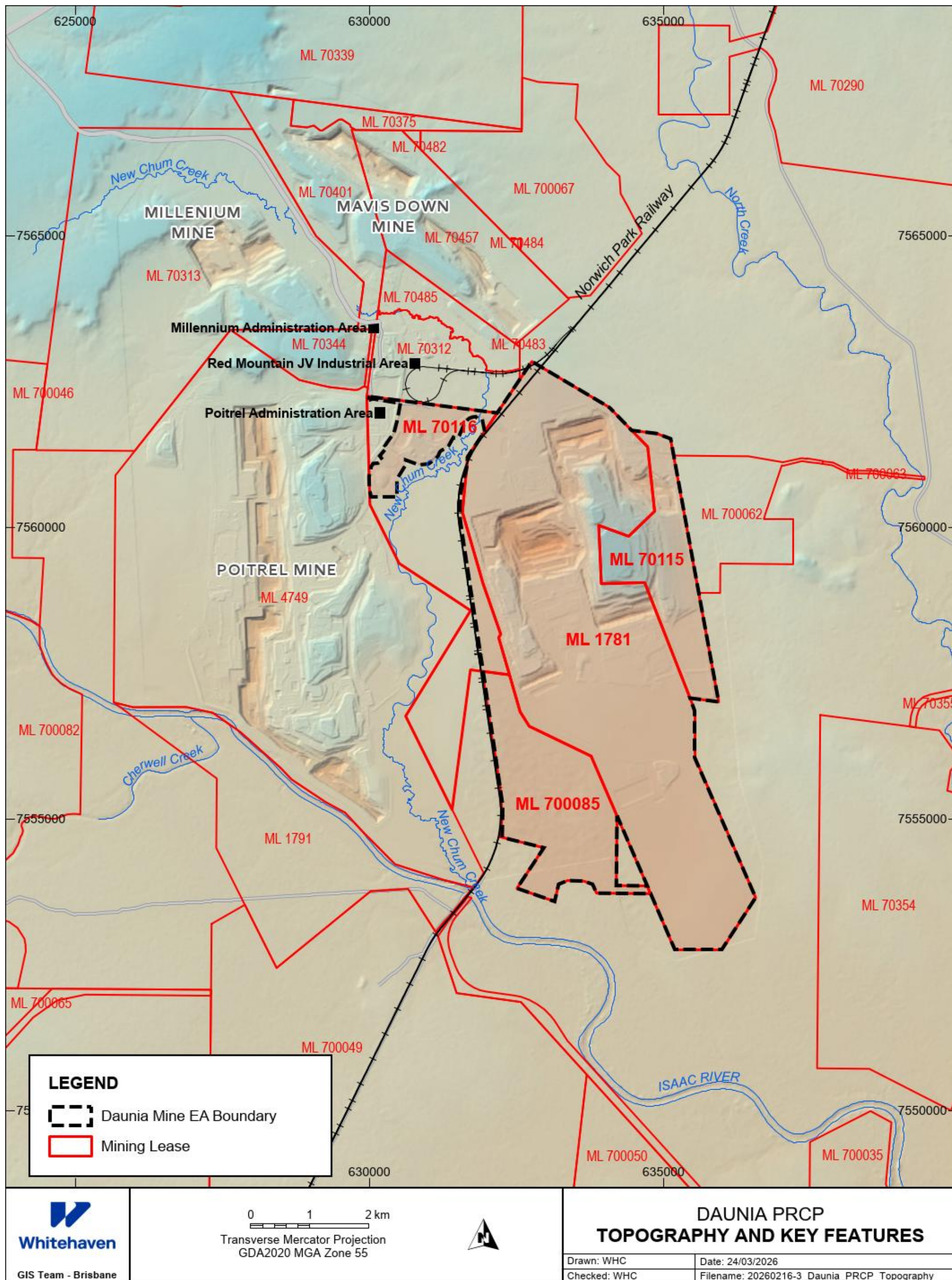


Figure 3-4 Topography and key features

3.1.2.2 Climate

DNM is located in a semi-arid climatic zone, which is characterised by high summer temperatures, warm dry winters and a distinct wet and dry season. Weather data was collected at the Moranbah Water Treatment Plant (Station No. 034038) between 1972 and 2012; and since 2012 it has been collected at the Moranbah Airport (Station No. 034035) (BoM, 2021).

3.1.2.2.1 Temperature

Maximum average temperatures range from 24°C in June/July to 34°C in December/January, with minimum average temperatures ranging from 10°C in July to 22°C in January.

3.1.2.2.2 Rainfall

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

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

Month	Station no. 034038 (mm)	Station no. 034035 (mm)
January	103.8	88.0
February	100.7	100.5
March	55.4	92.6
April	36.4	23.8
May	34.5	30.1
June	22.1	16.7
July	18.0	28.0
August	25.0	9.0
September	9.1	8.3
October	35.7	24.0
November	69.3	38.3
December	103.9	55.3
Annual	614.2	514.6

3.1.2.2.3 Evaporation

The evaporation rate is highest in the summer months - mean daily rate of 8.5 mm in December; and lowest in the cooler months - mean daily rate of 3.5 mm in June. The annual average rate of evaporation is approximately 2,300 mm, which greatly exceeds the annual rainfall, a characteristic of semi-arid environments.

3.1.2.2.4 Wind

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

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

DNM is located within the Northern part of the Bowen Basin, one of the five major foreland sedimentary basins formed along the eastern side of Australia during the Permian geologic period. The north-south orientated 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 basin geology of the Collinsville Shelf begins with the basal Permian Back Creek Group, which predominantly consists of fine-grained clastic sedimentary rocks deposited in fluvial to shallow marine environments. Overlying this unit conformably is the Blackwater Group, which includes the Moranbah, Fort Cooper (FCCM), and Rangal (RCM) Coal Measures. At DNM, the economic coal seams occur within the Late Permian RCM. Permian strata crop out along the eastern and western basin margins and are unconformably overlain by Triassic consolidated sedimentary rocks of the Rewan Group.

The Permian and Triassic sequences are overlain by a thin veneer of unconsolidated to semi-consolidated Cainozoic sediments, comprising Tertiary to Quaternary alluvium and colluvium. Alluvial deposits are primarily confined to river and creek systems, such as the Isaac River and New Chum Creek. Although absent within the DNM area, volcanic extrusions (e.g., basalt) occur elsewhere in the region. The generalised regional stratigraphy of the Study Area (regional area surrounding DNM is summarised in Table 3-4. Solid geology, surface geology and the alluvium extents of the Isaac River are depicted in Figure 3-5, Figure 3-6 and Figure 3-7 below.

Table 3-4 Summary of stratigraphy in the study area

Age	Unit		Thickness (m)	Description
Cenozoic	Isaac River Quaternary alluvium		~50	Surficial cover localised along Isaac River and North Creek
	Regolith - alluvium, colluvium and other sediments in floodplains, alluvial fans, and high terraces		~20	Surficial cover throughout the Project
	Suttor Formation		~100	Present to south and east of Study Area
Triassic	Mimosa Group	Clematis Group	~100	Cross-bedded quartz sandstone, some quartz conglomerate and minor red-brown mudstone
		Rewan Group	~840	Rewan Formation: green lithic sandstone, pebbly lithic sandstone, green to reddish brown mudstone and minor volcanolithic pebble conglomerate (at base). Sagittarius Sandstone: lithic sandstone interbedded with mudstones and siltstones with scattered carbonaceous plant material.
Permian	Blackwater Group	Rangal Coal Measures	~200	Coal seams, carbonaceous shale and mudstone, tuff, siltstone, and mudstone.
		Fort Cooper Coal Measures	~350	Coal, brown and green sandstone, conglomerate, carbonaceous shale, tuff.
		Moranbah Coal Measures	~400	Quartzose to sublithic locally argillaceous sandstone, siltstone, mudstone, carbonaceous mudstone, and coal.
	Back Creek Group		~400	Quartzose to lithic sandstone, siltstone, carbonaceous shale, minor coal and sandy coquinite,

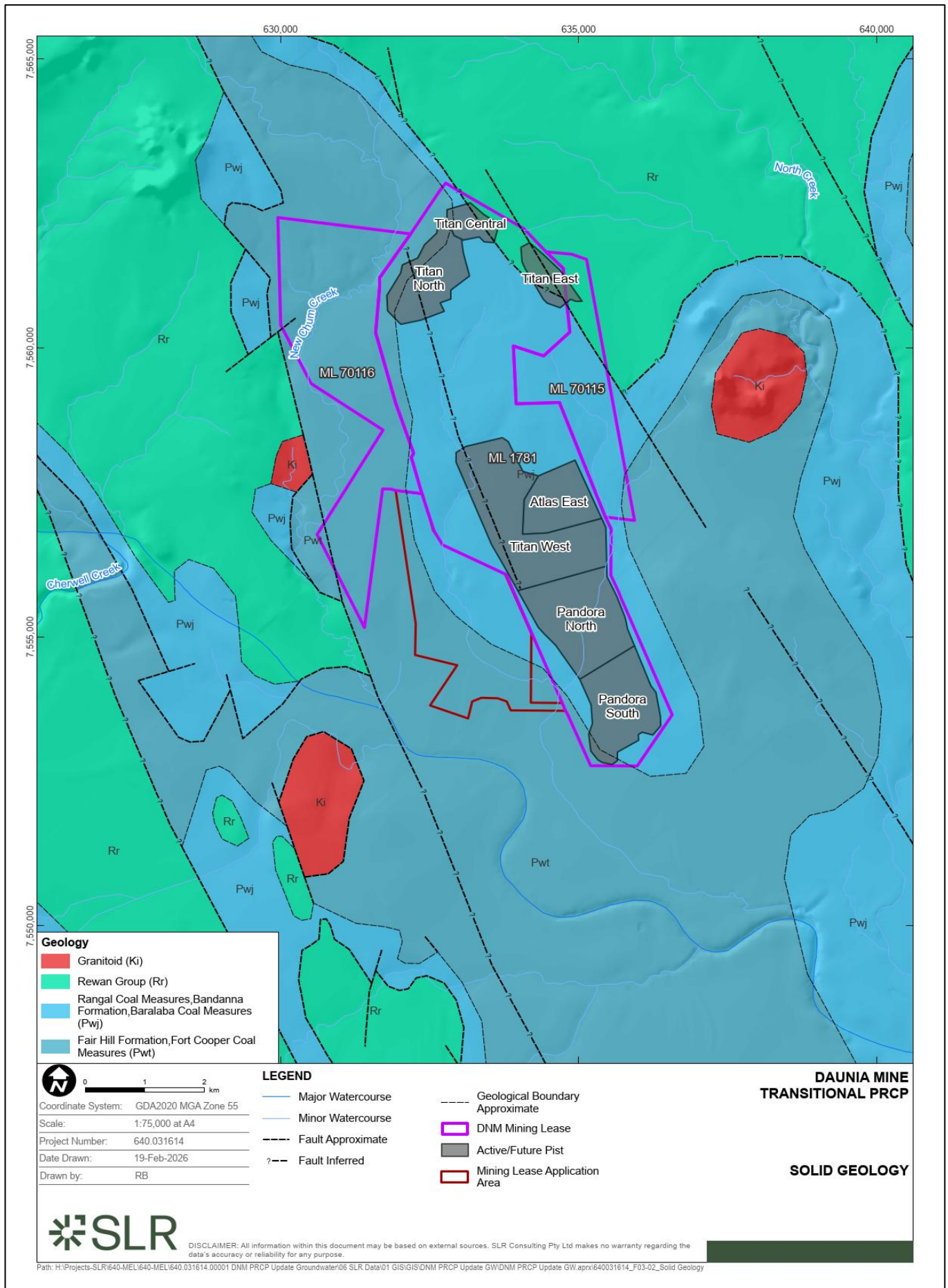


Figure 3-5 Solid geology

"If it's not safe, don't do it."

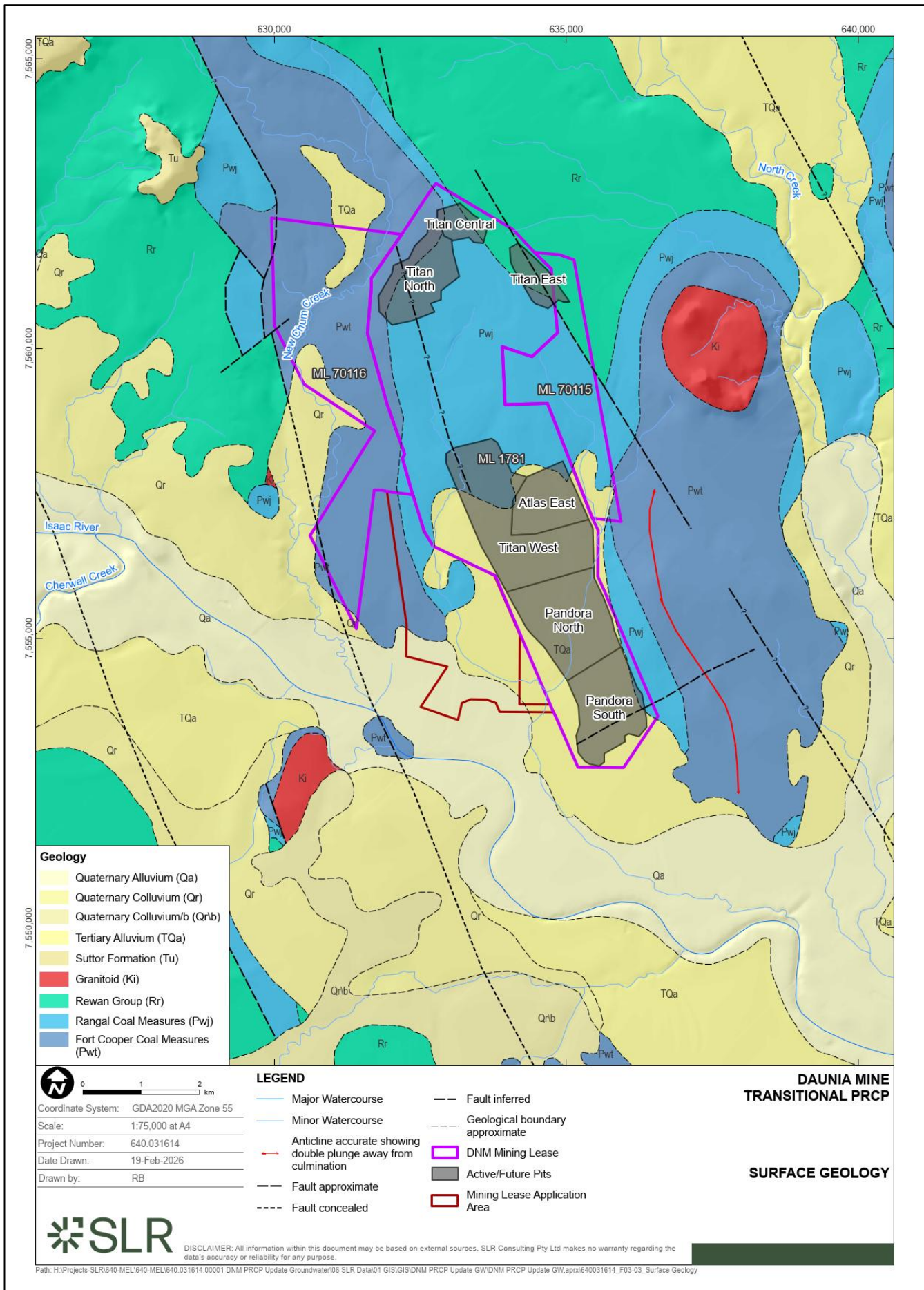


Figure 3-6 Surface geology

"If it's not safe, don't do it."

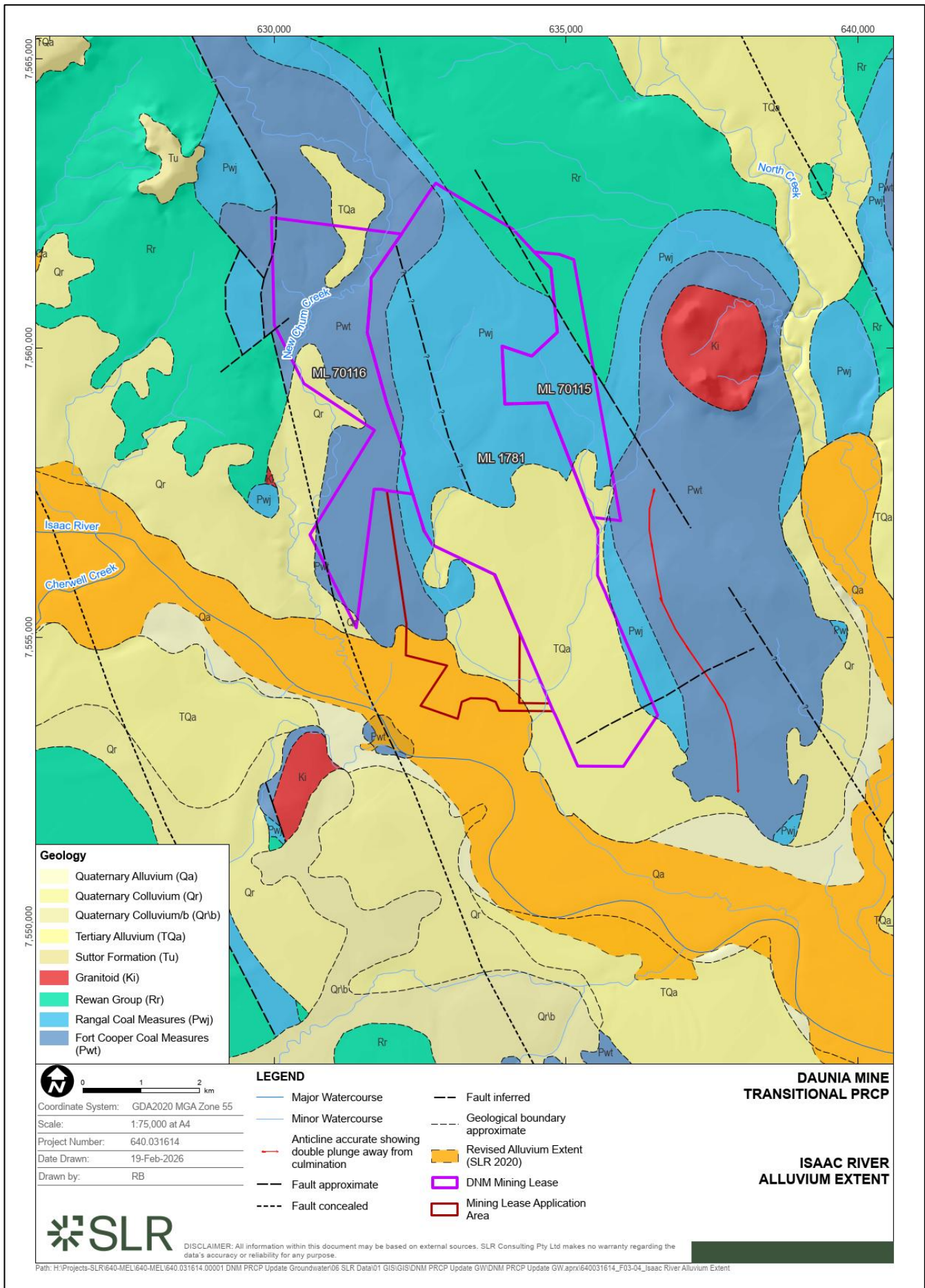


Figure 3-7 Isaac River alluvium extent

"If it's not safe, don't do it."

3.1.2.3.2 Local Geology

The stratigraphic profile within DNM comprises three distinct units:

- Cainozoic sediments (alluvium, colluvium) and regolith that includes weathered Permian strata;
- Triassic sedimentary rocks; and
- Permian coal measures.

Each of the main stratigraphic units is discussed in further detail below. The structural geology of the DNM is also discussed in Section 3.1.2.3.3.

3.1.2.3.2.1 *Cainozoic Sediments*

3.1.2.3.2.1.1 *Isaac River Alluvium*

The QLD State geological mapping (SDSG) shows Quaternary alluvium (Qa) along the Isaac River, west and south of DNM. Revised mapping for the Winchester South Project refines these extents using geophysics, slope analysis, and soil mapping (SLR, 2020) (See Figure 3-7).

The alluvium consists of unconsolidated clay, silt, sand, and gravel, generally <20 m thick, confined to low-lying areas near the Isaac River (AGE, 2013). Advisian (2018) notes the thickest deposits occur adjacent to the river. Bore and drill log data from Poitrel (west of DNM) indicate greater thickness south of the river. The modern river channel lies near the southern edge of the mapped alluvial zone, not its centre.

Figure 3-7 indicates that Quaternary alluvium associated with the Isaac River is approximately 500 m to 1 km west of the DNM southwestern boundary. The extent and thickness of the alluvial sediments was assessed at the Winchester South Project, located directly to the south of DNM in March 2019. A geophysical survey using AgTEM and DC-ERT methods adjacent to the Isaac River were undertaken to improve understanding of the extent, permeability, and depth of alluvium (SLR, 2020). The results of the survey is discussed in more details in Appendix 4.2 – Hydrogeology Assessment.

3.1.2.3.2.1.2 *Quaternary and Tertiary Sediments (Regolith)*

The Study Area is largely covered by unconsolidated to partially consolidated sediments, including Tertiary–Quaternary deposits (TQa) and Quaternary colluvium/residual deposits (Qr, Qr\b) derived from weathered Permian strata. Within DNM, both Permian and Tertiary–Quaternary units are typically weathered to ~25 m below ground level (mBGL). These non-alluvial Quaternary sediments are often grouped with Tertiary units as “regolith” due to similar characteristics. ISDSG mapping shows TQa deposits only in southern DNM (Figure 3-7), along tributaries draining to the Isaac River. These deposits represent ancestral valley alluvium, now dissected by modern channels, and are absent in the area between DNM and the North Creek alluvium. Tertiary material on the western DNM boundary is ~8 m thick, overlying weathered Permian strata, while southern DNM contains unconsolidated clay, silt, sand, and gravel, generally <20 m thick. The extent and thickness of regolith are inferred from site data and CSIRO soil mapping presented in the Appendix 4.2 – Hydrogeology Assessment.

3.1.2.3.2.2 *Triassic Strata*

The Triassic-aged Rewan Group (Rr) consists of pebbly lithic sandstone, green to reddish-brown mudstone, and minor volcanolithic pebble conglomerates, representing Late Permian to Early Triassic strata. It unconformably overlies the Permian coal measures as in-fill material and thickens toward the Isaac River but is absent where the coal measures outcrop. Within the DNM area, the Rewan Group is generally absent, occurring only as a subcrop along the northeastern boundary of the mining lease (Figure 3-6).

3.1.2.3.2.3 *Permian Coal Measures (Blackwater Group)*

Permian coal-bearing sedimentary rocks of the Blackwater Group form the primary economic resource of the numerous mines in the Study Area. In decreasing depth order (shallow to deeper), the major coal measures in the Study Area include (in order of increasing age):

- Rangal Coal Measures (Pwj);
- Fort Cooper Coal Measures (Pwt); and

- Moranbah Coal Measures (Pwb).

The following sub-sections provide further discussion of each unit.

3.1.2.3.2.3.1 Rangel Coal Measures

Coal resources at DNM occur within the approximately 100 m thick Rangel Coal Measures (Pwj), which overlie the Fort Cooper Coal Measures and are locally overlain by the Rewan Group (SLR, 2019). These Late Permian strata comprise interbedded sandstones, siltstones, mudstones, shales, and coal seams, with non-coal intervals referred to as interburden. The primary mining targets are the Leichhardt Seam (DL1), typically 5 m thick, and the Upper Vermont Seam (DV4), about 3.5 m thick, separated by 10–35 m of interburden. The Leichhardt Seam is highly weathered near subcrop, and in the north, the Upper Vermont Seam splits into upper and lower plies (DV2 and DV1).

3.1.2.3.2.3.2 Fort Cooper Coal Measures

The Fort Cooper Coal Measures (Pwt) underlie the Rangel Coal Measures at DNM and occur only as subcrop along the northwestern boundary. The contact between the two units is marked by the Yarrabee Tuff, a basin-wide marker bed of weak, brown tuffaceous claystone averaging 0.7 m thick (ranging from 0.5 to 1.5 m thick at DNM). Hydrogeologically, the Lower Vermont Seam of the Fort Cooper Coal Measures and the Upper Vermont Seam of the Rangel Coal Measures are treated as a single unit due to their separation by only the thin Yarrabee Tuff. Regionally, the Fort Cooper Coal Measures can reach 350 m in thickness (HydroSimulations, 2018) and comprise lithic sandstone, conglomerate, mudstone, carbonaceous shale, coal, tuff, and tuffaceous mudstone. Coal seams exceeding 1 m thickness include the Lower Vermont and Girrah seams.

3.1.2.3.2.3.3 Moranbah Coal Measures

The Moranbah Coal Measures (Pwb) form the lowermost coal-bearing unit of the Blackwater Group. They subcrop along the western limb of the Bowen Basin and are mined at operations such as Caval Ridge, Peak Downs, and Saraji, located well west of DNM. Comprising volcanic lithic sandstones with lesser siltstone, mudstone, conglomerate, and coal, these measures occur at depths that render them irrelevant to groundwater considerations for DNM.

3.1.2.3.2.3.4 Granitic Intrusions

A large igneous intrusion is present 1.7 km east of northern DNM (refer Figure 3-5). Other smaller granites have been mapped in the southern ML 1781 area which are not identified in QLD Government geological mapping.

3.1.2.3.3 Structural Geology

At the end of coal deposition in the Late Triassic, the Bowen Basin experienced significant east-directed tectonic compression, resulting in major thrust faulting that enhanced coal resource accessibility. DNM lies within the Western Foreland structural domain, about 20 km west of the Jellinbah Fault Zone, where fault displacement can exceed 100 m. The Permian coal measures at DNM have undergone substantial deformation, including folding and numerous normal and reverse faults (BHP, 2019). Major northwest–southeast trending faults (e.g. New Chum Fault, Eastern Fault Alignment) and minor southwest–northeast faults (SLE 2017) truncate the lateral continuity of Permian units, causing repetition of the Fort Cooper–Rangel–Rewan sequence.

Numerous fault sets have been mapped and identified across the Study Area:

- NNW-striking thrusts up to 3.3 km long with displacement up to 30 m, part of the Jellinbah Thrust System; and
- E–W faults 100–200 m long with displacement up to 2–5 m.

Normal faults occur in three orientations (BHP, 2019):

- NNW striking normal faults (up to 3.6 km long); and
- NE striking faults (up to 1.35 km, displacement up to 30 m), and minor E–W faults (displacement up to 5 m).

Igneous intrusions have also been mapped within the region, with a large granite intrusion located approximately 1.7 km east of the northern DNM. Drilling in the DNM area has also found that igneous intrusions are present at the southern end of ML 1781 that are not identified in Queensland Government geological mapping.

3.1.2.4 Geological setting

DNM is located on the western limb of the northern Bowen Basin, a foreland sedimentary basin of approximately 200,000 km². The Bowen Basin (at DNM) is characterised by a relatively thin accumulation of sediments, gentle easterly dips and minor to moderate deformation. DNM lies near the western boundary of one of the sedimentary troughs, the Taroom Trough, which was filled by a thick accumulation of mainly terrestrial sediments during the Permo-Triassic period. DNM occurs within a shallow basinal structure immediately east of the New Chum Fault, which separates DNM from the Poitrel Mine deposit to the west. New Chum Creek, which flows from north to south between DNM and Poitrel Mine, broadly follows the mapped basinal structure.

The geology of the study area is discussed in Appendix 4.2 – Hydrogeology Assessment.

3.1.2.4.1 Geological cross sections

The coal bearing sequences at DNM are the late Permian-age Rangal Coal Measures (RCM), comprising the following seam groups in stratigraphic order, from youngest to oldest (Mine Waste Management, 2026):

- Leichhardt Seam: L1, L2 and L3 plys (when combined L1 and L3 plys together are referred as L13 ply);
- Lower Leichhardt Seam: L4 ply;
- Upper Vermont Seam: V1, V2 and V3 plys (when combined V2 and V3 plys together are referred as V23 ply. V23 is sub-economic and not mined); and
- Lower Vermont Seam: Vermont Lower (VL) ply (not mined).

Non-coal Permian sediments consist of moderately weak to strong sandstones, siltstones, minor mudstones and carbonaceous mudstones. Sandstone units are commonly greater than 2m thick. Interbedded and interlaminated siltstone occurs within some sandstone units. The Yarrabee Tuff 'marker horizon' is widespread throughout the RCM and at DNM is located immediately above the VL ply.

Due to the eastward dip of the seams, the location of the weathered zone ranged from above the Leichhardt seam at the start of mining operations to the current location (at the highwall) above the Vermont seam in Titan North, Titan Central and Titan East Pits.

The locations and orientations of geological cross sections across the DNM are presented in Figure 3-8, and selected sections intersecting the coals seams present, are provided in Figure 3-9 to Figure 3-12 (Mine Waste Management, 2026).

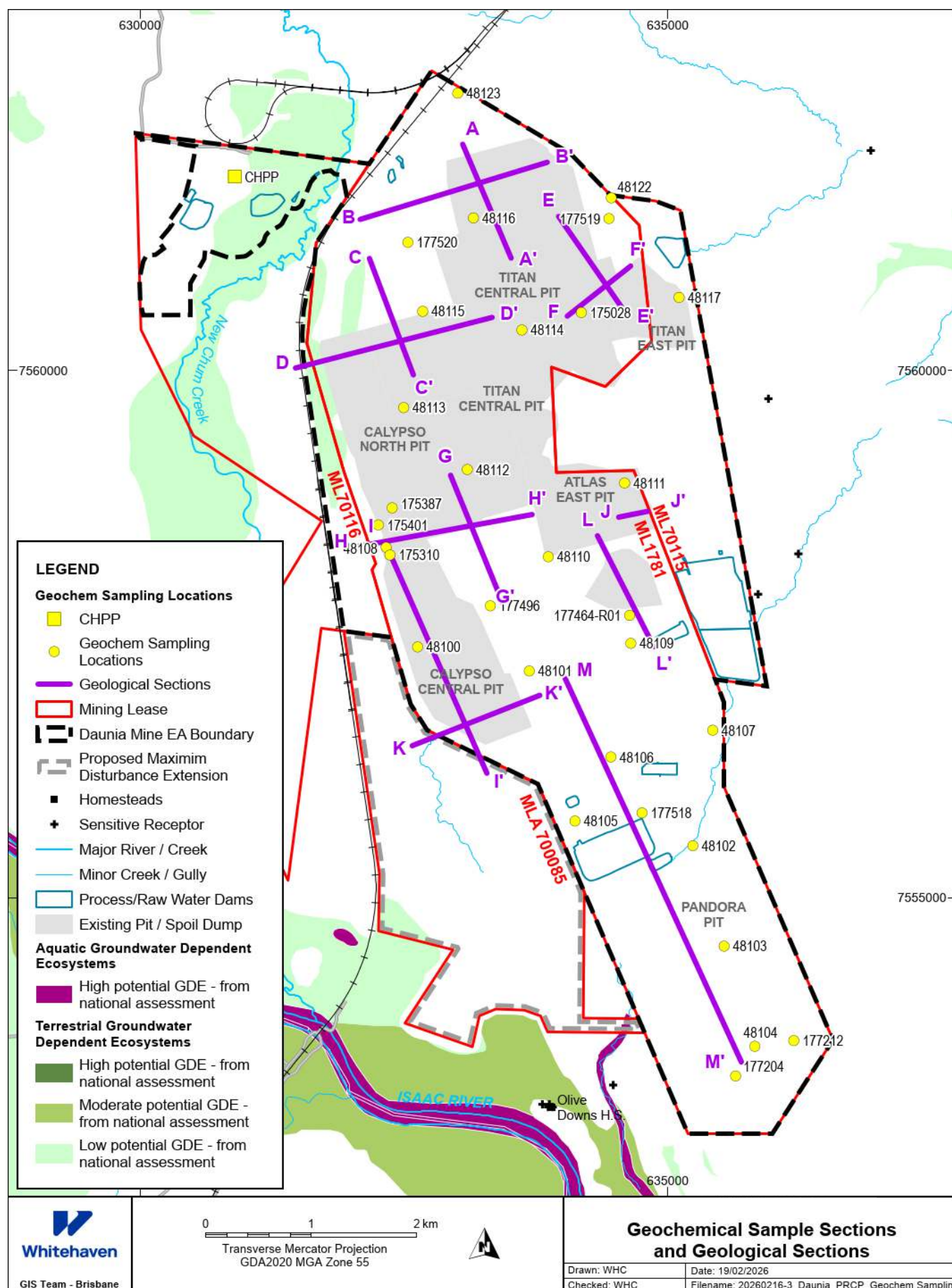


Figure 3-8 Geological cross sections

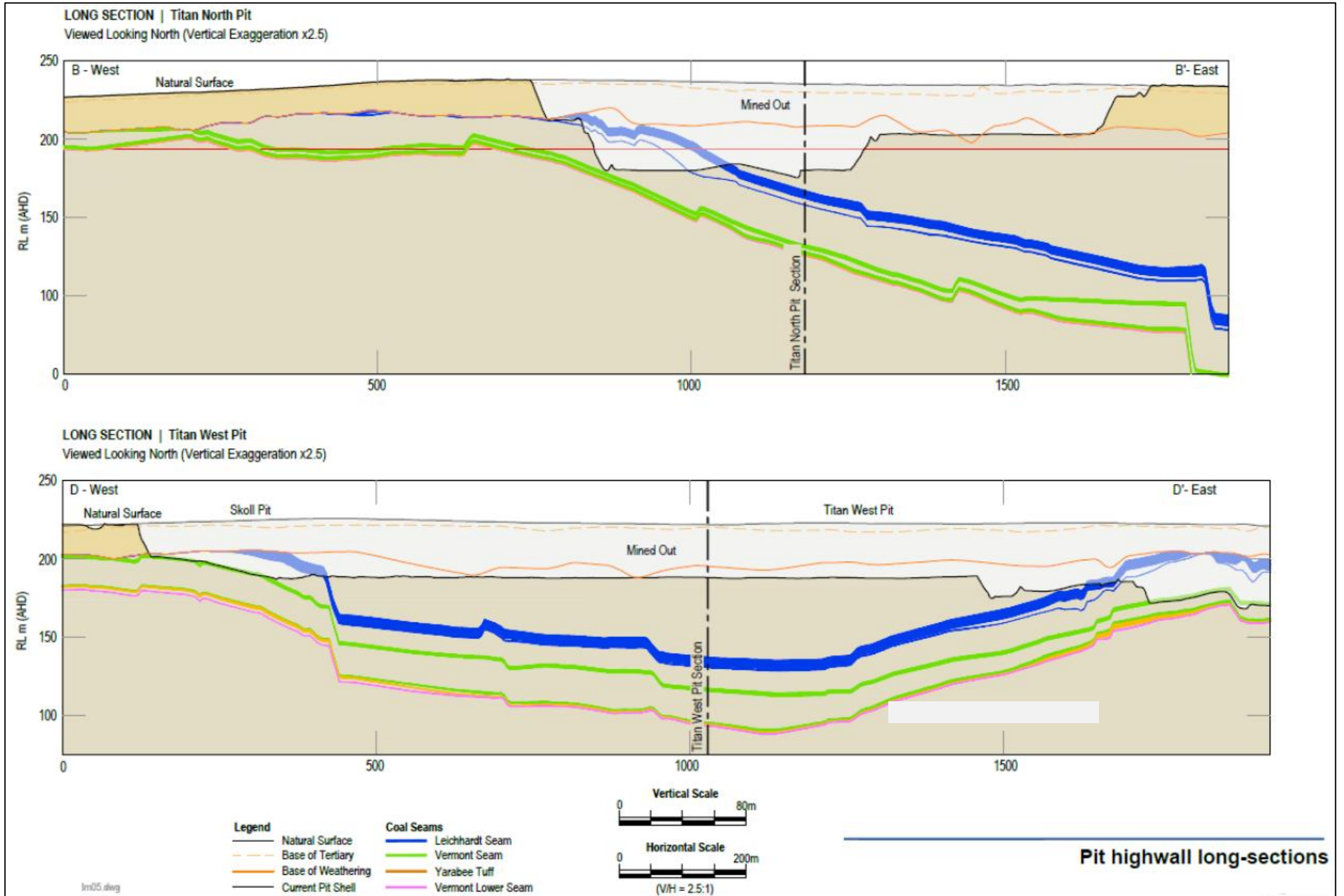


Figure 3-9 Cross section B to B' and D to D'

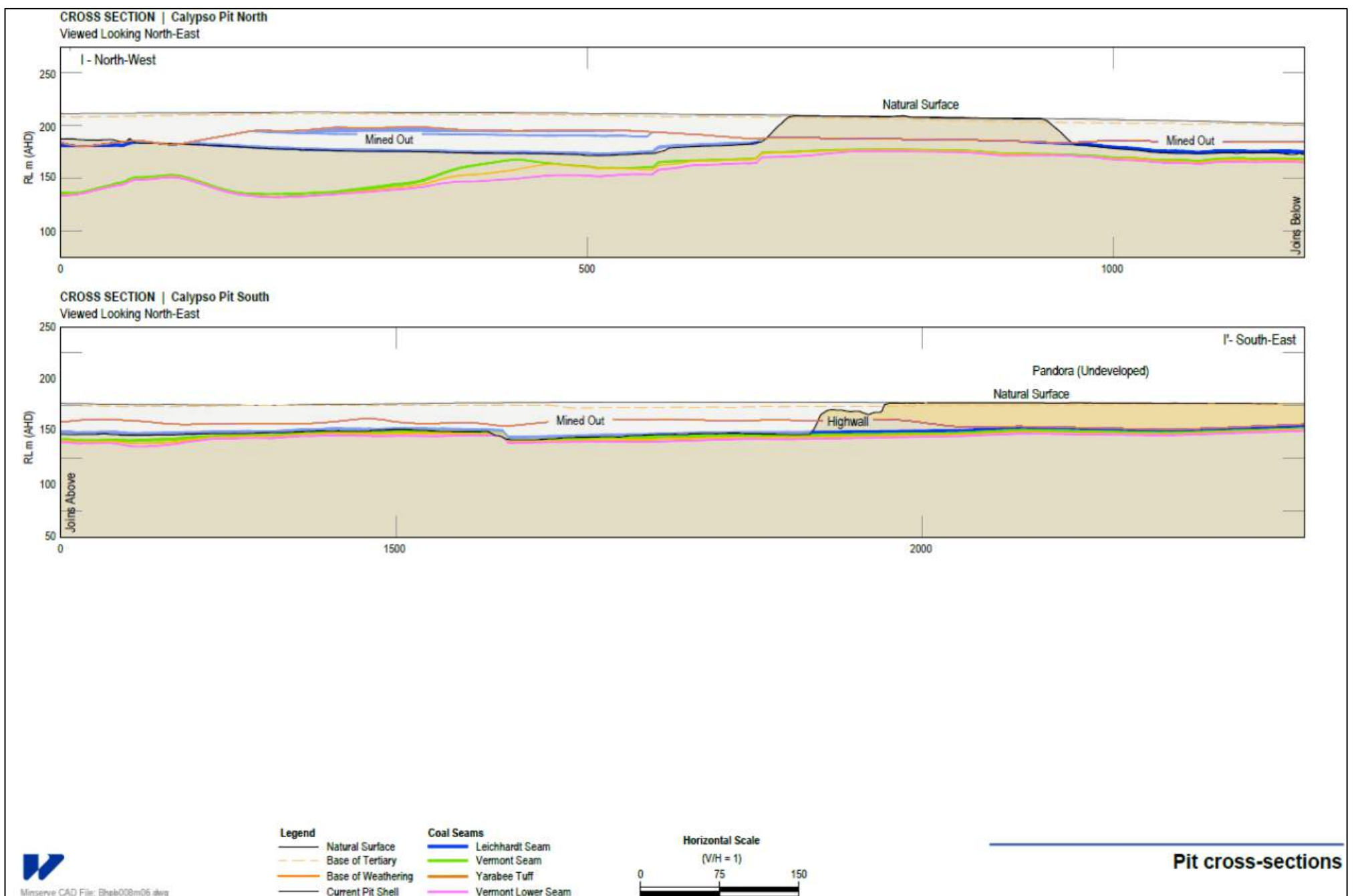


Figure 3-10 Cross section I to I'

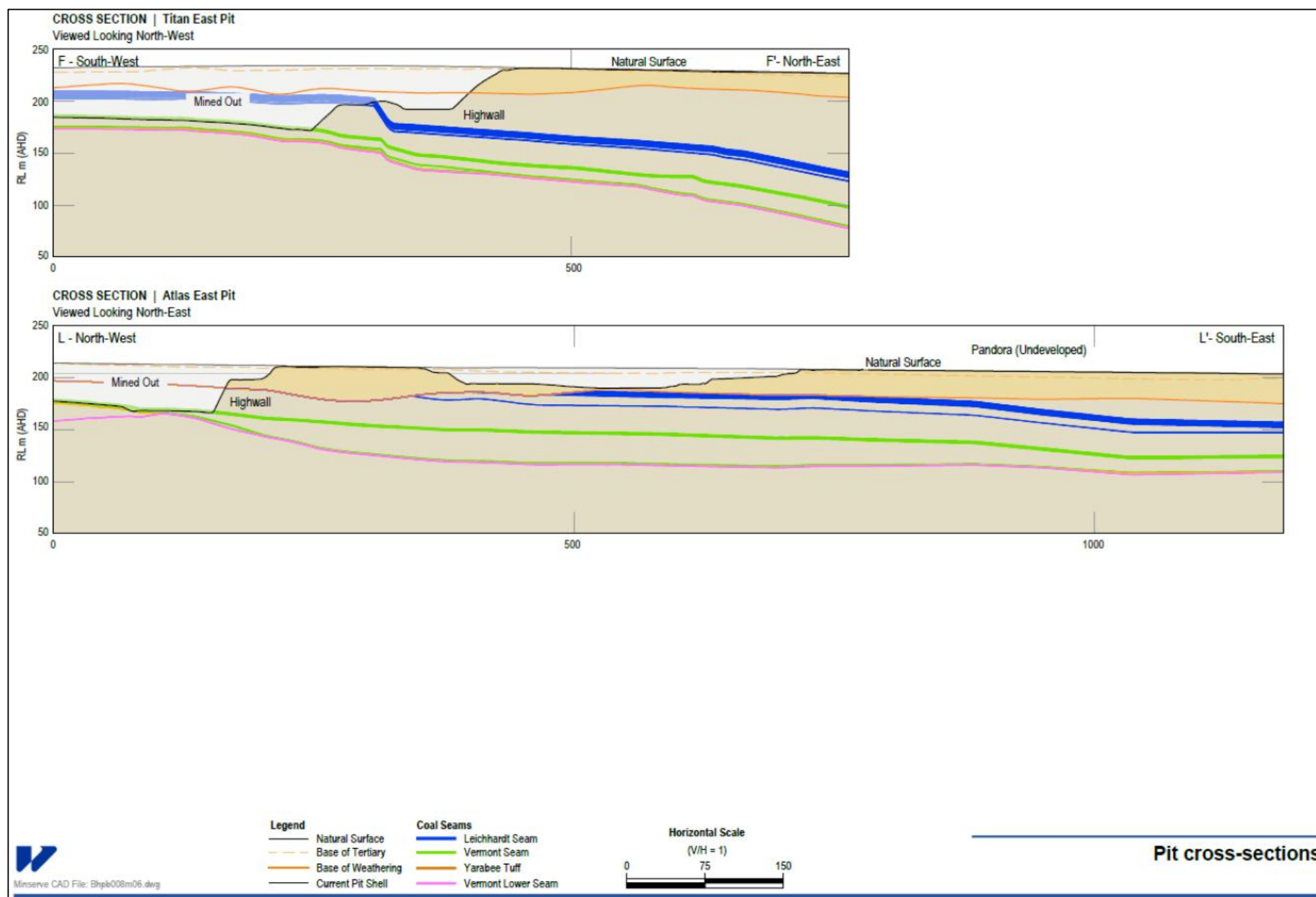


Figure 3-11 Cross section F to F' and L to L'

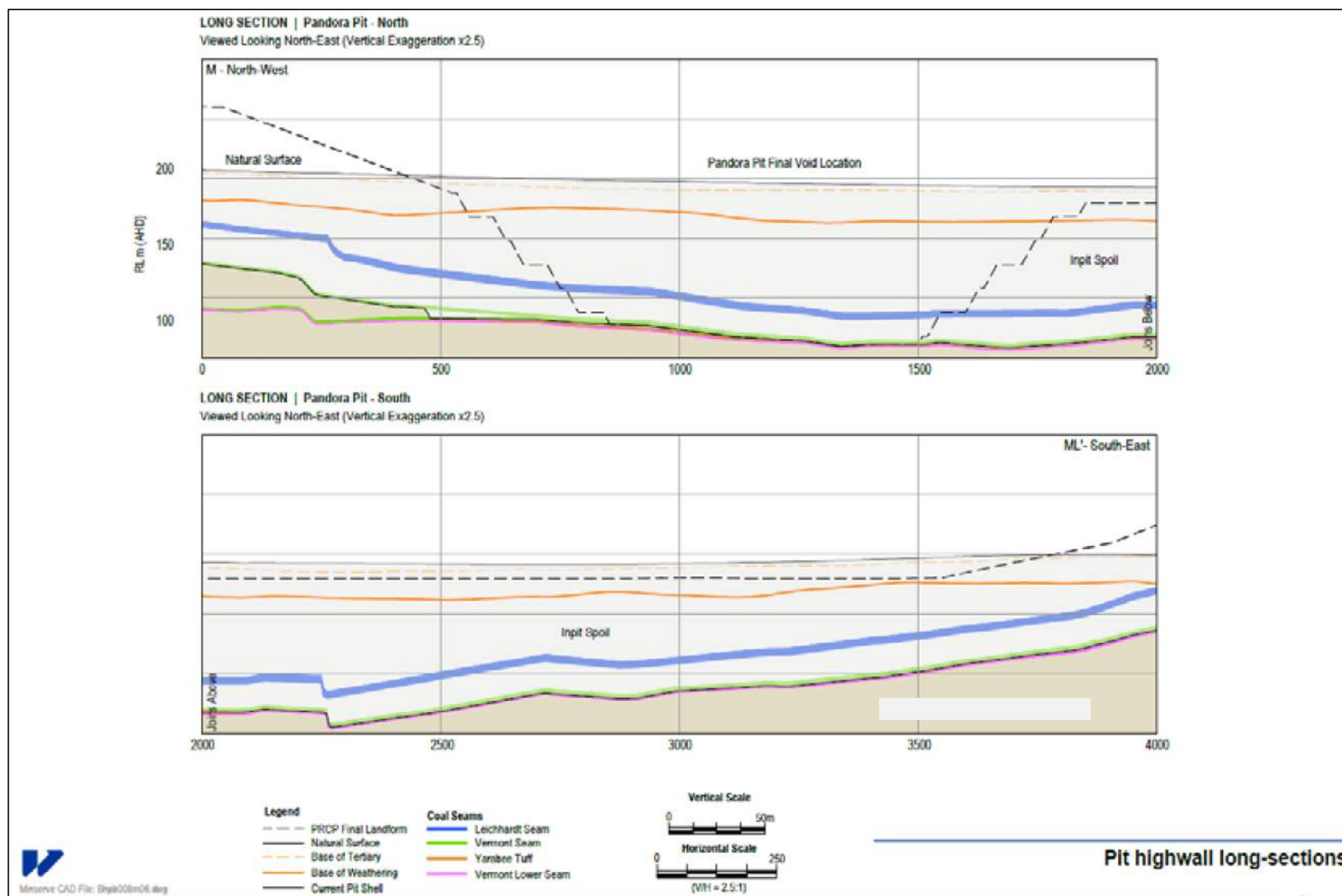


Figure 3-12 Cross section M-M'

3.1.2.5 Hydrogeology

A hydrogeological assessment, including conceptual and numerical modelling, has been undertaken to support the development of this PRC Plan. A detailed report - *Daunia Mine Transitional PRC Plan Hydrogeology Assessment (October 2025)* is provided in Appendix 4.2 – Hydrogeology Assessment.

DNM lies within the Isaac Connors Groundwater Management Area (GMA – Zone 34) of the Fitzroy Basin under the State of Queensland *Water Act 2000 Water Plan (Fitzroy Basin) 2011* (State of Queensland, 2022b). Within the GMA, alluvial groundwater is managed as Groundwater Unit 1. Groundwater located within hard rock aquifers are managed as Groundwater Unit 2 (sub-artesian aquifers). Volumetric limits apply to extraction of groundwater within the GMA for uses other than for stock and domestic purposes. The objectives for groundwaters within the GMA – Zone 34 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 licencing.

3.1.2.5.1 Groundwater environmental values

DNM is located within the Isaac groundwater environmental values area. The groundwater chemistry is defined as a zone of 'sodic sequence', which is saline and sodium (Na) and chloride (Cl) dominated (DEHP, 2011). Table 3-5 summarises the Isaac groundwater environmental values.

Table 3-5 DNM groundwater environmental values

Groundwater zone	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
Isaac groundwaters	✓	✓	✓	✓	-	-	✓	-	-	✓	-	✓

3.1.2.5.2 Hydrogeological units

The hydrogeological regime relevant to DNM comprises the following key hydrogeological units:

Cainozoic sediments:

- Quaternary alluvium – unconfined aquifer (water-bearing strata of permeable rock, sand, or gravel) localised along Isaac River;
- Quaternary to Tertiary colluvium and weathered units (regolith) – unconfined and largely unsaturated unit bordering alluvium; and
- Triassic Rewan Group – aquitard overlying Permian coal measures in places across DNM and more generally in areas north and west of the DNM.

Permian coal measures:

- Low permeability interburden units with aquitard properties; and
- Coal seams that exhibit water bearing properties primarily associated with secondary porosity via cracks and fissures.

An Early Cretaceous granitoid body is located about 1.7 km east of the DNM. The rock is solid with a very fine groundmass, making significant primary porosity unlikely. Consequently, it is not expected to store or transmit groundwater effectively and is likely to function as an aquitard.

The coal seams within the RCM are the primary aquifer units within the DNM area. These seams are characterised as confined fractured rock aquifers, with the Leichardt Seam and combined Vermont Seams and immediately underlying strata being the main aquifer units. The overburden above the Leichardt Seam acts as an aquitard and is typically dry, or very low yielding.

Structural faulting associated with the Jellinbah Thrust System occurs in the proximity of DNM. Assessments of the faulting's influence on the regional groundwater system have indicated the faults have been cemented with calcite and siderite. Therefore, the faults, which would have initially increased the permeabilities in parallel with the fault plane, have healed and are effectively acting as barriers to groundwater flow perpendicular to the faults. Therefore, the major faults to both the west and east of DNM have resulted in hydrogeological compartmentalisation of the Permian groundwater system.

3.1.2.5.2.1 Quaternary-Tertiary sediments

The unconsolidated alluvial sediments of the Isaac River, other Quaternary-Tertiary sediments, and weathered regolith are generally considered to function as one interconnected hydrogeologic unit. However, significant heterogeneity is present throughout the unit given the variable lithology and stratigraphy.

Monitoring bores installed in 2021 within unconsolidated Quaternary-Tertiary sediments at DNM have remained dry since installation, while monitoring data from the Isaac River Alluvium at the Poitrel Mine to the west of DNM identified sporadic saturation of the alluvial groundwater unit.

More regionally, bores have recorded groundwater within the Isaac River Alluvium ranging from 171 mAHD to 179 mAHD with the interpreted alluvium being up to 14 m thickness at the monitored locations. Groundwater levels within the Isaac River Alluvium show groundwater flow is consistent with the orientation and direction of the Isaac River, with general south-easterly flow gradients.

The heterogeneous nature of the alluvial sediments is reflected in the hydraulic conductivity, which ranges from 10^{-2} metres per day (m/day) to almost 10^1 m/day. Hydraulic testing of the alluvium within the proximity of DNM found hydraulic conductivity to be within this scale, with values ranging from 0.09 m/day to 1.25 m/day (SLR 2026).

The Quaternary to Tertiary colluvium and weathered units present in the proximity of DNM are largely unsaturated, with the presence of water restricted to lower elevation areas along the Isaac River and the lower reaches of its tributaries. Flow within the regolith, where it is saturated, is topographically driven.

Recharge of the alluvium is predominantly from stream flow/flooding (i.e. loosing streams), and direct precipitation, while the non-alluvial regolith materials, that comprises of low hydraulic conductivity strata (i.e. clay and claystone), restricts recharge.

Recharge rates of the Quaternary and Tertiary sediments, estimated using chloride mass balance calculations based on regionally available water quality data, are as follows:

- Isaac River Channel Alluvium – 3 mm/yr;
- Isaac River Flood Plain Alluvium – 1.3 mm/yr;
- Other alluvium – 1.3 mm/yr; and
- Tertiary sediments – 0.1 mm/yr.

The Quaternary and Tertiary sediments are primarily discharged via evapotranspiration from riparian vegetation, short term baseflow after significant rainfall and extraction via privately-owned bores within the alluvium. As the alluvium is predominantly underlain by low hydraulic conductivity stratigraphy (i.e. claystone, siltstone and sandstone), limited downward discharge to the underlying formations is expected in areas where the natural lithology has not been disturbed.

Groundwater in the Isaac River Alluvium is also extracted through landowner bores. Localised perched groundwater occurs where the clay layers slow infiltration, allowing waterbodies such as floodplain wetlands to retain water during dry periods.

3.1.2.5.2.2 Permian coal measures

Groundwater within the Permian coal measures is confined and sub-artesian. The coal seams within the Permian unit generally support higher hydraulic conductivity than the interburden/overburden. The coal seams have dual porosity, with a primary matrix porosity and secondary (dominant) porosity provided by fractures (joints and cleats).

Historical testing of the bores at DNM reported the following horizontal conductivity ranges:

- 1.92-2.05 m/day for the Leichhardt Seam;

- 0.00076-0.25 m/day for the combined Vermont Seams;
- 0.0011-0.45 m/day where bores are screened across the Leichardt Seam, Vermont Seams and interburden between seams; and
- 0.002-0.035 m/day for non-coal Permian units (interburden).

The hydraulic conductivity of the Permian coal measures generally declines with depth, due to increasing overburden pressure reducing the aperture of secondary porosity features.

Groundwater investigations prior to the commencement of mining (2012 to 2013) at DNM identified groundwater elevations in the Permian coal measures ranging from approximately 191.5 mAHD in the northeast of DNM to approximately 170.5 mAHD in the south. This suggests a pre-mining general north-south groundwater gradient.

Ongoing monitoring of groundwater elevations in Vermont Seam shows differing responses related to proximity to active mining operations, however groundwater heights have shown limited correlation with rainfall. A general north to south hydraulic gradient is evident, with highest groundwater elevations of approximately 200 mAHD recorded to the north of the DNM area, and lowest elevations of approximately 170 mAHD recorded to the south of the DNM area.

Groundwater level data for the Leichardt Seam is limited to one monitoring bore, which has remained relatively stable fluctuating between approximately 179 mAHD and 180 mAHD.

RCM and Fort Cooper Coal Measures interburden monitoring bores are predominantly located to the north and in proximity to the active DNM mining voids. Depth to the groundwater over the monitoring period has remained relatively stable in the monitoring bores, which reported interburden groundwater elevations ranging from 170 mAHD and 202 mAHD. Groundwater monitoring to the east of DNM shows the greatest groundwater elevation variation within the interburden with elevations decreasing from 186.5 mAHD in 2010 to 180 mAHD in 2022.

The general lack of response within the Permian groundwater monitoring bores to mining activities indicates there is limited hydraulic conductivity within the aquifer and/or compartmentalisation of the groundwater system created through cemented faults restricting groundwater flows.

Recharge to the Permian coal measures occurs where the unit occurs at subcrop. Due to the low hydraulic conductivity of the interburden material, groundwater largely flows horizontally within the coal measures, along the bedding plane of the coal seams.

A potentiometric surface for the RCM, utilising recent regional data up to late 2024, is presented in Appendix 4.2, Figure 4-8. The general groundwater flow direction within the RCM is from the north-west to the south-east.

Groundwater discharge predominantly occurs via pit void faces in mining operations.

3.1.2.5.3 Groundwater quality and type

3.1.2.5.3.1 Quaternary-Tertiary sediments

As groundwater bores within the Cainozoic sediments/alluvium at DNM have been dry since installation, no groundwater quality information specific to DNM is available. Interpretation of groundwater type and quality of the alluvial aquifers have been taken from alternate bores located within the region and from surrounding mining projects, as summarised in Table 3-6.

Table 3-6 Summary of groundwater quality characteristics in alluvium and regolith units

Unit/Aquifer	Water Type	Salinity (TDS mg/L)	Observations / Notes
Alluvium (Poitrel Mine)	Na-Cl	N/A	N/A
Alluvium (regional, Isaac River)	Mixed types	Avg: 556; Range: 10-5,620	— Fresh to moderately saline; — Variability suggests compartmentalisation and heterogeneity

Unit/Aquifer	Water Type	Salinity (TDS mg/L)	Observations / Notes
Regolith material	N/A	Avg: 7,101; Range: 1,110-18,600	— Brackish to highly saline; — Water occurrence restricted and variable.

Groundwater within the alluvium regionally generally meets stock water supply and short-term irrigation criteria. However, the alluvial groundwater was found to generally exceed criteria for drinking water, freshwater aquatic systems, and long-term irrigation. The alluvial groundwater also recorded concentrations of total and dissolved iron (Fe) and manganese (Mn) above the Fitzroy Plan Water Quality Objectives for Zone 34 (shallow) (DEHP, 2011). Where groundwater was present within the regional Tertiary sediments, it exhibited poorer quality compared to the alluvium and generally exceeded guideline criteria for livestock, irrigation, drinking water or aquatic ecosystems.

3.1.2.5.3.2 Permian

Groundwater quality in the coal seams and interburden at DNM has been assessed through bore water chemistry and TDS results (refer Table 3-7). The coal seam groundwater is typically saline and Na-Cl dominated, with some local variation in the Vermont Seam. Interburden groundwater is moderately saline to saline, with Na-Cl-HCO₃ water types recorded. Salinities in both aquifer types generally exceed stock watering guideline criteria.

Table 3-7 Summary of groundwater quality characteristics in coal seams and interburden units at DNM

Unit / Aquifer	Water Type	Salinity (TDS mg/L)	Observations / Notes
Coal seams – General	Na-Cl	Mean: 7,598; Range: 720-24,704	— Predominantly Na-Cl water type; — Generally saline; — Salinity exceeds stock watering criteria.
Coal seams – Vermont Seam (shallow, southern DNM)	Na-Cl with elevated Mg	N/A	— Higher magnesium (Mg) linked to interaction with overlying Quaternary-Tertiary deposits.
Interburden units	Na-Cl-HCO ₃	Mean: 5,349; Range: 1,520-9,126	— Moderately saline to saline; — Salinity exceeds stock watering criteria.

Water quality results for the DNM monitoring bores indicate the RCM (interburden and coal) exceed stock water, irrigation, drinking water and aquatic ecosystems criteria. The groundwater data also exceeds the Fitzroy Plan Water Quality Objectives (DEHP, 2011) for aquatic ecosystem protection, as summarised in Table 3-8 below.

Table 3-8 Aquatic ecosystem water quality exceedances of groundwater from DNM monitoring bores

Zone	Seam	Aquatic ecosystem water quality exceedance(s)
Zone 34 – Deep	Vermont Seams	Na
Zone 34 – Shallow	Leichhardt Seam	Electrical conductivity (EC), Cl
Zone 34 – Shallow	Vermont Seams	Ca, Mg
Zone 34 – Shallow and Deep	Vermont Seams	EC, alkalinity, Na, Cl, dissolved Fe

3.1.2.5.4 Groundwater use

The Queensland Government's Groundwater Bore Database and the Bureau of Meteorology's National Groundwater Information System lists 70 registered bores within 5 km of DNM. The bore uses listed on the databases are summarised in Table 3-9.

Table 3-9 Summary of registered groundwater bore use

Registered groundwater bore use	Count	%
Groundwater monitoring (mine monitoring, water resource investigation etc.)	57	81
Water Supply	4	6
Unknown	9	13
Total	70	100

Bore surveys completed in the region for surrounding mining projects have identified the following:

- In 2008, prior to commencement of mining at DNM, 12 private groundwater bores (9 in use) were identified within the proximity of DNM with the closest active supply bore to DNM located 14 km to the north-west.
- Bore surveys conducted between 2017 and 2020 identified:
 - 6 Isaac River Alluvium bores between 1.1 km and 6.3 km south/south-west of DNM used for stock watering and domestic supply.
 - The closest non-alluvial supply bore was 4.2 km east of DNM and was installed within the Permian coal measures.
 - The density of third-party supply bores was found to increase in the proximity of the Isaac River, suggesting the non-Permian groundwaters were the primary groundwaters extracted in the region.

The 2023 PRCP groundwater assessment for DNM (SLR, 2023) included a review of landholder bore surveys for surrounding mining projects (Olive Downs, Moorvale South, and Winchester South). Four alluvium / Tertiary bores were identified directly south of the DNM, the nearest being an apparently “active” domestic supply bore (Bore 9 / House Bore) adjacent to the Isaac River approximately 1 km directly south of the southern end of the DNM and discussed in Appendix 4.2 – Hydrogeology Assessment and presented in Figure 3-13 below.

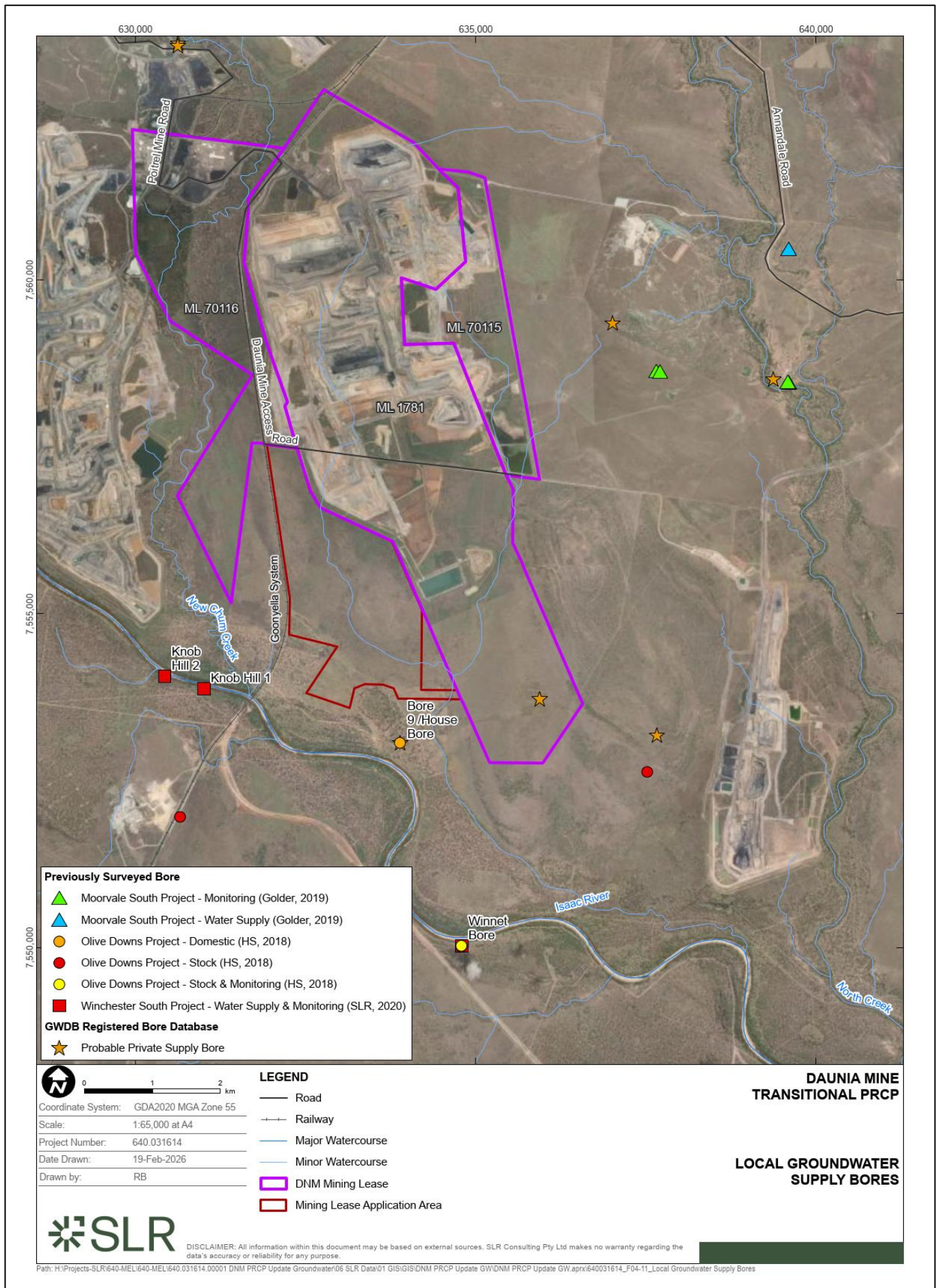


Figure 3-13 Local groundwater supply bores

"If it's not safe, don't do it."

3.1.2.5.5 Groundwater Dependant Ecosystems

The Bureau of Meteorology Groundwater Dependent Ecosystems (GDE) Atlas (BoM, 2017) indicates that areas with possible high, moderate and low potential for groundwater interaction occur in the vicinity of DNM with moderate to high potential GDE's identified predominantly to the southwest of DNM in alignment with the Isaac River:

- Terrestrial vegetation associated with the riparian zones of the Isaac River and tributaries is mapped as having a high potential to be dependent on groundwater;
- Broader areas of the Isaac River floodplain are mapped as hosting terrestrial ecosystems with a moderate to low potential to be dependent on groundwater; and
- The channel of the ephemeral Isaac River and an adjacent unnamed minor drainage line is designated as having a high potential to be dependent on the surface expression of groundwater.

Local GDE studies completed in the proximity of DNM were reviewed as part of the hydrogeological assessment (Appendix 4.2, Section 4.5.2). The results of the targeted studies in relation to potential groundwater usage are summarised in Table 3-10.

Table 3-10 Summary of studies on local GDEs near DNM

Source/Study	GDE Type	Location/Context	Findings
Remote sensing (IESC 2018 approach)	Terrestrial	Closest ~7.3 km SE of DNM (North Creek & Isaac River confluence)	No potential terrestrial GDEs in immediate vicinity of DNM.
Poitrel Mine Survey (2018)	Terrestrial	NW of DNM, New Chum Creek	Low confidence terrestrial GDE identified.
GDE Atlas	Aquatic	Isaac River (west of DNM)	High confidence aquatic GDE mapped but inferred not groundwater-dependent due to 10-20 m depth to groundwater.
Winchester South Project studies (extends to southern boundary of DNM)	Aquatic (in-stream)	Isaac River	Ecosystems largely not dependent on groundwater.
Winchester South Project studies	Riparian vegetation	Isaac River	Moderate–high potential as terrestrial GDE, but groundwater dependence likely facultative.
Winchester South Project studies	Palustrine wetlands vegetation	Adjacent to Isaac River	Depth to groundwater 10–20 m. Aquatic wetlands ecosystems not groundwater-dependent. Terrestrial vegetation has moderate potential as GDE, dependence likely facultative.
Winchester South Project studies	Terrestrial vegetation (floodplains)	Isaac River floodplains (outside wetlands)	Moderate potential as GDE, dependence likely facultative. Unlikely dependant on groundwater due to high salinity
Winchester South Project studies	Stygofauna	Bores sampled	No stygofauna species recorded as groundwater has high EC.

A GDE study was also completed for the Isaac Downs Project 9 km to the west of DNM (3D Environmental, 2019). This study focussed on the Isaac River and associated floodplain environment and is discussed in more detail in Appendix 4.2.

As part of the 2025 DWIP, a stygofauna assessment was completed to evaluate the ecological values of groundwater underlying the project area and to determine potential risks associated with the proposed OOPD (SLR, 2025).

To place these findings in context with the broader GDE assessments undertaken around DNM, the DWIP investigations were initiated to support the Mining Lease Application, major amendment to the Environmental Authority (EA) and this updated PRC Plan. These DWIP specific studies build on the earlier regional and local GDE assessments summarised above.

Groundwater quality within DWIP was assessed as part of the stygofauna assessment EC and pH were noted to be within the range known to support diverse stygofauna however Total Dissolved Solids (TDS) were notably high reducing the likelihood of stygofauna.

This groundwater quality context is consistent with previous findings for the broader Isaac River corridor, where elevated salinity has similarly reduced the likelihood of groundwater dependent biota.

A desktop assessment identified a total of five families of stygofauna reported from six samples across the Northern Bown Basin sub-bioregion. Field surveys undertaken in July 2024 and May 2025 surveyed seven bores and indicated one stygofauna taxa (a stygoxene Nematode worm).

These results align with earlier studies near DNM, which also recorded very limited or no stygofauna, indicating consistently low regional groundwater ecological values.

Overall, stygofauna has been assessed as having low environmental value due to only one identified stygofauna taxa, the occurrence of one stygoxene individual and no stygobite taxa and groundwater with a high TDS reducing the suitability of groundwater.

This low value assessment is therefore consistent with previous GDE investigations in the local area and reinforces the conclusion that groundwater habitats in the Daunia region generally have limited capacity to support obligate groundwater fauna.

These results indicate that the groundwater in the DWIP project area is unlikely to provide supporting services to environmental third-party users of the water resource (i.e. groundwater dependent stygobitic fauna), as defined under the EPBC Act. Accordingly, the DWIP findings confirm and extend the existing understanding that groundwater systems west of DNM provide minimal ecological function for GDEs or stygobitic species.

3.1.2.5.6 Conceptual Site Model – End of Mining

A hydrogeological conceptual site model (CSM) representing the PRC Plan extent of mining and approved activities, at the last day of mining at DNM, is illustrated in Figure 3-14. The key hydrogeological features present at the end of mining that are relevant to the discussion of potential groundwater impacts post-mining are likely to be:

- Groundwater drawdown within the RCM, associated with passive dewatering into the DNM mine pit voids, results in inwards hydraulic flow gradients in the coal measures.
- Fault displacement of Permian sequences has potentially formed hydraulic barriers, resulting in compartmentalisation within hydrostratigraphic units.
- Mine pit voids capture seepage from spoil emplacements.
- Potential for minor seepage from the OOPD, and groundwater mounding in the local underlying strata.
- Little to no impact on environmental receptors.
- No likely impact on anthropogenic receptors.

The inclusion of the OOPD will result in a higher rate of rainfall recharge over the area due to the more permeable and unstructured nature of waste rock. The rainfall infiltrating the OOPD will exit the OOPD in the following ways:

- Water evaporates and is taken up by vegetation as the OOPD is progressively shaped to its final landform and revegetated.

- Possible localised seepage from the toe of the OOPD where the underlying soil permeability does not permit infiltration at the rate water is percolating through the OOPD. This seepage may be captured in a toe drain around the OOPD.
- A portion of water may percolate through the base of the OOPD into the underlying Tertiary–Quaternary sediments and weathered Permian coal measures.

The higher recharge into the OOPD will increase seepage to the underlying strata compared with natural conditions, creating a groundwater mound that will migrate primarily toward the Pandora Pit void. The void will therefore act as a dominant hydraulic sink, potentially west and south off site, depending on infiltration rates and the resulting position of the groundwater divide.

Although infiltrating rainfall may leach minor constituents from the spoil, leachability testing shows the waste rock is predominantly non-acid-forming and has a strong neutralising capacity. The waste rock poses negligible risk of acid, metalliferous, or saline drainage and all test results remain below the Water Quality Objectives for Isaac Groundwaters (Zone 34). Consequently, the potential risk associated with any off-site migration of seepage from the OOPD is considered low.

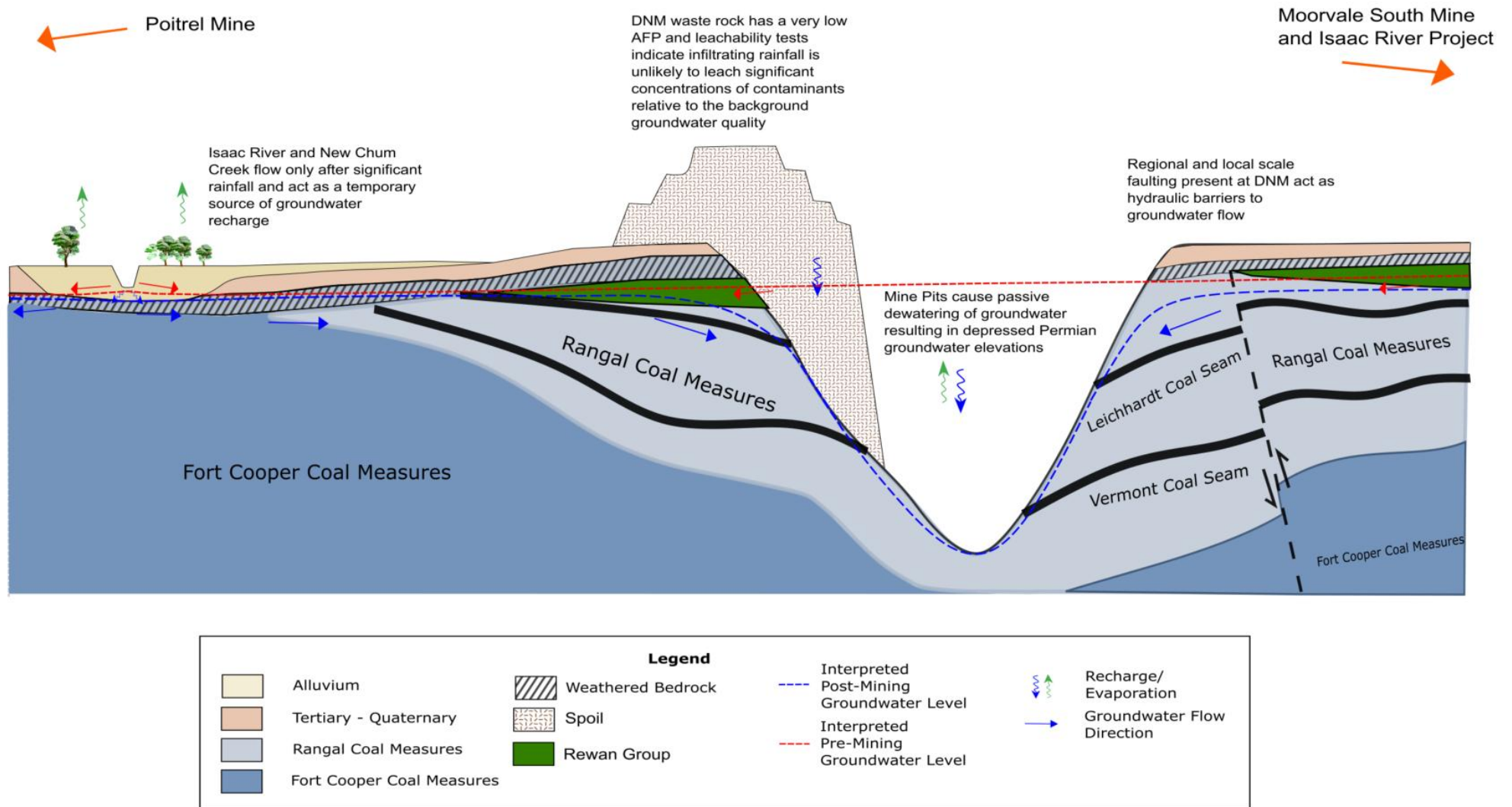


Figure 3-14 Conceptual model of the groundwater system - end of mining

3.1.2.6 Site hydrology and fluvial networks

3.1.2.6.1 Site hydrology

DNM is located within the Isaac River Sub-basin within the Fitzroy Basin, with the Isaac River located approximately 1km to the west at its closest point from the western boundary of ML1781. The area covered by the EA is in the Upper Isaac River catchment and the Isaac Northern Tributaries sub-catchment.

The Isaac River Sub-basin has a total area of approximately 22,327 km² and the total Fitzroy Basin has an area of approximately 142,482 km². From a broad regional context, the area covered by the DNM operations (~31 km²) represents approximately 0.14% of the Isaac River Sub-basin.

The Isaac Northern Tributaries sub-catchment is covered under the Environmental Protection (Water and Wetland Biodiversity) Policy 2019, Department of Environment and Heritage Protection (2011) Isaac River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including water of the Isaac River Sub-basin (including Connors River) (DEHP, 2011). The nominated environmental values of the sub-catchment are summarised in Table 3-11.

Table 3-11 DNM surface water environmental values

Sub-catchment	Aquatic ecosystems	Irrigation	Farm supply/use	Stock water	Aquaculture	Human consumer	Primary recreation	Visual recreation	Drinking water	Industrial use	Cultural and spiritual value
Isaac Northern Upland Tributaries	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Illustrated in Figure 3-17 is the location of the operations and the receiving watercourses and drainage lines. The mine voids and spoil dumps (mining areas) at DNM are located between New Chum Creek to the west, North Creek to the east and the Isaac River to the south. The DNM operated mine industrial area (MIA) and CHPP area is located at the northern end of the joint ML70116 with New Chum Creek immediately to the east. The MIA and CHPP areas are connected to the mining areas via a haul road over New Chum Creek. The OOPD is to be located to the west of the existing project as part of the DWIP. Pre-mining, surface water flows from the majority of the mining area was transported to the Isaac River via drainage lines and other unnamed and *Water Act 2000* unmapped watercourses. The northern most mining area, and the location of the Titan East residual void, is at the headwaters of an unnamed and *Water Act 2000* unmapped watercourse that drains to the east and into North Creek.

Overall, the DNM infrastructure areas are drained by New Chum Creek which flows into the Isaac River and the DNM mining areas are drained by two unnamed drainage paths that also flow into the Isaac River. The Isaac River and New Chum Creek are both ephemeral waterways that ultimately drain to the Fitzroy River, which discharges into the Coral Sea at Rockhampton.

Overland flows within mining disturbed areas are captured and managed through on-site dams. Captured water is utilised within the operations or released as required under the conditions specified in the EA.

The watercourses and drainage lines in the proximity of DNM are ephemeral and only flow for short periods after rainfall. Except for the Isaac River, the watercourses do not support semi-permanent or permanent waterholes. The only major hierarchy waterway within proximity of DNM is the Isaac River, which does support a regionally important Quaternary alluvial groundwater aquifer.

The watercourses and drainage lines in the immediate proximity of DNM are summarised in Table 3-12.

Table 3-12 Watercourses and key drainage lines within and immediately surrounding DNM

Watercourse	Perennial	Hierarchy	Strahler stream order	Comment
Isaac River	Non-Perennial	Major	6	Flows in a south easterly direction past the southern end of DNM approximately 1km from the mining leases at its closest point.
New Chum Creek	Non-perennial	Minor	3	Flows past the Millennium Mine and through RMI ML to the north before passing under the DNM haul road. Flowing through the Poitrel Mine immediately to the west. A diversion around the Poitrel mining operation is present before its confluence with the Isaac River.
North Creek	Non-perennial	Minor	4	Flows in a north south direction approximately 3km to the east of DNM. Northern areas in the proximity of Titan East residual void drain through unnamed tributaries to North Creek.
Unnamed watercourse	Non-perennial	Minor	1-2	<i>Water Act 2000</i> unmapped and unnamed tributary of the Isaac River. Pre-mining this drainage line received the majority of overland flow from the mining area. The drainage line has a confluence with the Isaac River to the south of DNM.
DNM drainage feature	Non-perennial	Minor	1-2	Unnamed drainage line that is a defined drainage feature under the <i>Water Act 2000</i> . Headwaters located in the northern portion and to the east of DNM. Drains across the southern portion of DNM within the future Pandora mining area, before flowing into the unnamed watercourse listed above.
DNM east drainage feature	Non-perennial	Minor	1-2	Unmapped and unnamed watercourse between northern DNM and North Creek.

3.1.2.6.2 Surface water quality data

3.1.2.6.2.1 Daunia Coal Mine Project – Environmental Impact Statement (2008)

Surface water quality across the Daunia Coal Mine Project area was originally characterised as part of the 2008 Environmental Impact Assessment, with baseline monitoring undertaken across the key drainage features that convey runoff from both the proposed project infrastructure and mining areas.

The baseline assessment included monitoring within New Chum Creek, the unnamed drainage paths, and the Isaac River thereby providing a pre-mining dataset against which potential future changes could be measured. The following information summarises the surface water quality information drawn directly from the DNM EIS (2008).

Three areas where water quality was assessed pre-mining for DNM were New Chum Creek (where the DNM infrastructure areas drain), Daunia and Daunia East unnamed drainage paths (where the mining areas drain) and the Isaac River, which New Chum Creek and the unnamed drainage paths drain into.

Water quality data from New Chum Creek is provided in Table 3-13.

Table 3-13 DNM pre-mining water quality data from New Chum Creek collected by BMA Poitrel (DNM EIS 2008)

Site Location	Date	pH	Conductivity (uS/cm)	Suspended Solids (mg/L)
Downstream- New Chum Creek	20/12/2007	7.99	351	332
	10/01/2008	7.93	237	202
	19/03/2008	8.52	2510	23
	20/03/2008	8.42	2310	21
	25/03/2008	8.28	2190	No Data
	7/04/2008	8.54	2420	No Data
	8/04/2008	8.56	2345	No Data
	9/04/2008	8.34	2260	No Data
	10/04/2008	8.43	2250	No Data
	11/04/2008	8.54	2310	No Data
	14/04/2008	8.45	2340	No Data

There was no historic water quality data available for the unnamed drainage paths, with only a single monitoring event undertaken in April 2008 at eight monitoring locations (refer to Figure 3-15). The results of this investigation are summarised in Table 3-14.

Table 3-14 DNM pre-mining water quality results from field investigation by BMA Poitrel (DNM EIS 2008)

Site Number	Date and time sampled	Temperature (deg C)	pH	Conductivity (uS/cm)	Dissolved oxygen (ppm)	Turbidity (NTU)
1	8/04/2008 14:10	23.4	8.33	1,846	9.04	527
2	9/04/2008 10:30	23.7	8.58	120.6	7.51	31.8
3	9/04/2008 11:45	25.5	8.21	133.8	7.09	461
4	9/04/2008 12:35	27.1	8.47	175.8	8.07	72.2
5	9/04/2008 13:30	29.3	9.33	145.4	18.66	81.9
6	10/04/2008 08:15	N/A - dry				
7	10/04/2008 11:00	23.4	8.13	141.8	8.22	285
8	10/04/2008 12:50	28.4	9.04	153.7	9.98	201
9	10/04/2008 16:15	23.4	8.31	2,310	9.14	342

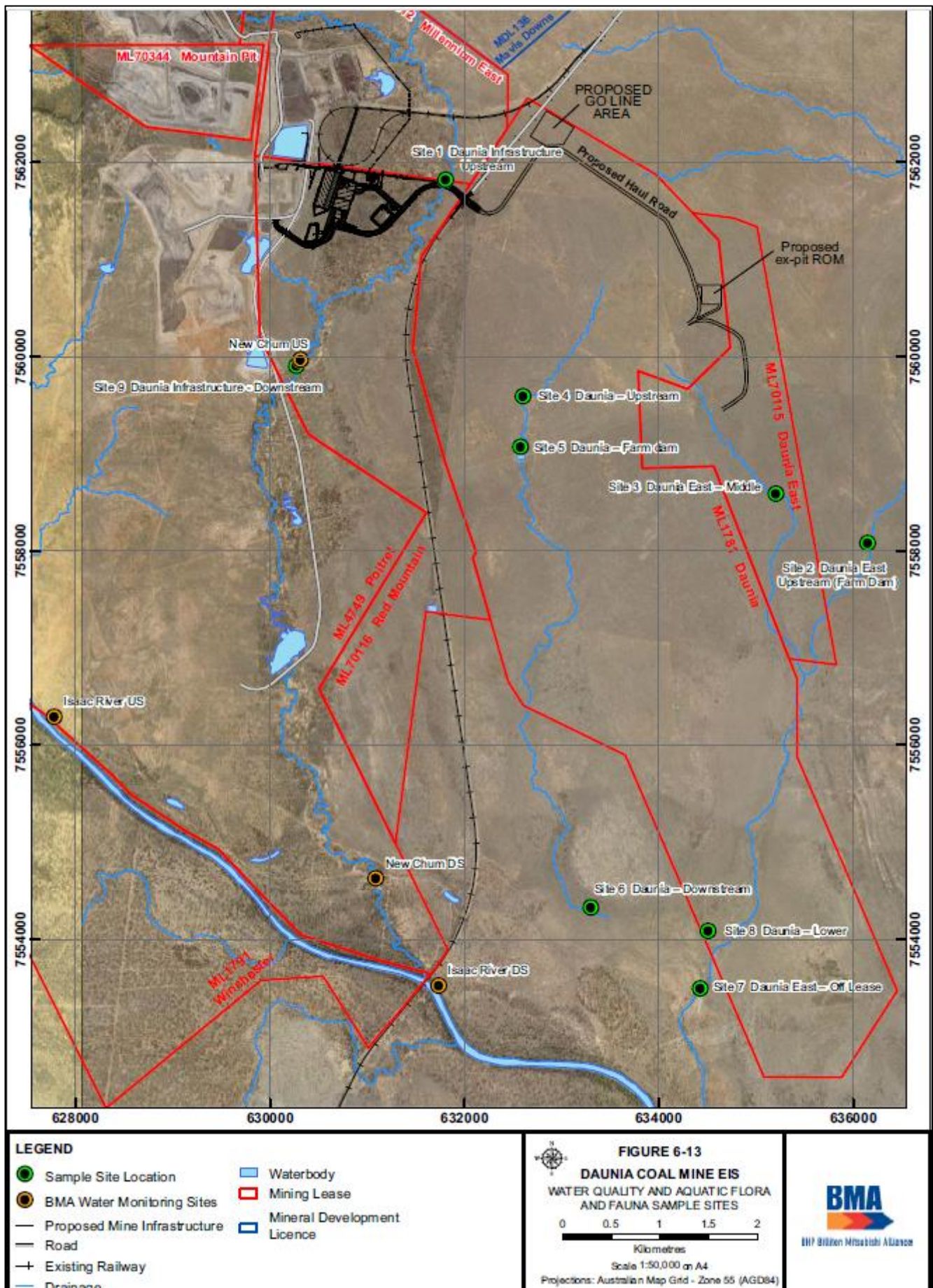


Figure 3-15 DNM pre-mining water quality sample sites (DNM EIS 2008)

Surface water quality has been monitored at several locations along the Isaac River as part of the stream gauging station network managed by the Department of Regional Development, Manufacturing and Water (DRDMW). The closest monitoring site to DNM at the time was Deverill Gauging Station, approximately 18 km downstream and the water quality summary is provided in Table 3-15. BMA also collected water quality information at upstream and downstream monitoring locations in the Isaac River (shown in Figure 3-15) with the water quality data provided in Table 3-16.

Table 3-15 Long-term water quality summary for the Deverill Gauging Station (DNM EIS 2008)

Parameter	No. of samples	Minimum	Median	Maximum	Mean	Start date	End date
Dissolved oxygen (mg/L)	7	5	-	9.8	6.72	07/02/1995	24/03/2000
Conductivity (uS/cm)	16	78	383	1370	462.69	25/06/1989	24/03/2000
Temperature (deg C)	33	14	25	34	25.18	06/07/1964	24/03/2000
pH	12	7.18	7.82	8.5	7.81	20/06/1990	24/03/2000
Turbidity (NTU)	7	10.5	-	4420	1848.85	14/12/1995	24/03/2000

Table 3-16 DNM pre-mining water quality data collected for the Isaac River by BMA Poitrel (data points cover period between 29/10/2007 to 25/09/2008)

Site and associated statistics	Temperature (deg C)	pH	Conductivity (uS/cm)
Isaac River - US			
Average	19.3	7.68	842.63
Median	19.2	7.27	677
No. of data points	31,380	21,472	27,156
Guideline value (Queensland Water Quality Guidelines, QWQG, 2006)	N/A	6.5-7.5	720
Isaac River – DS			
Average	20.1	7.78	952.87
Median	19.8	7.78	833
No. of data points	33,201	19,480	29,295
Guideline value (QWQG, 2006)	N/A	6.5-7.5	720

The EIS further noted the following:

- The Project site is situated within an ephemeral catchment network dominated by New Chum Creek and two unnamed drainage paths, all of which ultimately discharge to the Isaac River and, further downstream, the Fitzroy River system.
- As the proposed mining areas comprise only 0.7 per cent of the upstream Isaac River catchment, the Project was anticipated to have a negligible influence on river flows and associated water extraction entitlements.

- The mining area of the Project Site has been highly disturbed by grazing and the encroachment of the exotic species, Buffel Grass (*Cenchrus ciliaris*).
- The effect of grazing has exposed soils to sheet erosion across the site and this has added to the high turbidity concentrations within the drainage paths. Further to this, recent rainfall events in January and February of 2008 resulted in the high turbidity levels recorded across the Project Site.
- In the infrastructure area of the Project Site, the release of water down New Chum Creek by an upstream user during the sampling period does not reflect the natural water quality conditions, although it does reflect the current condition of this creek. Turbidity, pH and conductivity are all higher than the QWQG guideline for the two sites located in New Chum Creek (Site 1 and 9). The QWQGs must be taken in context for ephemeral streams. The guidelines have not been specifically developed for such ephemeral environments.
- Typical Environmental Authority release criteria for EC and pH are:
 - EC < 2500 µS/cm
 - pH 6.5 – 9
- These criteria are consistent with minimising impacts on the ephemeral waters in question, based on the water quality data reviewed and collated in the EIS. They were also consistent with the aquatic ecology environmental values identified in Section 9 of the EIS (see 3.1.2.6.3 and 3.1.2.6.4).

3.1.2.6.2.2 Daunia West Infrastructure Project (2025)

As a result of the DWIP inclusion, further water quality investigation of the Isaac River have been undertaken. Water quality monitoring at four sites was undertaken between 2015 and 2023, with in-situ results compared against default water quality objectives for moderately disturbed waters in the Upper Isaac River catchment and, where relevant ANZG toxicant DGVs. The results are presented within Table 3-17 In situ water quality summary from 2015 - 2023.

Table 3-17 In situ water quality summary from 2015 - 2023

Parameter	Unit	WQO		IRDE	IRDS	IRPD	IRUS
Temperature	°C	-	Count	3	6	4	6
			Min	18.17	13.48	14.70	16.20
			Median	22.04	21.72	24.56	21.59
			Max	24.73	29.20	27.90	27.22
Electrical Conductivity	µS/cm	<720 baseflow <250 high flow	Count	7	4	4	6
			Min	245	113	238	290
			Median	332	358	342	385
			Max	400	3,210	701	770
pH	Unit	6.5 - 8.5	Count	4	7	4	6
			Min	7.4	7.9	7.4	7.9
			Median	7.8	8.3	7.8	8.2
			Max	8.2	9.2	8.2	8.8
Dissolved Oxygen	% saturation	85 - 110	Count	4	7	4	5
			Min	14	79	65	57

Parameter	Unit	WQO		IRDE	IRDS	IRPD	IRUS
Turbidity	NTU	<50	Median	95	102	75	96
			Max	103	133	108	139
			Count	4	7	4	6
			Min	13	16	37	8
			Median	43	57	86	46
			Max	65	579	167	208

Additionally, field surveys were undertaken in July 2024 and May 2025 (Figure 3-16) and are presented in Table 3-18 and Table 3-19. They generally comply with the WQOs, with the exception of:

- pH, which was lower than the WQO at all sites holding water in July 2024
- dissolved oxygen, which was lower than the WQO at all sites holding water in July 2024 and at one site in May 2025; and
- turbidity, which was higher than the WQO at all sites holding water in July 2024.

Table 3-18 In situ water quality monitoring July 2024

		Temperature	Electrical Conductivity	pH	Dissolved Oxygen	Dissolved Oxygen
Units		°C	µS/cm	units	mg/L	% saturation
WQO		–	<720 baseflow <250 high flow	6.5–8.5	–	85–110
Sites	IRUS	9.9	190	5.7	5.00	44
	UCUS	13.3	222	6.3	5.66	53
	UCDS1	10.51	91	6.3	6.04	55
	FD1	12.3	143	6.4	4.95	47

Table 3-19 In situ water quality monitoring May 2025

		Temperature	Electrical Conductivity	pH	Dissolved Oxygen	Dissolved Oxygen
Units		°C	µS/cm	units	mg/L	% saturation
WQO		–	<720 baseflow <250 high flow	6.5–8.5	–	85–110
Sites	IRUS	21.1	401	6.8	8.11	93
	IRDS1	20.38	383	7.0	7.76	88
	IRDS2	19.94	348	7.1	7.49	83

		Temperature	Electrical Conductivity	pH	Dissolved Oxygen	Dissolved Oxygen
	UCUS	21.21	507	7.0	5.12	59
	UCUS2	24.29	354	7.6	8.94	109
	UCDS1	25.5	240	7.1	7.90	99
	FD1	23.83	275	7.2	8.24	100
	WS2	22.54	337	6.7	8.06	96

Laboratory analysed water quality parameters generally complied with the WQO or toxicant DGVs, with the exception of:

- turbidity at sites FD1 and UCUS2 in May 2025;
- total nitrogen at sites IRUS, UCUS, UCDS1 and FD1 in July 2024 and sites WS2, FD1, USDS1, UCUS and UCUS2 in May 2025;
- nitrate and nitrite at site FD1;
- ammonia at sites IRUS, UCUS and FD1 in July 2024;
- total phosphorus at sites IRUS, UCUS, UCDS1 and FD1 in July 2024;
- sodium at sites IRUS, IRDS1 and IRDS2 in May 2025;
- total chromium at sites UCDS1 and FD1 in July 2024;
- total cobalt at sites UCDS1 and FD1 in July 2024 and May 2025;
- total copper at sites IRUS, UCUS, UCDS1 and FD1 in July 2024 and at sites UCUS, UCUS2, UCDS1 and FD1 in May 2025;
- dissolved copper at sites UCUS, UCDS1 and FD1 in July 2024, and sites FD1, UCUS, UCUS2 and FD1 in May 2025;
- total lead at sites UCDS1 and FD1 in July 2024;
- total nickel at sites UCDS1 and FD1 in July 2024;
- total vanadium at sites UCDS1 and FD1;
- total zinc at sites IRUS, UCDS1 and FD1 in July 2024; and
- total petroleum hydrocarbons (TPH) C10 – 36 at site UCUS in May 2025.

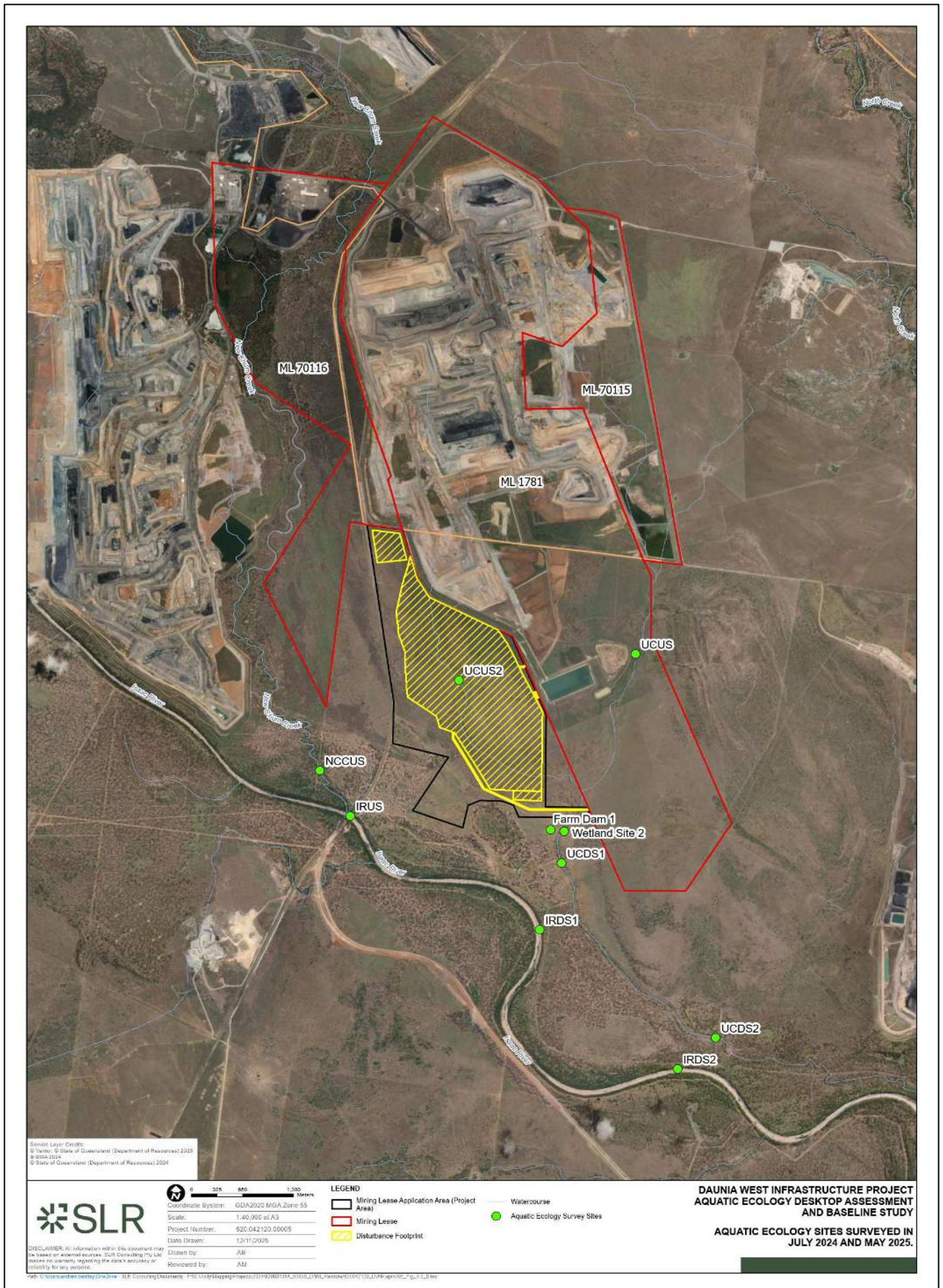


Figure 3-16 Aquatic ecology sites surveyed in July 2024 and May 2025

"If it's not safe, don't do it."

3.1.2.6.3 Summary of aquatic ecological values

The EIS for the Daunia Coal Project (2008) reported that aquatic habitats within the Daunia Project Site and surrounding areas consisted primarily of ephemeral drainage paths (Daunia and Daunia East) and New Chum Creek, a larger but still intermittently flowing watercourse. To support the inclusion of the DWIP, a further Aquatic Ecology Assessment was undertaken for the Daunia West area. Field surveys and desktop assessments indicated that these systems are substantially degraded by long-term grazing, land clearing, weed invasion, altered flow regimes, construction of farm dams, and erosion, resulting in generally poor to very poor aquatic habitat condition. Riparian vegetation was typically noted to be sparse or absent in the DWIP areas, with Buffel Grass dominating disturbed banks, while New Chum Creek retained moderately intact riparian structure.

Aquatic flora and fauna values across the site were found to be uniformly low, consistent with the naturally intermittent hydrology of the Isaac River sub-catchment. Macrophyte diversity was found to be low, limited mostly to sedges and small ephemeral species associated with shallow impoundments. No threatened aquatic flora species were recorded.

Fish communities were similarly simple, with only four common, tolerant species (Spangled Perch, Agassiz's Glassfish, Eastern Rainbowfish and Hyrtl's Tandan) captured across Daunia, Daunia East and New Chum Creek. No fish were recorded at several monitoring sites within Daunia West which is identified to have severely constrained connectivity for fish passage. However, six species (Agassiz's glassfish, common gudgeons, eastern rainbowfish, spangled perch, southern purple spotted gudgeon, and bony bream) were recorded across the wider DWIP area. The restricted biosecurity matter Mozambique tilapia (*Oreochromis mossambicus*) was recorded at one site during the July 2024 monitoring. All species noted across the site are typical of ephemeral waterways in the region. No fish species of conservation significance were detected.

Across the site, macroinvertebrate communities were reported to be dominated by tolerant taxa. An AusRivAS assessments was completed within Daunia, Daunia East and New Chum Creek which classified all sites as significantly impaired (Band B) or severely impaired (Band C), reflecting the combination of disturbed habitat and ephemeral hydrology. An additional AusRivAS assessment was undertaken for Daunia West to inform DWIP. This also showed that macroinvertebrate communities were dominated by tolerant taxa, however, several PET taxa were identified from bed and edge habitat. No listed threatened aquatic macroinvertebrate species were identified within this assessment.

Surveys also found no turtles, platypus or other significant aquatic fauna, consistent with the absence of permanent deep-water habitat required by these species.

Overall, EIS and DWIP assessments identified no aquatic Matters of National Environmental Significance, no threatened aquatic species, and no wetlands or waterways of High Ecological Significance within or adjacent to the Project Area. The aquatic ecosystems across the site were assessed as being of low ecological value, supporting simple, disturbance-tolerant aquatic communities typical of the ephemeral waterways of the Upper Isaac River sub-catchment.

3.1.2.6.4 Summary of potential project impacts

The EIS (2008) noted the following in respect to potential impacts of the DNM Project.

3.1.2.6.4.1 Mining Areas (Daunia & Daunia East)

The Project would require the progressive removal of approximately 15 km of highly disturbed, low-value aquatic habitat in the two ephemeral drainage paths. Key potential impacts were noted to include:

- Loss of degraded riparian and in-stream habitat, although the affected communities are widespread and not of conservation significance.
- Reduction in catchment size and surface flow (approximately 26 km² / 0.1% of the Isaac River catchment), with negligible downstream influence on Isaac River hydrology or aquatic communities.
- Altered flow patterns and runoff from mining surfaces and haul roads, potentially affecting water quality if not controlled.

Given the poor existing condition of the drainage lines and the absence of sensitive species, impacts to aquatic flora, fish, and macroinvertebrates were described as minor and localised, with no significant impact on regional aquatic ecosystems.

3.1.2.6.4.2 Daunia West Infrastructure Project

The Project proposes to clear vegetation for an OOPD and requires permanent realignment of an unnamed green waterway to the west of the Project Area to accommodate the DWIP footprint as well as construction of associated access tracks and haul roads. Potential impacts and mitigation are presented in Table 3-20.

Table 3-20 OOPD potential impacts and mitigation

Potential Impact	Mitigation
Contamination From Increased Turbidity and Sedimentation	DNM Erosion and Sedimentation Control Plan works in proximity to waterways will preferentially be undertaken at times of no rainfall. Monitoring (e.g. current Fitzroy River Receiving Environment Monitoring Program; FRREMP monitoring) will be implemented when required, and if water quality is adversely impacted then remedial actions will be undertaken to correct water quality issues.
Contamination Due to Fuel and Chemical Spills	Spill Prevention and Response Procedure including: - Refuelling in designated areas, which are located away from waterways (e.g. >50 m). - Storing fuels and chemicals in bunded designated areas designed, constructed and maintained in accordance with Australian Standard 1940. - Storage fuels and chemicals away from waterways, farm dams and drainage features. - Deploying suitable spill kits for containment of any spill.
Introduction and Spread of Weeds	Weed Management Procedure including vehicle and machinery hygiene protocols.
Instream Works Required for Infilling of the Unnamed Waterway	The proponent acknowledges this impact and proposes a financial offset.
Permanent Waterway Barrier Works Associated with Haul Road Waterway Crossings of the Unnamed Waterway.	Waterway barriers will be designed to achieve the ADR for Waterway Barrier Works. Where achievement of the ADR is not possible, then a suitably qualified person will be engaged in the detailed design process to ensure the design achieves positive fish passage outcomes, and secondary approval will be sort.
Changes to Downstream Water Quality	The release of MAW associated with the proposed Project will be in accordance with the existing EA conditions, including release volumes. Minor changes to downstream hydrology from removal of the unnamed waterway will have minor impact on run-off and flow in the unnamed waterway, and negligible impact on flows in the Isaac River.
Changes to Downstream Hydrology	The Project will not require additional release points to those already used and approved under the EA, and any releases will continue to be made in accordance with the lease limits of the EA and as per current operations.

3.1.2.6.4.3 Infrastructure Areas (New Chum Creek)

New Chum Creek was noted to remain largely intact, with the primary disturbance being the haul road crossing. Potential impacts include:

- Short-term sedimentation and turbidity during construction
- Localised flow modification at the crossing
- Changes to runoff quality from infrastructure areas

The impacts were expected to be short-term and manageable with standard erosion, sediment and water quality controls.

3.1.2.6.4.4 Cumulative Impacts

The EIS (2008) report that while cumulative pressures across the Isaac and Fitzroy catchments were acknowledged due to numerous mining operations in ephemeral drainage systems, the contribution from the Daunia Project was expected to be small, given the limited ecological value of the affected habitats and the minor proportion of catchment affected.

Updated assessments completed for the DWIP indicate that this conclusion remains valid. The proposed release strategy to the Isaac River is informed by existing release conditions applied to nearby operating coal mines and sits within a broader strategic framework designed to manage cumulative water quality impacts across the catchment.

3.1.2.6.5 Water licences

DNM currently holds a water licence permitting the taking of underground water (Table 3-21).

Table 3-21 Water licence applicable to DNM

Authorisation number	Authorisation activity	Authorised purpose	Approval date (most recent update)	Expiry date
603817	Taking of underground water – dewatering	Take water	10/11/2010	30/06/2111

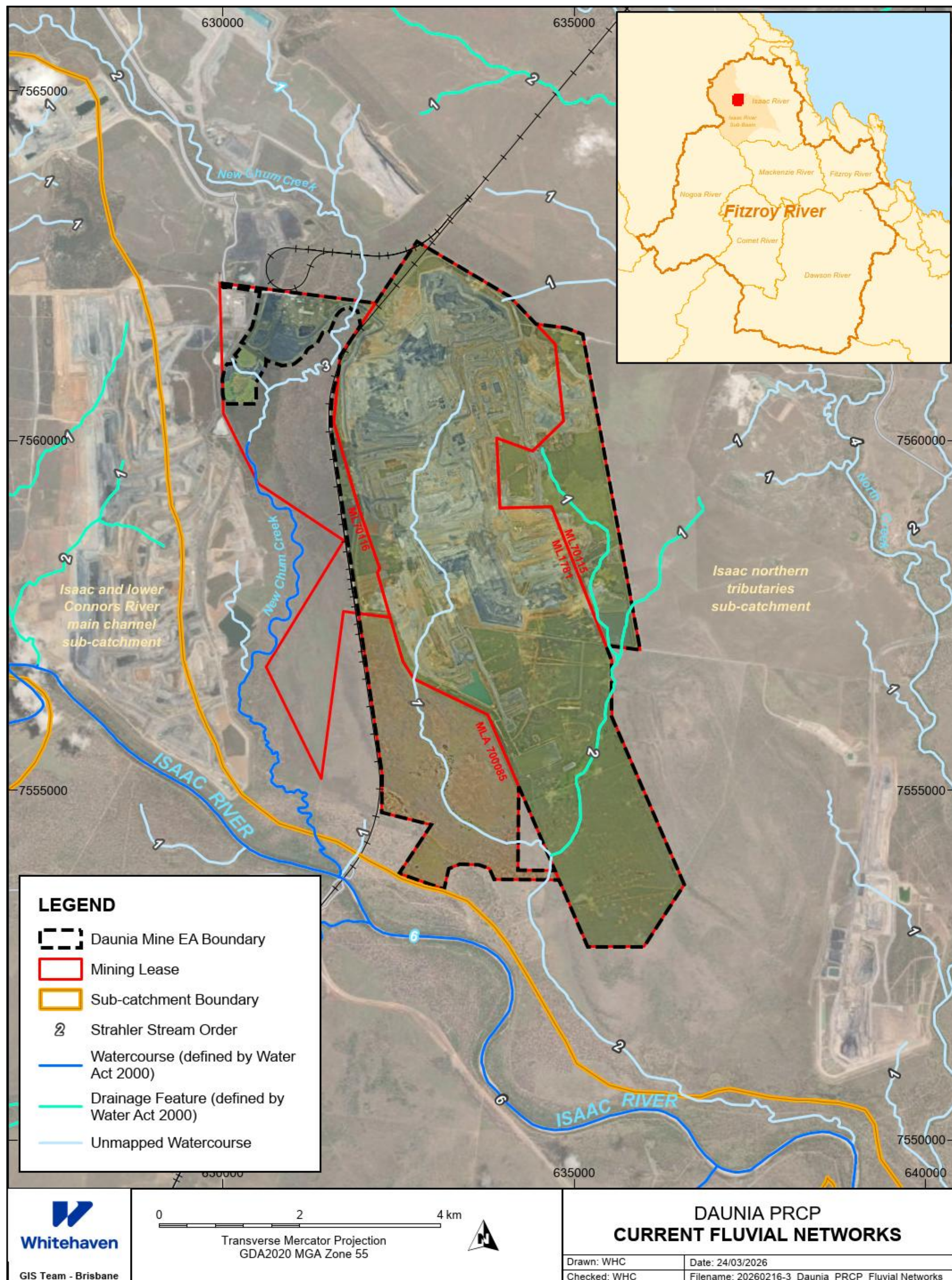


Figure 3-17 DNM current fluvial network

3.1.2.7 Soil types, properties and productivity

3.1.2.7.1 Soil context

Three baseline soil surveys have been undertaken during the life of DNM (Bourne & Tuck, 1993; BMA, 2008; GT Environmental Services, 2012). A total of 11 soil mapping units (SMU) have been identified. A summary of the Australian Soil Classification corresponding to the SMUs and a description of soil types at DNM is included in Table 3-22. The soil mapping according to the Australian Soil Classification is shown in Figure 3-18. Further detail is provided in Appendix 4.3 – Material Characterisation.

The pre-mining land suitability class of DNM was assessed in accordance with the *Guidelines for Agricultural Land Evaluation in Queensland* (DSITI & DNRM, 2015) classification system. This system allows for land to be allocated into five possible classes (with land suitability decreasing progressively from Class 1 to Class 5) which are derived from limitations that include soil type. The DNM pre-mining land suitability classes for grazing were predominately Class 2 to 3 with some small areas of Class 4, as provided in Table 3-22.

Table 3-22 Summary of DNM soil types

SMU code	Associated Australian Soil Classification	Land Suitability Class	Additional notes
DB1	Vertosol, Dermosol	3	Hard setting uniform clays with brigalow with coarse structured subsoils on hard sandstone below 90cm. Minor variants include surface laterite gravels and fractured sandstone throughout the profile
DB2	Vertosol, Dermosol	2	Cracking and non-cracking clays. Brigalow, bauhinia, poplar box and Dawson's gum
DB3	Vertosol	2	Alluvial clay plains on grey cracking brigalow clays
DB4	Vertosol	2	Little or no gilgai
DB5	Gravelly Dermosol	4	Similar to DB1 but much shallower and rockier. Prominent surface gravels and occasional sandstone outcrops
DB6	Vertosol	3	Tall poplar box with scattered brigalow on cracking clays with silty clay loam veneer surface
DE1	Vertosol, Dermosol	2	Mountain coolibah uplands with brown clay on sandstone and other sediments
DD1	Vertosol	2	Broad lower elevation alluvial areas
A2	Chromosol, Sodosol	4	Hard setting sandy loam duplex soils alongside New Chum Creek often with bleached A2 over hard, coarse structured medium yellow clay often heavily mottled. Poplar box mixed woodlands with associated brigalow and blackbutt
B4	Vertosol	2	Deep well-structured black cracking clay with granular surface mulch
B4v	Vertosol, Dermosol	2	Fine granular non-cracking red/brown brigalow scrub soil

Based on the soil characteristics, one soil management group has been identified for rehabilitation, red/brown clay soil with a neutral pH, and high buffering capacity and total organic carbon content. Table 3-23 summarises the chemical parameters of the representative undisturbed soil management group at DNM. The sample locations in Table 3-23 are shown in Figure 3-18.

Table 3-23 Chemical properties of the soil management group (0-10cm) of DNM (BMA, 2008)

Analysis (unit)	Soil management group and sample ID			
	Red/brown clay soil sampling results			
	3	18	30	44
Soil pH (H ₂ O)	6.8	7.6	7.3	7.8
Soil EC (dS/m)	0.13	0.14	0.13	0.14
Total organic carbon (%)	3.7	3.6	3.6	3.5
Cation exchange capacity (CEC) (meq/100g)	23.44	34.07	33.05	39.14
Exchangeable sodium percentage (ESP) (%)	1.2	1.2	2.2	1.1
Ca/Mg (ratio)	2.64	3.96	3.23	4.55
Clay content (%)	33	53	61	49

As a result of the DWIP, further soil and land resources assessment has been undertaken within the mining lease application area. The desktop assessment showed two dominant SMUs and one sub-dominant SMU underlaying the area as follows;

- Epipedal Black-Brown Vertosol;
- Palic Brown Arenosol; and
- Sodic Eutrophic Black Chromosol (found within Black-Brown Vertosol).

Soil sampling and quality analysis was undertaken inclusive of a laboratory assessment. A range of topsoil thicknesses from 10 – 40 cm were noted and exhibited a neutral pH. An Emerson Aggregate Test (EAT) revealed Class 3 soil which are considered moderately dispersive, furthermore, sodium testing revealed generally non-sodic topsoil with generally sodic to high sodic subsoils. As such the erodibility risk is moderate to high and significant erosion and sediment controls are likely to be required.

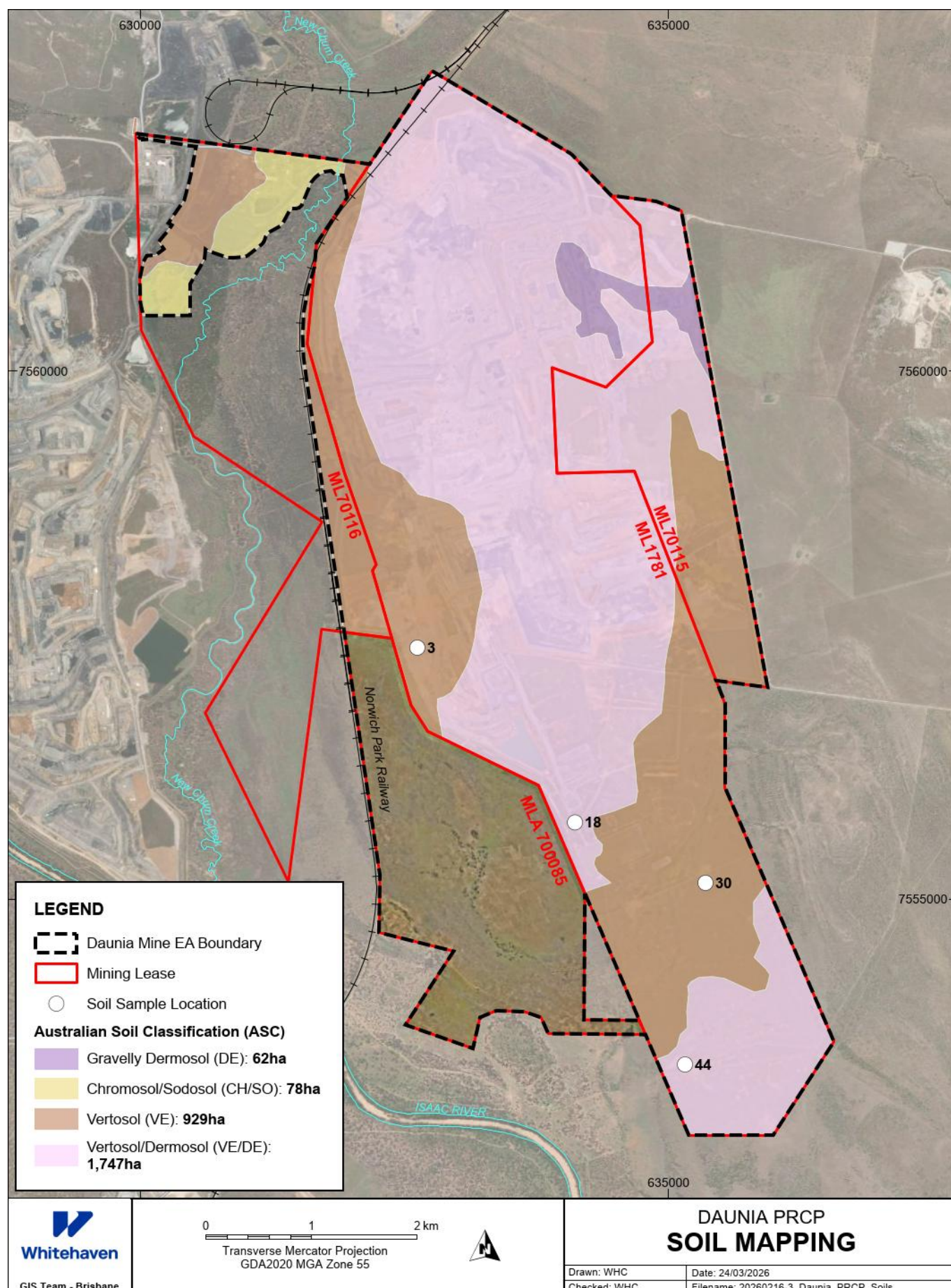


Figure 3-18 DNM soil mapping units (Australian Soil Classification)

3.1.2.8 Land stability

Prior to mining, DNM had been largely cleared of native vegetation and was being utilised for cattle grazing pastures, resulting in extensive cover of buffel grass. As discussed previously in Section 3.1.2.7, few of the soils exhibited good surface mulching characteristics and all were relatively hard setting at the surface with quite hard blocky clays mostly within 40 cm of the surface. Subsoils and overburden were noted to have variously elevated ESP values indicating they are marginally sodic to sodic and may be prone to dispersion (BMA, 2008). Placement of sodic soil or overburden on final external batters was to be avoided.

3.1.2.9 Vegetation communities and ecological data

A number of previous ecological studies relating to vegetation communities and ecological values (i.e. regional ecosystems, threatened flora and fauna species and their habitats) have been undertaken within the DNM site. An initial baseline flora and fauna survey was conducted across the DNM site in 2008 (SKM, 2008). Several additional smaller project-based terrestrial ecological assessments have also been undertaken, including:

- Daunia Mine Endangered Regional Ecosystem Ecological Assessment Report (DNM ERE Assessment) (ELA, 2015);
- Daunia Mine Project Skoll Matters of State Environmental Significance Assessment (ELA, 2016);
- Daunia Mine Calypso Ecological Assessment (ELA, 2019); and
- Daunia West Infrastructure Project (SLR, 2025).

The results of the previous ecological studies and the following Queensland Government ecological database searches have been reviewed to determine the baseline vegetation communities and ecological values of the DNM site, as well as the fauna presence and habitats as discussed in Section 3.1.2.10:

- Regional ecosystem mapping (DES, 2022b);
- Matters of state environmental significance mapping (MSES) (DES, 2022c);
- Maps of environmentally sensitive areas (DES, 2022d); and
- WildNet records conservation significant species (DES, 2022e).

It is important to note that vegetation clearing and disturbance activities approved within the DNM site may have occurred since previous ecological assessments.

3.1.2.9.1 Regional ecosystems

The majority of the vegetation communities and regional ecosystems (REs) on the DNM site were cleared prior to development of the existing mine site (SKM, 2008). The results of the initial flora and fauna surveys confirmed the majority of the DNM site supported non-remnant cleared grasslands dominated with buffel grass (*Cenchrus ciliaris*) with or without brigalow (*Acacia harpophylla*) and/or poplar box (*Eucalyptus populnea*) regrowth (SKM, 2008). However, other native grass species including *Dichanthium spp.* and *Astrebla spp* were also mapped as a subdominant pre-clearing regional ecosystem.

In addition, field surveys undertaken as part of the DNM ERE Assessment (ELA, 2015) and DNM Project Skoll (ELA, 2016) verified smaller areas of remnant and high value regrowth (HVR) REs occurring along the north-western edge of the DNM site (Figure 3-21).

More recently the DWIP (SLR, 2025) identified areas of remnant vegetation to the west of the DNM site. A significant residual impact assessment under the *Nature Conservation Act 1992* (NC Act) was completed, identifying that the development would result in 16.26 ha of impact to Endangered or Of Concern REs and 5.94 ha of impact to REs within the defined distance from the banks of an identified watercourse under the VM Act.

The remaining ground-truthed REs previously recorded on DNM are listed in Table 3-24 along with their *Vegetation Management Act 1999* (VM Act) class and biodiversity status. These are mapped in Figure 3-20 (SKM, 2008; ELA, 2015; ELA, 2016 and SLR, 2025).

Table 3-24 Ground-truthed regional ecosystems recorded during ecological assessments at DNM

Community description	RE	Remnant/ HVR	RE VM Act class	RE biodiversity status
<i>Acacia harpophylla</i> shrubby woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains	11.4.9	Remnant HVR	Endangered	Endangered
<i>Eucalyptus populnea</i> and/or <i>E. melanophloia</i> and/or <i>Corymbia clarksoniana</i> on Cainozoic sand plains and/or remnant surfaces	11.5.3	Remnant HVR	Least concern	No concern at present
<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest to woodland on fine grained sedimentary rock.	11.9.5	Remnant HVR	Endangered	Endangered
<i>Eucalyptus coolabah</i> woodland on alluvial plains	11.3.3	Remnant	Of concern	Of concern

Due to the level of previous clearing on DNM prior to the commencement of mining, pre-clearing regional ecosystems were also reviewed to improve the understanding of the main vegetation communities occurring on DNM. The results of the pre-cleared REs mapped for DNM are listed in Table 3-25 and illustrated in Figure 3-19 along with their VM Act class and biodiversity status. The results of the review of pre-clearing regional ecosystems have also been used to plan for woodland habitat revegetation targeting the key regional ecosystems likely to have occurred prior to mining that are achievable on the rehabilitated landforms, slopes, spoils and soils (Refer Section 3.6.1.8).

Table 3-25 Pre-clearing regional ecosystems mapped on DNM (DES, 2023a)

Community description	RE	RE VM Act class	RE biodiversity status
<i>Dichanthium</i> spp., <i>Astrelba</i> spp. grassland on Cainozoic clay plains	11.4.4	Least concern	Of Concern
<i>Acacia harpophylla</i> shrubby woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains	11.4.9	Endangered	Endangered
<i>Eucalyptus populnea</i> and/or <i>E. melanophloia</i> and/or <i>Corymbia clarksoniana</i> on Cainozoic sand plains and/or remnant surfaces	11.5.3	Least concern	No concern at present
<i>Eucalyptus melanophloia</i> +/- <i>E. orgadophila</i> woodland to open woodland on fine-grained sedimentary rocks	11.9.2	Least concern	No concern at present
<i>Dichanthium</i> spp., <i>Astrelba</i> spp. grassland on fine-grained sedimentary rocks	11.9.3	Least concern	No concern at present
<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest to woodland on fine grained sedimentary rock.	11.9.5	Endangered	Endangered

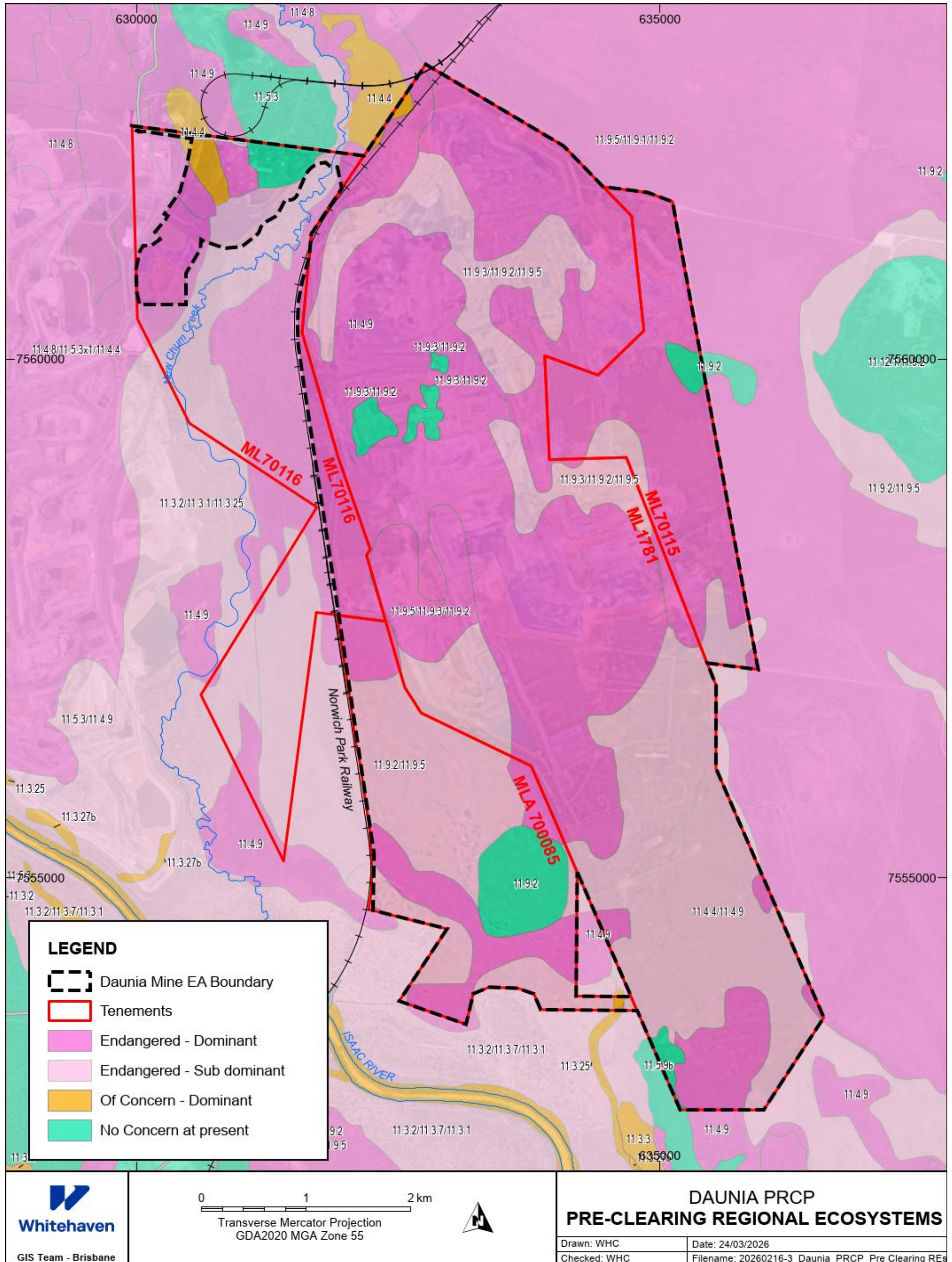


Figure 3-19 Pre-clearing regional ecosystems

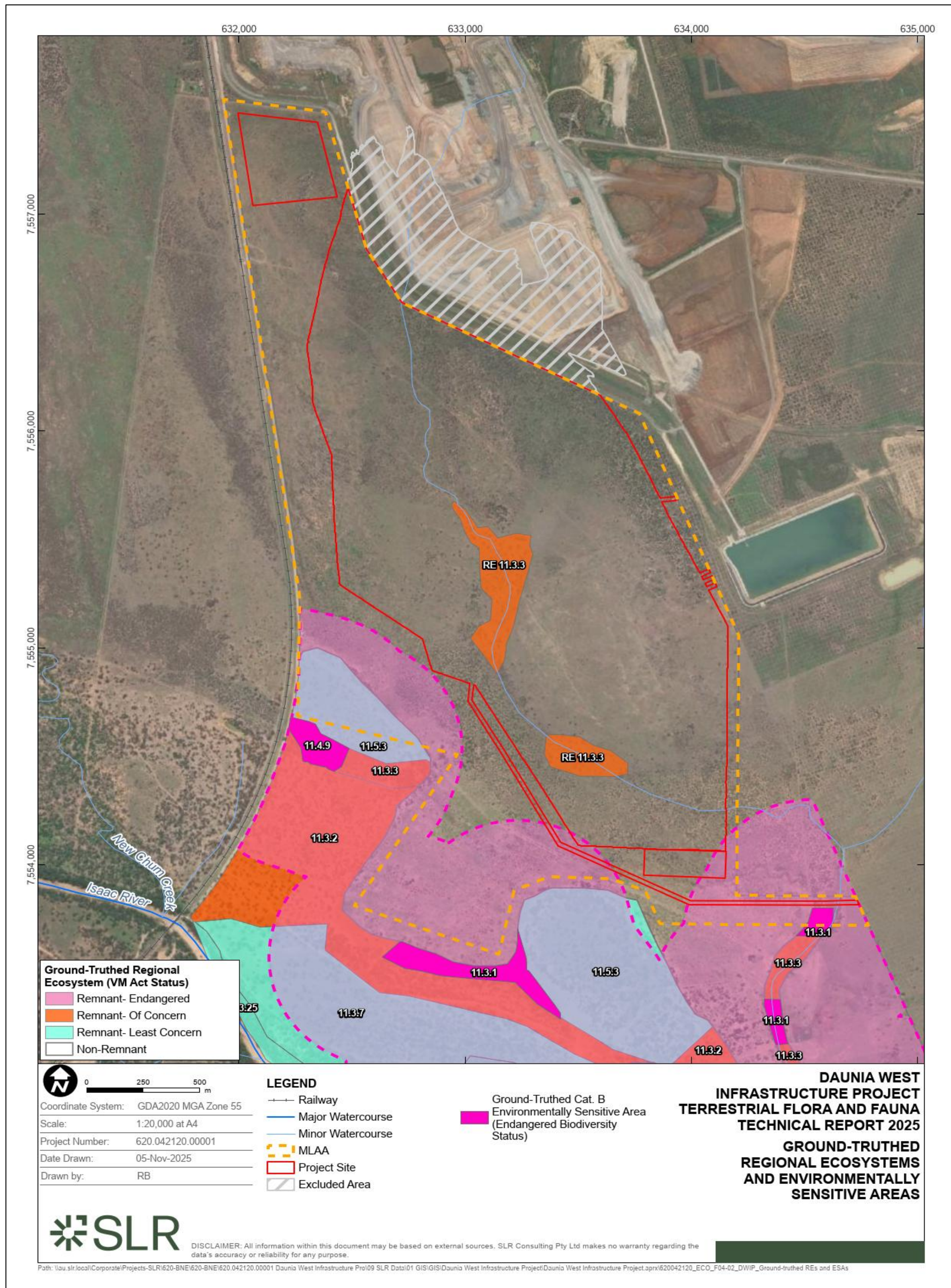


Figure 3-20 Daunia West Infrastructure Project - Ground-truthed regional ecosystems and environmentally sensitive areas

3.1.2.9.2 Environmentally sensitive areas

Category B environmentally sensitive areas (ESAs) are defined under Schedule 19 of the *Environmental Protection Regulation 2019* to include Endangered REs based on the biodiversity status identified in the 'Regional ecosystem description database'.

At the time of the ecological assessment (ELA, 2015), the following ground-truthed REs with an Endangered biodiversity status were associated with Category B ESAs (Figure 3-21):

- RE 11.4.9 - *Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains
- RE 11.9.5 - *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks

The DWIP (SLR, 2025) : reviewed ESAs within the western Mining Lease Application Area (MLAA). A 2023 field assessment identified one Endangered RE within the MLAA and one bordering the MLAA. Both are associated with Category B ESAs :

- RE 11.3.1 – *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains
- RE 11.4.9 – *Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains

3.1.2.9.3 State significant flora species

No threatened flora species listed under NC Act have been recorded within the DNM site based on previous baseline ecological surveys and desktop searches (SKM, 2008; ELA, 2015; ELA, 2016; ELA, 2019; DES, 2022d; SLR, 2025).

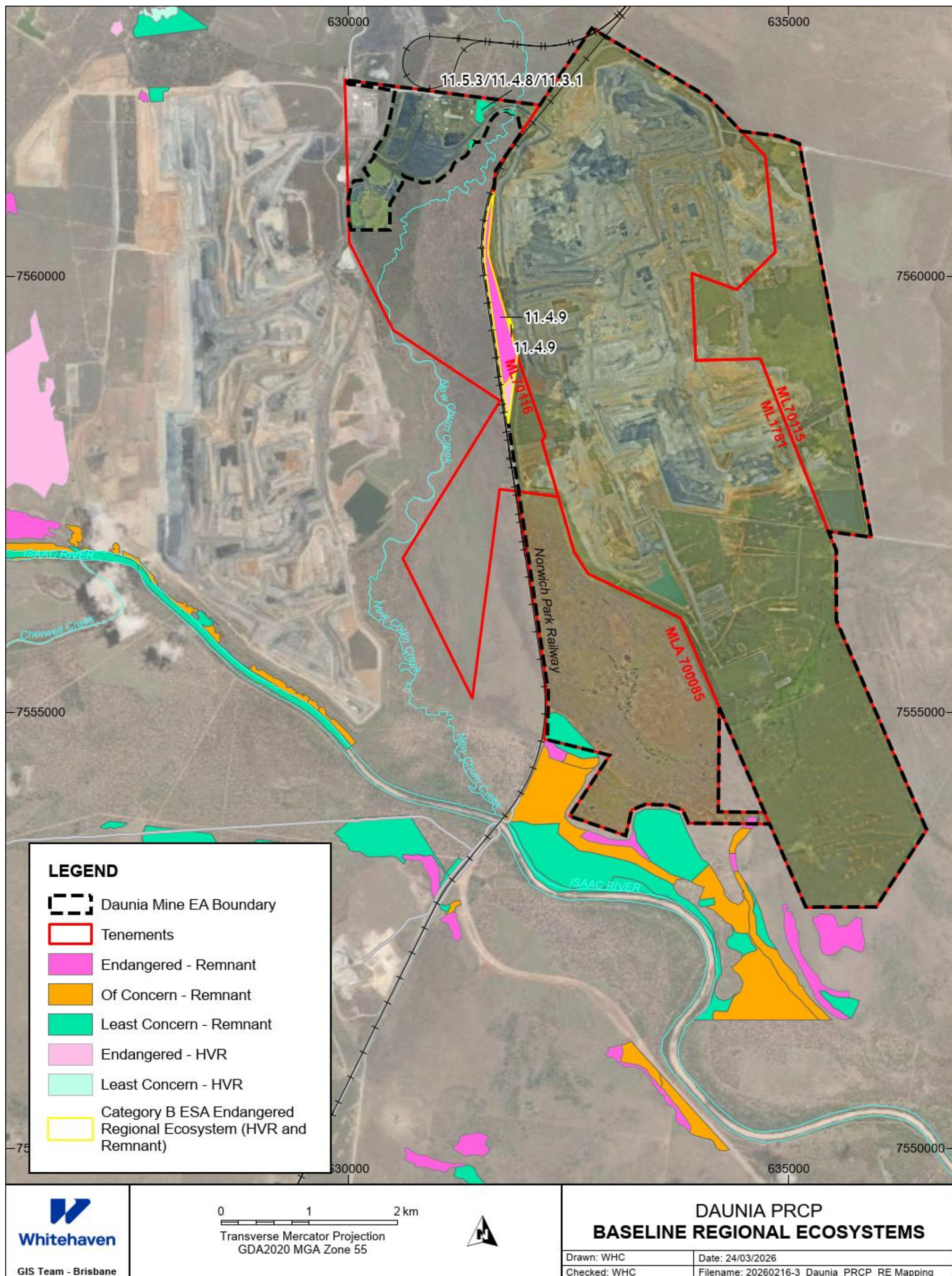


Figure 3-21 DNM baseline regional ecosystems and environmentally sensitive areas (ESA)

3.1.2.10 Fauna presence and populations

3.1.2.10.1 State significant fauna species

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

- Ornamental snake (*Denisonia maculata*) (Vulnerable NC Act) (ELA, 2015)
- Short-beaked echidna (*Tachyglossus aculeatus*) (Special least concern NC Act) (ELA, 2015)
- Rufous fantail (*Rhipidura rufifrons*) (Special least concern NC Act) (ELA, 2015)

Ornamental snake was recorded during spotlighting searches within brigalow woodland habitat containing ephemeral gilgais (ELA, 2015). This habitat has a highly structural complex ground layer consisting of large amounts of woody debris and soil cracks, as well as containing ephemeral gilgais (ELA, 2015). Ornamental snake habitat has been mapped in areas of remnant and regrowth brigalow associated with REs 11.4.9 and 11.9.5 (Figure 3-22).

Echidna was recorded within the brigalow woodland habitats containing ephemeral wetlands in the north-western portion of the DNM site (ELA, 2015). Although not observed in other habitats, it is expected the echidna has potential to occur in all terrestrial habitats in the DNM site except intensively managed farmland (ELA, 2015).

The rufous fantail was recorded within mature brigalow regrowth associated with RE11.9.5 (ELA, 2015) (Figure 3-22). Although the species was recorded on DNM site, the species preferred habitat includes wet sclerophyll forest and rainforest, which is not supported within the DNM site.

The squatter pigeon (*Geophaps scripta scripta*) (Vulnerable NC Act) has also been determined as likely to occur on DNM site based on the presence of suitable foraging and dispersal habitat and the occurrence of nearby records within 1km of the DNM site (DES, 2022e). Suitable foraging habitat for the squatter pigeon is associated with the mature brigalow regrowth and poplar box regrowth communities within 3km of permanent water associated with REs 11.4.9, 11.9.5 and/or 11.5.3 (ELA, 2015) (Figure 3-22). The woodland and riparian habitats outside of the DNM site to the south along the Isaac River also provide potential breeding habitat for this species particularly when water is abundant.

The proposed woodland habitat PMLU area on DNM is 1,229 ha, representing a significant increase in the extent of woodland habitat vegetation as compared to pre-mining conditions. While there are no existing obligations to establish fauna corridors and/or promote fauna use in the within the DNM rehabilitation area, the woodland habitat revegetation will provide long-term connectivity for highly mobile species including birds, kangaroos and wallabies. It will also offer potential long-term habitat for threatened fauna species, including the koala and squatter pigeon. From a connectivity perspective, the woodland habitat areas will function as ecological stepping stones, enhancing linkages between New Chum Creek to the west and the Isaac River (Figure 3-22).

In 2025, a terrestrial ecology survey was undertaken for the DWIP (SLR, 2025). A significant impact assessment under the EPBC Act was undertaken as part of the survey. It concluded that squatter pigeon (southern) and koala were likely to lose breeding, foraging and dispersal habitats as a result of proposed works, however, this was unlikely to lead to significant impacts on these species. A significant impact assessment was also undertaken for the ornamental snake, concluding that the loss of potential breeding, foraging and dispersal habitats as a result of the project was likely to result in a significant impact.

The survey identified no conservation-significant fauna species within the DWIP area, however RE 11.3.3 was observed, noting that this area may provide breeding and foraging habitat for koala. As such a further habitat quality assessment was undertaken, which revealed two patches of RE 11.3.3 combined with a strip of interconnecting non-remnant vegetation between these patches. However, these areas are disconnected from adjacent areas of suitable habitat resulting in isolation due to historical mechanical clearing. Overall, the DWIP OOPD project site contains approximately 16.26 ha of suitable koala habitat (Figure 3-23).

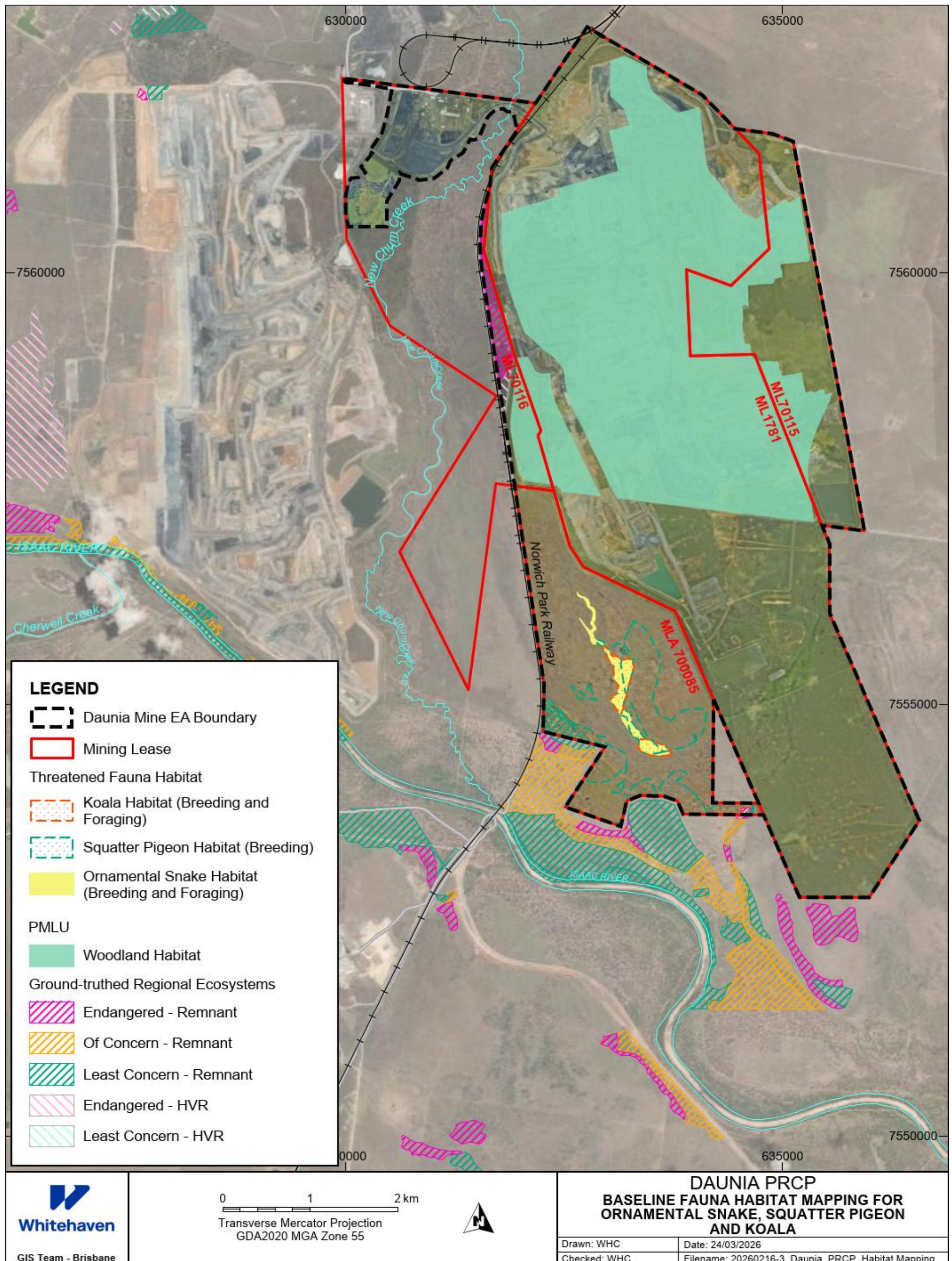


Figure 3-22 Baseline fauna habitat mapping for ornamental snake and squatter pigeon

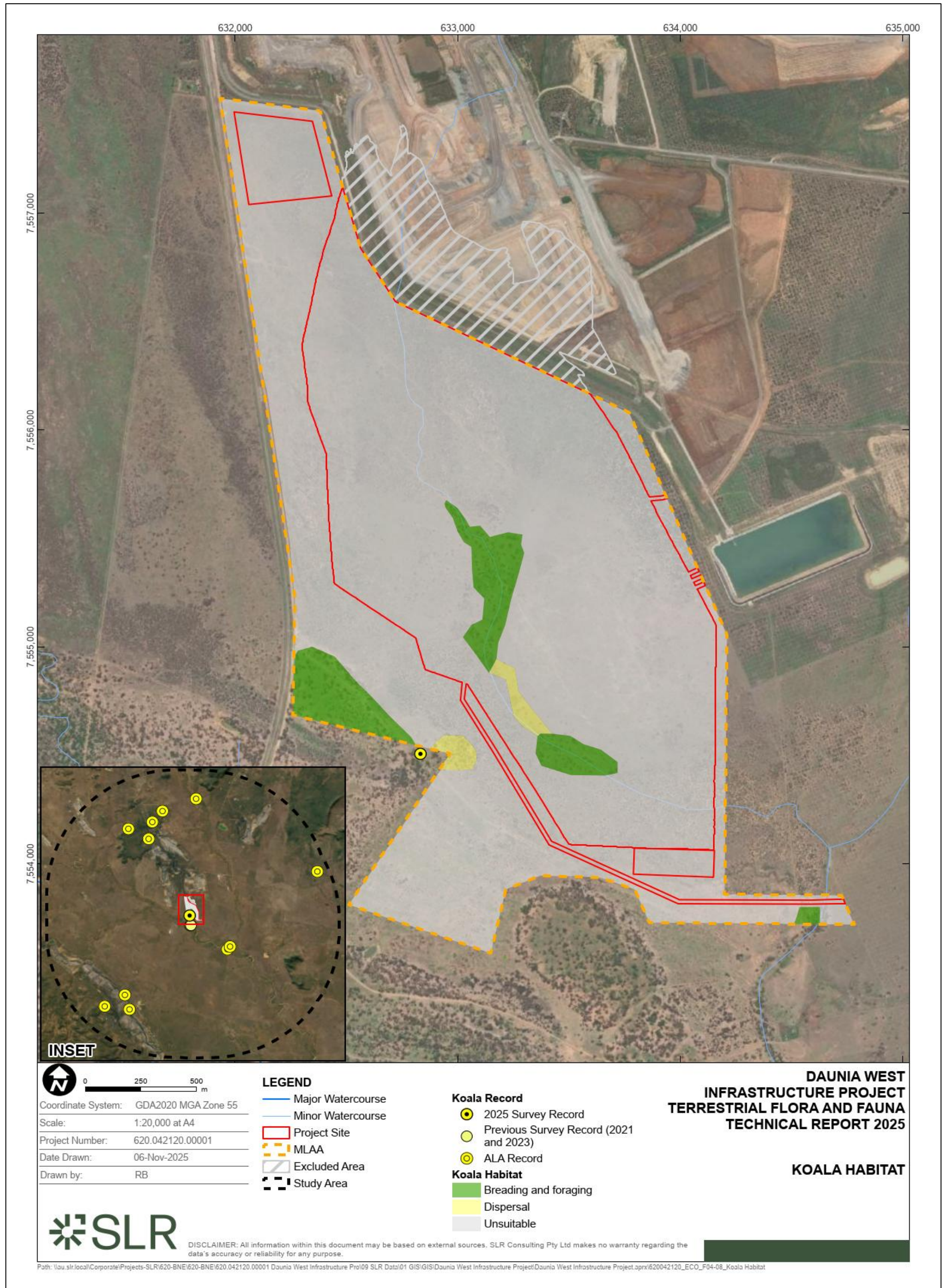


Figure 3-23 Daunia West Infrastructure Project – Koala Habitat

3.1.2.11 Pre-mining land use

Prior to mining, DNM had been largely cleared of native vegetation and was being utilised for cattle grazing pastures, resulting in extensive cover of buffel grass. Small areas of remnant vegetation in very poor condition remained as fragmented patches (SKM, 2008). Section 3.1.2.7 described the pre-mining land suitability for cattle grazing.

3.1.2.12 Underlying landholders

Land holding within the DNM site comprises the following:

- Whitehaven Coal Limited (WHC) freehold land (i.e. owned by Whitehaven Daunia Pty Ltd, held on behalf of WHC): ML70115 (100%), ML1781 (portion) and ML70116 (portion).
 - Whitehaven Coal Limited (WHC) leasehold land (i.e. leased by Whitehaven Daunia Pty Ltd from the State on behalf of WHC): ML1781 (portion) and ML70116 (portion).
 - Freehold land owned by J.D. and J.L. Lloyd: ML1781 (portion).
 - Freehold land owned by B.A. Nielsen: ML70116 (portion).
 - Freehold land owned by Stanmore Resources Limited: ML1781 (portion).
 - Freehold land owned by A.G.H. Williams: ML1781 (portion).
 - Freehold land owned by Queensland Rail (QR) and held as Lands Lease: ML1781 (portion) and ML70116 (portion).
 - Freehold land owned by Isaac Regional Council (IRC) (unnamed road reserve): ML1781 (portion)
- The underlying landholders for DNM are shown in Figure 3-24.

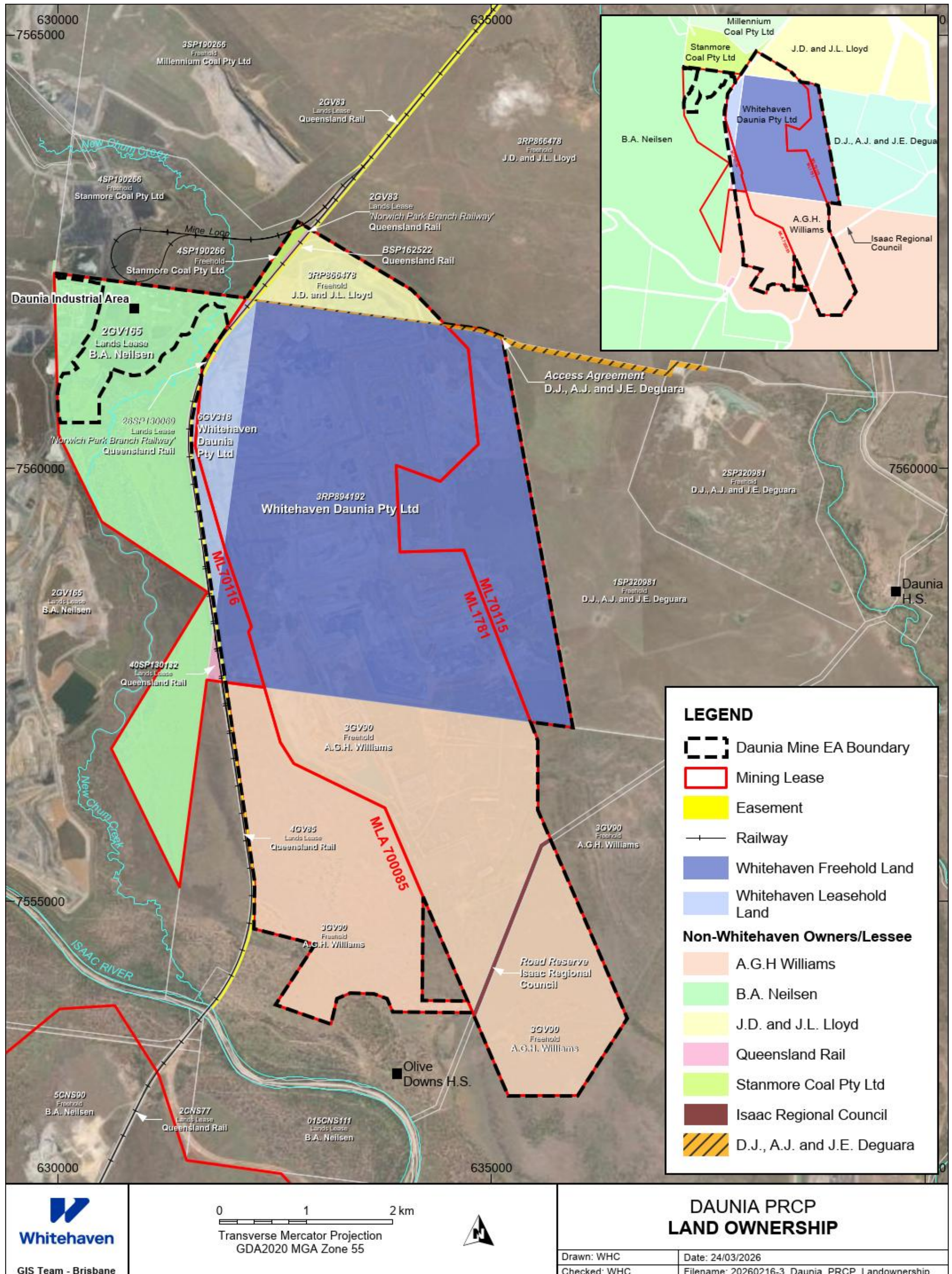


Figure 3-24 DNM land ownerships

3.1.3 Design for closure

This PRC Plan has been developed to manage progressive rehabilitation of the DNM 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 achievement of milestone criteria.
- Demonstrating a successful rehabilitation trajectory towards 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.*

PRCP Guideline (Section 3.1)

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

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

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 to the plan. The relevant activities at DNM that will require rehabilitation, the predicted duration and availability for progressive rehabilitation, are provided in Table 3-26. The areas requiring rehabilitation are illustrated in Figure 3-25.

DNM 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.

Based on current life-of-mine planning, mining at DNM is planned to conclude in 2042. Progressive rehabilitation works are underway across DNM and are expected to continue beyond the cessation of mining as defined in the PRCP Schedule.

Table 3-26 Relevant activities requiring rehabilitation at DNM

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. - Available for progressive rehabilitation as dump areas reach final position and they are no longer required for associated infrastructure or access requirements. - 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.
CHPP and associated infrastructure; coal stockpiles	Utilised until the end of coal processing.	Available for rehabilitation once coal processing is complete.
Workshop; buildings and other infrastructure areas	Varying: with the latest utilised until the end of rehabilitation activities.	- Dependent on the use and location, or unless deemed suitable to be retained for the PMLU. - The majority will be available for rehabilitation at the end of the major rehabilitation activities. - Some areas may be available earlier, such as at the end of mining or coal processing.
Roads; laydown and general disturbance	Varying: with the latest utilised until the end of rehabilitation activities.	- Dependent on the use and location, or unless deemed suitable to be retained for the PMLU. - Typically areas will be available for rehabilitation either at the end of mining or coal processing or after the major rehabilitation activities are complete.
Exploration	Throughout the operational life.	- Available for rehabilitation within six (6) months after exploration activities are complete (<i>as per Eligibility criteria and standard conditions for exploration and mineral development projects, or its successor</i>). - Exploration areas not planned to be mined and within designated Rehabilitation Areas, will be rehabilitated in accordance with the <i>Eligibility criteria and standard conditions for exploration and mineral development projects</i> or its successor.
Mine dams	Varying: with the latest utilised until the end of rehabilitation activities.	Available for rehabilitation when no longer required for water management.
Watercourse crossing	Utilised until the end of rehabilitation activities.	Available for rehabilitation when the major rehabilitation activities are complete.
Residual voids	Utilised until the end of mining.	Available for improvement once the PMLU low-wall spoil rehabilitation is complete for each pit.

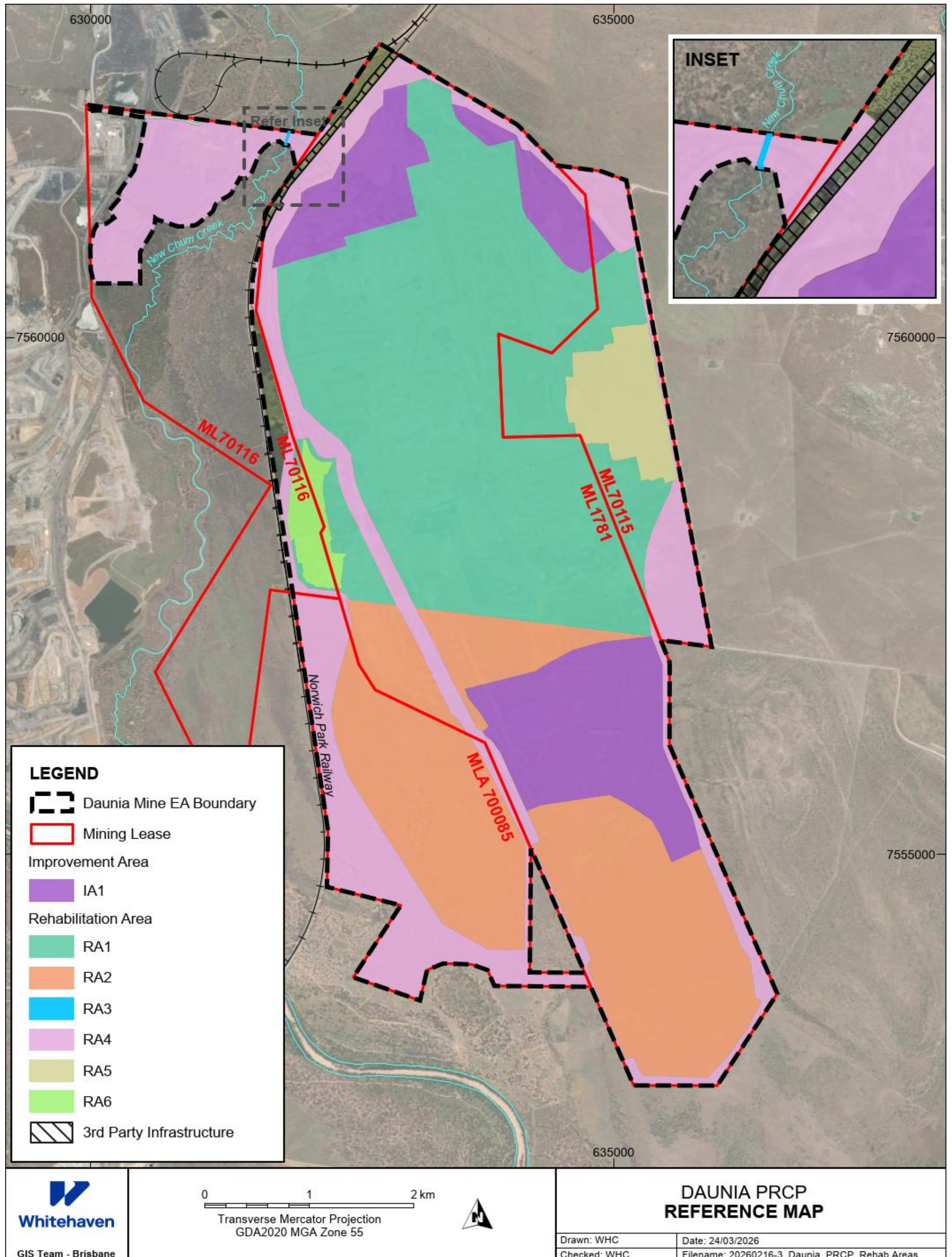


Figure 3-25 Reference map: indicative areas available for rehabilitation

3.1.4.2 Existing rehabilitation

DNM has commenced approximately 148 ha of existing rehabilitation towards the achievement of the nominated PMLUs and rehabilitation milestones outlined in the PRCP Schedule (Appendix 4.1 – PRCP Schedule). The existing rehabilitation hectares completed for the cattle grazing and woodland habitat PMLUs can be seen in Figure 3-25. These areas reflect the following:

- Cattle Grazing PMLU: 104 ha of existing cattle grazing rehabilitation is progressing towards Rehabilitation Milestone (RM) RM5 in Rehabilitation Area (RA) RA5
- Woodland Habitat PMLU: 44 ha of existing woodland habitat rehabilitation is progressing to RM5 in RA6

Note some smaller areas of existing rehabilitation have been excluded from the PRCP Schedule as they are likely to be re-disturbed by various mining activities. These areas are scheduled to be rehabilitated once they are no longer required for mining or ancillary activities.

No rehabilitation areas have been applied for progressive certification under the EP Act.

Routine rehabilitation monitoring was conducted across all DNM rehabilitation areas and two reference sites in November 2023 (BMA, 2024). Monitoring was undertaken in accordance with the *BMA Rehabilitation Monitoring Program Methodology Version 5* (BMA, 2023). Field survey and soils laboratory data was analysed to determine each sites performance against the post mining land use (PMLU) completion criteria for cattle grazing as per Table E1 of the DNM Environmental Authority EA. No woodland habitat rehabilitation had currently been undertaken on DNM at the time of monitoring.

Land suitability for cattle grazing was assessed and scored against the criteria under the '*Rehabilitated mined land suitability for beef cattle grazing in the Bowen Basin Technical paper 1 (revised cattle grazing rule set)*' (Highlands Environmental, 2023). It is important to note the revised cattle grazing rule set supersedes the previous version listed in the EA '*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.*' (Short, 2018).

An assessment of grazing land condition was 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) (Section 3.8.1.4.1.1).

A total of six cattle grazing rehabilitation sites were monitored in the FY24 monitoring program. Pasture condition monitoring results indicate that all areas of existing cattle grazing (excluding the areas seeded in 2023) are performing well with very high levels of preferred, palatable and productive pasture species (3P) >70% across all sites. Figure 3-26 to Figure 3-29 presents examples of the rehabilitation areas monitored in FY24, demonstrating pasture condition and vegetation.



Figure 3-26 Cattle grazing rehabilitation at DNM03



Figure 3-27 Cattle grazing rehabilitation at DNM04



Figure 3-28 Cattle grazing rehabilitation at DNM05



Figure 3-29 Cattle grazing rehabilitation at DNM06

Overall, the cattle grazing rehabilitation sites scored LSC ≤ 3 for most parameters with the only factors limiting scores being low available phosphorus (Colwell P, ranging from 5 to 9); and moderate to highly alkaline soils (up to pH 9.3).

Low levels of available phosphorus (P) are common in many soils as is indicated by the low levels of available P returned from reference sites with 6-7 P (Table 3-44). It could therefore be argued that where available P is the only limiting factor and where P values in 0-10 cm rehabilitation is equivalent to reference sites that the rehabilitation considered representative of pre-mining. Phosphorus is also able to be ameliorated through the application of P-based fertilisers (i.e. superphosphate).

Limitations associated with pH water in 0.1 m returned moderate to highly alkaline soils across all the rehabilitation sites ranging from pH 8.2 to 9.3. Sites with soil pH > 8.4 were scored an overall land suitability class of 4 and sites returning pH > 9.0 were scored an overall land suitability class of 5 as per the cattle grazing rule set (Highlands Environmental, 2023).

Cattle grazing rehabilitation and reference sites were assessed against 'land condition' as per the *Queensland Reef Water Quality Program Reef Protection Regulations in Reef Catchments Grazing Guide Version 2* (DES 2022) (hereafter Grazing Guide). Whilst all sites returned good to fair pasture condition several sites were recorded with active gully erosion therefore reducing the overall land condition score to poor. Site DNM05 however achieved an overall result of fair land condition so is on track towards achieving completion criteria for existing cattle grazing.

Ongoing monitoring will be undertaken on DNM as discussed in Section 3.8.

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.

The CCP documents the iterative consultation process used to guide ongoing PRCP-related engagement. It identifies stakeholders¹ considered to have a genuine, demonstratable and legitimate interest in the ongoing rehabilitation and closure planning at DNM. Table 1 of Appendix 4.4 describes the stakeholders, the nature of existing relationships, and their potential areas of interest with respect to the DNM'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); and
 - Information provided to the community; and
- Engagement outcomes, including:
 - Issues raised by/discussed with the community
 - How issues have been considered; and
 - Decisions/outcomes of the engagement

3.2.1 Commitments made to address feedback consultation to date

Initial consultation and engagement relating to DNM was undertaken by BMA during 2008-2009 when obtaining the EA. Since then, the following rehabilitation and closure-related engagement by BMA has taken place for DNM:

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

- During 2018, BMA engaged with DES on the PMLUs and associated acceptance criteria within the EA. These PMLUs and acceptance criteria were included in the 18 November 2019 DNM EA amendment, reflected as Table E1 (Rehabilitation Requirements).
- Since 2021, BMA has been providing regular PRC planning briefings to the Isaac Regional Council (IRC) as part of bi-annual and special purpose meetings. This has included briefing the IRC on the commencement of the DNM PRCP process (November 2022 and January 2023).
- Since 2021, BMA has also undertaken ongoing consultation with the BBAC, who represent the Barada Barna People as Traditional Owners. Consultation to date has included various aspects related to rehabilitation. BBAC's feedback has included a request to work together with BMA to understand how they can get involved in rehabilitation execution activities over time, as guided by the PRCP Schedules to be submitted for approval.

Following WHC's acquisition of DNM in 2024, WHC has undertaken further consultation through:

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

The following parties were engaged:

- BBAC;
- Underlying and adjacent landholders (within 5 km) of DNM's MLs;
- The General Manager and general mine personnel at DNM;
- IRC;
- Members of the Moranbah community, including residents, business owners, and community organisations and groups;
- STAC members representing community members, groups and businesses in Moranbah and Dysart; and
- Queensland Parliamentary representatives (Member for Burdekin, Hon. Dale Last MP).

The following information was provided to stakeholders:

- DNM 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 the PRC Plan, 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:

- Multiple underlying landholders indicated a preference for reinstating as much grazing PMLU as practicable, consistent with surrounding property uses and future land management expectations.
- BBAC expressed continual interest in exploring opportunities to participate in final landform and rehabilitation activities over time.
- 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

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 PRC plan. The community consultation register must include:

- Consultation date(s)
- Identification of each community member
- Description of consultation type (workshop, quarterly meetings, etc.)
- Information provided to the community
- Issues raised/discussed by the community
- How issues have been considered ; and
- Decisions/outcomes of engagement

Table 3-27 documents the stakeholders identified as having a genuine interest and outlines the nature of DNM's relationships with each. It also highlights stakeholders' potential areas of interest with respect to DNM's PRCP planning. Further details are provided in the DNM PRC Plan Community Consultation Register provided in Appendix 4.4 – Community Consultation Plan and Register.

Table 3-27 Stakeholders identified as having a genuine interest in the DNM PRC Plan

Stakeholder	Existing relationship	Potential areas of interest
Traditional Owners		
Barada Barna Peoples, represented by Barada Barna Aboriginal Corporation (BBAC)	WHC have regular engagement with BBAC on a range of issues ranging from native title and cultural heritage to community and economic development.	- Aspirations around rehabilitation and potential commercial opportunities as a PMLU - How operational management and/or rehabilitation could contribute to future use of the areas - Recognition and management of cultural heritage impacts - Native Title and land acquisition interests - PMLUs, NUMAs and landform/landscape - Future access to and ownership of land - Environmental management/stewardship - Employment and business opportunities in rehabilitation, environmental management and monitoring
Underlying and Adjacent Landholders (within 5 km)		
Property Owners: - Olive Downs - Mavis Downs - Winchester Downs/Poitrel - Moorvale/Daunia - Wotonga	WHC (and previously BMA) has had a long and constructive working relationship with the property owners, including with respect to a compensation agreement.	- Environmental management/stewardship - PMLUs, NUMAs and closure landforms - PRCP Schedule - Future access to and ownership of land - Water usage, quality and access to groundwater and surface water (e.g. water allocations, water pipelines, etc.) - Potential impacts on land, water, property, and future business value relating to PMLUs, NUMAs and timing of impacts
Daunia Mine		
General Manager	WHC's Community Relations and Closure Team are in regular consultation with DNM's General Manager.	- Closure timing and planning - Rehabilitation strategy - Workforce transition - Community and economic impact - Local employment and business opportunities in rehabilitation works - Legacy and post-closure vision
Mine Personnel	WHC maintains ongoing communication with its workforce through 'toolbox' talks.	- Timing of closure - Rehabilitation obligations - Employment continuity - Management of closure impacts on employment and businesses - Economic and community sustainability - Local employment and business opportunities in rehabilitation works
Local Government		
Isaac Regional Council (IRC)	- WHC has regular meetings with Council, and meets with Councillors and officers as needed on specific issues. - WHC and IRC meet at least twice each year. - These updates will continue throughout mine operations and into mine closure.	- Local employment - Effects on Council services and infrastructure - Environmental management/stewardship - Rehabilitation progress and PRCP Schedule - PMLUs, NUMAs and closure landforms - Management of closure impacts on employment and businesses - Alignment of rehabilitation plans with local and regional planning goals, and regional transformation/diversification - Economic transformation (towards post-mining) and community sustainability - Cumulative impacts of closure of multiple mining assets in a similar timeframe (e.g. job and population losses)

Stakeholder	Existing relationship	Potential areas of interest
Moranbah Community		
Moranbah residents	WHC conducts a range of engagement activities with community members, from one-off responses to enquiries, to regular community information processes and attendance at the local Moranbah markets. DNM personnel and their families are an important part of the Daunia community.	- Timing of closure - Rehabilitation obligations and progress - Environmental management / stewardship - Employment continuity - Post-mining landforms, and NUMAs - Management of closure impacts on employment and businesses - Economic and community sustainability - Local employment and business opportunities in rehabilitation works
Moranbah Community Groups and Businesses		
Community Groups and Businesses in Moranbah and the Isaac Region	WHC utilises a wide range of communication, consultation and social investment strategies to develop and maintain relationships with Bowen Basin community groups. The Moranbah Smart Transformation Advisory Council (STAC) is sponsored by WHC and represents a broad cross-section of community and business interests in Moranbah. The Moranbah STACs are sponsored by WHC and represent a broad cross-section of community and business interests. The STACs meet approximately every two months.	- Local employment and business opportunities, and future jobs - Opportunities to participate in supply chain (e.g. environmental management, rehabilitation) - With closure, loss of jobs and supply opportunities, and changes to demands for services (e.g. childcare and schools) - Potential for cumulative job losses if other mines close in a similar timeframe - Economic transformation (towards post-mining), and industry diversification - Educational and childcare opportunities - Wellbeing and health/healthcare provision - Economic and community sustainability - Environmental management - PMLUs and NUMAs - Community and economic transformation
Utilities		
Corporations and Government agencies: - Aurizon (rail) - Queensland Rail (rail) - IRC (road reserve) - Ergon Energy (power supply)	WHC has constructive working relationships and engages with utility owners and easement holders as required (issue-specific or transactional engagement). This includes engagement on: - Sections of the Norwich Park Branch Railway (owned by QR and operated by Aurizon), located within ML 1781 and within ML 70116. - The train load-out (TLO) and rail loop, which are owned by QR and operated by Aurizon, located within the RMI ML 70312 (owned by Stanmore Coal Pty Ltd.). - An unnamed road reserve owned by IRC, which transects ML 1781, and is subject to a Compensation Agreement with IRC. - Ergon Energy powerlines within ML 1781 and ML 70116.	- WHC has constructive working relationships and engages with utility owners and easement holders as required (issue-specific or transactional engagement). This includes engagement on: - Sections of the Norwich Park Branch Railway (owned by QR and operated by Aurizon), located within ML 1781 and within ML 70116. - The train load-out (TLO) and rail loop, which are owned by QR and operated by Aurizon, located within the RMI ML 70312 (owned by Stanmore Coal Pty Ltd.). - An unnamed road reserve owned by IRC, which transects ML 1781, and is subject to a Compensation Agreement with IRC. - Ergon Energy powerlines within ML 1781 and ML 70116.
Adjacent and Nearby Mining Interests		
Mining interests: - Poitrel Mine (Stanmore) - Red Mountain - Infrastructure (Stanmore) - Millennium Coal (Stanmore and Metres) - Moorvale Mine (Peabody Energy) - Isaac River Project (Coking Coal One Pty. Ltd. / Bowen Coking Coal Ltd) - Winchester South (Whitehaven Coal)	WHC liaises with adjoining and nearby mining and resource interests on an as-needed basis, in relation to <i>Mineral and Energy Resources (Common Provisions) Act 2014</i> (Queensland) (MERCPA) requirements for overlap activities, and as part of industry associations and research partnerships.	- Future land use and ownership - Collaboration on good industry rehabilitation and closure practices - Cumulative impacts and opportunities of mine closures - Cessation of use of DNM CHPP, conveyor, and TLO

Stakeholder	Existing relationship	Potential areas of interest
— Olive Downs (Pembroke Resources)		
Petroleum Tenement Holders		
Petroleum (gas) tenements: — Arrow Energy (CH4 Pty Ltd)	CH4 Pty Ltd (Arrow Energy) hold an Authority to Prospect and a Potential Commercial Area (for coal seam gas) which overlap with Daunia Mine's MLs. As the MLs were granted prior to the enactment of the MERCPA, and ML 1781 also holds gaseous hydrocarbons rights, there is no requirement to notify CH4 Pty Ltd of activities within the MLs. CH4 Pty Ltd is considered as an adjacent tenement holder.	— Future land use and ownership — Collaboration on good industry rehabilitation and closure practices — Cumulative impacts and opportunities of mine closures
State Government		
Department of Environment, Tourism, Science and Innovation (DETSI) Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (DNRMMRRD) Department of Primary Industries (DPI)	WHC has constructive working relationships with DNRMMRRD and DETSI. DNRMMRRD's Deputy Director-General Georesources has asked to be kept informed on PRC planning. Consultation on DNM's PRC Plan is not expected to be required by other State Government stakeholders, but they are briefed as necessary.	— Legislative compliance — Resource development — Employment and growth opportunities — Public interest — Environmental management — Economic transformation (towards post-mining) — Financial assurance — Environmental risk management — Future PMLUs, NUMAs and closure landforms — Company responses to stakeholder views — Industry best practice, and innovative future-looking approaches
Queensland Ministerial Representatives		
Queensland Parliament - Member for Burdekin	WHC provides briefings to the Member for Burdekin's office on an as-needed basis.	— Closure planning — Workforce transition strategies — Community engagement efforts — Economic sustainability initiatives — Opportunities for collaboration
Federal Government		
Office of the Minister and Dep. Sec. Environment Protection, Department of Climate Change, Energy, the Environment and Water	WHC provides briefings to the Minister's office on an as-needed basis.	— Closure planning — Workforce transition strategies — Community engagement efforts — Economic sustainability initiatives — Opportunities for collaboration

3.2.3 Ongoing consultation

3.2.3.1 Consultation objectives, engagement type and frequency

Once the DNM transitional PRC Plan has been approved, consultation as part of implementing the DNM PRC Plan will be informed by the program documented in Table 3-32, 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 3-28 Consultation program for PRC Plan implementation

Consultation Objective #1:	To engage stakeholders with a genuine interest in developing objectives and aspirations for post-mining land use and landform, and social value opportunities to be considered in PRC planning	
Stakeholders	Engagement type	Proposed consultation frequency
- Barada Barna Peoples, represented by Barada Barna Aboriginal Corporation (BBAC) - Underlying and Adjacent Landholders - Local Government, IRC - Moranbah Community	Advise underlying and adjacent landowners, BBAC and IRC in writing when the PRC Plan is approved.	Once-off
	Communicate with underlying landowners during the terms of WHC's leases on their land and seek their inputs on DNM's PRCP Schedule and approved PMLUs and NUMAs.	As part of future updates and/or amendments of the DNM PRC Plan
	Meet with underlying landowners, BBAC and IRC to provide an update on the PRC Plan and progress with rehabilitation, and invite their inputs and feedback on: - The approved PMLUs, 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 - Shared value initiatives, e.g., infrastructure retention, capacity building, environmental management, or research partnerships - Rehabilitation methods, schedule, and progress towards milestones	As requested, or as agreed with representatives
	As part of bi-annual meetings with IRC, and addressing WHC's portfolio rather than individual assets: - Provide an update on the status of the PRC Plans, rehabilitation, and forecast upcoming PRC Plan consultation for WHC assets. - Seek to understand the Council's strategic analysis and planning for Isaac LGA and the DNM mining area. - Share information to support understanding of challenges, opportunities and community aspirations of relevance to mine closure and rehabilitation. - Co-operate if advocacy is required to achieve better PRC planning outcomes in the Isaac LGA. - Build in consideration of the outcomes of Smart Transformation's projects as relevant, and the IRC's intended transformation approach.	Bi-annually, or as agreed with IRC
	Participate in Council, community or industry-led initiatives including research partnerships which aim to harness social value from mine closure and rehabilitation planning, and/or work towards economic transformation/transition.	As invited
	In cooperation with BBAC and other First Nations within Isaac LGA, and on a portfolio wide basis: - Communicate the pipeline of opportunities relating to rehabilitation work and land management. - Develop a shared understanding of business capabilities relevant to closure and rehabilitation works. Plan and implement an Indigenous business capability development program to match rehabilitation opportunities if this is required.	Ongoing engagement process
	Via the Moranbah STAC, and/or PRC Plan-specific workshops or focus groups, seek the involvement of community members and groups in articulating community aspirations for rehabilitation, PMLUs and economic transformation.	To be supported by WHC- wide consultation, as required
	Provide community updates on DNM's PRCP if there are any substantive changes and associated PRCP Amendments required.	As relevant

Consultation Objective #2:	To support transparent access to information about DNM’s PRC planning and implementation, enabling opportunities for the Moranbah community, DNM suppliers and government agencies and representatives to provide inputs and feedback on rehabilitation and closure outcomes	
Stakeholders	Engagement type	Proposed consultation frequency
Daunia Mine: Mine Personnel	Keep the DNM workforce updated if there are changes to the PRC Plan.	Ongoing engagement process
Moranbah Community	Using community forums such as interagency meetings, the Moranbah STACs, partnership meetings and community and business networks, provide community updates on PRC planning (DNM-specific as relevant, and portfolio wide).	Ongoing engagement process
Moranbah Businesses	Provide information about the pending closure of DNM 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 — Shadow Minister for Environment, Great Barrier Reef, Science and Youth Affairs Resources — Member for Burdekin (Queensland Parliament) — Department of Environment, Tourism, Science and Innovation (DETSI) PRCP Team — Director, Native Title Services and Coal Hub, Department of Resources — Deputy Director-General of Georesources, Department of Resources — Assistant Secretary Assessments and Governance Branch, DCCEEW	As requested, or as agreed with representatives
Consultation Objective #3:	To engage with utility owners and operators, and adjacent mining and energy tenement holders, to provide information about DNM’s closure planning that supports them to manage their assets and interests	
Stakeholder	Engagement type	Proposed consultation frequency
Daunia Mine: General Manager	Involve internal WHC stakeholders in PRCP processes to build capacity for community consultation on PRCP issues and support effective delivery of PRC Plans.	Ongoing
Utilities: Aurizon (rail), Queensland Rail (rail)	Maintain correspondence with Queensland Rail and Aurizon regarding progressive rehabilitation activities as they affect the Norwich Park Branch Railway (operated by Aurizon Holdings on land owned by QR), and regarding the conveyor from DNM, TLO facilities (and associated services to operate) and rail line.	As requested, or as agreed with representatives
Utilities: IRC (road reserve) and Ergon Energy (power supply)	Engage with relevant utility owners to inform them of closure timelines and rehabilitation activities relevant to the land either: — Owned by Council as road reserve (IRC) — Utilised to provide Electricity Services (Ergon)	Initiated three years prior to decommissioning
	Maintain correspondence regarding progressive rehabilitation and undertake consultation regarding crossing/interface agreements, as required if rehabilitation will affect utilities	During the three years prior to decommissioning
Adjacent and Nearby Mining Interests: Including Poitrel Mine (Stanmore), Red Mountain Infrastructure (Stanmore), Millennium Coal (Stanmore and Metres), Moorvale Mine (Peabody Energy), Isaac River Project (Coking Coal One Pty. Ltd. / Bowen Coking Coal Ltd), Winchester South (Whitehaven Coal) and Olive Downs (Pembroke Resources). Petroleum Tenement Holders: Arrow Energy (CH4 Pty Ltd)	Engage with Stanmore regarding the schedule for cessation of use of the DNM CHPP, DNM conveyor and TLO facilities	Initiated three years prior to decommissioning
	Write to advise adjacent and nearby resource interests if there are any substantive changes to the closure and rehabilitation schedule in future iterations of the DNM PRC Plan. At a business level, WHC will participate in industry and research partnerships of relevance to PRCP and rehabilitation.	As requested, or as agreed with representatives/mining operations
State Government: Department of Resources	Provide updates on PRCP to the Director Native Title Services, Coal Hub (Rockhampton) 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 been successfully achieved

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

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

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

3.3.1 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 DNM will align with the requirements of the EP Act as described. The *Environmental Protection Act 1994* (EP Act) and *Environmental Protection Regulations 2019* (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. For DNM, the primary LOD is the site's EA (EPML00561913).

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

- Identified rehabilitation and closure outcomes in the LOD (EA EPML00561913);
- 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.

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) was presented to external stakeholders for consideration and sourcing of alternatives that may provide value to the community post-mining. Achievement of the PMLUs is aligned with this engagement, in particular, the underlying landowners expect disturbed land to become rehabilitated to a state suitable for the approved PMLUs or is managed as a non-use management area.

Consultation also identified that multiple landholders expressed a preference for reinstating as much grazing PMLU as practicable, consistent with how these properties are currently managed. This feedback is documented in the Community Consultation Register (Appendix 4.4) and has been considered in defining the extent and distribution of the grazing PMLU within the final landform concept.

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 DNM that would require habitat connectivity as part of the final landform).

3.3.3 Nominated PMLUs

The PMLUs proposed at DNM include:

- Cattle grazing;
- Woodland habitat; and
- Watercourse.

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. The watercourse PMLU is associated with the existing haul road and culvert crossing New Chum Creek.

The proposed post-mining land use concept (final site design) is provided in Figure 3-30. The PMLUs are listed Table 3-29 along with their associated rehabilitation areas and milestones. This is also consistent with and further defined in the PRCP Schedule (Appendix 4.1).

In terms of the third-party infrastructure area defined in Figure 3-30, this further explained in Section 3.6.5, these areas do not have a defined PMLU and the rehabilitation of these areas is not included in this PRC Plan. These areas are undisturbed by mining activities and may continue to exist once mining activities have ceased, subject to the owner's discretion.

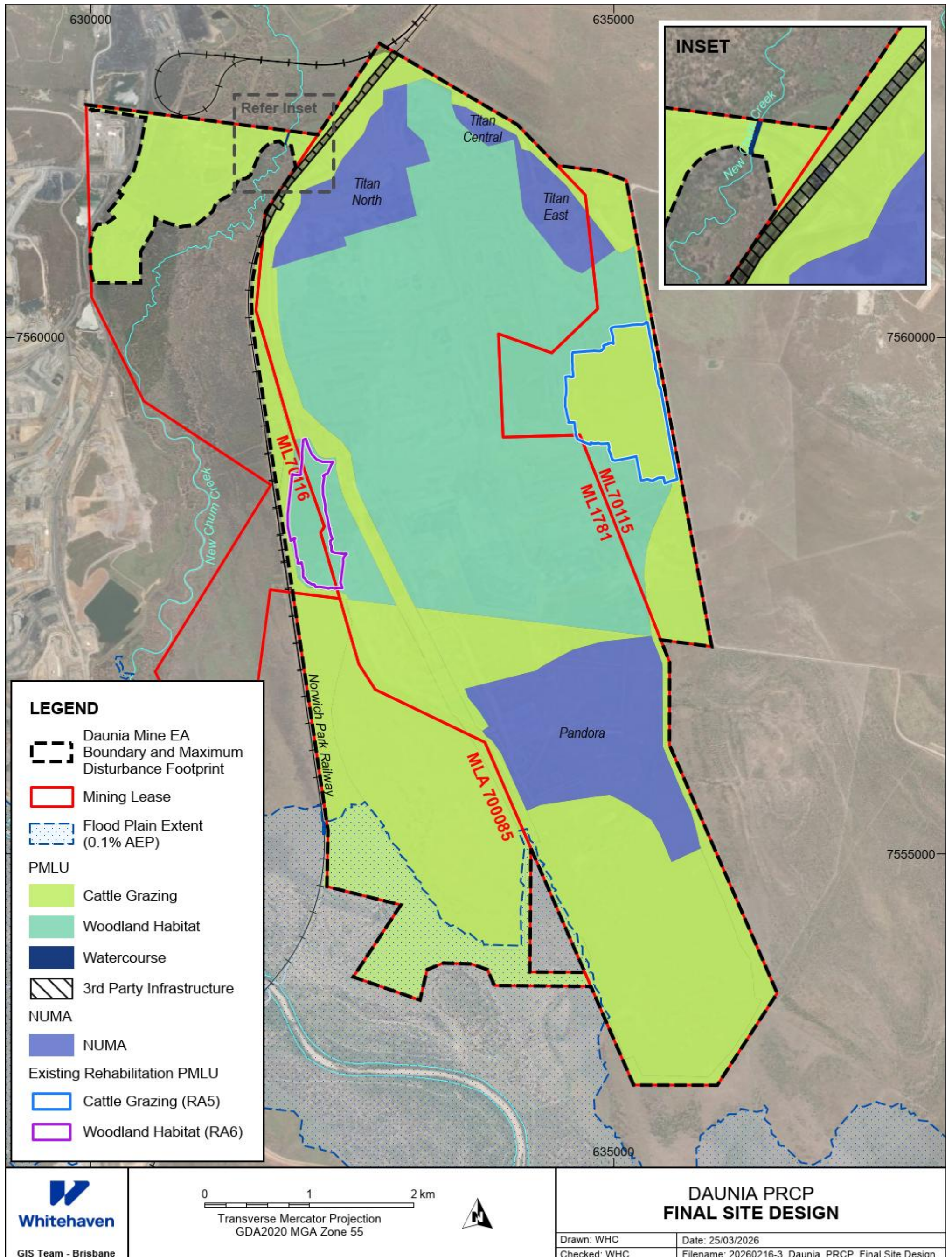


Figure 3-30 Final Site Design

Table 3-29 Nominated PMLUs and their associated rehabilitation milestones

PMLU	Rehabilitation Area (RA)	Milestones	Progressively Rehabilitated
Cattle Grazing	RA2 - Spoil Dumps	RM1 – Infrastructure decommissioning and removal RM2 – Identification, remediation and removal of contaminated land RM3 – Landform development (including re-profiling, reshaping) RM4 – Surface preparation RM5 – Revegetation RM6 – Achievement of surface requirements RM7 – Achievement of PMLU to a safe, stable, non-polluting and self-sustaining condition RM8 – Water management in the final landform	Yes
	RA4 – Infrastructure Areas (CHPP, MIA, workshops, dams, coal stockpiles, roads and general infrastructure)	RM1 – Infrastructure decommissioning and removal RM2 – Identification, remediation and removal of contaminated land RM3 – Landform development (including re-profiling, reshaping) RM4 – Surface preparation RM5 – Revegetation RM6 – Achievement of surface requirements RM7 – Achievement of PMLU to a safe, stable, non-polluting and self-sustaining condition RM8 – Water management in the final landform	No, rehabilitation will be completed upon closure once the infrastructure is no longer required
	RA5 – Existing Rehabilitation	RM5 – Revegetation RM6 – Achievement of surface requirements RM7 – Achievement of PMLU to a safe, stable, non-polluting and self-sustaining condition RM8 – Water management in the final landform	N/A
Woodland habitat	RA1 – Spoil Dumps	RM1 – Infrastructure decommissioning and removal RM2 – Identification, remediation and removal of contaminated land RM3 – Landform development (including re-profiling, reshaping) RM4 – Surface preparation RM5 – Revegetation RM6 – Achievement of surface requirements RM7 – Achievement of PMLU to a safe, stable, non-polluting and self-sustaining condition RM8 – Water management in the final landform	Yes
	RA6 – Existing Rehabilitation	RM5 – Revegetation RM6 – Achievement of surface requirements RM7 – Achievement of PMLU to a safe, stable, non-polluting and self-sustaining condition RM8 – Water management in the final landform	N/A
Watercourse	RA3 – Watercourse Crossing / Culverts	RM1 – Infrastructure decommissioning and removal RM2 – Identification, remediation and removal of contaminated land RM3 – Landform development (including re-profiling, reshaping) RM4 – Surface preparation RM5 – Revegetation RM6 – Achievement of surface requirements RM7 – Achievement of PMLU to a safe, stable, non-polluting and self-sustaining condition RM8 – Water management in the final landform	No, rehabilitation will be completed upon closure once the infrastructure is no longer required

3.3.3.1 Cattle grazing (planned and existing)

Areas with this PMLU will be rehabilitated to support cattle grazing. At DNM, cattle grazing is predominantly planned for lower slope areas disturbed by mining activities, areas that require shallow rooted species and/ or areas where significant clearing occurred prior to mining. Within the DNM MLs, the total proposed cattle grazing PMLU area is approximately 1,615 ha, of which approximately 1,511 ha are to be rehabilitated as part of RA2 and RA4, and the remaining 104 ha is existing rehabilitation as part of RA5.

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 DNM has been described in Section 3.1.2.7.

To ensure that planned rehabilitation is suitable for sustainable beef 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* (revised cattle grazing rule set) (Short, 2025). This was completed specifically for cattle grazing on rehabilitated coal mining land in Queensland. However, the areas at DNM that have existing rehabilitation for cattle grazing in place before the development of this PRCP (areas as defined in RA5) 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 native and naturalised exotic species that are preferred, palatable and productive (3P) grasses and legumes cognisant of grazing best management practice. Species availability may vary, however at least four preferred pasture grass species, including two preferred native pasture grasses, and two legumes will be seeded. In addition, at least two native shade tree species consisting of *Eucalyptus* sp. and/or *Corymbia* sp framework tree species will be included in the seed mix.

3.3.3.2 Woodland habitat (planned and existing)

Areas with this PMLU will be rehabilitated to support woodland habitat. At DNM, 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. Within the DNM MLs, the total proposed woodland habitat PMLU area is approximately 1,229 ha, of which approximately 1,185 ha is to be rehabilitated as part of RA1. The total woodland PMLU also includes 44 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.

Where possible, DNM is aiming for woodland habitat to achieve characteristics of the surrounding dominant representative regional ecosystems (i.e. RE 11.5.3 and RE 11.9.2), from the representative subdominant regional ecosystems based on their listing in the relevant Regional Ecosystem Technical Descriptions (Queensland Herbarium, 2018). Where woodland habitat aligned to these dominant REs 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 'hybrid' 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

New Chum Creek is the only watercourse that traverses through DNM (Section 3.1.2.6). The disturbed area within the New Chum Creek watercourse PMLU is associated with a culvert for the existing haul road (approximately 0.3 ha). The rehabilitation of the culvert crossing to a watercourse PMLU (RA3) will be undertaken following the completion of mining, when the haul road is no longer required.

During previous engagements between BMA and DES in 2018 regarding planned PMLUs, a watercourse PMLU was not proposed for the DNM EA, as at the time, PMLU criteria was developed specifically for creek diversions. It was not envisaged that a PMLU and criteria would be needed for the minor watercourse disturbance on DNM. However, the EA objectives, indicators and acceptance criteria for a PMLU of watercourse was accepted by DES during this engagement for the other BMA sites (Table 3-30), therefore this can be applied to rehabilitation of the disturbed area within New Chum Creek. The watercourse PMLU criteria in Table 3-30 have been adopted for the milestone criteria in the PRCP Schedule as appropriate.

Table 3-30 PMLU objectives, indicators and acceptance criteria for watercourse

Goal	Objective	Indicator	Acceptance criteria
Safe to humans and wildlife	Safety hazards in rehabilitation are not significantly different to surrounding unmined landscapes subject to the same land use	Hazard assessment	No significant difference.
Stable	Rehabilitation is erosionally stable	Geomorphic index (IDC method)	Greater or equal to upstream or downstream values.
Non-polluting	Rainfall runoff from rehabilitation achieves relevant water quality objectives for receiving waters	pH, EC and turbidity	Not significantly different to upstream values.

Where possible, DNM is aiming for riparian habitat revegetation to achieve characteristics of the riparian revegetation zones for natural watercourses. These zones are defined as follows, and include the dominant flora species found in the area:

- 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.

3.3.4 Regional planning integration

The PMLUs at DNM consider the pre-mining land use, current adjacent land uses (cattle grazing and coal mining), land ownership and approved EA conditions.

Under the Isaac Regional Planning Scheme (Isaac Regional Council, 2021), DNM is located in a Rural Area zone. This includes primary production uses (such as cropping, intensive horticulture, aquaculture, grazing, intensive animal industries, animal husbandry and animal keeping), renewable energy facilities and extractive industries, outdoor recreation and small-scale tourism facilities. The purpose of the rural zone includes providing “for other uses and activities that are compatible with: (i) existing and future rural uses and activities; and (ii) the character and environmental features of the zone...” (Isaac Regional Council, 2021).

Land use performance outcomes (PO11) for this Rural Area zone include ensuring development:

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

Concurrently, the Queensland Government - via the Mackay, Isaac and Whitsunday Regional Plan (State of Queensland, 2012), maps DNM in a regional landscape and rural production area, which includes land used for agriculture, natural economic resources (including extractive resources), water catchment, traditional uses, conservation areas and native forests.

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

Relationship with PRCP Schedule

The proposed PMLUs for DNM are consistent with pre-mining land uses, current adjacent land uses and PMLUs already approved as part of the site’s EA. These PMLUs can also be aligned to future land use development outcomes defined as part of State and regional plans.

The PMLU extents consider the closure landform, existing vegetation, ecological values, pre-mining land uses, watercourses and surrounding public infrastructure.

The EA acceptance criteria - agreed and approved as part of prior approvals - for cattle grazing, woodland habitat and watercourse, have been refined to reflect site-specific rehabilitation needs and are transitioned to milestone criteria for achieving these PMLUs.

3.4 Non-use management areas

Legislative Requirement

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

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

PRCP Guideline (Section 3.3)

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

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

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

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

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

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

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

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

3.4.1 Regulatory context

As outlined in section 754 (3) of the EP Act and Section 6.3.2 of the PRCP Guideline 'a NUMA will be taken to be pre-approved if a land outcome, the same or substantially similar to a NUMA, is contained in a 'land outcome document' (DES, 2023). This applied to DNM because the residual voids were authorised

under Schedule E (Condition E9) of the DNM EA. This condition identifies an “outcome” for the land, in the form of residual voids, with the area and location to be determined.

As per the PRCP Guideline, if a NUMA had been identified in a LOD, the applicant was not required under the transitional provisions pathway to comply with sections 126C(1)(g) or (h), or section 126D(2) or (3) of the EP Act, and was not required to complete the information requirements under section 126C(1)(j) of the EP Act for the approved NUMAs. During the transitional assessment, DNM was still required to meet the legislative requirements under section 126C(1)(d) of the EP Act.

As the EA did not state the area or the location of the proposed NUMAs, the PRCP Guideline required the PRC Plan to include detail on how the total area would be minimised and how the location of the proposed NUMAs would minimise risks to the environment. This information was originally provided in the PRC Plan submitted in December 2025, which formed the basis of the first approved PRCP Schedule for DNM and thereby transitioned the NUMAs into the Schedule. Sections 3.4.2 and 3.4.3 now present the updated NUMA information applicable to this PRC Plan under the approved PRCP Schedule.

With approval of the PRCP Schedule, the transitional provisions no longer apply. However, the pre-approval status of the NUMAs (as residual voids identified in the EA) continues to apply under section 754(3) of the EP Act and Section 6.3.2 of the PRCP Guideline. Accordingly, Sections 3.4.2 and 3.4.3 now present the current information required to demonstrate how the NUMA extents minimise environmental risk under the approved PRCP framework.

3.4.2 Minimisation of NUMA area – EP Act s 754(4)(a)

The DNM NUMAs occur within the residual voids of Titan North, Titan Central, Titan East and Pandora (Figure 3-25). The Titan Central residual void is immediately north of Titan East and therefore the NUMAs for these voids are contiguous, resulting in three NUMAs for the four residual voids. The extent of the NUMAs have been designed to achieve a safe and structurally stable landform. Design criteria include:

- residual voids located below natural ground level (including high-wall, end-walls, low-wall and floor);
- wall set-backs designed to achieve a FOS of ≥ 1.5 at the safety bund; and
- installation of safety bunds and fences.

The proposed NUMA area has been progressively reduced through multiple iterations of mine planning and rehabilitation design. Since the original PRCP submission by BMA (Rev 1), the total NUMA area has been reduced from approximately 503 ha to 432 ha. This reduction has been achieved through:

- Progressive backfilling of final voids to completely fill Atlas West, Atlas East, Calypso Central, Skoll, and Titan West pits, and to also backfill more of the Titan North, Titan Central and Titan East voids as compared to PRC Plan Rev 1;
- Revegetation of a greater portion of residual void low-walls, which now form part of the designated PMLU areas; and
- Elimination of voids within the floodplain through hydrologic analysis and mine plan optimisation, ensuring no residual voids interact with the floodplain and thereby reducing potential for downstream environmental impacts.

Alternative PMLUs were also considered during closure planning, including partial or complete backfilling and conversion to land-based rehabilitation. These options were assessed in the context of spoil availability, geotechnical feasibility and environmental performance. Complete backfilling was found to be impractical due to insufficient spoil volumes, significant additional disturbance to adjoining landforms and disproportionate economic implications. Retention of the remaining voids as water bodies is therefore considered the most practicable, safe and environmentally acceptable closure outcome.

Further reductions to NUMA areas are not technically achievable due to:

- 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 need to maintain wall stability and avoid unacceptable geotechnical risks if additional slope reduction were attempted.

Accordingly, the current 432 ha NUMA footprint represents the minimum safely achievable area while maintaining compliance with geotechnical, hydrological and safety requirements.

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 DNM NUMAs are provided in Table 3-31.

Table 3-31 Nominated improvement areas and their associated management milestones

NUMA	Improvement Area (IA)	Management Milestones
NUMA	IA1 – Residual voids	MM1 – achievement of structural stability MM2 – achievement of surface requirements MM3 – achievement of sufficient improvement

3.4.3 Minimising environmental risk from NUMA location – EP Act s 754(4)(b)

Following refinement of the mine plan since the 2023 PRC Plan and PRCP Schedule submission by BMA, the mining and rehabilitation design approach for the site has been refined. These refinements have been undertaken to minimise long-term environmental risk, improve long-term stability, and maximise post-mining land use potential, consistent with the intent of the PRC framework.

In addition, a comprehensive suite of technical studies was undertaken under this PRC Plan to assess, refine, and optimise the location and extent of the DNM NUMAs to minimise environmental harm. The final design approach incorporated findings from the following key studies.

- Void in floodplain modelling (Section 3.5)
- Water balance modelling (Section 3.6.3.3.2)
- Void water quality modelling (Section 3.6.3.5)
- Void geotechnical studies (Section 3.6.3.2)
- Groundwater modelling (Section 3.6.3.4)
- Rehabilitation flood modelling (Section 3.6.1.2)

The outcomes of these studies informed successive refinements to the NUMA design, resulting in the following key modifications:

- No floodplain interaction: residual voids have been removed from the floodplain. All NUMAs are located outside modelled flood extents.
- Pandora NUMA flood resilience: inclusion of a stabilised landform along the western end-wall to mitigate the risk of flooding into the residual void up 0.1% Annual Exceedance Probability (AEP) and Probable Maximum Flood (PMF) events.

- Hydrologic and geochemical risk management: Final NUMA configurations ensure that residual voids will not present an unacceptable risk of environmental harm outside the tenure boundary by:
 - Preventing flooding into residual voids through final landform construction;
 - Functioning as permanent groundwater sinks, preventing off-tenement release of contaminants; and
 - ensuring voids will not overtop, with long-term pit water levels remaining well below spill points.
- Hydraulic separation: NUMA configurations minimise potential connectivity between the deeper Permian and shallower alluvial aquifers.
- Geotechnical stability: Geotechnical modelling confirms NUMAs meet acceptable FOS with no structural deformation expected beyond the NUMA boundaries.

Alternative PMLUs were also considered during closure planning, including partial or complete backfilling and conversion to land-based rehabilitation. These options were assessed in the context of spoil availability, geotechnical feasibility and environmental performance. Complete backfilling was found to be impractical due to insufficient spoil volumes, significant additional disturbance to adjoining landforms and disproportionate economic implications. Retention of the remaining voids as water bodies is therefore considered the most practicable, safe and environmentally acceptable closure outcome.

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 can 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.

3.4.4 Community considerations

Community feedback obtained through the consultation process (summarised in Section 3.2 and detailed in Appendix 4.4 – Community Consultation Plan and Register) has directly informed the designation of residual voids as NUMAs. Stakeholders including underlying landholders, Barada Barna Aboriginal Corporation (BBAC), IRC, adjacent resource operators 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.

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.

3.4.5 Regional planning integration

3.4.5.1 Issac Regional Planning Scheme

The Isaac Region has a strong history and connection with mining and the resources sector, which has positioned the region as a gateway to mining and exploration activities. Both the local Isaac Regional Planning Scheme (Isaac Regional Council, 2021) and the broader Mackay, Isaac and Whitsunday Regional Plan (State of Queensland, 2012) identify mineral and extractive resource industries - in particular, coal and coal seam gas, as significant components of the current and future regional economic development.

3.4.5.2 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 NUMAs at DNM are consistent with the objectives of the Water Plan is provided in Table 3-32.

Table 3-32 Consistency of DNM 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.
Environmental outcomes	The proposed NUMAs are located outside mapped floodplains, so they will not alter natural floodwater movement or reduce the environmental flows. DNM NUMAs are not subject to inundation from floodwaters including 0.1% AEP and Probable Maximum Flood (PMF) events. NUMAs at DNM are also designed to prevent uncontrolled releases from the void, thereby supporting the plan's goal to prevent degradation of aquatic 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.
Floodplain protection	The proposed NUMAs are located outside mapped floodplains, so they will not alter natural floodwater movement or reduce the environmental flows. DNM NUMAs are not subject to inundation from floodwaters up to and including 0.1% AEP events.
Ecological outcomes	NUMA siting and management is consistent with the Water Plan's general ecological outcomes, including: — minimising changes to natural flow variability;

Water Plan Objective	Consistency of Proposed NUMAs
	— maintaining river-floodplain connectivity; — protecting aquatic ecosystems and refugia; and — supporting interactions between surface water, groundwater and water-dependent ecosystems.

3.4.5.3 Summary

To align with the Isaac Regional Planning Scheme and the Water Plan (Fitzroy Basin) 2011, wherever possible, DNM will minimise the extent of the NUMAs remaining in the landscape by backfilling where mine planning allows and ensuring residual voids do not present an unacceptable risk of environmental harm outside the NUMA extent, through their design as groundwater sinks with flood protection to 0.1% AEP, with a safety bund, fencing and warning signage erected to prevent public access. Section 3.4.3 further discusses minimising the extent and environmental impacts of NUMAs. In addition, residual voids will not be excluded from future land use if their rehabilitation is enabled by advances in technology.

Relationship with PRCP Schedule
The proposed NUMAs for DNM are designed to be safe, structurally stable and minimise the risk of environmental harm. Retention of residual voids as pre-approved NUMAs, that are part of the rehabilitated landscape, is consistent with the DNM LOD.

3.5 Voids in flood plains

PRCP Guideline (Section 3.4)

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

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

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

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.

An assessment of voids in flood plains was undertaken by an Appropriately Qualified Person (AQP) to support the development of this PRC Plan. The detailed report – *PRCP Flood Plain Modelling Daunia Mine PRCP Flood Report* (WRM, 2026) is provided in Appendix 4.5 – Rehabilitation Flood Assessment.

3.5.1 Background

The four residual voids in the final landform, Titan North, Titan Central, Titan East and Pandora, are pre-approved in the LOD as NUMAs (Figure 3-25). As the location of these voids is not identified within the LOD, and in accordance with the PRCP Guideline transitional provisions, a voids in flood plain assessment has been undertaken to support this PRC Plan.

The relevant design flood event for the flood plain modelling in the EP Regulation is a 0.1% AEP for a relevant watercourse. A 'relevant watercourse' is defined as (State of Queensland, 2022a):

- (a) a watercourse classified as stream order 4 or higher under the Strahler stream order classification system; or
- (b) if a watercourse mentioned in paragraph (a) is permanently diverted under—
 - (i) a condition, or proposed condition, of an environmental authority mentioned in the Water Act 2000, section 98; or
 - (ii) a water licence or proposed water licence under the Water Act 2000;
 - (iii) the watercourse as permanently diverted.

The relevant watercourses for the DNM voids in flood plains assessment are:

- Isaac River;
- North Creek; and
- Cherwell Creek.

3.5.2 Flood plain modelling

The previous flood study for DNM was undertaken by WRM in 2019 and involved hydrologic and hydraulic modelling of the Issac River and nearby local catchments to define baseline flood behaviour at the site. Modelling has been refined in 2026 to:

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- Align with the QLD Government information sheet on Voids in flood plains (DES, 2024; ERS/2019/4966 Version 1.01);
- Use updated and improved versions of the hydrologic and hydraulic models;
- Account for the effects of climate change;
- Update the Flood Frequency Analysis (FFA) using five years of additional data; and
- Complete a PRCP flood modelling assessment.

The updated hydrologic modelling involved:

- Transitioning from the XP-RAFTS model to the URBS model;
- Recalibration;
- Reconciliation of the model with the updated FFA; and
- Application of Australian Rainfall and Runoff (ARR, 2019) climate change factors.

The updated hydraulic modelling involved:

- Updating to version 2025.0.0 of the TUFLOW hydraulic model;
- Recalibration; and
- Assess peak design flooding conditions for existing, pre-mining and post-mining conditions using hydrologic modelling design inflows.

Base topographic data used in the 2019 modelling included:

- LiDAR data captured in August 2019. This data covers most of the DNM operational areas, including most of the Isaac River within and in the immediate vicinity of DNM.
- LiDAR data captured in 2012. This data covers areas of the Isaac River floodplain that were not covered by the LiDAR data from 2019.
- Shuttle Radar Topography Mission (SRTM) Digital Elevation Model captured in 2000, used to fill in a few outer edges of the flood plain. This data was normalised to the other LiDAR sources to make the elevations matched as close as possible.

The updated 2026 modelling incorporated:

- LiDAR data captured in January 2025 for the DNM site. A preliminary review showed that there were no material differences between the 2019 and 2025 LiDAR data sets within the Isaac River flood floodplain.
- Proposed final landform topographic data (Version 3.1.1). Version 3.1.1 includes the OoPD and a revised spoil emplacement to act as a flood protection landform. The flood protection landform provides separation between the Pandora residual void and the Issac River flood plain as can be seen in Figure 3-30.

The 2026 modelling was run for the 0.1% AEP and Probable Maximum Flood (PMF) event for the following scenarios:

- Existing conditions - Present day conditions, using 'Existing' hydrology and current site topographic data;
- Pre-mining conditions - 'Existing' hydrology and pre-mining topographic data within DNM (i.e., excluding any artificial features inside the mining tenure) with current topographic data outside DNM. Used to define the floodplain for the PRCP.
- Post-mining conditions - 'Post mining' hydrology and the proposed DNM final landform and adjacent mine sites. Used to assess flooding risk for residual voids and the proposed final landform post-closure

Peak flood extents, depths and velocities were predicted for each of the three scenarios.

A detailed description of the modelling methodologies employed is provided in Appendix 4.5 – Rehabilitation Flood Assessment.

3.5.3 Results

The residual voids in the proposed DNM final landform are not inundated for either the 0.1% AEP or the PMF events (Figure 3-34 to Figure 3-37). The northern residual voids are outside the flood plain of a relevant watercourse. The final landform separates the Pandora residual void from the Issac River flood plain. There is no predicted ingress to the Pandora void for events up to and including the PMF under post mining conditions, including under the potential effects of climate change.

Predicted peak velocities adjacent to the flood protection landform are 1.1 m/s and are not expected to present an erosional stability risk to the landform. The available freeboard provided by the flood protection landform is more than the predicted potential change in peak flood levels estimated by the sensitivity analysis. Increases in peak velocities predicted by the sensitivity analysis are also minor.

Predicted peak velocities adjacent to the OOPD are 1.7 m/s under the 0.1% AEP event. Under PMF conditions these increase to velocities typically within the range of 2.1 – 2.8 m/s. A localised area near the southwest corner of the OOPD experiences velocities of up to 3.2 m/s. The OOPD is not part of the Pandora residual void flood protection landform and presents no risk of erosional instability leading to inundation of the Pandora residual void.

Relationship with PRCP Schedule

The residual voids are outside the flood plain for relevant watercourses and will not be inundated by the predicted 0.1% AEP event.

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

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.

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

The key hydrogeological units present within and immediately surrounding DNM are summarised in Section 3.1.2.5 and presented in Table 3-33.

Table 3-33 Key hydrostratigraphic units and their hydrogeological characteristics at DNM

Unit	Sub-unit/Description	Hydrogeological characteristics
Quaternary-Tertiary sediments	Quaternary alluvium	Unconfined aquifer of permeable rock, sand, or gravel; localised along Isaac River and North Creek.
	Quaternary to Tertiary colluvium and weathered units (regolith)	Unconfined, largely unsaturated; borders alluvium.
Triassic Rewan Group	-	Aquitard; overlies Permian coal measures.
Permian coal measures	Interburden units	Low permeability with aquitard properties.
	Coal seams	Water-bearing strata with variable permeability.
Source: SLR (2026)		

3.6.1.1.1 Groundwater modelling

The latest version of the DNM regional numerical groundwater model was completed in 2025 and developed specifically for the DNM Void Closure Plan (ERM, 2026). It is primarily intended to assess regional-scale mining impacts within a cumulative impact framework. In this context, operations like DNM are incorporated as part of the broader regional hydrogeological system in which they are situated.

The model has been developed in accordance with the Australian Groundwater Modelling Guidelines (Barnett, et al., 2012), the Murray Darling Basin Commission Groundwater Flow Modelling Guideline (Aquaterra, 2001), and the Independent Expert Scientific Committee Explanatory Note for Uncertainty Analysis (IESC, 2018).

The numerical model utilises a graphical user interface in conjunction with the modelling software MODFLOW- USG, which is distributed by the United States Geological Survey.

The objectives of the predictive groundwater numerical modelling were to:

- Assess groundwater behaviour across the DNM area, including inflow to the final landform proposed voids;
- Simulate the level and rate of recovery of the proposed void lakes, and the level and rate of mining-related groundwater drawdown recovery in the groundwater system surrounding the voids; and
- Identify areas of potential risk, such as private supply bores or GDEs where groundwater impact mitigation/control measures may be necessary post-closure.

The current DNM regional numerical groundwater model builds on a number of models, as indicated in Appendix 4.2, using a Geographic Information Systems (GIS) in conjunction with MODFLOW-USG, with the model layering based on a simplified regional scale representation of the central Bowen Basin hydrogeological framework.

The groundwater model utilised the second iteration of the closure landform design (the final and third design proposed in this PRC Plan has since been modified based on outcomes of other studies). A review of the final closure landform design along with the revised void water balance model results, confirmed that changes to the closure landform design undertaken post the groundwater modelling do not have a material impact to the groundwater model results.

An assessment of the groundwater model including data inputs, calibration and predictions, using the 2012 Australian Groundwater Modelling Guidelines classification system, identified the model overall, can be classified as primarily a Class 3 “high confidence” model, with some aspects meeting the lower Class 2 criteria. Therefore, the groundwater model is considered suitable to inform the development of this PRC Plan.

Additional information on the model results including considerations of climate change scenarios, are detailed in the hydrogeological assessment contained in Appendix 4.2.

3.6.1.1.2 Void lake and groundwater relationship

The residual voids will accumulate water over time due to rainfall, surface water runoff and groundwater inflows from recovered groundwater levels. Void water levels were not predicted by the groundwater model but were estimated by the balance between groundwater inflow and the direct rainfall and rainfall runoff from the surrounding catchment against the evaporation loss from the lake surface through iterative surface water balance modelling (WRM, 2026b).

The residual void water level recovery is a slow process, with the recovery rate declining as the lakes reach equilibrium conditions. The majority of recovery in the voids is achieved within the first 50 years, and equilibrium water level conditions are reached after approximately 100 to 200 years. Equilibrium is achieved while there are still stress periods of a maximum 1 year duration occurring in the groundwater model. Predicted residual void lake levels remain significantly below the base of the shallow geologic formations for each of the residual voids, even with the temporal fluctuations in void water levels predicted by the WRM (2025) water balance model. That is, there is never the potential for a flux of water to leave the residual voids and enter the shallow geologic formations.

To apply a conservative assumption, the modelling considered that void lakes would be present immediately following completion of mining. While this is realistic for some DNM voids that are expected to hold water at closure (as they may serve as water storage areas and receive dewatering from remaining dams that are to be rehabilitated), the assumption was primarily adopted to stress test the prediction that voids will behave as long-term groundwater sinks, since groundwater fluxes are strongly governed by lake levels.

During the first 200 years post-mining, in particular during wet periods, some variability in outflows from the voids into the backfilled spoil are predicted as the water level in the voids rises quicker than the local groundwater recovers. This is shown in the modelling to be localised to the Titan North void. Once groundwater levels recover and stabilise, particularly within the spoil, the voids are predicted to act as permanent groundwater sinks. At this point, 99% of inflows are predicted to come via the backfilled spoil, originating mainly as local recharge applied to spoil. The remaining 1% is predicted to come from natural geological formations.

3.6.1.1.3 Groundwater levels

Modelled post-mining equilibrium groundwater levels are shown in Figures 7-20 to 7-23 in Appendix 4.2. These hydrographs confirm that groundwater drawdown is caused by the currently approved mining activities, and the closure landform design does not contribute to any additional drawdown.

Within DNM (including areas of spoil backfill) the water table is predicted to remain depressed 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 to the residual voids are maintained post-mining. Steepest water table gradients outside the voids themselves occur northeast of the DNM adjacent the Titan East Void, whereas gradients north and west of Titan North and surrounding the Pandora Void are generally somewhat shallower.

Predicted groundwater levels for the Leichhardt and Vermont Seams of the Permian Coal Measures indicate that groundwater levels in the Permian sequence are predicted to remain depressed in the long term, driven by the ongoing evaporation-driven groundwater discharge to the residual void lakes and governed by the lake elevations themselves. Generally, predicted groundwater levels are very similar between the Leichhardt and Vermont seams.

3.6.1.1.4 Flow path simulation

An analysis of the water movement within the final landform was undertaken to simulate and assess the movement and fate of water particles through the groundwater system post-mining. A number of particles were placed on the final landform and within the residual voids in the recovery groundwater model and the mod-PATH3DU code (S.S. Papadopoulos & Associates, Inc., 2018) was used to simulate particle pathways along the groundwater flow field during recovery (i.e. 977 years). To run the mod-PATH3DU code the transient head outputs from the groundwater flow model were used by mod-PATH3DU to simulate particle flow path lines.

Figure 3-31 shows the predicted movement of water particles in the 977-year recovery simulation of the final landform. The colours along the predicted particle flow paths provides the model layer the particle was simulated to be moving through, with the green to red scale classification representing particles moving from shallow to deep model layers.

The colour changes along the paths indicate that particles situated within the shallower saturated layers at the beginning of the post-mining simulation generally move progressively toward deeper layers representing the Permian coal measures (or backfilled spoil where the coal measures has been mined out) over the post-mining period. The flow path analysis indicates the particles generally move toward the void lakes, with many of the particles remaining in the voids once they have entered the void lakes. Particles that move into the voids during the post-mining simulation remain within the voids for the duration of the simulation. Particles starting in voids themselves remain within the voids for the duration of the simulation.

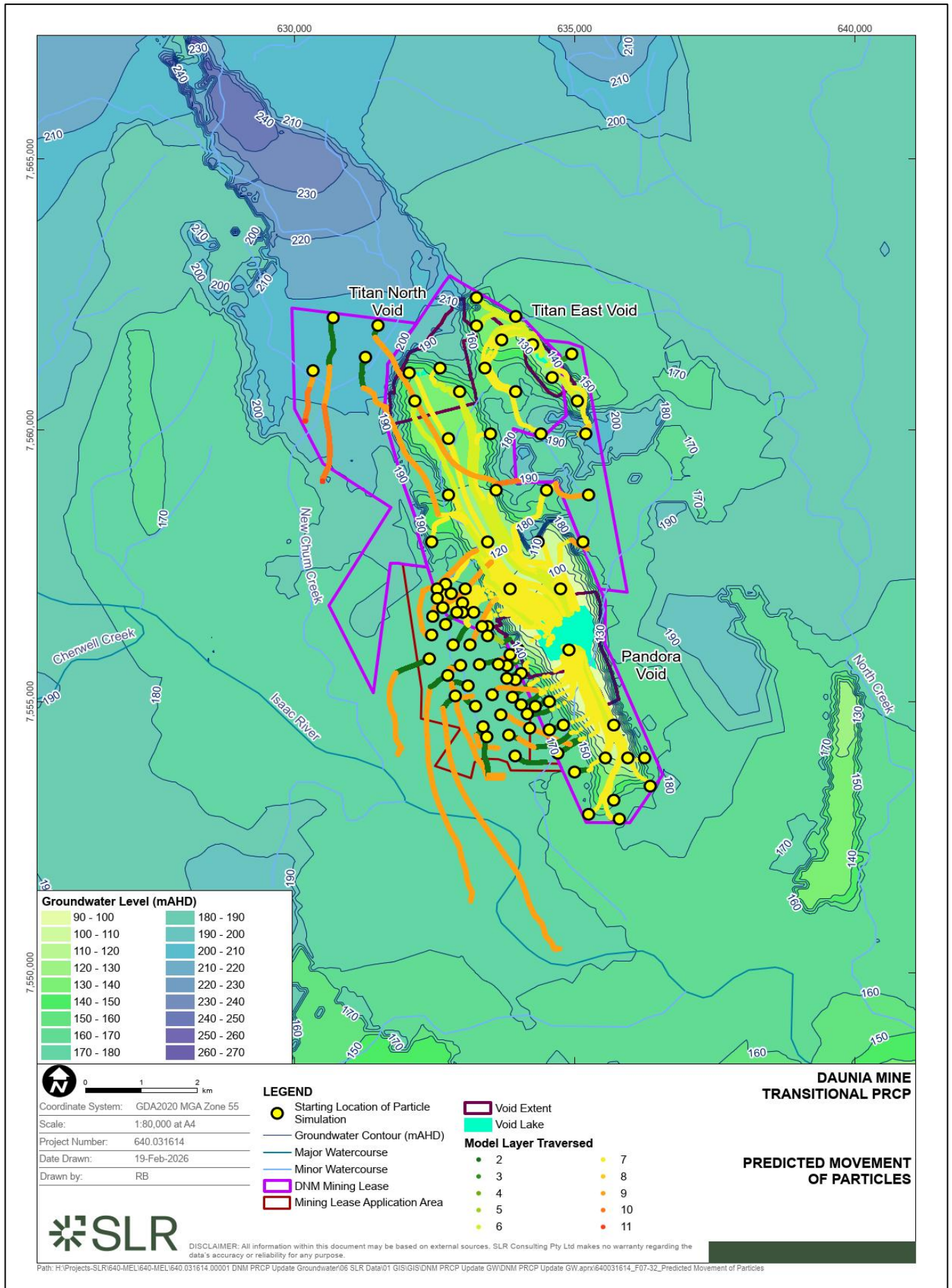


Figure 3-31 Predicted movement of particles

"If it's not safe, don't do it."

A groundwater divide is present beneath the OOPD, with flow paths across the eastern ~65% of the footprint moving eastward toward the Pandora residual void. Along the western margin, some initial particle movement is directed away from the void while passing through the shallow model layers. Once the particles enter the underlying Fort Cooper Coal Measures, most turn east or south east and ultimately migrate back toward the Pandora residual void. Three particles located at the extreme western edge continue south within the deeper Permian system. These particles remain confined to lower hydrological units throughout the full model run and do not move upward into the shallow aquifers.

Overall, the particle tracking indicates that the vast majority of seepage from the OOPD will return to and be captured by the Pandora residual void, with only limited seepage from the far western margin migrating towards the south within the deep Permian coal measures. This seepage is not expected to impact the shallow aquifers.

Some groundwater particles originating beneath the MIA, west-northwest of Titan North, are not captured within the final landform during the 977 year simulation. Instead, they migrate approximately 2 km southward and marginally exit the DNM area, likely due to the hydraulic influence of the adjacent Poitrel Mine during the post mining period. These potential off site movements will be addressed through the PRC Plan's Contaminated Land Assessment. Importantly, no particles are predicted to migrate substantially beyond the DNM boundary into the broader receiving environment.

3.6.1.1.5 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, identified the following key features:

- Residual void lake formation, with lake levels stabilising below the groundwater elevations and any shallow post-Permian strata regardless of climate scenario modelled, including the base of surficial weathering and shallow hydrostratigraphic units (i.e. alluvium and regolith).
- Residual groundwater drawdown within the RCM resulting from the approved DNM mining operations and ongoing evaporative discharge from the residual void lakes, results in continued inwards hydraulic flow gradients in the coal measures to the residual voids and no outflow in the long term regardless of climate scenario modelled.
- Residual voids continue to capture seepage from spoil emplacements with the exception of seepage from the western margin of the OOPD.
- Moderate potential for groundwater beneath the rehabilitated MIA to not be captured by the closure landform due the hydraulic influence of the adjacent Poitrel Mine and cemented faults.
- Little to no additional impact on surficial aquifers, including the alluvial aquifers, caused by the closure landform.
- Little to no additional impact on environmental receptors caused by the closure landform.
- Little to no additional impact on anthropogenic receptors caused by the closure landform.

A visual representation of the post-closure conceptual-site-model is provided in Figure 3-32.

3.6.1.1.6 Future requirements and commitments

In accordance with PRCP Schedule condition PRCP17, an up-to-date closure groundwater and water balance model will be maintained for DNM. 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 PRCP18, prior to the completion of mining, DNM 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 tenure boundaries post-closure; and
- b) groundwater drawdown will not negatively impact GDEs on or surrounding the site.

These future deliverables (PRCP17–PRCP18) form part of the closure phase hydrogeological assurance pathway and complement the conceptual hydrogeological assessment presented in Sections 3.6.1.1 and 3.6.1.5.

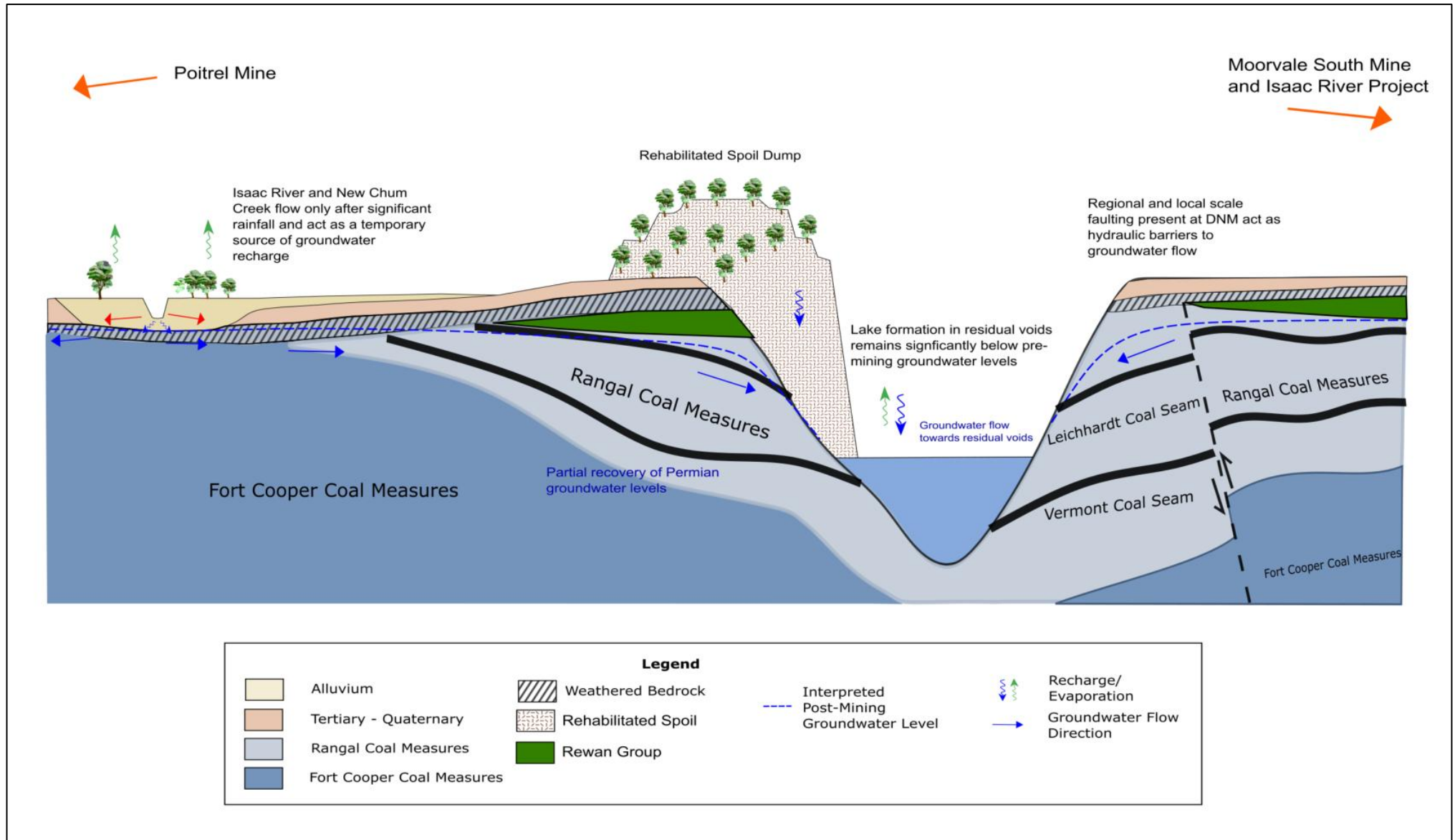


Figure 3-32 DNM post-mining hydrogeological conceptual model of groundwater system – Northern Pits

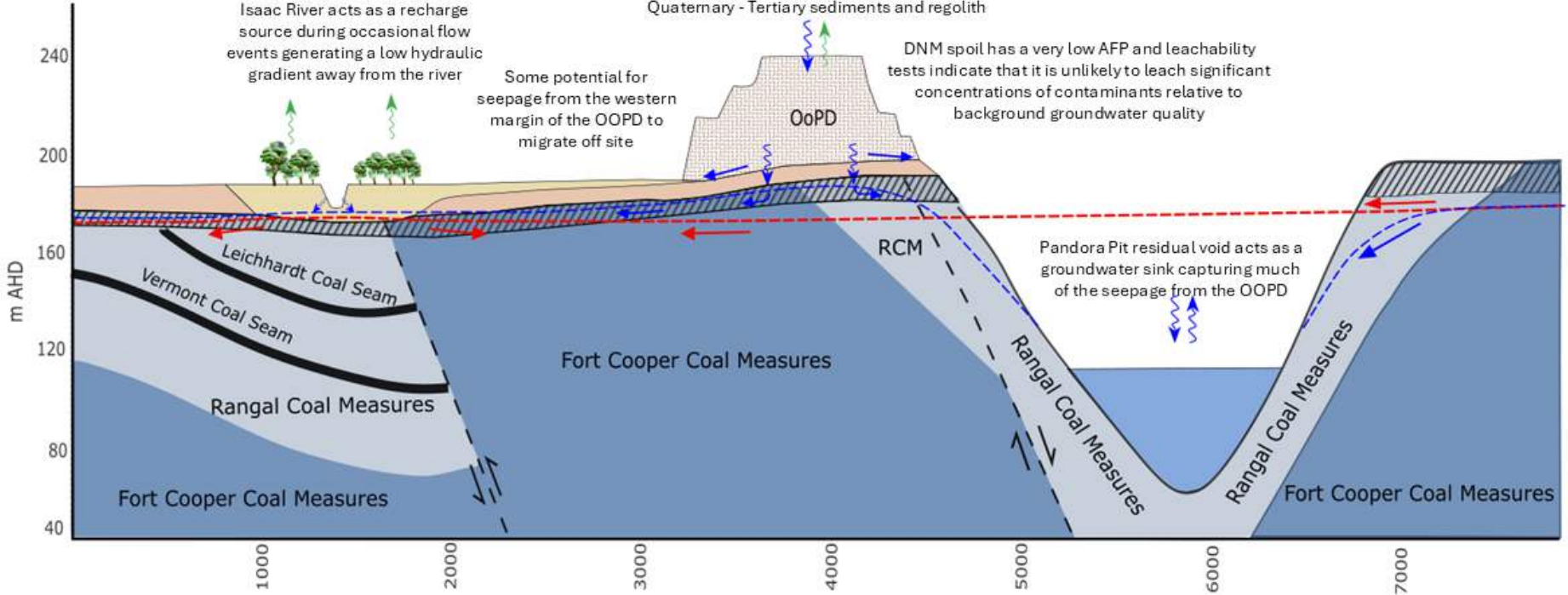


Figure 3-33 DNM post-mining hydrogeological conceptual model of the groundwater system - OOPD

Relationship with PRCP Schedule

Retention of residual voids within the closure landform will maintain groundwater gradients towards the voids within the area containing the spoil dumps and co-disposed rejects. The voids, once groundwater and void lake levels stabilise, will establish as long-term groundwater sinks. Void lake levels remain below the shallow geological formations and therefore do not provide complete exposure pathways between the void lakes/Permian hosted aquifers with the shallower aquifers such as those hosted within the Quaternary alluvium.

The closure landform will have little to no additional impact to environmental or anthropogenic receptors.

With the retention of the residual voids in the closure landform, no on-going groundwater management will be required.

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, including consideration of flow alteration, modelling flood levels for a range of design storm events and development of a flooding risk profile, has been undertaken to support the development of this PRC Plan. The detailed report – *PRCP Flood Plain Modelling Daunia Mine PRCP Flood Report* (WRM, 2026) is provided in Appendix 4.5 – Rehabilitation Flood Assessment..

Following a change in ownership, Whitehaven Coal engaged WRM to update the previous (WRM, 2019) hydrologic and hydraulic models to reflect current site conditions, revise the closure landform designs, update modelling standards, and regulatory requirements. The 2026 update included:

- conversion of the hydrologic model from XP-RAFTS to URBS (Unified River Basin Simulator);
- incorporation of updated ARR2019 guidance on climate-change adjustments to rainfall and losses;
- revision of the Flood Frequency Analysis (FFA) at the Isaac River at Deverill gauge (130410A) to include five additional years of data (2020-2024); and
- development of a PRCP flood assessment using the updated final landform.

The updated models were recalibrated, validated against the revised FFA results, and applied to simulate flood behaviour for the 0.1 % AEP and Probable Maximum Flood (PMF) events under existing, pre-mining, and post-mining conditions.

The flood modelling was undertaken on an iterative approach with the closure landform design development. Information from the initial round of rehabilitation flood modelling was used to inform further development of the closure landform design. The amended landform design included refinements comprising of removal of culverts and other infrastructure from watercourses/floodplains, and changes to landforms to provide increased protection from flood waters. Upon finalising the closure landform design, the flood modelling was re-run and the flood risk profile and other interpretations amended to reflect the final closure landform design, which is presented within this PRC Plan.

3.6.1.2.1 Local drainage and model domain

The DNM area lies within the Isaac River catchment. Key drainage features in the vicinity include Cherwell Creek, North Creek and New Chum Creek, which all discharge to the Isaac River.

- Cherwell Creek drains approximately 698 km² west of DNM and joins the Isaac River about 6 km upstream.
- North Creek drains approximately 330 km² to the north and east and joins the Isaac River about 11 km downstream.
- New Chum Creek drains approximately 48 km² to the west and traverses multiple mining leases before joining the Isaac River adjacent to DNM.

The stated catchment areas (in km²) represent the total contributing drainage areas to each creek and illustrate their relative scale and influence on flood behaviour near the mine.

In accordance with the Queensland Government *Voids in Floodplains* guideline (DES, 2024), the PRCP floodplain definition is based on the 0.1% AEP event for relevant watercourses of stream order 4 or higher. For this assessment, the relevant watercourses are the Isaac River, Cherwell Creek and North Creek.

3.6.1.2.2 Hydrologic modelling

The hydrologic modelling undertaken to support this PRC Plan was based on an existing model for DNM (WRM, 2019), which had been completed using industry standard software XPRAFTS. A review of the existing model by WMS indicated that it was fit for purpose and provided an appropriate model domain for the Isaac River, inclusive of the DNM mining area.

The 2026 study replaced the earlier XP-RAFTS model with an updated URBS rainfall-runoff routing model (Carroll, 2024), calibrated against observed flood events in 2008, 2010 and 2017. The URBS model uses a conceptual storage approach to route rainfall excess through the catchment and incorporates parameters for channel routing (α), catchment routing (β) and non-linearity (m). The URBS model development followed the ARR2019 guidelines and applied three hydrology scenarios:

- Validation hydrology reconciled with FFA results for 10-1% AEP events;
- Existing-conditions hydrology incorporating ARR2019 climate-change adjustments for the year 2030 (SSP5-8.5, +1.3 °C); and
- Post-mining hydrology incorporating ARR2019 adjustments for the year 2100 (SSP2-4.5, +2.5°C). Rainfall and loss uplift factors were obtained from the ARR Datahub (Geoscience Australia, 2024).

3.6.1.2.3 Hydraulic modelling

TUFLOW 2D hydraulic models were developed to determine flood behaviour around the closure landforms. TUFLOW (version 2020-10-AD) is an industry standard software hydraulic modelling package. Hydraulic models incorporating the closure landform design were developed for the Isaac River.

The TUFLOW model was updated to version 2025.0.0 to incorporate advancements in modelling capabilities and recalibrated using the updated URBS hydrology. Model runs were undertaken for pre-mining, existing and post-mining conditions for the 0.1% AEP and PMF events.

As the available LiDAR footprint and closure landform design was limited to the mine area and immediate surrounds, publicly accessible one second SRTM Hydrological DEM topographical data (Geoscience Australia) was used in addition to the LiDAR data to develop the DEM to cover the required area. Due to the lower resolution of the publicly available topographical data and other disparities between the data sets, terrain modifiers were used to create the DEM. The terrain modifiers were used to:

- align the elevations; prevent flooding of the Poitrel Mine voids;
- remove culverts associated with RMI operations upgradient; and
- ensure that watercourses were appropriately aligned.

LiDAR data were merged with 1 second SRTM hydrological DEMs to develop the model terrain. Terrain modifiers were applied to align elevation datasets, remove redundant culverts, and maintain correct watercourse alignments.

3.6.1.2.4 Representation of voids and breaklines

In previous flood rehabilitation modelling, the Pandora void was coded out of the hydraulic domain to prevent artificial ponding, effectively functioning as a “breakline” that limited simulated flood ingress. The regulator noted that this treatment could underestimate potential inundation.

In the updated modelling completed for revision 3 of the PRCP (WRM, 2026), the void was not coded out. The final landform surface, including the flood protection landform adjacent to the Pandora void and the OOPD, was represented explicitly within the terrain model. Results of modelling completed for this revision of the PRCP show that the final landform prevents flood ingress to the Pandora void for all events up to and including the PMF, confirming that the previous breakline treatment did not impact flood risk and that the floodplain protection landform is adequate.

3.6.1.2.5 Flood levels and rehabilitation domains

Modelling of the closure landform indicates the northern residual voids are immune to flood ingress for all modelled events including the 0.1% AEP and upper climate change scenario RCP 8.5 P90.

The Pandora residual void is protected from floodwater ingress from the Isaac River and New Chum Creek up to and including the PMF event under post-mining (year 2100, +2.5°C) conditions. The modelling predicts 0.1% AEP peak flood levels of approximately 192.8 mAHD and PMF peak levels of approximately 196.5 mAHD along the western side of the final landform, adjacent to the Pandora residual void. Peak flood velocities are predicted to be about 0.4 m/s for the 0.1% AEP and 1.1 m/s for the PMF event.

Shallow, low-velocity floodwaters may interact with outer slopes of the flood protection landform at the floodplain margin, but these interactions are limited to the extremities of inundation and are not expected to cause erosion. Given the low hydraulic energy and limited exposure, erosion-resistant armouring is not considered necessary to maintain stability. The minimum proposed landform elevation adjacent to the Isaac River flood extent is ~200 mAHD, providing >7 m freeboard to the 0.1% AEP event and ~3.5 m freeboard to the PMF event.

Similarly, under 0.1% AEP event conditions, shallow, low-velocity floodwaters are expected to encroach on the toe of the OOPD on the southern side. Peak velocities in this area are predicted to remain below 1.7 m/s. Velocities increase under PMF conditions with localised areas on the southwest corner of the OOPD experiencing velocities up to 3.2 m/s. The majority of the OOPD experiences velocities of less than 2.8 m/s under these extreme conditions. The OOPD is not part of the Pandora residual void flood protection landform and presents no risk of erosional instability leading to inundation of the Pandora residual void.

Flood-mapping outputs (WRM 2026) for the 0.1% AEP and PMF events under post-mining conditions are presented in Figure 3-34 to Figure 3-37. These maps illustrate predicted peak flood depths and velocities around the closure landform. The results confirm that the residual voids remain outside the predicted inundation extent for all modelled scenarios, and that floodwater interaction with the flood protection landform adjacent to the Pandora residual void is shallow and low-velocity. The figures provide a visual summary of the updated flood-risk assessment, demonstrating that the final landform achieves effective protection from inundation and maintains stability under both design and extreme flood events.

Sensitivity testing of the model (WRM 2026, Tables 5.3 and 5.4, and Figures 5.13 and 5.14) indicates that increases in hydraulic roughness or discharge produce negligible changes to the 0.1% AEP event (up to 0.5 m flood level increase and 0.2 m/s increase in velocity).

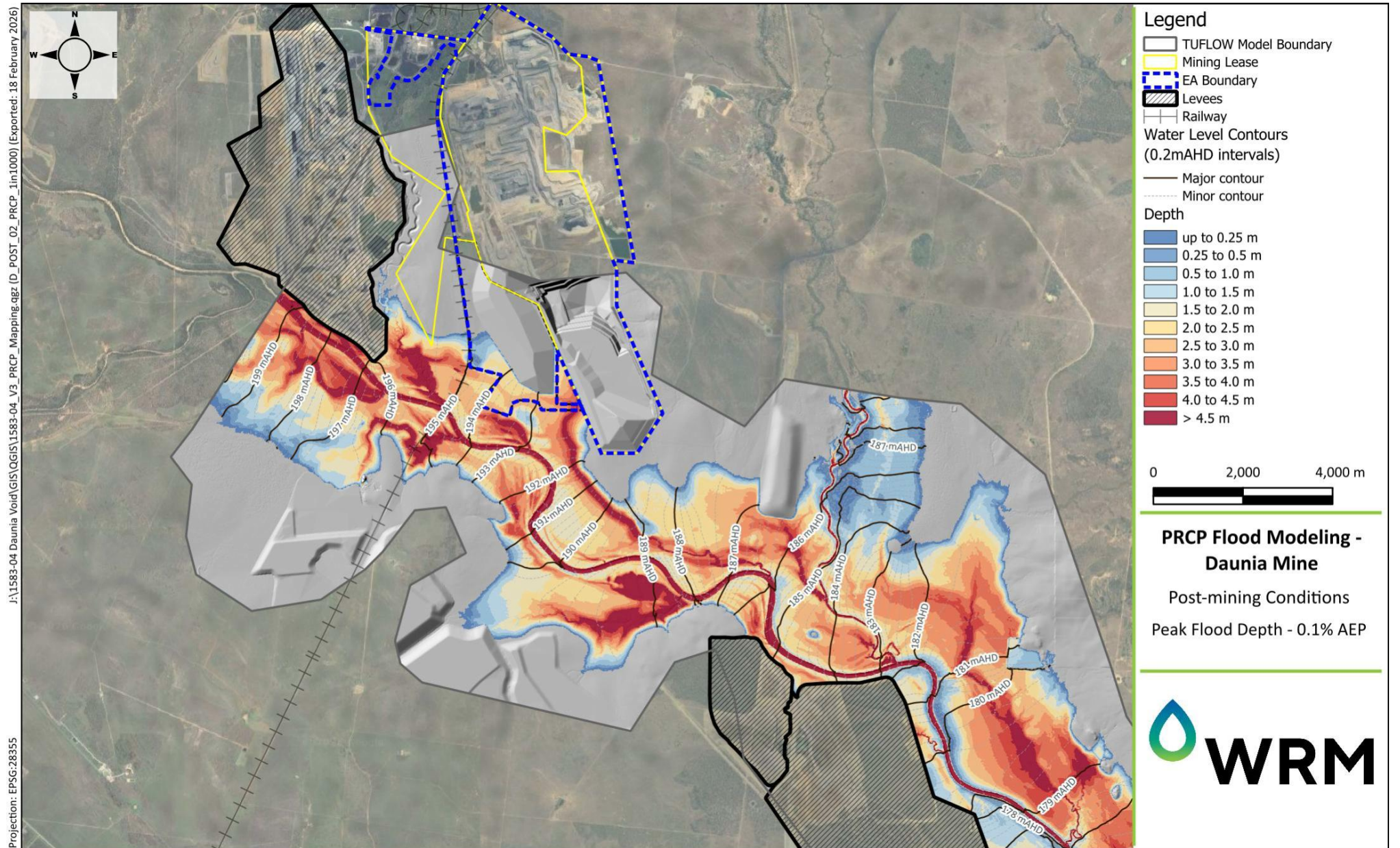


Figure 3-34 Peak flood depth – post-mining conditions – 0.1% AEP design event

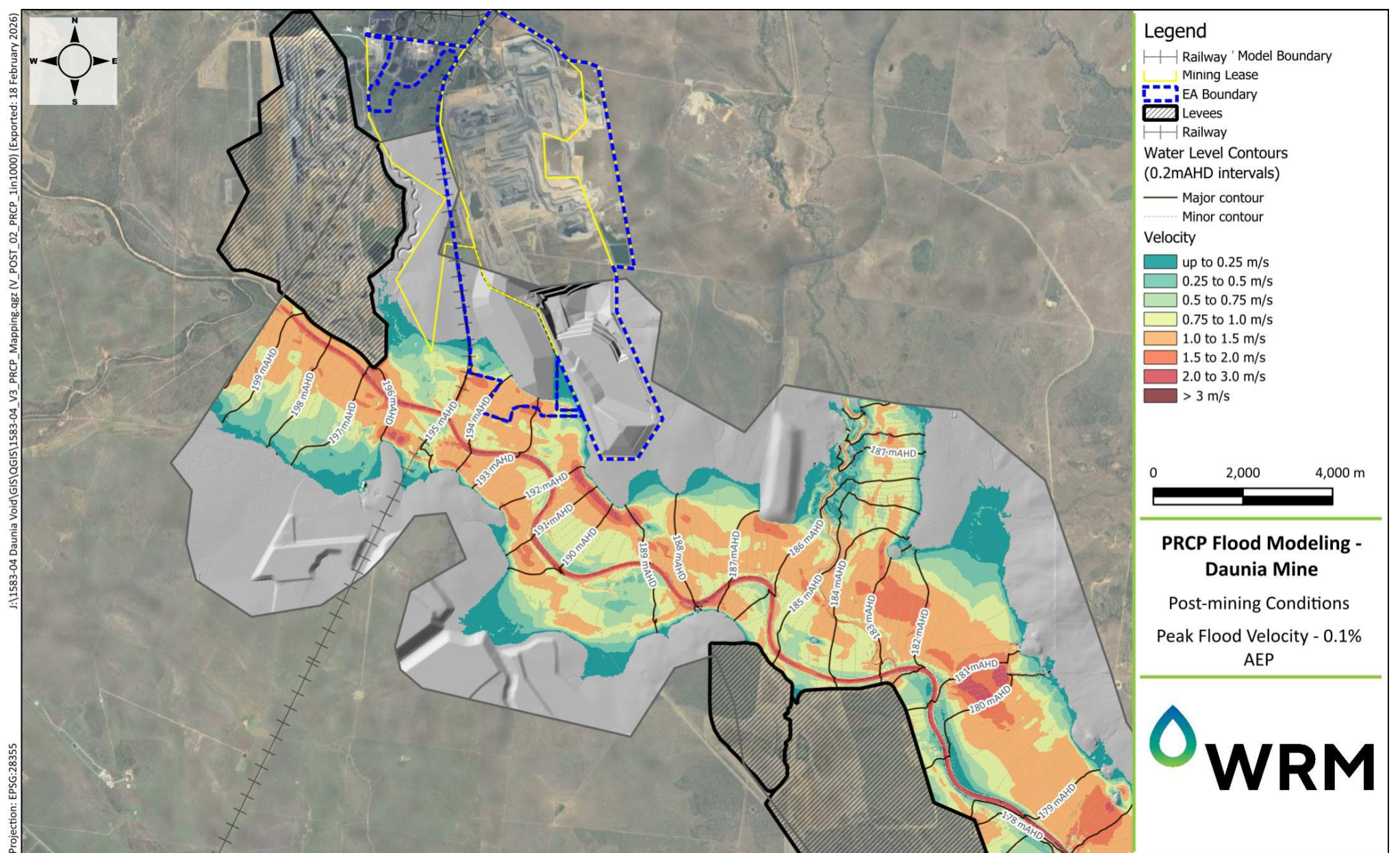


Figure 3-35 Peak flood velocity – post-mining conditions – 0.1% AEP design event

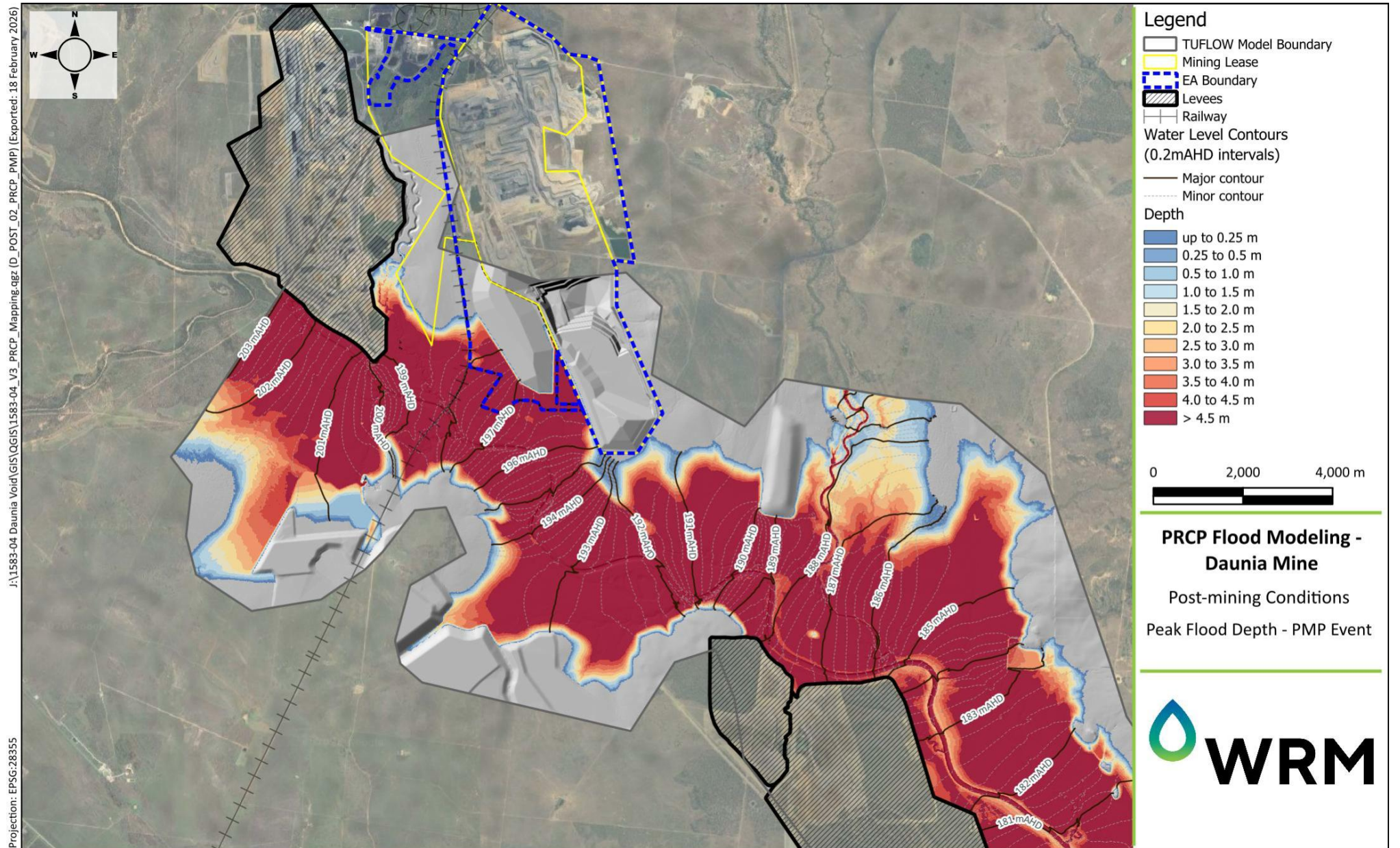


Figure 3-36 Peak flood depth – post-mining conditions – PMF event

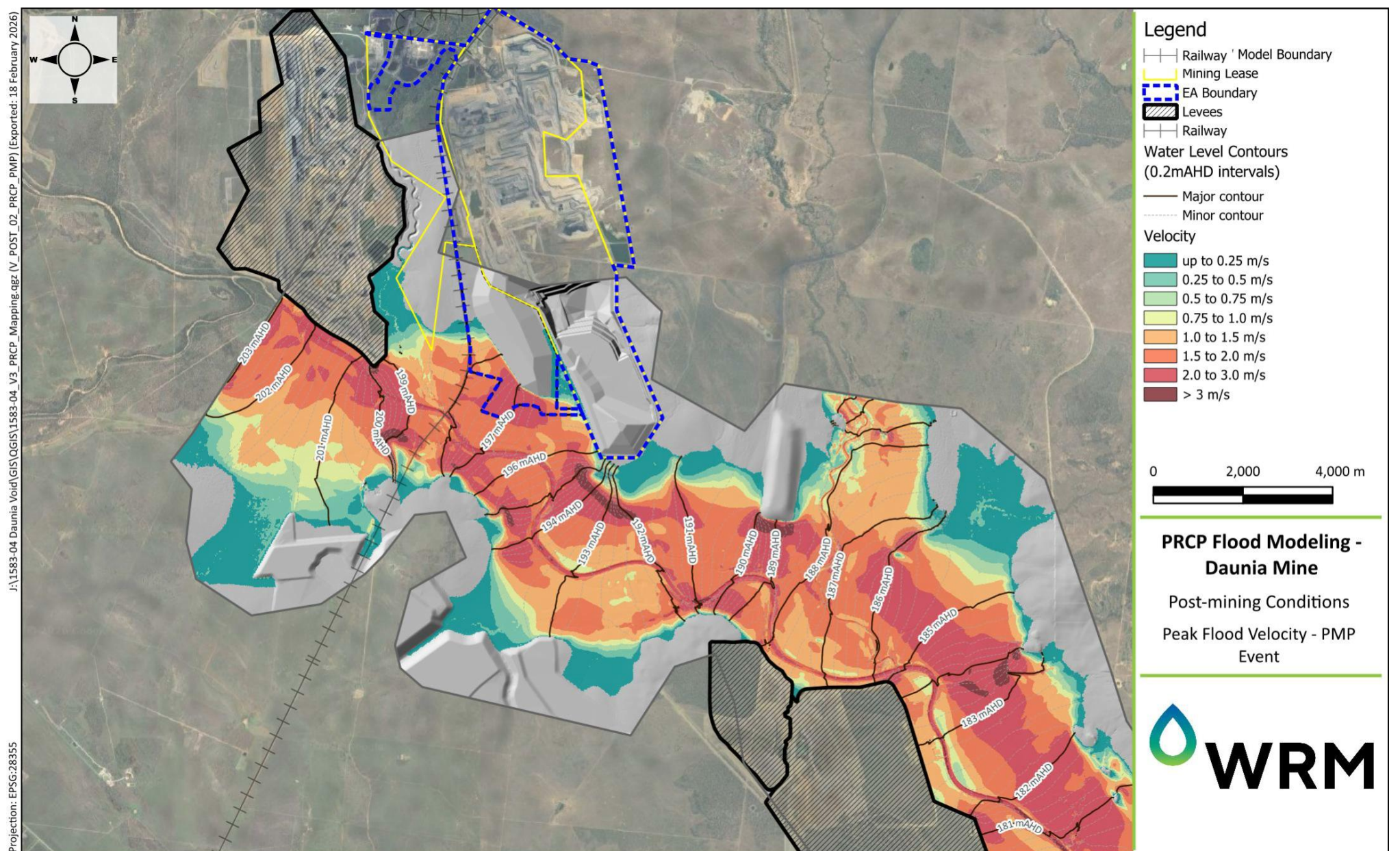


Figure 3-37 Peak flood velocity – post-mining conditions – PMF event

3.6.1.2.6 Alteration of flows

The proposed post-mining landform includes four (4) residual voids, which have a combined catchment area of 15.6 km². Of this, 5.1 km² is excised from the New Chum Creek catchment and 2.2 km² is excised from the North Creek catchment. The total excised catchment from the Isaac River of 15.6 km², represents 0.4% of the Isaac River catchment to the DNM site. This change is minor and unlikely to materially affect peak flows or flow volumes downstream of the DNM.

3.6.1.2.7 Flood risk profile

A flood risk profile was developed based on the rehabilitation flood modelling results and ISO 31000 methodology.

Using the updated 2026 WRM models, the final closure landform minimises flood interaction, maintains isolation of the residual voids from flooding and provides a stable configuration. The updated risk profile identifies low residual risk associated with flooding of the residual voids and no additional critical controls are required.

3.6.1.2.8 Future requirements and commitments

The section of the Pandora spoil landform that provides flood protection will be subject to a Consequence Category Assessment (CCA) before construction, during operations and under existing EA conditions to determine whether it is a regulated structure. The outcome of the CCA assessment, together with PRCP Schedule requirements (PRCP15, PRCP16 and the criteria listed in RM3), establish the assurance pathways for detailed design, third-party certification, construction quality, operational performance monitoring and management.

In accordance with PRCP Schedule condition PRCP15, a flood susceptibility and impact assessment will be prepared by a third-party AQP and submitted to the administering authority by 1 July 2029. The assessment under PRCP15 will:

- a) describe potential risks and impacts under extreme flood events up to and including the 0.1% AEP, including quantifying potential impacts to embankment structures, the final rehabilitated landform and the receiving environment;
- b) confirm that any such impacts will not prevent stable conditions being achieved and will not result in serious environmental harm that is irreversible, of a high impact or widespread, or significantly different to impacts experienced in the surrounding flood affected environment; and
- c) if required, recommend design, design modifications or additional protection measures (e.g. rock armouring, regrading, drainage re-alignment, toe protection, freeboard augmentation) to ensure long-term hydraulic and geotechnical stability.

In accordance with PRCP Schedule condition PRCP16, if the flood susceptibility and impact assessment required by PRCP15 identifies requirements for new flood protection measures or modifications to the Pandora spoil landform, by 1 December 2029 WHC will:

- a) submit a revised Closure Landform Design Report for the new or modified structures to the administering authority;
- b) ensure the design plan has been prepared and certified by a third-party AQP in the appropriate discipline/s); and
- c) demonstrate the design ensures flood immunity to the 0.1% AEP, with minimum stability criteria, crest elevation and freeboard requirements clearly defined.

The PRCP Schedule rehabilitation milestone criteria (RM3.1 - RM3.13) also apply to any new or modified flood protection features required under PRCP15 or PRCP16.

Relationship with PRCP Schedule

The interaction between flooding and the proposed closure landform presents low risk. The updated modelling confirms that the closure landform provides robust physical protection from inundation to the residual voids, flood behaviour does not compromise landform stability and downstream flows remain consistent with pre-mining conditions.

The final landform achieves an appropriate level of flood protection under both present-day and future (+2.5°C at year 2100) climatic conditions.

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 waste characterisation assessment has been undertaken to support the development of this PRC Plan. The detailed report – *Daunia Mine Progressive Rehabilitation and Closure Plan Environmental Geochemical Characterisation and Risk Assessment of Mineral Waste* by Mine Waste Management (MWM, 2026) is provided in Appendix 4.6 – Waste Characterisation.

3.6.1.3.1 Background

The relevant domains to mineral waste characterisation and management at DNM include the residual voids, the associated spoil dumps that will form a single main spoil landform north of Pandora and a smaller landform south of the Pandora void and the ROM and product coal stockpile areas.

DNM does not have a tailings storage facility (TSF). Tailings are dewatered at the CHPP to produce fine rejects, which are mostly blended with coarse rejects to form mixed plant rejects (MPR) and co-disposed within select spoil dumps. Tailings liquor from the dewatering process is recycled within the CHPP water circuit.

DNM generates two principal types of mineral waste:

- Spoil (overburden and interburden) – accounts for approximately 98.5% of all mineral waste at DNM. It includes both weathered (Tertiary and Permian-age) and fresh (unweathered, Permian-age) materials in roughly equal proportions. About 52% of spoil is fresh and 48% is weathered or oxidised. From a geochemical perspective, spoil is dominated by non-carbonaceous material (about 94% of all spoil), with the remaining 6% comprising carbonaceous material associated with coal seams. Spoil samples used for geochemical assessment were collected primarily from drill core and are representative of the stratigraphic variability across the mine.
- Coal rejects – generated during coal processing at the CHPP and comprising less than 1.5% of total mineral waste. Rejects are produced mainly as MPR, consisting of approximately 80% coarse rejects and 20% fine rejects, and are either co-disposed with spoil or periodically placed directly into selected spoil dumps. The proportions of spoil and rejects are not expected to change significantly over the remaining life of the mine.
- Coal – included in the geochemical assessment although generally not considered mineral waste. Small quantities of sub-economic coal may be mined with spoil or remain exposed on pit walls and floors, including within residual voids at closure.

All mineral waste and coal materials have been assessed for their potential to generate acid and metalliferous drainage (AMD), including acid drainage, neutral metalliferous drainage and saline drainage, as well as non-oxidative salinity. Spoil materials were also tested for sodicity and dispersion potential.

Each sample was classified as either non-acid forming (NAF) or potentially acid forming (PAF) based on the results of static and kinetic testing.

3.6.1.3.2 Geochemical assessment of mineral waste

3.6.1.3.2.1 Assessment methodology

Geochemical characterisation of spoil, coal rejects and coal at DNM was based on a consolidated dataset compiled from historical and recent sampling programs between 2008 and 2022. The dataset includes samples representative of all major lithological units and material types expected at closure.

Sampling and analysis covered the full range of spoil, rejects and coal likely to remain at closure. A total of 710 drill-hole samples were analysed from 31 drill holes across DNM, including 83 drill-chip and 627 drill-core samples. Samples represent both weathered and fresh, carbonaceous and non-carbonaceous spoil, as well as coal. In addition, 199 coal reject samples were analysed, comprising 61 tailings, 52 coarse rejects and 86 MPR samples from the CHPP. The dataset is representative of the stratigraphic and spatial variability of materials likely to occur at closure.

Static testing was conducted on all samples to assess AMD potential, salinity and metal mobility. Analyses included:

- pH and electrical conductivity (1:5 solid:water extract);
- total sulfur (for maximum potential acidity);
- acid neutralising capacity (ANC); and
- net acid-producing potential (NAPP).

Selected samples underwent additional testing, including Net Acid Generation (NAG) and sequential NAG, Acid Buffering Characterisation Curve (ABCC), total and organic carbon, total metals and metalloids, mineralogical analysis by quantitative X-ray diffraction, short-term leach testing with deionised and saline water extracts, exchangeable cations and CEC, and Emerson Aggregate Class testing for dispersion potential.

Kinetic oxygen consumption (OxCon) testing was also undertaken on representative spoil and coal samples to quantify sulfide oxidation, acidity generation and carbonate neutralisation rates under controlled laboratory conditions.

All laboratory work followed recognised industry and regulatory guidelines (INAP, 2009; AMIRA, 2002) and was undertaken by National Association of Testing Authorities (NATA)-accredited facilities including ALS Environmental (Brisbane) and Earth Systems (Melbourne).

3.6.1.3.2.2 Assessment results

The test work results were used to understand the geochemical properties of each individual material type (source) and assign a geochemical classification. This data (and AMD classifications) were then used to infer the geochemical hazard posed by each mineral waste type in their relative proportions within the final spoil landform.

The key findings from the geochemical assessment are presented below.

3.6.1.3.2.2.1 Rejects

- Rejects constitute approximately 1.5% of total mineral waste. Based on updated characterisation, around 5% of reject samples were classified as PAF, with total sulfur contents of approximately 0.56% S.
- AMD source hazard scoring for rejects is Moderate-High (score 14). However, rejects are co-disposed within the NAF spoil matrix as mixed plant rejects (MPR), allowing effective neutralisation of any limited acidity that may be produced. As such, as a bulk material, rejects has a low potential to generate AMD. MPR will not be placed within the OOPD.
- With some exceptions, the total metal and metalloid concentrations from 46 samples tested are generally low compared to average element abundance in soil in the earth's crust. Solubility data

indicates that leachate from rejects under deionised water and saline water conditions is expected to contain low concentrations of soluble metals and metalloids.

3.6.1.3.2.2.2 Spoil

- Recent waste characterisation confirms that spoil comprises approximately 93.6% non-carbonaceous and 6.4% carbonaceous material. Only a very small proportion of samples ($\leq 0.6\%$) were classified as PAF, indicating that bulk spoil is overwhelmingly NAF with very low total sulfur and excess neutralising capacity. Non-carbonaceous spoil has total sulfur contents typically below 0.03 % S (75th percentile), while carbonaceous spoil averages around 0.11 % S. These sulfur levels, combined with the high ANC values recorded across the dataset, indicate a substantial acid-neutralising capacity within the spoil mass.
- The AMD source hazard scoring for non-carbonaceous spoil is Low (score 2) and for carbonaceous spoil Moderate (score 10), resulting in a combined domain AMD hazard score of 1.2-1.3 (Low) for the DNM landforms.
- Soluble multi-element results indicate low concentrations of metals and metalloids in leachates from NAF spoil, whereas the low amount of PAF spoil may release moderate concentrations of Al, As, Mn, Mo, Se and Sb.
- Assuming that the analysed samples are representative of the spoil produced at DNM (current, past and future), as a bulk source material, spoil is expected to have low capacity to generate AMD.

3.6.1.3.2.2.3 Overall AMD potential

- Considering all mineral waste types, the updated assessment indicates that the final spoil landform is classified as a low AMD hazard. The domain AMD hazard scores (see Section 3.6.1.3.3) of 1.2 for the DNM main landform, and 1.3 for the Pandora landform both correspond to a Low hazard and a Highly Unlikely likelihood of AMD generation.
- The spoil material has low total sulfur, high ANC and minimal PAF proportion, confirming its net acid-neutralising nature.

3.6.1.3.2.2.4 Dispersion potential

- Spoil and rejects can generate contact water that is slightly to moderately saline (i.e. EC less than 2,000 $\mu\text{S}/\text{cm}$), largely as the result of non-oxidative processes (i.e. from the dissolution of salts and not oxidation of pyrite).
- Spoil is 'sodic to strongly sodic' with potential for dispersion (based on the high sodicity values).
- Emerson aggregate class testing found that about 51% of the spoil samples tested displayed 'some dispersion' and another 14% of the spoil samples had Emerson Class 3 suggesting remoulded dispersion. The remaining bulk of the samples had Emerson aggregate class values suggesting the samples were non-dispersive.
- Sodicity and dispersivity testing was not undertaken on rejects as these materials are not exposed on the final landform surface.

3.6.1.3.2.2.5 Coal

- Coal is not regarded as waste at DNM because ROM coal remains on-site for a relatively short period of time. However, some minor coal will report directly to spoil as waste, while remnant coal (seams) will be exposed on the highwalls of residual voids at closure.
- The assessment has shown that coal samples have variable geochemical properties, with approximately 48% of coal samples conservatively classed as PAF. Similar to other source material tested, coal samples with potential for AMD can release moderate concentrations of metals and metalloids in contact with water, under controlled laboratory conditions.

- Based on the geochemical properties and samples assessed for this report, it is expected that as a bulk source material, coal will have a moderate to high capacity to generate AMD.

These geochemical classifications were used to quantify landform-scale AMD hazard scores (Section 3.6.1.3.3).

3.6.1.3.3 Geochemical risk of final landforms

Final closure domains of relevance to mineral waste, include a rehabilitated spoil dump (final spoil landform) and four residual voids. The final spoil landform is comprised of approximately 98.5% spoil with the remaining 1.5% being rejects, with very minor waste coal. Based on operational practices and life-of-mine waste management, at closure it is expected that:

- Spoil landform will comprise spoil (overburden, interburden) and rejects;
- Highwalls will comprise overburden, interburden and coal seams (including seam roof, partings and floor); and
- Pit floors will comprise coal (conservatively).

3.6.1.3.4 Source hazard assessment

A geochemical source hazard assessment was conducted on the source material types comprising carbonaceous and non-carbonaceous spoil, rejects and coal (where relevant), as presented in Table 3-34.

The assessment used an AMD hazard-scoring framework based on three components: AMD propensity, AMD capacity and AMD quantity, to quantify the overall hazard and likelihood of AMD generation for each landform. These terms are defined as follows:

- AMD propensity represents the geochemical likelihood of a material to generate AMD, based on the proportion of samples classified as PAF:
 - <5% PAF are rated Implausible (score 1),
 - 5-40 % PAF Plausible (score 5), and
 - 40 % PAF Expected (score 7).
- AMD capacity reflects the potential severity of AMD generation and is estimated using total sulfur as a proxy for acid-forming potential. The 75th percentile total S value of PAF (and NAF-S) samples is applied as a conservative measure, recognising that some sulfur may occur in NAF minerals.
 - <0.1 S% are Low (1),
 - 0.2-0.5 %S Moderate (5), and
 - >0.5 %S Moderate-High to High (7-10).

Capacity scores also account for drainage type, with acid drainage assigned higher severity than neutral or saline drainage.

AMD quantity represents the tonnage of material with AMD potential in each landform.

- Low rating (1) corresponds to <5% AMD-generating material,
- Moderate (5) to >5 %, and
- High (10) to >5 % of material rated Moderate-High or High for AMD capacity.

The overall AMD source-material hazard score is a weighted combination of propensity (50%), capacity (25%) and quantity (25%). The weighted average of source-material scores (proportional to their abundance in each domain) defines the landform AMD hazard score.

Landform AMD hazard scores are interpreted using the following likelihood scale (aligned with ISO 31000):

- 0-5 = Highly Unlikely;

- 5-10 = Unlikely;
- 10-15 = Probable;
- 15-20 = Likely; and
- 20 = Highly Likely.

Table 3-34 Summary of AMD hazard scores for DNM Main and Pandora landforms

Landform	Material type	Proportion of total landform	AMD Propensity (rating)	AMD Capacity (rating)	AMD Quantity (rating)	Source material hazard score	Domain AMD hazard score	AMD likelihood ranking
DNM Main	Non-carbonaceous spoil	92.2%	1 (Implausible)	1 (Low)	1 (Low)	2 (Low)	1.2 (Low)	Highly Unlikely
	Carbonaceous spoil	6.3%	5 (Plausible)	5 (Moderate)	1 (Low)	10 (Moderate)		
	Coal rejects	1.5%	7 (Expected)	7 (Moderate-High)	1 (Low)	14 (Moderate-High)		
Pandora & OOPD	Non-carbonaceous spoil	93.6%	1 (Implausible)	1 (Low)	1 (Low)	2 (Low)	1.3 (Low)	Highly Unlikely
	Carbonaceous spoil	6.4%	5 (Plausible)	5 (Moderate)	1 (Low)	10 (Moderate)		
Source: Mine Waste Management (2026)								

3.6.1.3.4.1 Source-pathway-receptor model

The CSM by SLR in Figure 3-32 highlights the Source-Pathway-Receptor (SPR) assessment for potential AMD and salinity impacts from mineral waste at DNM. The CSM focuses on the relationships between spoil landforms, residual voids, surface water and groundwater and illustrates potential sources of run-off and seepage, plausible receptors (e.g. creeks, residual voids, groundwater), and the pathways connecting them.

The CSM indicates that the spoil landforms will drain toward the adjacent residual voids, with most seepage and surface run-off reporting internally rather than off-site.

Groundwater modelling shows that all residual voids will act as long-term groundwater sinks, capturing local seepage and run-off from adjoining landforms and highwalls.

Regional hydrogeological assessment by SLR (2026) found that the nearest significant alluvial aquifer (Isaac River floodplain) is located approximately 3 km west of the southern end of DNM. Shallow permeable strata may occur intermittently along some creeks but are discontinuous and largely unsaturated, indicating negligible hydraulic connectivity between the spoil landforms and surface-water features.

Particle tracking in the groundwater model in Figure 3-31 confirms that there is no connectivity between groundwater at DNM and regional surface water systems. With the exception of seepage generated along the western margin of the OOPD, seepage and shallow groundwater are expected to migrate toward the residual voids, consistent with the pit drawdown.

Under extreme rainfall events, surface run-off from the northern landform may discharge to New Chum Creek and run-off from the southern landform may discharge to tributaries of the Isaac River. These creeks are therefore considered plausible, but infrequent, surface water receptors.

Potential pathways and receptors for AMD and salinity were identified based on the CSM and hydrogeological modelling. The outcomes of the SPR assessment for each domain are summarised in Table 3-35.

Table 3-35 Summary of AMD and salinity pathways and associated SPR risk ratings

Domain	Source composition	Receptor type	Primary pathway(s)	Primary receptor(s)	Potential impact mechanism	Likelihood	Severity	Risk rating		Overall risk rating	Key findings
								AMD	Salinity		
Main spoil landform (Titan North / Central, Titan East)	~92.2% non-carbonaceous spoil, ~6.3% carbonaceous spoil, ~1.5% coal rejects	Surface water	Surface-water runoff; seepage via shallow permeable strata	New Chum Creek	Acidic drainage, neutral metalliferous drainage and saline drainage	Highly Unlikely	S1	Low	Low-Medium	Low	- Low total S; - ANC/MPA>>2; - runoff to New Chum Creek limited to major rainfall; - predicted concentrations below ecological concern.
		Residual voids	Seepage via groundwater	All residual voids		Highly Unlikely	S1	Low	Low	Low	- Residual voids act as groundwater sinks; - seepage contained internally with no external discharge.
Pandora spoil landform	~93.6% non-carbonaceous spoil, ~6.4% carbonaceous spoil	Surface water	Surface-water runoff; seepage via shallow permeable strata	Unnamed tributary to Isaac River		Highly Unlikely	S1-S2	Low	Low-Medium	Low	- Short pathway (~200 m); - runoff only during high rainfall; - no persistent connectivity to Isaac River.
		Residual void	Seepage via groundwater	Pandora void		Highly Unlikely	S1	Low	Low	Low	- Residual void functions as terminal sink; - seepage captured within void catchment.
OOPD	~93.6% non-carbonaceous spoil, ~6.4% carbonaceous spoil	Surface water	Surface-water runoff; seepage via shallow permeable strata	Unnamed tributary to Isaac River		Highly Unlikely	S1-S2	Low	Low-Medium	Low	- Short pathway (~200 m); - runoff only during high rainfall; - no persistent connectivity to Isaac River.
		Residual void	Seepage via groundwater	Pandora void		Highly Unlikely	S1	Low	Low	Low	- Residual void functions as terminal sink; - seepage captured within void catchment.
		Groundwater	Seepage via groundwater	Permian aquifer		Highly Unlikely	S1	Low	Low	Low	<40% of seepage not captured by Pandora residual voids. - No MPR placed in OOPD. - Seepage migrates to deep Permian coal measures and not impact shallow aquifers.
Residual-void highwalls and pit floors	Highwalls: 86-88% non-carbonaceous, 12-14% carbonaceous (≤6% PAF exposed) Pit floors: ~44% coal (submerged post-closure)	Residual voids	Surface-water runoff from highwalls	All residual voids		Unlikely	S1-S2	Low	Low	Low	- Pit floors submerged post-closure, eliminating oxidation; - voids retain seepage and runoff internally; - no off-site pathways.

Notes: S1 = minor impact; S2 = low impact.

Adapted from: Mine Waste Management (2026)

3.6.1.3.5 Management and rehabilitation measures

The outcomes of the geochemical and SPR assessment have informed the following management and rehabilitation measures.

The assessment found that the environmental risks posed by mineral wastes likely to be present at closure are low. No specific AMD management measures (such as alkaline amendment or engineered capping systems) are required to manage mineral wastes during rehabilitation and closure, other than operational practices already proposed for blending, burial and placement of spoil and coal rejects.

Decommissioning and rehabilitation activities related to mineral waste will be addressed as part of the milestone criteria for infrastructure removal, remediation of contaminated land, landform reshaping, surface preparation and revegetation.

Proposed mineral waste management and rehabilitation measures relevant to this waste characterisation assessment include the following:

- Residual voids:
 - Each void will remain as a groundwater sink post-closure and will receive runoff and seepage from adjacent spoil landforms and highwalls. No specific AMD management measures are required beyond ongoing implementation of landform design and stability measures described in the main PRCP volume.
- Spoil landforms:
 - The existing spoil emplacements will be reshaped and seeded
 - The small proportion of carbonaceous spoil with AMD potential will be co-disposed with the bulk of NAF spoil, which has excess neutralising capacity sufficient to manage any acidity generated in situ.
- Coal rejects:
 - Rejects will continue to be managed during operations by disposal within spoil and progressive covering by additional spoil material. No specific AMD remediation is required at closure.
 - No MPR will be placed within the OOPD or Pandora spoil emplacements
 - The optimal thickness of spoil cover to manage the limited AMD hazard associated with coal rejects will be determined following further assessment prior to placement of final cover.
- ROM pad:
 - Remnant coal will be removed and disposed within spoil. The ROM pad area will be reshaped, covered with soil, ripped and seeded.
- Coal stockpile area:
 - Remnant coal will be removed and disposed within spoil. The former coal stockpile area will be covered with suitable soil material, ripped and seeded.

Further details regarding cover design is provided in Section 3.6.1.6.

Relationship with PRCP Schedule

The environmental risks associated with mineral waste at closure are low, and no specific AMD or salinity control structures are required.

Management of mineral waste will be achieved through the planned spoil placement strategy, blending of minor reactive materials with non-acid-forming spoil, and completion of surface preparation and revegetation activities defined within the PRCP schedule.

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.

A growth media assessment has been undertaken to support the development of this PRC Plan. The detailed report – *Daunia Mine Materials Characterisation Study* (Landloch, 2022) is provided in Appendix 4.3 – Material Characterisation. Soil surveys have been conducted for the proposed mining footprint (refer to Section 3.1.2.6).

3.6.1.4.1 Quality of available resources

The key chemical and physical properties of the stockpiled topsoil within the soil management group available for rehabilitation at DNM is summarised in Table 3-36.

Table 3-36 Key physical and chemical properties of stockpiled soil

Analysis	Red/brown clay topsoil
<i>Chemical properties</i>	
pH _{1:5}	Neutral to strongly alkaline (7.8-8.7)
EC _{1:5} (dS/m)	Low to moderate (0.15-0.43)
ESP (%)	Non-sodic to sodic (1.7-7.8)
Total N (mg/kg)	Low to moderate (688-1,684)
Plant available P (mg/kg)	Low to moderate (7-38)
Plant available K (mg/kg)	Low (93-172)
Organic carbon (%)	Low to high (0.94-1.91)
CEC (meq./100 g)	Moderate (13-28)
Ca/Mg ratio	Low Ca to balanced (2-6.5)
<i>Physical properties</i>	
Clay content (%)	>30
Rock content (%)	<20
Emerson Aggregate Test (EAT)	Slightly dispersive to stable (3b-7)
Permeability	Low
<i>Note: Chemical properties are based on average 10th and 90th percentile values for all stockpile samples analysed</i>	
<i>Source: Landloch (2022)</i>	

3.6.1.4.2 Quantity of available resources

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

The volume of topsoil available for rehabilitation currently includes the volume of topsoil stockpiled on site (4,477,000 m³ as of February 2025) and the future topsoil expected to be generated through ongoing mine advancement. Future advancement is estimated to cover an area of 650 ha, which at a conservative 0.15m topsoil strip depth, equates to 980,000 m³ of future topsoil availability.

In addition, topsoil stripping associated with the proposed DWIP footprint has been estimated to recover approximately 815,000 m³ of future topsoil (SLR, 2025)

Taking into account existing stockpiles and future mine progression (including the DWIP area), the total forecast of topsoil availability for rehabilitation is 6,272,000 m³

The total volume of growth media required for rehabilitation of each PMLU is shown in Table 3-37. These volumes include disturbance areas where topsoil has been stripped or is planned to be future stripped.

Table 3-37 Required growth media volumes for DNM PMLUs

PMLU	Area requiring growth media (ha)	Growth media depth (m)	Growth media volume required (m ³)
Cattle Grazing	1,615	>0.15	2,422,500
Woodland Habitat	1,229	>0.10	1,229,000
Watercourse	0.3	>0.15	450
Total growth media required			3,651,950
Total topsoil available			6,272,000
Balance			2,620,050 (surplus)

3.6.1.4.3 Resource management

During mining operations, topsoil and other growth media is stripped in accordance with the recommended depths identified in pre-mining soil surveys. Stripped material is either used direct on active rehabilitation areas or stockpiled progressively for later use. Existing topsoil stockpiles are located throughout the DNM site and are available for haulage and placement as required.

The location of topsoil stockpiles (as of April 2025) is shown Figure 3-38. Stockpile locations and volumes will vary throughout the life of the operation as materials are used for rehabilitation and new stockpiles are established as mining progresses. The spatial extent of each stockpile is recorded in the site's GIS system and a corresponding volume inventory is maintained to support planning for progressive rehabilitation.

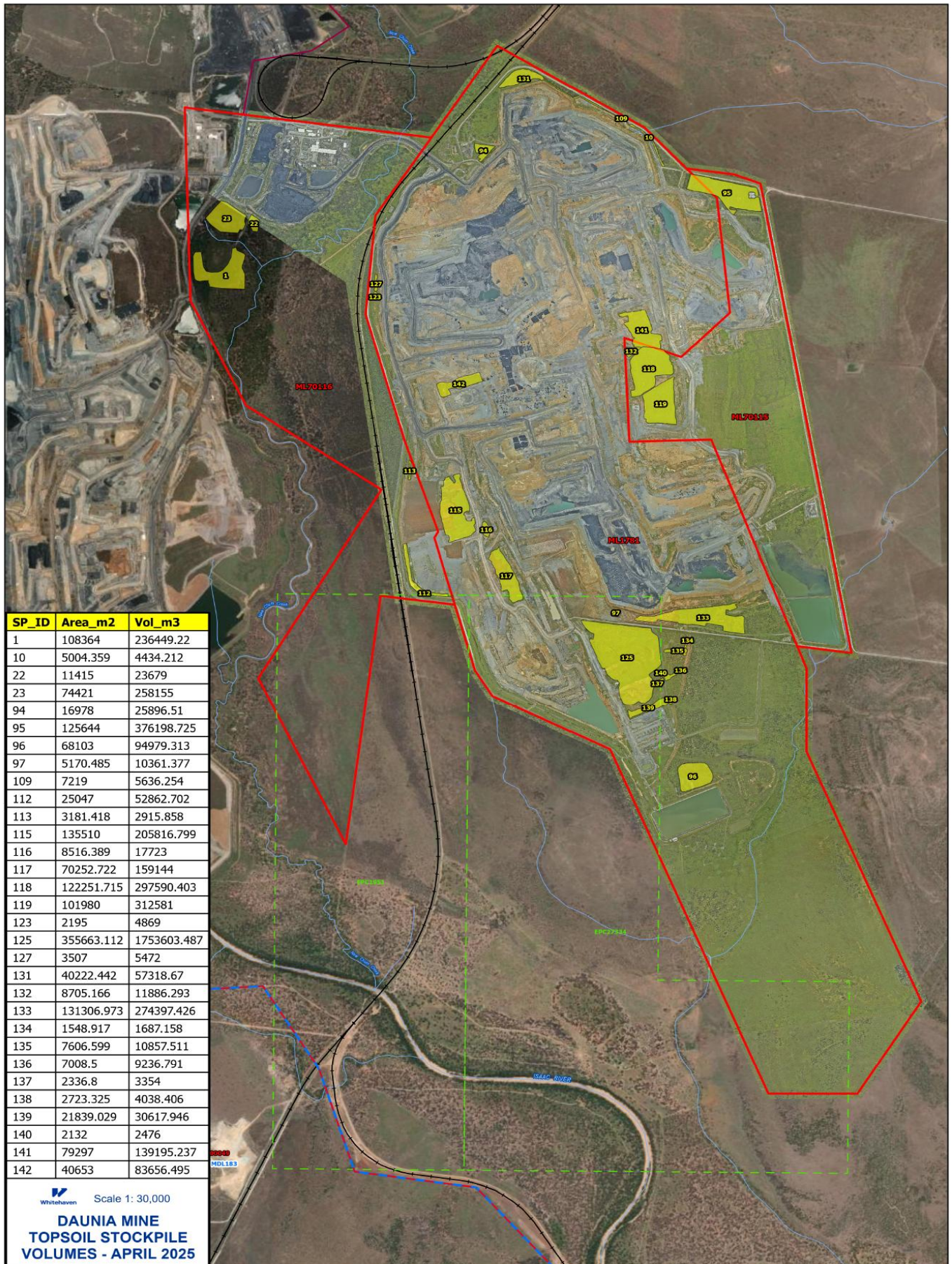


Figure 3-38 DNM topsoil stockpile locations and volumes – April 2025

3.6.1.4.3.1 Growth media assessment

In accordance with PRCP Schedule 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 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 DNM has certain limitations, including sodicity (ESP up to 7.8%), alkaline pH (7.8-8.7), low to moderate fertility (N, P, K), low organic carbon (<2%) and low permeability. 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 3-38).
- 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 3-38. These treatments will be applied as part of rehabilitation works to ensure the growth media meets the soil quality criteria set out in the milestone targets.

Table 3-38 Growth media ameliorant options and surface treatments for the DNM PMLUs

PMLU	Minimum growth media depth	Ameliorant treatments	Surface preparation and treatments
Cattle crazing	Topsoil – minimum depth of 150 mm is sufficient to store moisture and nutrients to initiate and sustain pasture growth	— Manure — Urea — DAP / MAP — Superphosphate or superphosphate — Potassium fertiliser — Gypsum — Incorporated organic matter — Surface mulching	— 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 100mm. 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	— 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 (Section 3.6.1.8.8)
Watercourse	Topsoil – minimum depth of 150 mm to encourage a vegetative cover to provide erosion resistance	— Manure — Superphosphate — Gypsum — Incorporated organic matter — Surface mulching	— 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 3.6.1.8.11)

To ensure soils used in rehabilitation are suitable for the PMLUs and long-term ecosystem function, as-constructed growth media must meet defined chemical and physical quality targets. The proposed targets in Table 3-39 are based on topsoil stockpile characterisation data (Landloch 2022) and supported by recognised guidelines (DERM 2011; Hazelton & Murphy 2007). The targets vary between PMLU as the cattle grazing PMLU requires higher nutrients, whereas the woodland habitat and watercourse PMLUs have been guided by a combination of industry guidelines and reference site results to provide measurable benchmarks for soil suitability and guide the application of ameliorants prior to placement.

Table 3-39 Proposed soil quality targets for growth media at DNM

Parameter	Target range cattle grazing PMLU	Target range woodland and watercourse PMLU	Soil stockpile level	Rationale
pH (1:5)	5.6-8.4	5.1-8.8	Neutral to slightly alkaline range (7.8-8.7)	Sulfur to be used to neutralise alkaline soil where needed
EC (Sat Ext) dS/m	<4	<4	Low-moderate (EC 1:5 water 0.15-0.43)	Current levels indicate no salinity risk for pasture and woodland species
ESP (%)	<6	<6	Non-sodic to sodic (1.7- 7.8)	Gypsum to be applied to reduce sodicity below 6% where needed
Nitrate Nitrogen N (mg/kg)	>10	>5	Low-moderate (688- 1,684)	Nitrogen fertiliser to be added where <1,000
Plant-available P (mg/kg)	>14	>10	Low-moderate (7-38)	Superphosphate/DAP to be added where <15
Plant-available K (mg/kg)	>110-260	>110-260	Low (93-172)	Potassium fertiliser added where <150
Organic carbon (%)	>1	>1	Low (0.94-1.91)	Organic matter/compost added to raise carbon where low
CEC (cmol(+)/kg)	>12	>12	Moderate (13-28)	CEC>15 supports nutrient retention
Ca:Mg ratio	>4	>4	Low (2-6.5)	Gypsum and lime to adjust balance if outside range
Source: Hazelton & Murphy (2007); DERM (2011), Short (2023)				

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 DNM final landform design presented in this PRC Plan is a conceptual level design, subject to an iterative refinement process, comprising both spoil emplacements and 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 2027 (per the PRCP Schedule).

The Closure Landform Design Report is a technical document to be prepared, and peer reviewed by an AQP. It is to include detailed landform designs and incorporate all relevant structures. The relevant structures at DNM include:

- Overburden/spoil emplacements;
- Waste rock dumps;
- Residual voids/depressed landforms; and
- Flood protection landforms/levees.

To comply with the PRCP Schedule (PRCP13 and PRCP14), the Closure Landform Design Report is to:

- Incorporate all relevant structures.
- Include detailed landform designs.
- Be certified by an AQP as safe, erosionally and structurally stable.
- Demonstrate suitability for the PMLU, having regard to material properties and local conditions.
- Show that the landforms will achieve and sustain a stable condition.
- Be maintained and updated as necessary to ensure that relevant structures remain capable of achieving and sustaining a stable condition, with any updates certified by an AQP.

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.

A landform design assessment has been undertaken to support the development of this PRC Plan. The report, *Landform Evolution Modelling Simulations to Support Rehabilitation Landform Design: Daunia Mine* (Landloch, 2026), is provided in Appendix 4.7 – Landform Design. This assessment informs the detailed landform design to be incorporated into the Closure Landform Design Report described above.

In addition to Landloch (2026), the current iteration of the conceptual final landform design has been refined based on the outcomes from the following studies, 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 plains modelling assessment (Section 3.5); and
- A hydrogeological assessment (Section 3.6.1.1).

The conceptual 3D final landform design for DNM is presented in Figure 3-39 .

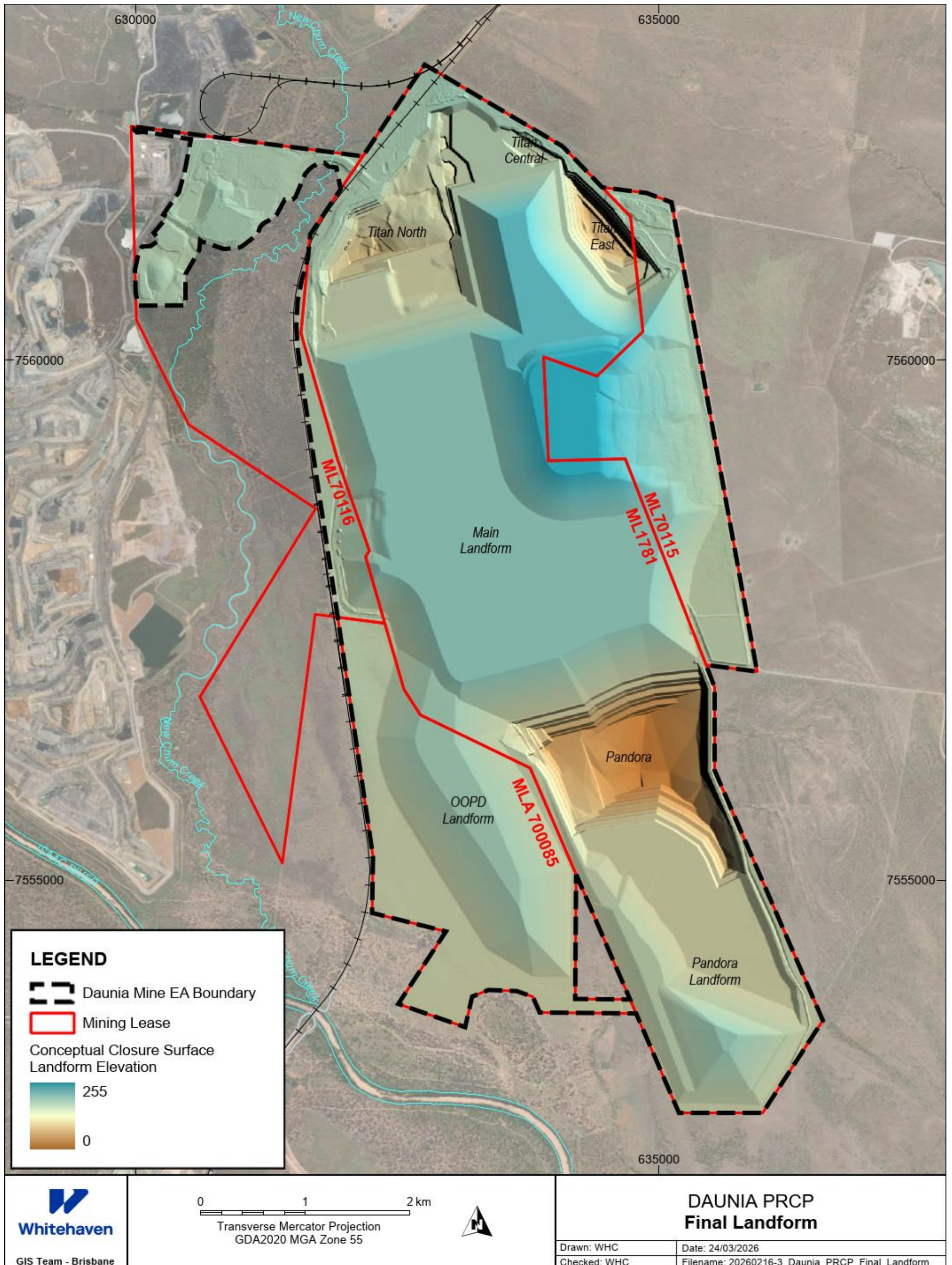


Figure 3-39 DNM Conceptual 3D closure landform design

3.6.1.5.1 Method of determining landform design

Designing of the spoil emplacements with a PMLU in the current conceptual final landform comprised a three-step process:

1. Surface material, or growth media, characterisation;
2. WEPP simulations to develop modelling parameters and landform design criteria; and
3. Testing of the conceptual final landform design using landform evolution modelling.

Three material types were considered when developing design criteria for the final landform:

- Soils – comprising ~95% vertosols and dermosols and ~5% chromosols and sodosols.
- Spoil (waste rock) – Spoil is categorised as one of two spoil management units:
 - Unweathered zone materials – fresh Permian spoil; and
 - Weathered zone materials – weathered sediments and clays.

3.6.1.5.1.1 Soil

Broadscale soil mapping in the region from QLD Globe shows that vertosols and dermosols dominate, with smaller areas of sodosols and chromosols. Detailed surveys in 2004, 2008 and 2012 confirmed these groups, with the 2008 survey indicating about 95% were vertosols and dermosols and 5% were chromosols and sodosols (Landloch, 2026).

The soil resource available for rehabilitation at DNM is largely contained within existing stockpiles. Landloch (2022) sampled 22 stockpiles, collecting 88 samples in total from these locations. All samples were tested for field texture, pH_w and salinity. A subset of 22 samples were further analysed for exchangeable cations and fertility parameters.

The stockpiled soils are generally red to brown in colour with clay loam to medium clay textures. Growth media properties, in terms of suitability for supporting revegetation, are discussed in Section 3.6.1.4.

3.6.1.5.1.2 Fresh Permian spoil

Fresh Permian spoil (Permian spoil) is the dominant spoil material at DNM. It is a coarse, rocky spoil derived mainly from sandstone, siltstone and claystone strata. Rock content (particles larger than 20 mm in size) ranges from 30 to 81% (median 55%). The rock fraction of the Permian spoil was assessed as having medium durability, meaning it can be expected to breakdown to a mix of rock, gravel and fines and will maintain greater erosion resistance in comparison to other materials available for rehabilitation at DNM.

The fine spoil fraction contains about 25% clay, with sodic and potentially dispersive characteristics. However, the high rock content will counteract the propensity for tunnel erosion and overall structural instability. Permian spoil is the most suitable material available for constructing surface layers or drainage features at DNM that require higher erosional resistance.

The Permian spoil has an overall low AMD hazard score (Section 3.6.1.3.2.2.2).

3.6.1.5.1.3 Weathered sediments and clays

Weathered sediments and clays are a weathered spoil material containing a rock content similar to Permian spoils (~55-58%). However, the durability of the rock in the weathered sediments and clays is very low. These spoils are expected to quickly degrade into fine particles. The fine fraction is dominated by clay to clay-loam textures, with clay-sized particles representing ~45%. The fines are sodic, dispersive and prone to tunnel and gully erosion, as well as hard setting when exposed to wet/dry cycles.

The weathered sediments and clays have an overall low AMD hazard score (Section 3.6.1.3.2.2.2).

In addition to the erosion risk presented by the weathered sediments and clays, these spoils were also considered unlikely to support vegetation. For these reasons, the weathered sediments and clays will not be used as a surface material or growth media on the final landform and will not be considered further in this section.

3.6.1.5.1.4 *Materials available for landform rehabilitation*

Soils and Permian spoil are the available materials considered most suitable for use as a growth medium on the spoil emplacements with a PMLU within the final landform at DNM. Whilst the coarse nature of the Permian spoil will resist erosive forces, it was not considered optimal for revegetation establishment and, therefore, a soil-rock mixture comprising soils and Permian spoil has been designed to minimise the void ratio of the Permian spoil and improve its ability to support revegetation. A one-part soil to four parts Permian spoil mix was calculated to produce a soil-rock mixture comprising 36% fines and 64% coarse particles. This is within the commonly accepted ranges for a material with a minimum void ratio (20-40% fines to 60-80% coarse particles).

3.6.1.5.1.5 *WEPP simulations*

WEPP model simulations were run to predict runoff, erosion and deposition for 140 m high batter slopes at 15% and 25% gradients. Areas of the conceptual final landform design with grades $\leq 15\%$ are shown in Figure 3-40 as blue, and grades between 15% and 25% are shown as grey. Soils are proposed for use on slopes $\leq 15\%$ and the soil-rock mix is proposed for slopes $>15\%$ and $\leq 25\%$.

Simulations considered the following scenarios:

- Soil batters with 50% and 80% groundcover; and
- Soil-rock mixture batters at 0% and 50% groundcover.

Vegetation is a critical factor in erosion control. A literature review of both DNM reports and wider regional mapping tools by Landloch (2026) indicated groundcover values of 84-94% are typical for regionally similar non-rocky soils, while 48-71% is typical for shallow rocky soils in the region. Therefore, groundcover levels of $\geq 80\%$ were considered achievable on soil batters and $>50\%$ groundcover was considered achievable on surfaces constructed with the soil-rock mix. The modelling assumed best-practice rehabilitation, including:

- No discharge of concentrated runoff from landform tops onto batters;
- Slopes designed to avoid flow concentration;
- Tightly controlled contour ripping; and
- Effective soil management and revegetation practices.

WEPP simulations indicate that soil placed on slopes of up to 15% will be stable when 80% groundcover can be sustained. Average annual erosion rates on slopes with at least 80% groundcover remain below 5 t/ha/yr with vertical falls up to 140 m. At 50% groundcover, however, the risk of rilling and gullying is substantially higher and the average annual erosion rate exceeds 10 t/ha/yr with a vertical fall greater than about 22 m (Figure 3-41).

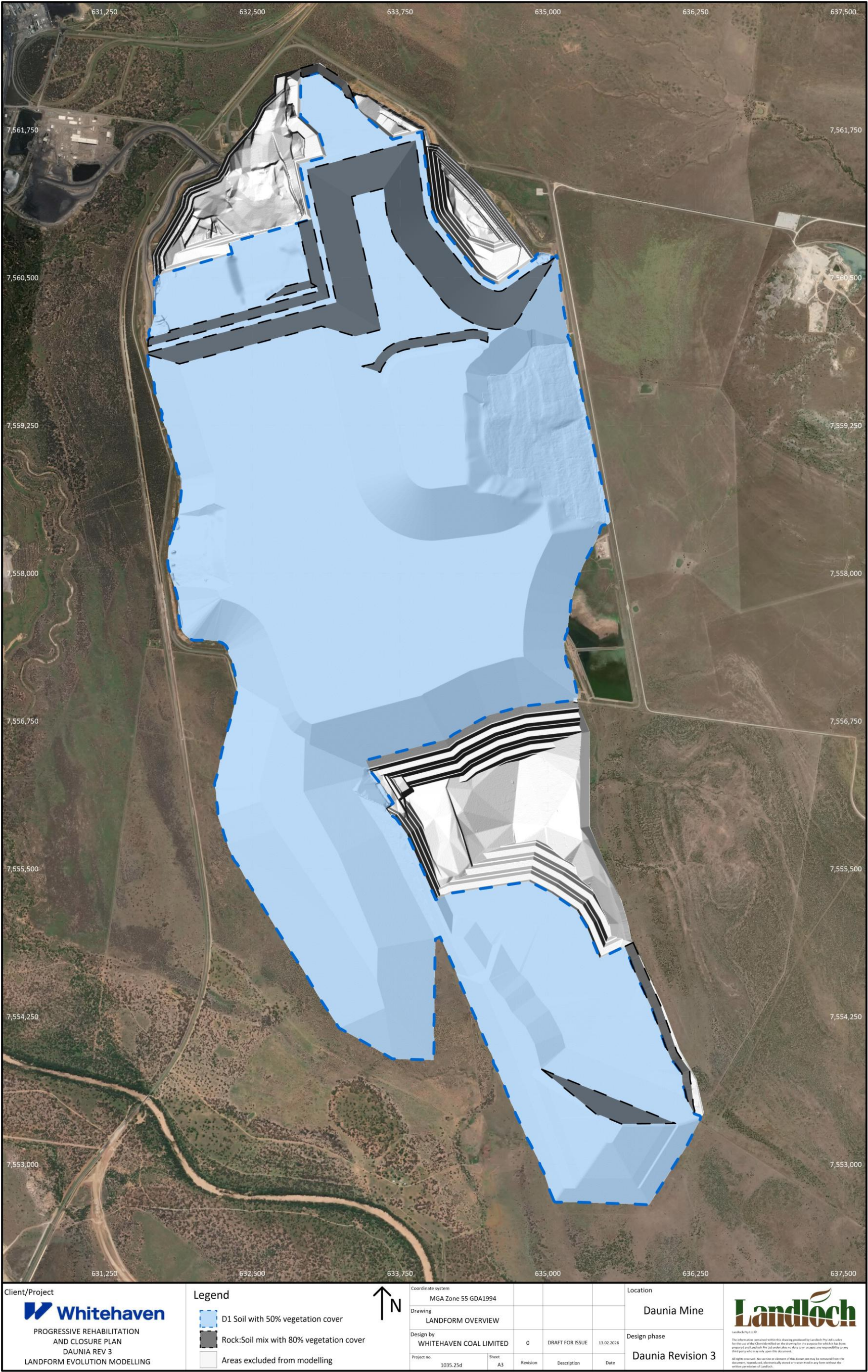


Figure 3-40 Digital Elevation Model

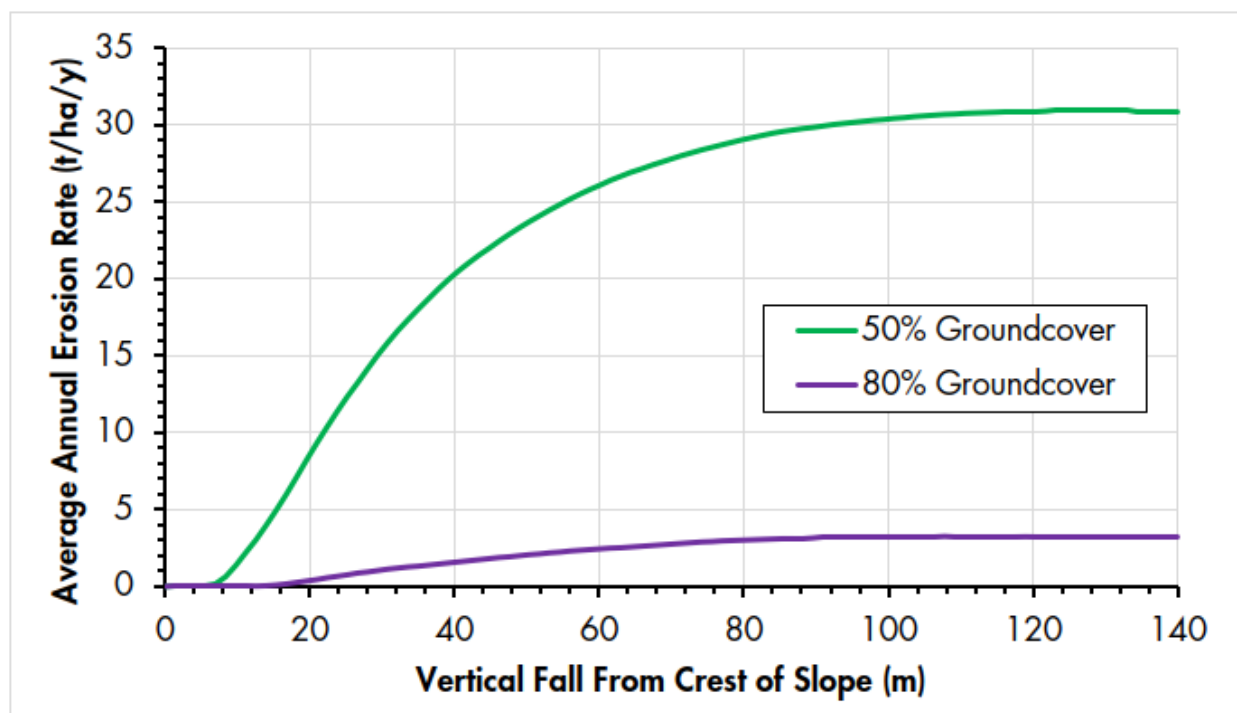


Figure 3-41 Average annual erosion rate on 15% slopes with a soil surface

Source: Landloch, 2026.

Simulations suggest the soil-rock mixture will be erosionally stable on steeper slopes up to 25% when at least 50% groundcover can be sustained. Average annual erosion rates on slopes with at least 50% groundcover remain below 10 t/ha/yr with vertical falls up to 140 m. The average annual erosion rate increases quickly with a bare soil-rock surface and a vertical fall of more than ~16 m. An average annual erosion rate exceeding 10 t/ha/yr is predicted to occur when the vertical fall is greater than 30 m.

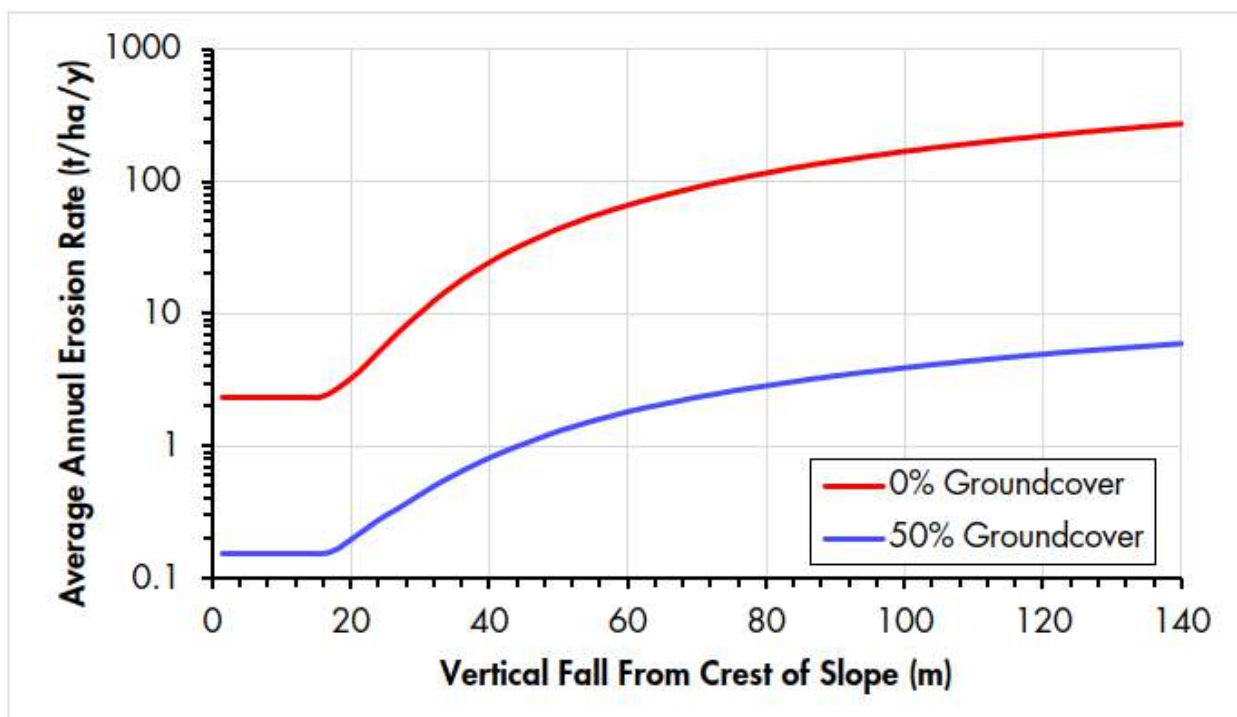


Figure 3-42 Average annual erosion rate on 25% slopes with a soil-rock surface

Source: Landloch, 2026.

The outcomes of the surface material characterisation and WEPP simulations contributed to developing the design criteria detailed in Table 3-41.

3.6.1.5.1.6 SIBERIA landform evolution modelling

The SIBERIA landform evolution model (LEM) was used to simulate the influence of runoff and erosion on the conceptual final landform design and predict rill and gully formation over a 300-year forecast.

Parameterisation of the SIBERIA model was undertaken by Landloch (2026). Specifically, the β_1 and m_1 input parameters were derived by applying the following approach:

1. Measure material runoff and erosion from laboratory-based flume and rainfall simulations to derive calibrated WEPP model parameters.
2. Generate daily time-series data of runoff and erosion using WEPP set up with:
 - a. Batter geometries consistent with the geometries of the landform being considered (allowing values for β_3 , n_1 , and m_3 to be fixed).
 - b. A long-term climate sequence (100-years) that is site specific and that contains frequent, infrequent, rare and very rare events.
3. Fit WEPP runoff and erosion output data to the SIBERIA model equations to derive values for β_1 and m_1 that are both material and site specific.

The conceptual final landform was prepared as a digital elevation model (DEM) meshed into the surrounding landscape (Figure 3-39). A random roughness of ± 10 cm was added to better represent natural surface conditions.

SIBERIA simulations were run for 300 years, with outputs at 50-year intervals using a synthetic 100-year climate file prepared to match daily, monthly and annual characteristics of the Moranbah climate. Outputs included:

- Maximum depth of gullies at each output year with gullies defined as having a minimum depth of 0.3 m;
- Average erosion (t/ha/y);
- Cumulative erosion (mm) for each output year; and
- Visual outputs showing the evolved DEM over which was draped the predicted material movement (erosion and deposition).

All SIBERIA outputs are provided in Appendix 4.7 – Landform Design.

LEM of the conceptual final landform design indicates:

- Low erosion rates on slopes $\leq 15\%$ with a soil surface.
- The maximum gully depth after 300 years is predicted to be 0.4 m.
- Soil surfaces at grades of $\leq 15\%$ are not prone to significant gully development provided the target groundcover is achieved and can be sustained.
- On the steeper slopes (25%) with a soil-rock mix surface, erosion rates remain low, although they are higher than the 15% slopes with a soil surface.
- Gullies are predicted to form after about 100 years, primarily on the northern waste dump slopes that wrap around the Titan East residual void low wall, above natural surface level and on a transition point between the main spoil emplacement and the OOPD. Gullies could reach depths of up to 0.9 m approximately 300 years following construction.

A visualisation of the conceptual final landform after 300 years is provided in Figure 3-43. Areas of gully formation with depths of more than 0.3 m are represented in red, areas where deposition occurs at depths of more than 0.3 m are presented in blue.

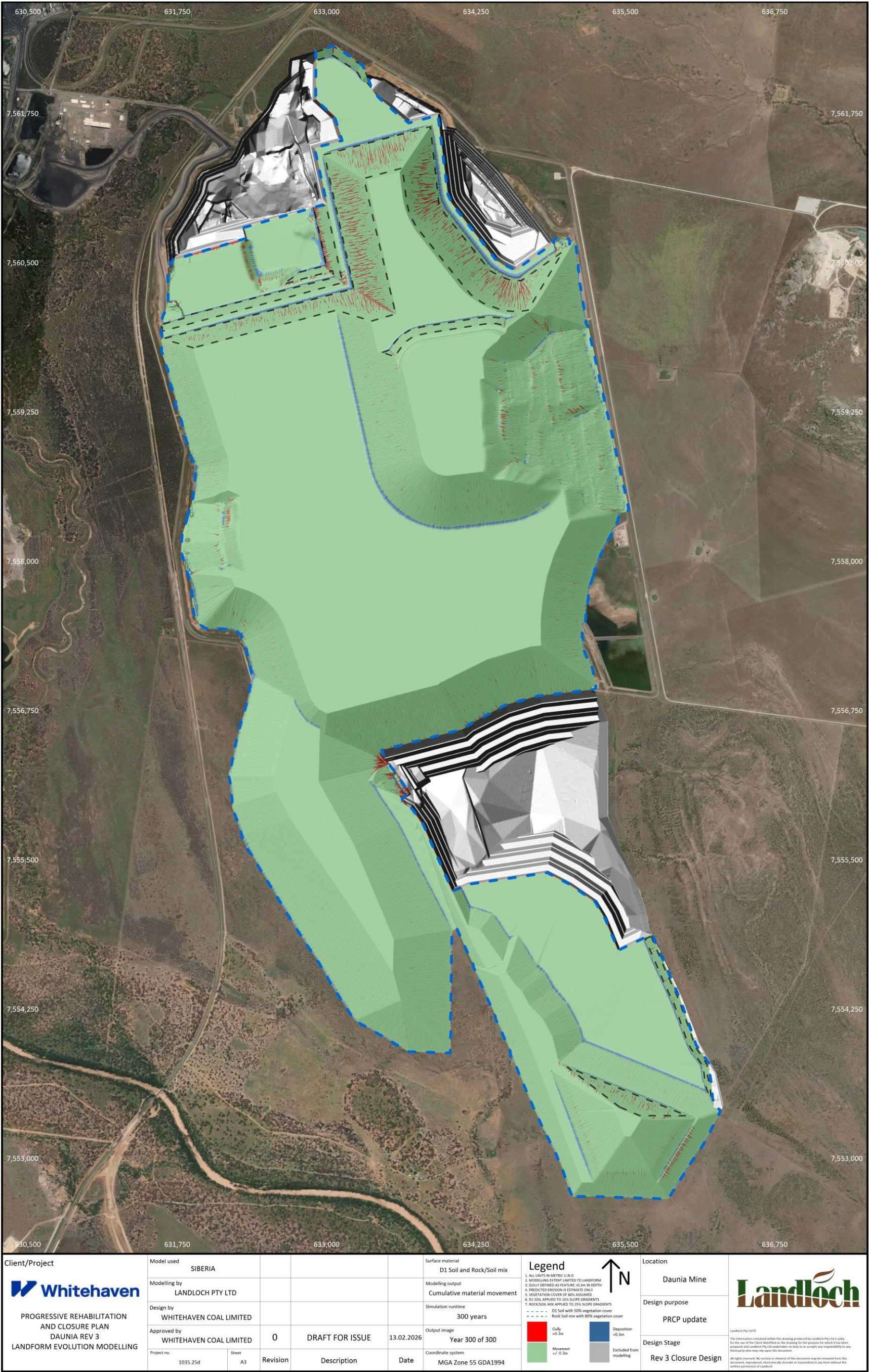


Figure 3-43 Predicted erosion and deposition depths of the DNM final landform after 300 years

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Average erosion rates for both materials, when placed at the surface of the conceptual final landform, decline over time, reaching long-term values of ~3.0 t/ha/yr for the soil and ~3.8 t/ha/yr for the soil-rock mix. This trend indicates that the conceptual final landform becomes more stable with time, erosional activity decreases, and there is a low tendency for ongoing rill and gully development.

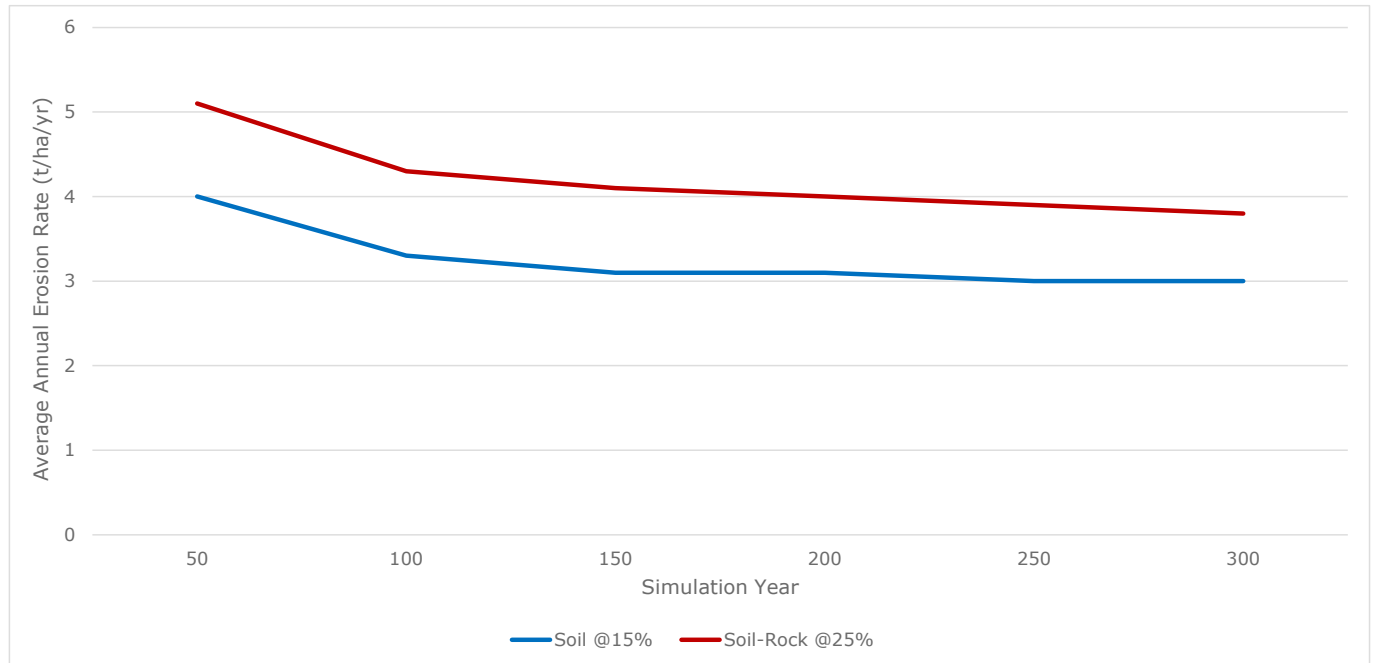


Figure 3-44 Predicted average annual erosion rates

Overall, the LEM suggests the PMLU areas of the conceptual final landform will be erosionally stable when constructed to a design that:

- Uses soil surfaces on slopes with grades of 15% or less and maintains a groundcover consistently above 80%; and
- Uses a soil-rock mixture on slopes with grades between 15-25% and maintains a groundcover consistently above 50%.

LEM indicates that limited gully development may occur on the above ground, northern waste dump slopes that wrap around the Titan East residual void low wall after about 100 years. These slopes will be constructed using the soil-rock surface material. The application of slightly larger diameter rock as armouring to increase erosion resistance, whilst not changing the overall proportion of rock and fines, has been identified as an option that could be considered during the detailed design phase to further reduce the potential for gullies to form on these slopes in the long-term.

The other location where gullies are predicted to form is at a localised transition point where the main spoil emplacement and OOPD interact. This result is a product of the conceptual level DEM and the scale at which it has been prepared. Detailed design of this area will focus on preventing concentrated flows forming in this location or constructing adequate surface water management infrastructure to manage flows in a way that resists erosion and mitigates this risk.

3.6.1.5.2 Final landform hydrology and flooding

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 emplacements 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, as per the above-described approach, to shed rainfall without the need for permanent berms or water management infrastructure. However,

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landform surface water drainage control features such as engineered drop structures (e.g. rock lined drains / chutes) will be required to safely convey rainfall collecting in catchments above the batters to the lower levels and 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. 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 drop structure failure is highest during the initial years post construction whilst armouring rock settles and vegetation establishes. Drop structures will be designed and constructed with suitably sized Permian spoil rock that is to be embedded into the underlying subgrade.

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.

A post-closure flood assessment was completed by WRM (2026a) and is discussed in detail in Section 3.5 and 3.6.1.2. The study concluded the residual voids in the north of the site are immune to flood ingress for all modelled events. In the south, the conceptual final landform provides flood protection for the Pandora residual void and prevents flood inundation under all modelled events (Table 3-40). The predicted peak flood velocities along the flood protection landform are 1.1 m/s and are not expected to present an erosional stability risk to the landform. The predicted peak flood velocities along the OOPD are higher with velocities during the 0.1% AEP event reaching 1.7 m/s. A single localised area of the OOPD is predicted to see velocities of up to 3.2 m/s during PMF event, however, velocities are generally limited to between 2.1 m/s and 2.8 m/s. Peak post mining flood levels and velocities for the 0.1% AEP and PMF are shown in Figure 3-34 through Figure 3-37 for the conceptual final landform adjacent to the Pandora residual void.

Table 3-40 Predicted post-mining peak flood levels, velocities and freeboard - 0.1% AEP and PMF events

Event	Post-mining Landform Elevation (mAHD)	Peak Flood Level (mAHD)	Peak Flood Velocity (m/s)	Indicative Freeboard (m)
Flood Protection Landform				
0.1% AEP	200	192.8	0.4	>7
PMF	200	196.5	1.1	3.5
Out of Pit Dump				
0.1% AEP	240	192.4	1.7	N/A
PMF	240	198.4	3.2 ¹	N/A

Source: WRM, 2026a.

¹ A localised of high velocity, occurring near the southwestern corner of the OOPD. Elsewhere in this area, velocities generally reach between 2.1 and 2.8 m/s at peak.

Sensitivity analysis undertaken on the 0.1% AEP event outcomes suggest changes to the hydraulic roughness assumptions could increase/decrease flood levels by ± 0.4 m. The sensitivity of hydrologic conditions to different climate change assumptions was also tested and resulted in an increase to peak discharge rates. This was the primary driver for an increase in peak flood levels of 0.5 m and peak flood velocities of 0.2 m/s. A flood level increase of 0.5 m remains within the freeboard provided by the current

conceptual landform design and a velocity increase of 0.2 m/s is considered unlikely to result in damaging velocities occurring at the landform toe under the 0.1% AEP event.

The current conceptual final landform will prevent flood ingress to the Pandora residual void and will be subjected to flood velocities below 1.7 m/s under the 0.1% AEP event, which are considered unlikely to lead to material erosion or geotechnical instability of the landform.

The closure monitoring and maintenance program will include event-based inspections for erosion, settlement and instability of all landforms impacted by floodwaters. Remedial works will be scheduled and implemented should evidence of erosion or instability be observed.

A hydrogeological assessment of the conceptual final landform design, incorporating the residual voids, was undertaken by SLR (2026) and is discussed in detail in Section 3.6.1.1. The study concluded the residual voids are likely to form pit lakes with the lake levels stabilising below the pre-mining groundwater levels, the surficial weathering zone and the shallow hydrostratigraphic units. The pit lakes will be subject to ongoing evaporation, leading to inward hydraulic flow gradients and no outflows over the long-term. Basal seepage from the majority of the final landforms will be captured within this zone of influence and report to the residual voids. Overall, the particle tracking indicates that the vast majority of seepage from the OOPD will return to and be captured by the Pandora Pit void, with only limited seepage from the far western margin migrating away but remaining within the deep Permian coal measures and not entering the shallow unconsolidated strata.

3.6.1.5.3 Long-term landform geotechnical stability

A geotechnical stability assessment of the DNM residual voids has been compiled to support the development of this PRC Plan. The detailed report, *Assessment of Geotechnical Stability of Residual Voids at Daunia Mine* (Henderson, 2026), is provided in Appendix 4.8 – Geotechnical Stability of Residual Voids and is further discussed in Section 3.6.3.2.

The geotechnical stability assessment focused on the residual voids, including the low walls constructed with spoil. Seven cross-sections from three residual voids were selected for assessment based on several voids properties, including greatest spoil height.

The final landform will include appropriate surface water drainage features including, for example, infrastructure with other primary purposes such as an exclusion/safety bunds to discourage human and wildlife from approaching the highwalls and end walls. The final landform itself will also protect residual voids from flood ingress. With these controls in place, the quantity of rainfall runoff with the potential to cause erosion within the residual voids will be limited and is not expected to materially affect long-term geotechnical stability.

Low walls within the NUMA boundaries will remain in their as-dumped profile, with batters at angle of repose. Each dump lift will be offset from the crest of the one below, reducing the overall low-wall angle to approximately 21° (~38%). Assuming an angle of repose of ~37° or ~75%, the low walls represent the steepest landform structures constructed from spoil on site. The geotechnical stability analysis results for all cross-sections reported low wall slope FOS values that ranged from a minimum of 1.5 to more than 2 at the PMLU/NUMA boundary. Considering the spoil landforms outside the NUMAs will be constructed with a maximum grade of 25%, much shallower than those of the low walls within the NUMAs, the risk of these slopes experiencing geotechnical failures is considered low.

3.6.1.5.4 Final landform design criteria – PMLU and NUMA areas

The technical studies undertaken and referred to in this section have been used to develop the final landform criteria that are used to design areas of the final closure landform with a PMLU. Whilst this section focuses primarily on the final landforms constructed from spoil, the final closure landform also includes the residual voids and the surrounding lands that have been disturbed by ancillary mining activities. The final conceptual landform design criteria are provided in Table 3-41 and within the PRCP Schedule (PRCP Schedule 4.1.2).

Area specific design criteria and specifications will be developed by an AQP prior to the execution of specific *Work Plan* areas, and appended to the Closure Landform Design Report (PRCP13). Detailed Work Plan area designs will incorporate criteria to address localised risks present. Where detailed designs result

in material changes to the conceptual closure design, the Closure Landform Design Report will be updated and the changes certified by and AQP. Following the execution of specific *Work Plan* areas, as-constructed reports (RM3.2) and the quality assurance outputs described in Section 3.6.1.5.7 will be appended to the Closure Landform Design Report.

Table 3-41 Landform design criteria

Landform structure	Landform design
Spoil dumps with PMLUs	— Relevant structures will be developed and/or reshaped such that they are consistent with the Closure Landform Design Report (PRCP13 and RM3.1) and documented in As-Constructed Reports detailing and justifying all design/s with AQP certification for any variations (RM3.2). — Spoil dump height up to 120 m above ground level to accommodate forecast quantities of mineral waste. — 20 m dump lift heights. — Erosion and sediment control systems are to be installed where required and verified by an AQP (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 (RM3.5). — For the Cattle Grazing PMLU at least 70% of slopes are to be $\leq 20\%$ gradient and at least 50% of slopes are to be $\leq 15\%$ gradient. No slopes are to be $\geq 25\%$ gradient (RM3.7). — For the Woodland Habitat PMLU slopes are to be reshaped to $\leq 25\%$ gradient (RM3.8). — Final landform slopes $\leq 15\%$ are to be constructed with a soil surface supporting a minimum self-sustaining total vegetative groundcover of $\geq 80\%$ (RM6.4). — Final landform slopes $\geq 15\%$ will be constructed with an AQP prescribed rock–soil mix surface designed to support a minimum self-sustaining total vegetative groundcover of $> 50\%$ (RM3.6 and RM6.4). The AQP will determine the required cover depth, rock:soil mix ratio, rock durability and grading, and material properties. Unless an AQP certifies an alternative based on site-specific testing, the default requirements are: minimum 1 m rock–soil mix (4:1 rock:soil); fresh Permian rock with slake durability $\geq 70\%$; AQP-approved median particle size from erodibility/shear-stress testing; non-dispersive materials; and chemical/physical properties suitable to support vegetation targets (RM3.6(a)–(e)). The required mix may be achieved through controlled placement or deep ripping to achieve equivalent blending. All parameters will be documented in the Closure Landform Design Report and As-Constructed Reports as required (PRCP13 and RM3.2). — For spoil dumps which include rejects, at least 1 m of capping material depth is required unless an alternative is recommended by an AQP (RM3.10). The depth of capping material is in addition to any AQP prescribed rock-soil mix requirements identified in RM3.6. — Cover surfaces are designed to be water shedding and free from surface ponding (RM3.11). — For outer landform slopes that interact with floodwaters up to the 0.1% AEP, mitigative measures are designed by an AQP to minimise potential instability and to manage high-energy flows (≥ 2.5 m/s) through energy dissipation measurements (e.g. rock lining) and surface-roughness considerations to reduce flow energy and ensure long-term landform stability (RM3.12 and RM3.13).

Landform structure	Landform design
Infrastructure and general areas – CHPP and associated infrastructure, administration, workshop, stockpile areas, laydown areas, roads, mine dams, drains	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 $\leq 12\%$.
NUMAs	— NUMA area extents are designed to not exceed the maximum limits defined in the PRCP Schedule (MM1.1). — The closure landform design is updated by an AQP and is based on latest flood modelling and materials data prior to construction (MM1.2) — Final residual voids are designed so they are not subject to floodwater inundation up to and including the 0.1% AEP event (MM1.3). — Final residual voids are designed so they will not overtop to the receiving environment (MM1.6). — The landform must not be constructed with dispersive materials. — Weathered sediments and clays are not to be placed on the surface of low wall dumps. — High-walls and end-walls are to remain as the final excavated wall profiles and include benches. — Low walls are to remain as dumped at angle of repose with 20 m lifts offset back from the crest below. — Pit walls are to achieve a FOS ≥ 1.5 within the NUMA extents (MM1.4). — The location of voids and associated safety bunds are to be positioned as to not cause instability or degradation to the land outside the NUMA (MM1.5). — Access to residual voids is to be restricted by a competent safety bund or equivalent landform to prevent access, and are to be constructed to the following specifications a) with non-weathered, non-dispersive materials; b) minimum height of 2 m; c) minimum base of 4 m; d) 1 in 3 batters; and e) positioned at the geotechnical offset or a 15 m offset, whichever is greater (MM2.1).

3.6.1.5.5 Methodology

The spoil dumps are constructed in 20 m, angle of repose lifts using a truck and shovel mining method. When an area of spoil emplacement that has a PMLU has been dumped out and is released to be progressively rehabilitated, a detailed rehabilitation design will be prepared by an AQP for the released area. Detailed design will progress the conceptual final landform design, as is current at the time, to a level of detail suitable to be issued for construction. Issued for construction, or detailed designs, will prescribe the target grades and surface water drainage control features required for the rehabilitation area. Surface water drainage and erosion and sediment control features will be installed in accordance with detailed design specifications and verified by an AQP. Detailed designs will be supported by technical specifications detailing 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 (including any energy dissipation and surface roughness parameters required under RM3.12 and RM3.13 where landforms interact with floodwaters up to the 0.1% AEP).

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 specification documents.

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. As-Constructed documentation will detail and justify any variations from the Closure Landform Design Report and include AQP certification that the design performance of the rehabilitated landform has been maintained (RM3.2). For flood-protection elements and related measures, future undertakings and timing are set out in Section 3.6.1.2.8.

3.6.1.5.6 Waste placement strategy

The waste materials generated at DNM are described in Section 3.6.1.3 and 3.6.1.5. A summary of their properties and proposed placement strategies are summarised in Table 3-42.

Table 3-42 Summary of waste material placement at DNM

Material type	Volume	Characteristics and limitations	Placement use and strategy
Spoil	~98.5%	— Permian spoil ~52% - rock content of 30-81% with a moderate slake durability — Weathered Sediments and Clays ~48% - rock content of 55-58% with a low slake durability — Fine fractions can be sodic and dispersive, but rock fragments provide erosion resistance — Non-carbonaceous spoil has negligible potential to generate AMD — Carbonaceous spoil has a low potential to generate AMD — Non-saline to slightly saline — Alkaline to highly alkaline — Low concentrations of total metals and metalloids	— Can be used to construct the final landform when covered by the appropriate growth media specification for the grade: — Soil for grades $\leq 15\%$ — Soil-rock mix for grades $> 15\%$ and $\leq 25\%$

Material type	Volume	Characteristics and limitations	Placement use and strategy
		— Low soluble metals and metalloid concentrations	
Mixed Plant Rejects (MPR)	~1.5%	— Coarse rejects ~80% — Fine rejects ~20% — ~95% of MPR has a low potential to generate AMD — ~5% of MPR has a moderate to high potential to generate AMD — As a combined bulk material, MPR has a low potential to generate AMD — Non-saline — Alkaline to highly alkaline — Low concentrations of total metals and metalloids in alkaline conditions — Low soluble metals and metalloid concentrations in alkaline conditions	— MPR encapsulated within final landform with a nominal of 1 m of spoil — Not to be used on the surface of final landforms — MPR will not be placed in the OOPD

3.6.1.5.7 Quality assurance and quality control

Quality control measures will be applied to ensure the final landform is constructed to meet the stability requirements of the proposed PMLUs. Quality control will be achieved by dividing construction into defined lots aligned with landform staging, with inspection and verification completed for each stage prior to progression. The framework will include:

- Development of an approved *Work Plan* for landform construction and rehabilitation works;
- 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, slope profiling 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 quality assurance 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 will achieve the required stability and rehabilitation outcomes.

3.6.1.5.8 Trial methodology

Landform modelling results indicate that the proposed final landforms are expected to remain stable over time. Ongoing monitoring will confirm whether the landforms are progressing towards achievement of

milestone criteria and eventual certification, or whether corrective actions, maintenance or adjustments 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.

3.6.1.5.9 Future requirements and commitments

3.6.1.5.9.1 Closure Landform Design Report

As outlined in PRCP Schedule (PRCP13 and PRCP14) and discussed in Section 3.6.1.5, the Closure Landform Design Report is to be submitted to the administering authority by 1 July 2027. The report will:

- incorporate all relevant structures;
- include detailed landform designs;
- be certified by an AQP as safe, erosionally and structurally stable;
- demonstrate suitability for the PMLU, having regard to material properties and local conditions;
- demonstrate that the landform will support the achievement of a stable condition; and
- be maintained and updated as necessary to ensure that relevant structures remain capable of achieving and sustaining a stable condition, with any updates certified by an AQP.

3.6.1.5.9.2 Flood susceptibility and impact assessment

Future flood related requirements and commitments under the PRCP Schedule, including the PRCP15 flood susceptibility and impact assessment and any PRCP16 design update responses, are outlined in Section 3.6.1.2.8. These future undertakings include AQP led design, certification and construction requirements for landforms interacting with floodwaters and complement the criteria identified in RM3.

3.6.1.5.10 Limitations and assumptions

The final landform design is subject to several limitations and assumptions:

- The final landform depends on the mining schedule, which may change with updated geological knowledge, market conditions and/or technology advances. These changes could alter features such as dump heights, ramp positions or access bridges, but key elements including slope profiles, waste material placement constraints and surface material selection will be preserved.
- Maximum dump heights have been used in design to ensure modelling outcomes are conservative. Not all dumps are expected to reach these heights.
- A swell factor of 25% has been applied for dump scheduling, consistent with experience in the Bowen Basin.
- An angle of repose of 37° has been adopted for spoil dumps.
- Modelling has been carried out for up to 300 years using representative site materials

Relationship with PRCP Schedule

The landform has been designed to conservatively represent the closure landform and minimise risk, with appropriate slopes and realistic groundcover for the conditions and materials available on-site.

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 associated with the underlying waste materials, the final landform design and the cover system objectives. The primary risk to the conceptual DNM final landform is erosional instability. A cover system designed to manage geochemical risk is not required due to the low risks posed by the waste materials (Section 3.6.1.3) and the waste management practice of encapsulating MPR within a minimum of 1 m of spoil.

3.6.1.6.1 Geochemical basis

Geochemical characterisation of DNM's mineral waste (Section 3.6.1.3) has shown that:

- **Spoil:** The majority of spoil has been classified as NAF with moderate to high ANC. Approximately 2% of spoil samples indicated some potential to generate low-level AMD. Spoil has low total metal and metalloid enrichment and generates low concentrations of soluble metals and metalloids. Spoil leachate is generally non-saline to slightly saline. As a bulk material, spoil is considered NAF with a low risk for AMD generation.

The fines fraction of spoil is sodic to strongly sodic, with approximately half of samples showing some dispersivity. However, spoil also contains a significant rock content which reduces the material's erosion potential.

- **Mixed Plant Rejects:** Approximately 95% of MPR are classified as NAF with a moderate to high ANC. Five percent (5%) of MPR samples indicated a moderate to high potential to generate AMD. Four out of 50 rejects and fine tailings samples showed significant sulfur enrichment which aligns with the small volume of samples with moderate to high potential to generate AMD. MPR leachate was generally non-saline and generated low soluble metal concentrations. As a bulk material co-disposed with spoil, MPR has a low potential to generate AMD.

The DNM waste materials are therefore not anticipated to present a geochemical risk to the post-closure landscape. However, as a small proportion of the MPR waste stream may present a moderate to high potential to generate AMD, this material will be encapsulated by a minimum of 1 m of spoil when co-disposed within the final landform. MPR will not be placed within the OOPD.

The geochemical properties of topsoil are provided in Section 3.6.1.4. Whilst the topsoil at DNM can be limited in terms of fertility indicators, and may require amelioration to support revegetation, it does not present a geochemical risk to the post-closure landscape.

3.6.1.6.2 Physical basis

Physical characterisation of DNM's mineral waste (Section 3.6.1.5) has shown that spoil can be segregated into either fresh Permian spoil or weathered sediments and clays:

- Permian Spoil is a coarse, rocky spoil derived mainly from sandstone, siltstone and claystone strata. Rock content ranges from 30 to 81% with medium durability. The fine fraction contains about 25% clay, with sodic and potentially dispersive characteristics. However, the high rock content will counteract the propensity for tunnel erosion and overall structural instability. Permian spoil is the most suitable material available for constructing surface layers or drainage features at DNM that require higher erosional resistance.
- Weathered sediments and clays are a weathered spoil material containing a rock content similar to Permian spoils (~55-58%). However, the durability of the rock in the weathered sediments and clays is very low and, when exposed at the surface, are expected to degrade quickly into fines. The fine fraction of the weathered sediments and clays is dominated by clay to clay-loam textures (clay-sized particles ~45%). The fines are sodic, dispersive and prone to tunnel and gully erosion, as well as hard setting when exposed to wet/dry cycles.

The weathered sediments and clays 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 Permian spoil means it can be used as a cover system construction material.

The physical properties of topsoil are provided in Section 3.6.1.4. Topsoil tends to have a low rock content and high clay content with a low permeability. It can also be sodic and dispersive. Topsoil may be used as a surface growth medium cover material on slopes with a grade of $\leq 15\%$. For slopes $\geq 15\%$ and $\leq 25\%$ gradient, topsoil will be used according to AQP certified area specific detailed designs (RM3.6) or mixed with Permian spoil. The rock content of Permian spoil provides erosion resistance while the topsoil component improves the ability of the material to support revegetation.

3.6.1.6.3 Cover system objectives

The objectives of the cover system on the final DNM landform are to:

- Minimise erosion potential; and
- Support the establishment and ongoing sustainability of the PMLU.

3.6.1.6.4 Conceptual cover system design

The conceptual DNM cover system has been designed to address the cover system objectives and is described below from waste to surface:

- MPR will not be placed within 1 m of the final landform surface unless an AQP prescribes an alternative (RM3.10).
- Weathered sediments and clays will not be placed within 1 m of the final landform surface.
- Growth media placed to a minimum depth of 150 mm on the cattle grazing PMLUs with slopes $\leq 15\%$ (Section 3.6.1.4).
- Growth media placed to a minimum depth of 100 mm on the woodland habitat PMLUs with slopes $\leq 15\%$ (Section 3.6.1.4).
- For slopes $\geq 15\%$ and $\leq 25\%$, surface cover will be AQP-prescribed designed to support a minimum sustained total vegetative groundcover of $> 50\%$ (RM3.6 and RM6.4). The AQP will determine the required cover depth, rock:soil mix ratio, rock durability and grading, and material properties. Unless an AQP certifies an alternative based on site-specific testing, the default requirements are: minimum 1 m rock–soil mix (4:1 rock:soil); fresh Permian rock with slake durability $\geq 70\%$; AQP-approved median particle size based on erodibility/shear-stress testing; non-dispersive materials; and chemical/physical properties suitable to support vegetation targets

(RM3.6(a)–(e)). The required mix may be achieved through controlled placement or deep ripping to achieve equivalent blending.

- Growth media, supplemented with suitable ameliorants where necessary, will support the establishment and ongoing sustainability of ≥80% total vegetative groundcover to mitigate the erosion potential on slopes ≤15% for the cattle grazing PMLU.

3.6.1.6.5 Cover over coarse and fine rejects

MPR will be encapsulated by a nominal 1 m depth of spoil unless an alternative is recommended by an AQP (RM3.10). The nominal 1 m depth is greater than the maximum gully depths predicted by LEM over a 300-year timescale. The capping depth is in addition to, and not inclusive of any AQP prescribed requirements as identified in RM3.6 for slopes ≥15%. MPR will not be placed in the OOPD.

3.6.1.6.6 Material availability

The conceptual cover system design requires a supply of topsoil and fresh Permian spoil. A topsoil inventory is provided in Table 3-37 of Section 3.6.1.4. The inventory indicates DNM will have a topsoil surplus of approximately 50% at closure. Fresh Permian spoil represents approximately 52% of spoil material excavated at DNM and is therefore also not considered a limited resource.

Material availability is not anticipated to be a risk for the conceptual cover system design.

3.6.1.6.7 Quality assurance and quality control

The quality assurance and quality control program elements detailed in Section 3.6.1.5.7 are also applicable to cover design implementation.

Relationship with PRCP Schedule

The type of growth media placed will be determined by landform grade and PMLU in each specific area.

Construction of the cover system will not lead to ponding of surface water or impede the ability of the landform to shed excess water.

Growth media will be placed at the depths determined by the PMLU in each specific area.

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 closure landform design for DNM 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 considered in the assessment of ongoing water management requirements post-mining:

- With the exception of the residual void catchment, the closure landform above natural surface level, will be free draining. Surface water runoff will report to the surrounding watercourses (Section 3.6.1.5.2).

- Mining-related dams will be dewatered and desilted with dam liners removed (if relevant), before being remediated, removed and rehabilitated. The rehabilitated areas will be free- draining towards the surrounding watercourses (Sections 3.6.5.3).
- Residual voids will remain and develop pit lakes. The final landform will act as a long-term groundwater sink (Section 3.6.3).
- The final landform provides flood protection up to and including the PMF event (Section 3.6.1.2).
- There are no TSFs at DNM. Rejects are co-disposed as MPR with spoil in the final landform. The spoil as a bulk material has a moderate to high ANC. A small proportion of the rejects have potential to generate AMD. However, as a bulk material co-disposed with spoil, the risk of AMD seepage is low (3.6.1.3.2.2.3). MPR will not be placed within the OOPD.
- Modelling of flow paths through particle tracking simulations within groundwater over a 2,000-year recovery period, indicate that seepage from spoil dumps will largely migrate toward the Pandora residual void (NUMA) acting as a terminal sink. Limited seepage from the far western margin of the OOPD has been simulated as migrating away from the Pandora residual void. Seepage quality from the OOPD is not expected to pose a threat to local groundwater values and the particles are simulated to remain at depth in the Permian coal measures and do not enter the shallow Quaternary and Tertiary sediments(Section 3.6.1.1)
- 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 (3.6.1.3) and voids (Section 3.6.3) and show a low likelihood of connected exposure pathways from source to off-tenement receptors.

3.6.1.7.2 Contaminant sources

Current operational water requires the segregation of clean water, dirty water and mine affected water (MAW). Clean water has not come into contact with any areas disturbed by mine operations and does not require management other than segregation from the other water types. Dirty water typically contains elevated suspended solids. Runoff from areas disturbed by mining activities which have not been rehabilitated, but for which water quality parameters are otherwise in accordance with the ambient conditions, is referred to as dirty water. Dirty water can be released to the receiving environment via appropriate sediment controls. MAW includes:

- Pit water and CHPP process water;
- Stormwater from the CHPP, MIA and disturbed areas not yet rehabilitated; and
- Groundwater that has been in contact with disturbed areas not yet rehabilitated or has been extracted via dewatering activities.

MAW from operational areas is collected within on-site mine dams and recycled by mine operations, transferred to other operations where agreements exist, or is released in accordance with EA conditions.

The DNM operations include heavy industrial type activities, such as the operation and maintenance of processing facilities, light and heavy vehicles and other plant infrastructure required to support the extraction and processing of coal. These heavy industrial type activities include the storage, use and disposal of a variety of hazardous materials. Water storages containing mine affected waters also present a risk of land contamination. The DNM facilities will continue evolving over time with modern engineering and environmental standards; however, the duration and nature of the operations presents a reasonable likelihood for contamination being present at the completion of operations. Therefore, it is considered likely that contaminated land will be present at closure, which will require investigation and some remediation/management.

In line with the requirements of the EP Act 1994, the EA and PRCP Schedule, areas of identified land contamination that present an unacceptable risk to human health, the environment or achieving the nominated PMLU will be subject to investigation and remediation efforts, where appropriate. For clarity, the EA expressly authorises the disposal and management of certain wastes and contaminants associated with mining operations. As these authorised activities are regulated under the EA, any residues or impacts arising solely from EA authorised disposal practices are excluded from contaminated land investigation requirements and are not considered 'contaminated land' for the purposes of closure assessments.

The predominant hazardous materials identified to have a potential to cause contamination at DNM and impact PMLUs and/or the receiving environment include:

- Hydrocarbons: including diesel, oils, greases, methyl isobutyl carbinol and other solvents;
- Aqueous Film-Forming Foam: historical use of products (phased out in 2023) containing Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS); and
- Nitrogen: associated with explosive formulation.

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 low walls within the residual voids, constructed using spoil, MPR and topsoil;
- 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 spoil at DNM has been identified to contain moderate to high ANC with sufficient capacity to neutralise acid forming materials within the spoil dumps, including MPR disposal locations. Mine wastes characterisation included analysis for soluble metals and metalloids, in addition to pH, EC and major ions. Results indicated the majority of spoil and MPR will generate contact water that is generally alkaline, non-saline and with low concentrations of soluble metals/metalloids. Spoil leachate from 623 samples returned and EC range of 58 to 1,460 $\mu\text{S}/\text{cm}$, with a median value of 284 $\mu\text{S}/\text{cm}$ and a 90th percentile of 478 $\mu\text{S}/\text{cm}$. The median EC values for fine tailings, rejects and MPR (n=195) was 292, 331 and 281 $\mu\text{S}/\text{cm}$, respectively. Five of 107 spoil static leachate extraction samples reported slightly elevated soluble concentrations for one or more of the following elements:

- Aluminium (Al);
- Arsenic (As);
- Manganese (Mn);
- Molybdenum (Mo);
- Antimony (Sb); and
- Selenium (Se).

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 pit lakes. Pit lake water quality is expected to become concentrated through evaporation to high salinity levels. However, due to the void being a perpetual sink, there is no risk of the high concentration migrating away from the void.

The physical properties of the materials that will be used as growth media on the final landforms, namely topsoils and fresh Permian spoil, are discussed in Section 3.6.1.5. Growth media will be a source of dirty water until which time as vegetation establishes and initial, post-construction, erosion rates stabilise.

Contaminated land investigations will be undertaken in accordance with the EP Act and PRCP Schedule, to assess areas for potential contamination. The investigation will assess a range of potential contaminants that are utilised or generated during operations and will provide an assessment of the risk presented 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 PMLU nominated for the area. This includes remediation works required to prevent both surface and groundwater quality in the downstream receiving waterways exceeding water related completion criteria and PRCP Schedule rehabilitation milestones.

Where water storages have been used to contain MAW, they have the potential to accumulate impacted water and 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. No water storages that were created for, or by the mining operations, are proposed to remain as part of the closure landform. All mine affected water dams will be dewatered and the sediments assessed for contaminants of concern. Where necessary, the footprints of MAW water storages will be remediated prior to decommissioned. 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 and storing MAW, as well as 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 voids areas will be retained within the voids and mixed with pit lake waters. Pit lakes in the northern residual voids are expected to seep through the spoil emplacements with the water being drawn towards the Pandora residual void which behaves as a terminal sink with evaporation the only pathway for waters to move out of the voids.

Waste characterisation studies (Section 3.6.1.3) concluded that final landforms constructed using spoil and co-disposed MPR 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.

Temporary erosion and sediment controls will be employed to manage dirty 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 RM8 (water management in the final landform) and is representative of the background conditions. Temporary erosion and sediment controls will be subject to a maintenance program whilst in use to ensure they remain operational 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 RM8.

3.6.1.7.3.2 Groundwater contaminant pathways and fate

Contaminants will have the potential to 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 presented by the historic use of hazardous substances.

However, despite the low risk, once seepage from these areas enters the groundwater system, hydrological studies (Section 3.6.1.1) indicate the final landform will behave as terminal sink, with continued inward hydraulic flow gradients developing towards the Pandora residual void with no

groundwater outflow from the residual voids lakes occurring in the long-term. The zone of influence extends out far enough to capture most seepage from the spoil emplacements.

A groundwater divide is present beneath the OOPD, with flow paths across the eastern ~65% of the footprint moving eastward toward the Pandora residual void. Along the western margin, some initial particle movement is directed away from the void while passing through the shallower layers of the model, but once the particles enter the underlying layers representing the Fort Cooper Coal Measures, most turn east or south east and ultimately migrate back toward the Pandora residual void. Three particles located at the extreme western edge are predicted to continue south, but they remain confined to deeper Permian coal measures throughout the full model run and do not move upward into the shallow water table zones.

Overall, the particle tracking indicates that the vast majority of seepage from the OOPD will return to and be captured by the Pandora residual void, with only limited seepage from the far western margin outside the zone of influence of the residual voids. Seepage from the western margin will remain within the deep Permian coal measures and is not expected to enter the shallow aquifers.

Pit lakes are predicted to form within the residual voids. Modelled pit lake levels stabilise below the pre-mining groundwater levels and the shallow post-Permian strata, including the base of surficial weathering and shallow hydrostratigraphic units. Pit lake waters will not have a connection with the shallow aquifers.

During the initial pit lake stabilisation phase, climate is expected to have a greater influence on pit lake behaviour than groundwater. This is likely to result in variability in the flux between groundwaters hosted within the spoil (low wall dumps within the residual voids) and the pit lakes. Outflows from the voids in the initial stabilisation phase are towards the spoil. These events occur prior to the evapoconcentration of TDS levels in the pit lakes to concentrations above that which are observed naturally within the Permian unit. The modelling indicates that there is no loss of groundwaters beyond the tenement during this phase. Once pit lake levels stabilise, the final landform will act as a terminal sink.

The zone of influence created by the DNM residual voids may not extend far enough to capture seepage from all of the MIA as a result of the hydraulic influence of the adjacent Poitrel Mine. Within the central and western portion of the MIA and CHPP area, particle tracking indicates particles migrate in a southerly direction. Over the 2,000-year simulation period, particles are predicted to travel approximately 1 km into the Poitrel Mine operated portion of the joint ML. The groundwater flows in the Permian units in this area are governed by the Poitrel Mine operations/voids and compartmentalisation of the aquifer resulting from cemented fault lines. The particles over the simulation period do not enter the shallower Quaternary alluvial material associated with the Isaac River and do not leave the ML.

3.6.1.7.4 Water management controls

The key water management controls adopted for the rehabilitation and closure of DNM 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 DNM:

- 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 co-disposal of MPR within spoil emplacements will minimise the likelihood of this material being exposed at the surface.

Waste characterisation studies (Section 3.6.1.3) concluded that spoil and co-disposed MPR are 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 DNM is the final landform acting as a terminal sink capturing basal seepage from most spoil emplacement and other supporting areas of

the site. Pit lake levels are predicted to stabilise below, and not interact with, the shallow hydrostratigraphic units.

Impact controls mitigate or reduce the potential impacts on receptors to within acceptable levels. Rehabilitation of DNM utilises temporary sediment controls to mitigate the impact of the sediment loads of dirty water on downstream receptors. Sediment controls such as check dams along open channels or sediment retention basins installed at discharge points to the receiving environment will be used until which time as the sediment loads in runoff from rehabilitated areas has reduced, complies with the requirements of RM8 and are representative of the background conditions. Sediment controls will be designed, constructed and maintained in accordance with the IECA (2008) Best Practice Erosion and Sediment Control guidance document.

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 and long-term management requirements

No permanent surface water diversions are required for the final landform and, therefore, no long-term management requirements are anticipated.

The haul road crossing over New Chum Creek connecting the mine to the MIA and CHPP areas will be rehabilitated towards the end of the active closure phase following completion of major landform works and heavy mining equipment no longer needs to be moved between the mine area and the MIA. The haul road crossing footprint is approximately 0.3 ha.

3.6.1.7.6 On-going water management

No on-going water management will be required in the post-closure phase. The following water management activities will be scheduled to occur during the closure monitoring and maintenance phase:

- Surface and groundwater monitoring in accordance with Section 3.8.2 and 3.8.3;
- Monitoring for, and maintenance of, erosion on rehabilitated areas; and
- Operation, maintenance and decommissioning of temporary sediment controls.

Relationship with PRCP Schedule

The closure landform, with residual voids, will provide a landscape that does not require any ongoing active water management.

Surface and groundwater released off lease will comply with the water quality criteria prescribed by RM8.

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 revegetation objectives for the planned PMLUs of cattle grazing and woodland habitat are consistent with the PRCP Schedule and are detailed as follows:

- Cattle grazing:
 - Groundcover rates are required as follows:
 - For slopes $\leq 15\%$, $\geq 80\%$ total vegetative groundcover is required

- For slopes $\geq 15\%$, $\geq 50\%$ total vegetative groundcover is required
- To establish cattle grazing pasture within land suitability class ≤ 3 (Table 3-68), or not different from pre-mining class if ≥ 4 (DSITI & DNRM, 2015);
- To achieve grazing land condition assessed as Good (A) if ungrazed, or Fair (B) if under a grazing regime as described in the Queensland Reef Protection Regulations Farming in Reef Catchments Grazing Guide – Figure 3 (DES, 2022a) (replicated in Table 3-66).
- Woodland habitat:
 - Groundcover rates are required as follows:
 - For slopes $\leq 15\%$, $\geq 80\%$ total vegetative groundcover is required
 - For slopes $\geq 15\%$, $\geq 50\%$ total vegetative groundcover is required
 - To establish woodland habitat with species richness of ≥ 2 trees, ≥ 3 shrubs and ≥ 4 grasses and $\geq 16\%$ tree canopy cover
 - To achieve future woodland habitat rehabilitation with characteristics of surrounding regional ecosystems
- Watercourse:
 - To establish watercourse riparian vegetation with framework trees, woody understorey and groundcover species associated with Regional Ecosystem (RE) 11.3.25 *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines

The above revegetation objectives consider total vegetative groundcover to mean plants, plant litter, tree leaf litter, twigs and woody debris capable of protecting the soil surface from erosion.

3.6.1.8.2 Species of conservation significance

DNM has no obligations requiring specific inclusion of species of conservation significance in the revegetation planning. Nonetheless, areas adjoining undisturbed Endangered or Of Concern regional ecosystems or threatened species habitats will be rehabilitated to a woodland habitat PMLU, wherever possible.

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 the DNM site. 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. This approach will provide connectivity values between rehabilitated areas and existing vegetation and habitat.

3.6.1.8.4 Revegetation seed provenance

The provenance (where the seed comes from) 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 North bioregion.

Proof of provenance and or germination / viability certificates for all purchased seeds will be sought from the seed supplier(s).

3.6.1.8.5 Cattle grazing revegetation species and seeding rates

Revegetation to achieve a cattle grazing PMLU is planned for RA2 and 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 the cattle grazing PMLU is based on seeding preferred pasture species and legumes cognisant of grazing best management practice (DES, 2022a; Future Beef,

2022). Preferred pasture species include native and naturalised exotic grass species that are perennial, palatable and productive (3P) grasses (Future Beef, 2022). Preferred pasture species have been recommended based on species known to occur on DNM, as well as a selection of pasture species suitable for the soil management group described in Section 3.6.1.4.

A seeding rate of 12 kg/ha of pure live pasture seed, 3kg/ha of uncoated legume seed and 0.5 kg/ha of framework *Eucalyptus* sp. and/or *Corymbia* sp shade trees are to be applied, unless adjusted by an AQP. At least half (i.e. 6kg p/ha) native grasses is recommended for a cattle grazing PMLU (Table 3-43).

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 as listed in Table 3-43 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 DNM.

Table 3-43 Recommended species list and seeding rates for Cattle Grazing PMLU

Scientific name	Common name	Cracking clays and heavy loams / clays	Light loams / sands	Pure live seed ¹ (PLS) rate (kg/ha)
<i>Astrebula lappulacea</i> , <i>A. squarrosa</i> , <i>A. elymoides</i>	Mitchell Grasses (curly, bull and hoop)	X	-	1-3 (per species)
<i>Bothriochloa bladhii</i>	Forest Blue Grass	-	X	1-3
<i>Bothriochloa insculpta</i> cvv. <i>Bisset</i> *	Bisset Creeping Blue Grass	X	X	1-2
<i>Chloris gayana</i> cvv. <i>Callide</i> *	Callide Rhodes Grass	X	X	1-2
<i>Chloris gayana</i> cvv. <i>Katambora</i> *	Katambora Rhodes Grass	X	X	1-2
<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>	Queensland Blue Grass	X	-	1-3
<i>Digitaria brownii</i>	Cotton Panic	X	X	1-3
<i>Heteropogon contortus</i>	Black Spear Grass	X	X	1-3
<i>Megathyrsus maximus</i> var. <i>pubiglumis</i> *	Green Panic	-	X	1-2
<i>Panicum coloratum</i> var. <i>makarikariense</i> *	Bambatsi Panic	X	-	1-2
<i>Panicum decompositum</i>	Native Millet	X	X	1-3
<i>Urochloa mosambicensis</i> *	Sabi Grass	-	X	1-2

Scientific name	Common name	Cracking clays and heavy loams / clays	Light loams / sands	Pure live seed ¹ (PLS) rate (kg/ha)
Grass species - Total seed weight coated (kg/ha)				12
<i>Stylosanthes seabrana</i> *	Caatinga Stylo	X	-	1
<i>Macroptilium bracteatum</i> *	Burgundy Bean	X	X	1-2
<i>Stylosanthes hamata</i> *	Caribbean Stylo	-	X	1
<i>Rhynchosia minima</i>	Rhynchosia	X	X	1-2
Legume species - Total seed weight uncoated (kg/ha)				3
<i>Echinochloa esculenta</i>	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 DNM are also planned for future cattle grazing rehabilitation areas. At least two native shade tree species consisting of *Eucalyptus* sp. and/or *Corymbia* sp framework tree species will be included in the seed mix.

3.6.1.8.6 Cattle grazing reference sites

One existing cattle grazing reference site (DNM_REF01) occurs on existing cattle grazing country adjacent to the DNM mine site on the Olive Downs property (Figure 3-45 and Figure 3-49). Existing cattle grazing reference site results for vegetative groundcover, preferred pasture species, dry matter yields, land condition and land suitability class have been summarised in Table 3-44.

The cattle grazing reference site returned a Fair (B) land condition rating due to having 67% DM Yield of preferred (3P) grasses and stable soil condition with no erosion (DES, 2022a).

The cattle grazing reference site returned a Land Suitability Class score of <4. This is due to site limitations associated with low available Phosphorus (P).

Table 3-44 DNM Cattle Grazing Reference Site

Reference Site – DNM_REF01

Figure 3-45 Cattle grazing reference site (DNM_REF01)
Mean Slope: <2%
Total Groundcover: 81%
Trees: <i>Atalaya hemiglauc</i> a (whitewood), <i>Psydrax oleifolia</i> (Psydrax), <i>Lysiphyllum carronii</i> (red bauhinia)
Shrubs: <i>Lysiphyllum carronii</i> (red bauhinia), <i>Owenia acidula</i> (emu apple)
Exotic Grasses: <i>Cenchrus ciliaris</i> (buffel grass*), <i>Bothriochloa pertusa</i> (Indian couch*), <i>Megathyrsus maximus</i> var. <i>pubiglumis</i> (green panic*)
Native Grasses: <i>Aristida calycina</i> (dark wiregrass)
Invasive Plants: <i>Harrisia martinii</i> (Harrisia cactus*)
Dry matter yield kg/ha: 1500-2000
Land Condition: Fair (B)
Land Suitability Class: 4
Limiting Factors: 6-7 Colwell P to 0.1m

3.6.1.8.7 Woodland habitat revegetation

Areas of woodland habitat PMLU are planned on rehabilitated landforms associated with the spoil dumps (RA1). The spoil dumps are large elevated anthropogenic landforms, comprised of mudstones, claystones, siltstones and sandstones, with slopes and broad flat mesas (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).

The growth media for woodland habitat at DNM includes pre-stripped topsoil. Woodland habitat growth media will be ameliorated, if recommended by an AQP, prior to deep ripping and seeding (Section 3.6.1.4). The topsoil depth will be 100 mm to 150 mm to limit the effects of competition on woodland species due to the potential loads of exotic pasture species (i.e. buffel grass) and to provide the best chance of successful establishment of woody species (Emmerton et al., 2016b).

The approach to woodland habitat revegetation strongly considers the selection of key framework tree, shrub and grass species that are adapted to the growth media and rehabilitation landforms from representative regional ecosystems surrounding DNM or that would have occurred pre-clearing as discussed in Section 3.1.2.9. As the majority of the vegetation communities and regional ecosystems were cleared prior to the development of DNM (SKM, 2008), the woodland habitat revegetation species have been selected from mapped pre-clearing representative regional ecosystems that best align with the woodland habitat growth media and rehabilitation landforms (DES, 2022b; SKM, 2008).

The woodland habitat revegetation species have been selected from the following representative regional ecosystems:

- RE 11.5.3 – *Eucalyptus populnea* and/or *E. melanophloia* and/or *Corymbia clarksoniana* on Cainozoic sand plains and/or remnant surfaces
- RE 11.9.2 - *Eucalyptus melanophloia* +/- *E. orgadophila* woodland to open woodland on fine-grained sedimentary rocks (dominant)

A number of native grass species have also been included in the woodland habitat revegetation species mix taken from RE 11.9.3 (*Dichanthium* spp., *Astrebla* spp. grassland on fine-grained sedimentary rocks) which has been mapped as a subdominant pre-clearing regional ecosystem on DNM (DES, 2022b).

Woodland habitat revegetation species have been derived from the dominant representative regional ecosystems (i.e. RE 11.5.3 and RE 11.9.2) based on their listing in the relevant Regional Ecosystem Technical Descriptions (Queensland Herbarium, 2018). This approach will likely result in woodland habitat revegetation with both characteristics of the representative regional ecosystems, as well as species that are better adapted to macro climatic (i.e. drought, fire, flooding rains, climate change) and micro climatic factors (i.e. growth media, physical and chemical variation, variation in slope, aspect, altitude).

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 3-45). Short lived *Acacia* spp. (i.e. wattles) have been excluded from the species mix, with seed of intermediate lifespan *Acacia* spp. reduced, and these species 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 exotic 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 3-45 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 (<i>Corymbia</i>) species	E/C	<i>Eucalyptus</i> , <i>Corymbia</i> , occasionally <i>Angophora</i> 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

Life form and functional group	Code	Explanatory notes
Long lived acacias	LLA	Wattle species which may form recognisable communities or exist as part of the upper storey in other communities (e.g. <i>Acacia shirleyi</i> , <i>Acacia rhodoxylon</i>)
Woody understorey components		
Shrubby understorey	SU	A shrub is defined as: a woody plant that is multi-stemmed from the base (or within 200 mm from ground level) 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 (<i>Acacia</i> 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 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: <i>Cyperus</i> , <i>Dianella</i> and <i>Lomandra</i>)

3.6.1.8.8 Woodland habitat seed species and seeding rates

The recommended woodland habitat revegetation species mix for achieving areas of woodland habitat associated with a natural regional ecosystems on coal mining landforms have been listed in Table 3-46 along with the associated life form and functional group, preferred growth media and recommended seeding rates.

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 3-46 are sown at the overall recommended rate to achieve the required species richness.

The revegetation seed mix for the woodland habitat PMLU is to be recommended by an AQP based on the location of rehabilitation in relation to the surrounding regional ecosystems, and should consider the species and the rates listed in Table 3-46.

The seed mix rates are based on 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 rates as per Figure 3-46.

$$\text{Pure live seed (\%)} = \frac{\text{Viable seeds (\%)} \times \text{pure seed units (\%)}}{100}$$

Figure 3-46 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 are 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 or where there are operational constraints.

Table 3-46 Recommended species list and seeding rates for Woodland Habitat PMLU

Species name	Common name	Commercial availability rating ¹	Life form and functional group code ²	Pure live seed ³ rate (kg/ha-uncoated weight)	RE 11.5.3	RE 11.9.2
<i>Acacia rhodoxylon</i>	Rosewood	L	LLA	0.2-0.5	X	
<i>Alphitonia excelsa</i>	Red Ash	H	NE/NA	0.2-0.5	X	X
<i>Angophora leiocarpa</i>	Smooth Barked Apple	L	E/C	0.2-0.5	X	
<i>Atalaya hemiglauca</i>	Whitewood	H	NE/NA	0.3-0.5	X	X
<i>Corymbia citriodora</i> subsp. <i>citriodora</i> ^{*, **}	Lemon Scented Gum	H	E/C	0.5-1.5		X ^{*, **}
<i>Corymbia clarksoniana</i>	Clarkson's Bloodwood	M	E/C	0.5-1	X	
<i>Corymbia dallachiana</i>	Dallachy's Gum	M	E/C	0.2-0.5	X	X
<i>Corymbia erythrophloia</i>	Red Bloodwood	H	E/C	0.2-0.5	X	X
<i>Corymbia trachyphloia</i>	Brown Bloodwood	M	E/C	0.2-0.5		X
<i>Eucalyptus brownii</i>	Reid river box	M	E/C	0.2-0.5	X	
<i>Eucalyptus crebra</i> [*]	Narrow Leafed Ironbark	H	E/C	0.5 -1.5	X [*]	
<i>Eucalyptus melanophloia</i> [*]	Silver Leafed Ironbark	H	E/C	0.5 -1.5	X [*]	X [*]
<i>Eucalyptus orgadophila</i>	Mountain Coolabah	M	E/C	0.3-0.5		X
<i>Eucalyptus populnea</i> [*]	Poplar Box	M	E/C	0.5 -1.5	X [*]	X
<i>Lysiphyllum carronii</i>	Red Bauhinia	M	NE/NA	0.3-0.5	X	X
<i>Lysiphyllum hookeri</i>	White Bauhinia	M	NE/NA	0.2-0.5	X	
<i>Ventilago viminalis</i>	Vine tree	L	E/C	0.2-0.5	X	
Framework tree species - Total seed weight uncoated (kg/ha)				4.5		
<i>Acacia conferta</i>	Crowded-leaf wattle	H	SU	0.1-0.5	X	
<i>Acacia decora</i>	Western Silver Wattle	H	SU	0.1-0.5		X
<i>Acacia excelsa</i>	Ironwood wattle	L	ILA	0.1-0.5	X	X
<i>Acacia sericophylla</i>	Desert oak	M	ILA	0.1-0.5	X	
<i>Alstonia constricta</i>	Bitterbark	L	SU	0.1-0.5	X	X
<i>Alectryon diversifolius</i>	Holly bush	L	SU	0.1-0.5	X	X
<i>Breynia oblongifolia</i>	Coffee bush	L	SU	0.1-0.5		X
<i>Capparis lasiantha</i> , <i>C. canescens</i> , <i>C. loranthifolia</i> .	Wait-a-while	M	V/C	0.1-0.5	X	X
<i>Cassia brewsteri</i> ^{*, **}	Leichhardt bean	H	SU	0.3-0.5	X	X
<i>Dodonaea viscosa</i> ^{*, **}	Sticky hop bush	H	SU	0.2-0.5	X	X
<i>Dodonaea filifolia</i>	Thread leaved hop bush	L	SU	0.1-0.5		X
<i>Denhamia cunninghamii</i>		L	SU	0.1-0.5	X	
<i>Eremophila mitchellii</i>	False sandlewood	L	SU	0.1-0.5	X	X
<i>Erythroxylon australe</i>	Cocaine tree	L	SU	0.1-0.5	X	
<i>Geijera parvifolia</i>	Wilga	H	SU	0.2-0.5	X	X
<i>Grewia retusifolia</i> , <i>Grewia latifolia</i>	Emu berry	L	SU	0.2-0.5	X	X
<i>Owenia acidula</i>	Emu apple	L	SU	0.2-0.5		X
<i>Petalostigma pubescens</i>	Quinine	M	SU	0.2-0.5	X	X
<i>Senna artemisioides</i>	Silver cassia	H	SU	0.1– 0.5	X	
Woody understory species - Total seed weight uncoated (kg/ha)				3		
<i>Astrebula lappacea</i>	Curly Mitchell grass	H	NG	1-2	X	
<i>Aristida</i> spp (i.e. <i>A. calycina</i> , <i>A. latifolia</i> , <i>A. ramosa</i> , <i>A. caput-medusae</i> , <i>A. jerichoensis</i> , <i>A. personata</i> , <i>A. calycina</i> , <i>A. leptopoda</i>)	Three awned spear grass	M	NG	1-2	X	X
<i>Bothriochloa bladhii</i> subsp. <i>bladhii</i>	Forest blue grass	H	NG	1-2		X

Species name	Common name	Commercial availability rating ¹	Life form and functional group code ²	Pure live seed ³ rate (kg/ha-uncoated weight)	RE 11.5.3	RE 11.9.2
<i>Bothriochloa decipiens</i> var. <i>decipiens</i>	Pitted blue grass	L	NG	1-2	X	X
<i>Bothriochloa ewartiana</i>	Desert bluegrass	L	NG	1-2	X	X
<i>Chrysopogon fallax</i>	Golden beard grass	M	NG	1-2	X	X
<i>Chloris divaricata</i>		M	NG	1-2	X	X
<i>Chloris truncata</i>	Windmill grass	H	NG	1-2	X	X
<i>Cymbopogon refractus</i>	Barbwire grass	H	NG	1-2	X	
<i>Cynodon dactylon</i> var. <i>dactylon</i> *	Couch	H	IG	1-2		
<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>	Queensland bluegrass	H	NG	1-2	X	X
<i>Digitaria brownii</i>		M	NG	1-2	X	
<i>Eulalia aurea</i>	Silky brown top	M	NG	1-2		X
<i>Enteropogon acicularis</i>	Windmill grass	M	NG	1-2	X	X
<i>Heteropogon contortus</i>	Black spear grass	H	NG	1-2	X	X
<i>Iseilema vaginiflorum</i>		L	NG	1-2		X
<i>Panicum effusum</i>	Hairy panic	M	NG	1-2	X	
<i>Panicum decompositum</i>	Native millet	H	NG	1-2		X
<i>Panicum queenslandicum</i>	Yabila grass	L	NG	1-2	X	X
<i>Paspalidium distans</i>	Shot grass	L	NG	1-2		X
<i>Sarga leiocladum</i>		L	NG	1-2		X
<i>Sporobolus creber</i>		L	NG	1-2		X
<i>Themeda triandra</i>	Kangaroo grass	H	NG	1-2	X	X
Grass species- Total pure live seed weight uncoated (kg/ha)				10		
<i>Echinochloa esculenta</i>	Japanese Millet		Cover crop	5		
¹ Commercial availability rating: high (H), medium (M), low (L) ² Life form and functional group code: Eucalypt/Bloodwood (<i>Corymbia</i>) 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 * mandatory in relevant RE mix ** medium salinity tolerance (DERM 2011)						

3.6.1.8.9 Woodland habitat reference sites

One woodland habitat reference site has been established in a small patch of remaining remnant vegetation on the DNM mine site, adjacent to the MIA (Figure 3-47 and Figure 3-49). The woodland habitat reference site results summary has been provided below, in Table 3-47. The woodland habitat reference site returned five trees species, 11 shrub species, one native grass and three exotic grass species, 40% tree canopy cover and 96% total groundcover. The majority of the groundcover consists of exotic pasture grass.

Table 3-47 DNM Woodland habitat reference site

Reference Site – DNM_REF02

Figure 3-47 Woodland habitat reference site (DNM_REF02)
Mean Slope: <2%
Regional Ecosystem: 11.5.3
Total Groundcover: 98%
Tree Canopy Cover: 40%
Tree Species: <i>Eucalyptus populnea</i> (poplar box), <i>Acacia harpophylla</i> (brigalow), <i>Eucalyptus cambageana</i> (Dawson's gum), <i>Geijera salicifolia</i> , <i>Acacia salicina</i> (sally wattle) Evidence of recruitment: Yes
Shrub species: <i>Alstonia constricta</i> , <i>Capparis canescens</i> , <i>Acacia harpophylla</i> (brigalow), <i>Ventilago viminalis</i> (vine tree), <i>Alectryon oleifolius</i> (boonaree), <i>Alectryon diversifolius</i> (holly bush), <i>Alphitonia excelsa</i> (soap ash), <i>Eremophila mitchellii</i> (false sandalwood), <i>Citrus glauca</i> (native lime bush), <i>Carissa ovata</i> (currant bush), <i>Denhamia cunninghamiana</i>
Native Grasses: <i>Aristida calycina</i> (dark wiregrass) Exotic Grasses: <i>Cenchrus ciliaris</i> (buffel grass*), <i>Megathyrsus maximus var. pubiglumis</i> (green panic*), <i>Urochloa mosambicensis</i> (sabi grass*)
Invasive Plants: <i>Harrisia martinii</i> (Harrisia cactus*), <i>Opuntia sp.</i> (tree pear*)

"If it's not safe, don't do it."

3.6.1.8.10 Watercourse revegetation

A small section of New Chum Creek will require rehabilitation and revegetation activities to establish riparian vegetation associated with a watercourse PMLU.

The revegetation zones for natural watercourses (Figure 3-48) 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 and a high ground cover of grasses and reeds.

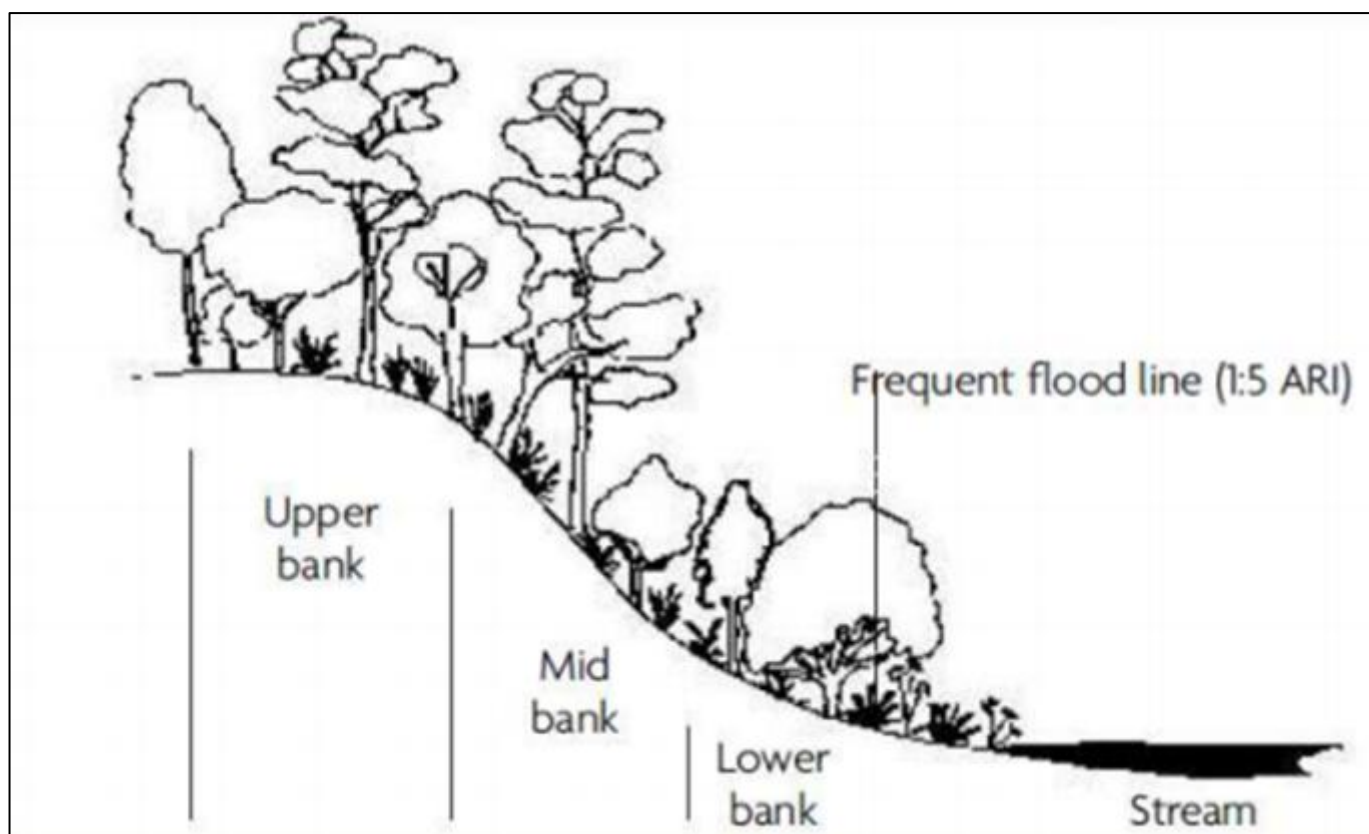


Figure 3-48 Conceptual riparian revegetation plantings zone (Vegetation Matters, 2014)

The growth media for watercourse 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).

3.6.1.8.11 Watercourse revegetation species and seeding rates

The watercourse revegetation species are based on selecting framework trees, woody understorey and groundcover species associated with the following regional ecosystems occurring along New Chum Creek (DES, 2022b):

- RE 11.3.25 *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines

"If it's not safe, don't do it."

The recommended watercourse revegetation species and seeding rates are listed in Table 3-48. 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 of pure live seed for woody understorey species and 10 kg/ha of pure live seed for grass species 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 in 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.

The preferred seeding timing for watercourse revegetation is August to October. There is 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 3-48 Recommended species and seeding rates for watercourse PMLU

Species name	Common name	Life form and functional group code ¹	Pure Live Seed ² rate (kg/ha uncoated weight)
Upper and mid banks			
<i>Angophora floribunda</i>	Rough Barked Apple	E/C	0.5 - 1
<i>Casuarina cunninghamiana</i> *	River She Oak	NE/NA	0.5 - 1
<i>Corymbia tessellaris</i> *	Moreton Bay Ash	NE/NA	0.5 - 1
<i>Eucalyptus camaldulensis</i> subsp. <i>obtus</i> a*	River Red Gum	E/C	1 - 2
<i>Eucalyptus coolabah</i> subsp. <i>coolabah</i>	Coolabah	E/C	1 - 2
<i>Eucalyptus tereticornis</i> subsp. <i>tereticornis</i> *	Queensland Blue Gum	E/C	0.5 - 1
<i>Lysiphyllum hookeri</i>	White Bauhinia	NE/NA	0.5 - 1
<i>Melaleuca bracteata</i> *	Black Tea Tree	NE/NA	0.5 - 1
<i>Terminalia oblongata</i>	Yellowwood	NE/NA	0.5 - 1
Framework tree species - total seed weight uncoated (kg/ha)			6
<i>Carissa ovata</i>	Current Bush	GCS	0.5 - 1
<i>Eremophila mitchellii</i>	False Sandalwood	SU	0.5 - 1
<i>Erythroxylum australe</i>	Cocaine Tree	SU	0.5 - 1
<i>Ficus coronata</i>	Creek Sandpaper Fig	SU	0.5 - 1
<i>Ficus fraseri</i>	White Sandpaper Fig	SU	0.5 - 1
<i>Ficus opposita</i>	Sandpaper Fig	SU	0.5 - 1
<i>Petalostigma pubescens</i>	Quinine	SU	0.5 - 1
Woody Understorey Species - Total Seed Weight Uncoated (Kg/Ha)			4
<i>Bothriochloa bladhii</i>	Forest Blue Grass	NG	0.5 - 1
<i>Cynodon dactylon</i> *	Couch	IG	2
<i>Chloris truncata</i>	Windmill grass	NG	0.5 - 1
<i>Cymbopogon refractus</i>	Barbwire grass	NG	0.5 - 1
<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>	Queensland bluegrass	NG	0.5 - 1
<i>Digitaria brownii</i>	Cotton panic	NG	0.5 - 1
<i>Eulalia aurea</i>	Silky brown top	NG	0.5 - 1
<i>Enteropogon acicularis</i>	Windmill grass	NG	0.5 - 1
<i>Heteropogon contortus</i>	Black spear grass	NG	0.5 - 1
<i>Lomandra longifolia</i>	Mat Rush	NG	0.2 - 0.5
<i>Panicum decompositum</i>	Native millet	NG	0.2 - 0.5
<i>Panicum effusum</i>	Hairy Panic	NG	0.2 - 0.5
<i>Paspalidium distans</i>	Shot Grass	NG	0.2 - 0.5
<i>Rhynchosia minima</i>	Rhynchosia	V/C	0.2 - 0.5
<i>Themeda triandra</i>	Kangaroo Grass	NG	0.5 - 1
Grass and other ground species- Total pure live seed weight uncoated (kg/ha))			10
Lower banks and bank toe			
<i>Casuarina cunninghamiana</i> *	River She Oak	NE/NA	0.5 -1.5
<i>Melaleuca bracteata</i> *	Black Tea Tree	NE/NA	0.5 -1.5
<i>Melaleuca leucadendra</i> *	Broad-Leaved Tea Tree	NE/NA	0.5 -1.5
<i>Melaleuca viminalis</i> *	Red Bottlebrush	NE/NA	0.5 -1.5
Framework tree species - total seed weight uncoated (kg/ha)			5
<i>Bothriochloa bladhii</i>	Forest Blue Grass	NG	1 - 2
<i>Cynodon dactylon</i> *	Couch	NG	1 - 2
<i>Chloris truncata</i>	Windmill grass	NG	1 - 2
<i>Cymbopogon refractus</i>	Barbwire grass	NG	1 - 2
<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>	Queensland bluegrass	NG	1 - 2

Species name	Common name	Life form and functional group code ¹	Pure Live Seed ² rate (kg/ha uncoated weight)
<i>Themeda triandra</i>	Kangaroo Grass	NG	0.5 -1
<i>Bothriochloa bladhii</i> subsp. <i>bladhii</i>	Forest Blue Grass	NG	1 - 2
<i>Lomandra longifolia</i>	Spiny-Headed Mat Rush	NG	2 - 3
<i>Eustrephus latifolius</i>	Wombat Vine	V/C	0.5 - 1
<i>Cyperus</i> spp. (<i>C. gracilis</i> , <i>C. polystachyos</i>)**	Sedge	NG	2 - 3
<i>Cynodon dactylon</i> *	Couch	IG	2 - 3
Ground species - total seed weight uncoated (kg/ha)			10
<i>Echinochloa esculenta</i>	Japanese Millet	Cover crop	5
Notes: ¹ Life form and functional group code: <i>Eucalypt/Bloodwood (Corymbia) species (E/C)</i>, <i>Non-eucalypt, non-acacia species (NE/NA)</i>, <i>Long lived acacias (LLA)</i>, <i>Shrubby understorey (SU)</i>, <i>Groundcover shrubs (GCS)</i>, <i>Vines/creepers (V/C)</i>, <i>Intermediate lifespan acacias (ILA)</i>, <i>Short lifespan wattles (SLA)</i>, <i>Introduced woody perennials (IWP)</i>, <i>Competitive pasture grasses (CPG)</i>, <i>Introduced grasses (IG)</i>, <i>Native grasses (NG)</i> 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)			

3.6.1.8.12 Watercourse reference sites

A reduced number of reference sites are proposed for New Chum Creek, reflecting the limited extent of disturbance and the relatively small revegetation area. Suitable reference site(s) will be established at the commencement of watercourse rehabilitation activities commence. Reference sites will be located within a relatively unmodified upstream section of New Chum Creek (Section 3.8.1.6).

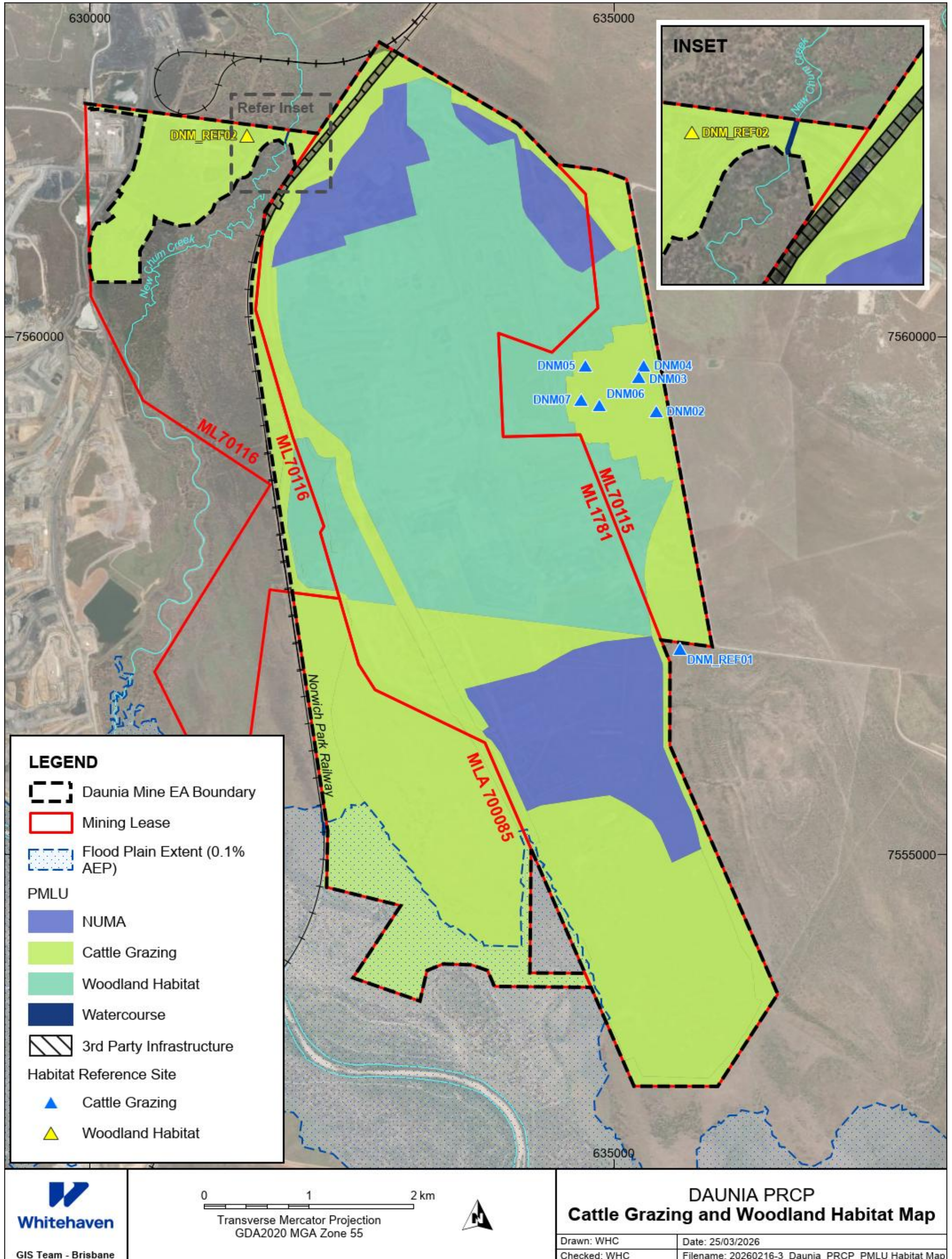


Figure 3-49 Cattle grazing and woodland habitat reference sites

Relationship with PRCP Schedule

The revegetation approach for the PMLUs focuses on selection and establishment of suitable species based on the growth media and rehabilitated landforms. Woodland habitat and watercourse rehabilitation strongly considers the inclusion of framework tree species, woody understorey and grass species from pre-clearing regional ecosystems occurring within or surrounding DNM on similar landforms and substrates. The recommended species will best support achievement of the cattle grazing, woodland habitat and watercourse PMLU revegetation objectives.

3.6.2 Tailings storage facilities

PRCP Guideline (Section 3.6.2)

The tailings require characterisation to determine the geochemistry, rheology and geotechnical parameters that influence 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.*

Not applicable, as there are no TSFs at DNM.

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.

3.6.3.1 Context

A Void Closure Plan has been compiled to support the development of this PRC Plan. The detailed report, *Void Closure Plan* (ERM, 2026), is provided in Appendix 4.9 – Void Closure Plan.

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 PRC Plan, a residual void means the remaining mined out pit below ground level after backfill.

For DNM, there are four residual voids in the final landform:

- Titan North;
- Titan Central;
- Titan East; and
- Pandora.

Residual voids include both areas of PMLU and NUMAs. Whilst there are four residual voids, the NUMA within the Titan East and Titan Central residual voids is contiguous resulting in only three NUMA areas within the final landform. These residual voids are pre-approved as NUMAs (Section 3.4). The NUMA boundaries have been designed to maximise the extent of land that can be safely assigned a PMLU (Section 3.3.2). The NUMA extents achieve an area that is safe and structurally stable and include additional set-backs from the void low-wall, high-wall and end-wall crests if required to achieve wall geotechnical stability, and a safety bund and fence.

3.6.3.2 Geotechnical stability

Geotechnical stability assessments have been undertaken by Henderson Geotech (2026) (Appendix 4.8) to confirm the conceptual high wall, end-wall and low wall slopes of the DNM residual voids will remain stable in the long term following closure. The adopted minimum FOS design acceptance criteria were derived using the statement of model uncertainty and outcomes of the consequence assessment. The design acceptance criteria are provided in Table 3-49.

Table 3-49 Adopted design acceptance criteria

Scenarios	Minimum Factor of Safety
Instability extending into grazing PMLUs	1.50
Instability extending to watercourses or flood protection structures	1.50
Instability extending into woodland PMLU	1.35
Instability contained wholly within NUMA	1.25
<i>Source: Henderson, 2026</i>	

Seven representative cross-sections were modelled (Figure 3-50) using Slide2 limit equilibrium analyses (Morgenstern-Price and Sarma methods) to assess the FOS for the final landform geometry under end-of-mining, interim and long-term pit-lake conditions. Groundwater conditions for each time step were taken from the regional groundwater model, with void water levels applied as internal boundaries.

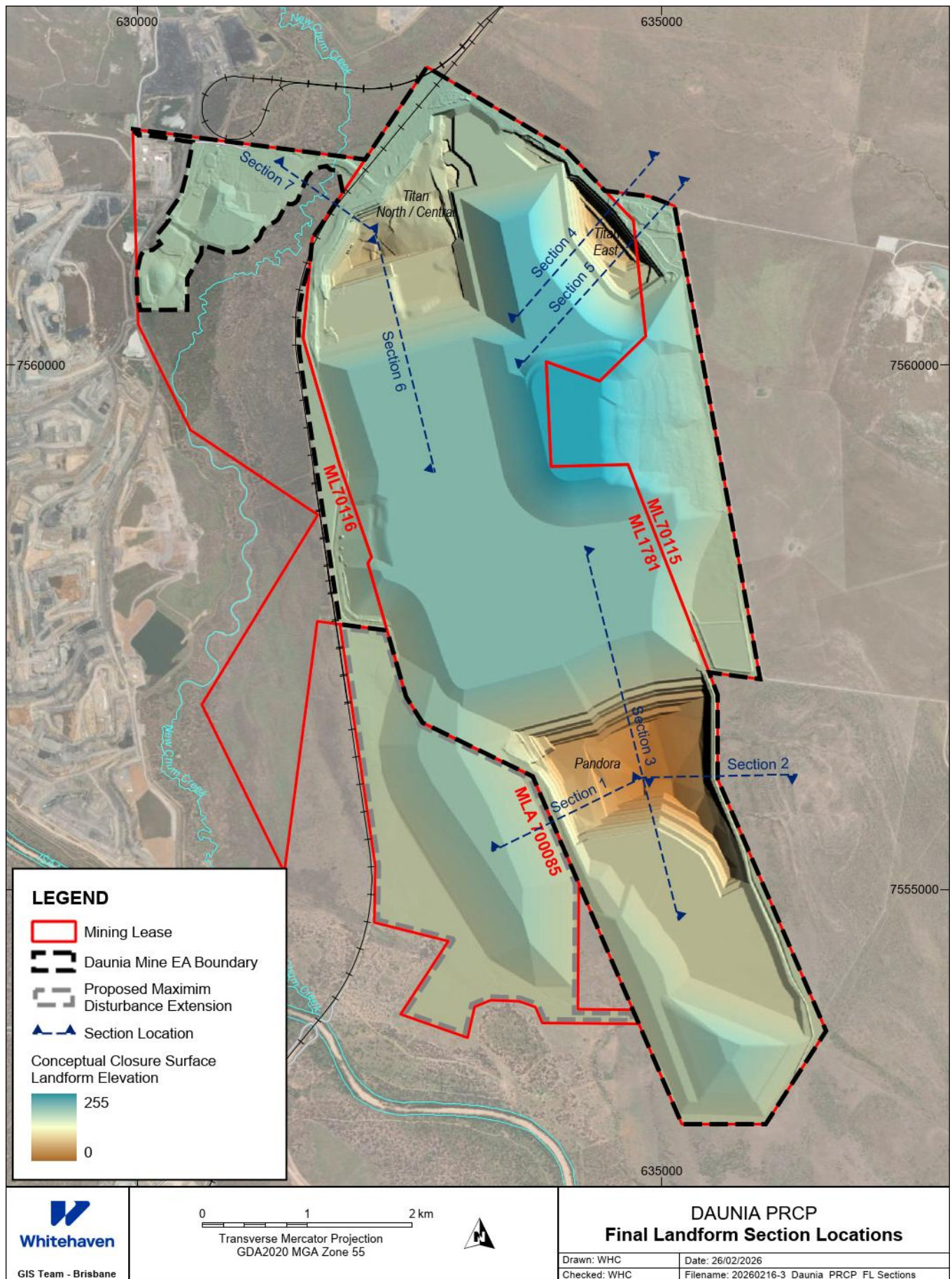


Figure 3-50 Locations of void cross-sections analysed geotechnical assessment

"If it's not safe, don't do it."

3.6.3.2.1 Low wall stability

Low wall stability results (Table 3-50) show residual void low walls meet or exceed the required FOS values for all assessment stages. The minimum FOS for NUMAs (1.25) and woodland habitat PMLUs (1.35) were satisfied, and no additional set-backs are required. These results confirm that the as-dumped low wall designs are geotechnically stable under long-term conditions.

Table 3-50 Summary of DNM residual void low wall stability results

Residual Void	Cross-section reference	NUMA FOS			Woodland habitat PMLU FOS		
		End-of - mining	Interim pit lake	Long-term pit lake	End-of - mining	Interim pit lake	Long-term pit lake
Titan North	6	1.60			1.60		
Titan East	4	1.65			1.65		
	5	1.60	1.64	1.64	1.64		
Pandora	3 northern	1.58	1.60	1.39	2.07	1.81	1.70
	3 southern	1.54	1.59	1.38	1.94	1.75	1.70
Source: Henderson Geotech (2026)							

The NUMA design incorporates low walls that have been reshaped and integrated into the overall closure landform to achieve long-term erosion stability. The low walls have been designed with reduced overall slope gradients and offset benches to break up flow paths, shorten slope length and limit flow concentration. The upper sections of the low walls will support PMLUs and merge into the surrounding spoil landforms, allowing runoff to be dispersed evenly before reporting to the residual voids. Surface water from adjacent rehabilitated areas will not discharge onto the NUMA low wall slopes.

3.6.3.2.2 High wall stability

High wall stability results are summarised in Table 3-51. The analyses show that all residual void high walls meet or exceed the minimum design acceptance criteria for all assessment stages at the PMLU/NUMA boundary.

Minor revisions were made to the Pandora and Titan North high wall geometries during the assessment to improve stability. The Pandora eastern high wall was modified by replacing the upper coal seam and overburden with spoil to remove a potential sliding surface caused by steep outward-dipping seams, increasing the FOS above the design criterion (Figure 3-51). A surface drain was removed from the northern wall of Titan North to prevent saturation of weathered overburden, which improved the FOS above the acceptance criteria.

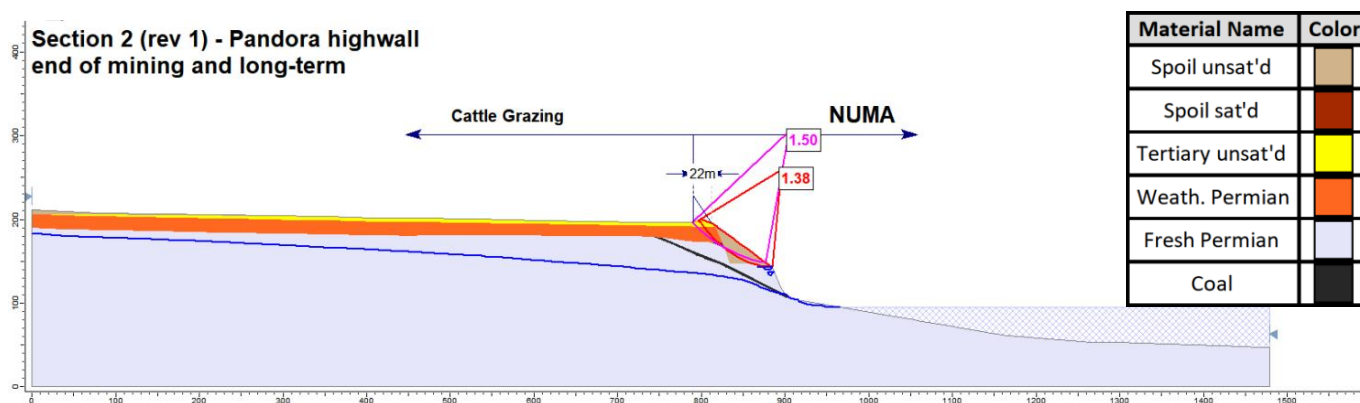


Figure 3-51 Pandora eastern highwall stability modifications

Rainfall runoff over the highwalls will be limited by exclusion bunds and flood protection landforms where required, preventing direct inflow and erosion of the crests. Drainage controls will be incorporated to divert surface water away from residual void edges and minimise concentrated flows along the wall crests.

Table 3-51 Summary of DNM residual void high wall stability analysis

Residual Void	Cross-section	NUMA FOS			Grazing and watercourse PMLU FOS		
		End-of - mining	Interim pit lake	Long-term pit lake	End-of - mining	Interim pit lake	Long-term pit lake
Titan North	7*	2.01			2.93		
Titan East	4	1.87			1.87		
	5	2.22			2.22		
Pandora	1	1.62			1.62		
	2*	1.38			1.50		
Note: *minimum FOS values based on revised landform design							
Source: Henderson Geotech (2026)							

3.6.3.3 Void hydrology

3.6.3.3.1 Stage, area and volume

The stage-storage relationships for each residual void, linking void volume, surface area, and elevation, were derived from the final landform topography. These relationships were used to calculate void surface area and volume at each modelled water level. Results are summarised in Table 3-52.

Table 3-52 Stage-storage properties of the residual voids

Residual void	Max. Vol. (ML)	Max. Surface Area (ha)	Spill Level (mAHD)	Initial Pit Lake Level (mAHD)
Titan North	41,810	192.4	210	139.0
Titan Central	450	6.22	210	193.1
Titan East	26,200	54.8	220	118.5
Pandora	201,850	448.5	190	70.4

Source: WRM (2026b)

3.6.3.3.2 Water balance

A void water balance model (WBM) based on the final landform design (Section 3.6.1.5) was completed by WRM (2026b) to assess the long-term hydrological behaviour of the residual voids. The model simulated rainfall, evaporation, runoff, spoil seepage and groundwater exchange over a 500-year period to evaluate water balance performance and equilibrium conditions. Model findings are summarised in Table 3-53 to Table 3-56.

Results show Titan North and Titan Central achieve equilibrium relatively early and do not vary greatly from their initial lake levels at the beginning of the simulation. Mean pit lake levels after 500 years are 139.5 mAHD for Titan North and 193.2 mAHD for Titan Central, less than 0.5 m more than initial conditions.

Mean pit lake levels in Titan East increase by approximately 2 m over initial conditions and tend to stabilise about 125 years post-closure at 120.4 mAHD. Mean pit lake levels in the Pandora residual void rise by about 20 m over initial conditions and also tend to stabilise approximately 125-130 years post closure at around 91.9 mAHD.

There is little variation between the 5th percentile pit lake levels and the 95th percentile pit lake levels for the northern voids with variation from the mean being less than 5% in either direction. The variation for Pandora, however, is much larger with the 5th percentile being 32% lower than the mean and the 95th percentile being 10% higher.

Pit lake levels are predicted to stabilise well below the shallow aquifers and residual void spill points. There is no anticipated interaction with the shallow aquifers or risk of overtopping.

Surface water runoff is the largest inflow to the residual voids, accounting for approximately 50% of inflows to the residual voids. Groundwater accounts for approximately 12-14% of inflows. The remaining inflows are attributed to seepage moving into the spoil emplacements from the northern residual voids, and then from the spoil emplacements to the Pandora residual void.

Fifty-seven to sixty-three percent (57-63%) of outflows are accounted for through evaporation. The remaining outflows are seepage moving from the northern voids into the spoil emplacement, and then again, seepage moving from the spoil emplacements to the Pandora residual voids. There are no seepage outflows from the Pandora void, nor are there any outflows to groundwater from any residual voids. Seepage from the northern voids drains downgradient through the spoil emplacements and toward Pandora, which functions as the terminal receiving basin for the post-mining landscape (Section 3.6.3.4).

No ongoing water management activities are anticipated for the DNM residual voids.

Table 3-53 Summary of DNM water balance model results 2545

Residual Void	Pit Lake Level - 5%ile	Pit Lake Level – Mean	Pit Lake Level – 95%ile
<i>Unit</i>	<i>mAHD</i>		
Titan North	136.7	139.5	146.7
Titan Central	192.2	193.2	195.2
Titan East	116.9	120.4	125.8
Pandora	69.8	91.9	102.2
Source: WRM (2026b)			

Table 3-54 Summary of DNM WBM average void inflows and outflows for years 2045 to 2095

Residual Void	Average Inflows (ML/day)				Average Outflows (ML/day)				Average volume change
	Surface Water Runoff	Groundwater	Seepage	Total	Evaporation	Groundwater	Seepage	Total	
Titan North	1.16	0.00	0.00	1.16	0.12	0.00	1.03	1.15	0.01
Titan Central	0.12	0.00	0.00	0.12	0.01	0.00	0.11	0.12	0.00
Titan East	0.44	0.18	0.00	0.61	0.17	0.00	0.43	0.60	0.01
Pandora	2.31	0.83	1.53	4.67	3.87	0.00	0.00	3.87	0.80
Spoil	-	-	1.57	1.57	-	-	1.53	1.53	0.05
Total	4.02 (49%)	1.01 (12%)	3.10 (38%)	8.13	4.17 (57%)	0.00 (0%)	3.10 (43%)	7.27	0.86
Source: WRM (2026b)									

Table 3-55 Summary of DNM WBM average void inflows and outflows for years 2095 to 2545

Residual Void	Average Inflows (ML/day)				Average Outflows (ML/day)				Average volume change
	Surface Water Runoff	Groundwater	Seepage	Total	Evaporation	Groundwater	Seepage	Total	
Titan North	1.17	0.00	0.00	1.17	0.14	0.00	1.03	1.17	0.00
Titan Central	0.12	0.00	0.00	0.12	0.01	0.00	0.11	0.12	0.00
Titan East	0.44	0.20	0.00	0.64	0.20	0.00	0.42	0.62	0.02
Pandora	2.58	1.03	1.55	5.16	5.05	0.00	0.00	5.05	0.11
Spoil	-	-	1.56	1.56	-	-	1.55	1.55	0.01
Total	4.31 (50%)	1.23 (14%)	3.11 (36%)	8.65	5.40 (63%)	0.00 (0%)	3.11 (37%)	8.51	0.14
Source: WRM (2026b)									

Table 3-56 Maximum void water depths (m)

Residual Void	5%ile	25%ile	Median	75%ile	95%ile
Titan North	3.8	6.0	8.4	11.2	16.5
Titan Central	0.7	1.4	2.3	3.3	5.0
Titan East	4.4	6.3	7.7	9.2	11.2
Pandora	32.8	35.8	38.2	40.8	43.4
<i>Source: WRM (2026b)</i>					

3.6.3.4 Groundwater modelling

Groundwater assessments have been undertaken to evaluate the potential interactions between the DNM residual voids and the surrounding groundwater system, and to assess the potential for long-term contaminant transport (SLR, 2026). This assessment is discussed in Section 3.6.1.1 with the SLR report provided as Appendix 4.2 – Hydrogeology Assessment.

The groundwater recovery model (SLR, 2026) simulates post-mining inflows and outflows between the residual voids and the surrounding groundwater system over a 977-year period. Recovery stress periods ranged from 1 to 50 years in duration, commencing at the end of mining in 2041 and extending until long-term equilibrium was achieved.

To address climate variability, three climate scenarios were used: Wetter-R1, Mid-R4 and Drier-R6. These scenarios were based on results from the water balance modelling (refer to Section 5.3). The mid-climate scenario (Mid-R4) forms the basis of groundwater recovery predictions, while the wetter and drier cases were used for sensitivity analyses.

Predicted groundwater inflows exhibit temporal variability across all residual voids during the early recovery phase. Short-term flux reversals occur where residual spoil remains unsaturated immediately following mine dewatering. Modelled inflows and outflows are driven by differences between local groundwater recovery rates and the gradual filling of the residual voids via rainfall, runoff and infiltration.

Groundwater levels recover gradually but stabilise below pre-mining elevations, maintaining sustained inward hydraulic gradients toward all residual voids (Figure 3-52). This behaviour is governed by continued evaporative loss from the void lakes, which drives long-term groundwater inflow. Modelled lake levels remain below the shallow Quaternary and Tertiary aquifers and well below each void's spill elevation, confirming there is no potential for upward seepage or overtopping.

Flow-path simulations (Figure 3-31) undertaken in conjunction with the numerical model confirm that groundwater and most seepage from the surrounding spoil converge toward the residual voids, with particle tracking showing capture within the Permian coal measures. Whilst the vast majority of seepage from the OOPD will return to and be captured by the Pandora residual void, limited seepage from the far western margin is predicted to migrate towards the south and away from the residual voids. Particles are predicted to move towards and remain within the deep Permian coal measures and are not expected to enter the shallow unconsolidated strata (Section 3.6.1.1). Containment of groundwater and most seepage within the Permian Coal Measures demonstrates that all post-mining hydraulic exchange remains confined to deep, low-permeability strata beneath the final landform. This indicates there are no hydraulic pathways connecting the residual voids to shallow aquifers, surface water systems or off-site receptors.

Seepage released from the Titan voids migrates downgradient toward Pandora, which functions as the final groundwater and seepage sink within the post-mining landform. While seepage outflows are predicted to occur within the coal measures, these are not expected to migrate beyond the footprint of the residual voids.

Predicted drawdown remains confined to the Rangal Coal Measures and does not extend into the overlying alluvial or weathered aquifers. Groundwater levels near the Isaac River and potential GDE areas remain within natural pre-mining variability, and no additional impacts to private bores are predicted.

Overall, the final landform is hydrologically contained and stable. The residual voids act as long-term groundwater sinks under all climate scenarios, ensuring most seepage and groundwater inflows remain within the mine footprint and preventing off-site migration of water or solutes leading to environmental harm.

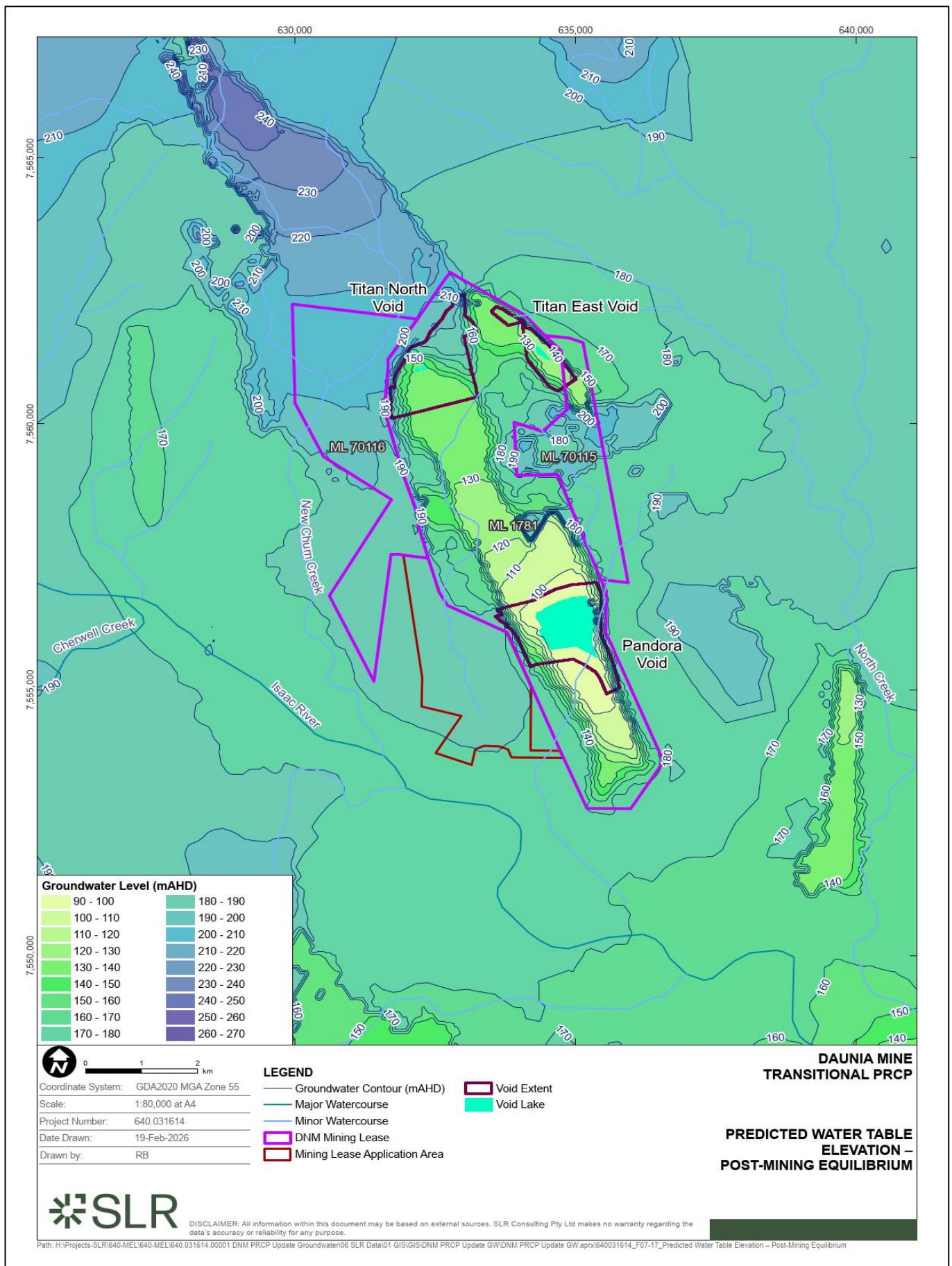


Figure 3-52 Predicted water table elevation at post-mining equilibrium

"If it's not safe, don't do it."

3.6.3.5 Void water quality

Water quality modelling of the Pandora residual void is detailed in the Void Closure Plan (ERM, 2026) (Appendix 4.9 – Void Closure Plan). PHREEQC was applied to predict long-term geochemical evolution of the pit lake under post-closure conditions, supported by limnology simulations using the General Lake Model (GLM). The assessment covered major ions, pH, redox state, and metal behaviour over 500 years.

Two PHREEQC scenarios were modelled:

- **Controlled:** Includes atmospheric exchange, mineral precipitation/dissolution, and ferrihydrite sorption to represent natural buffering and mineral-water interactions.
- **No-controls:** Disables these processes, simulating a simple mixture without precipitation buffering or mineral reactions. The no-controls scenario was performed to highlight the role of geochemical controls on predicted water quality. The results of the no-controls scenario are detailed in the VCP (ERM, 2026).

Results indicate evaporation and solute concentration dominate pit lake chemistry. Evapoconcentration drives TDS to ~60,000 mg/L (hypersaline) by 500 years in both scenarios.

In the controlled case, pH declines to ~5.3-5.9 as salinity and oxidation increase, with ferrihydrite formation limiting Fe mobility and stabilising water chemistry. Redox potential remains high, and mineral equilibria establish steady-state conditions. Mn concentration increases (<0.1 mg/L) but remain well below guideline values. All other metal and metalloid concentrations were found to be negligible throughout the modelling period.

Major-ion chemistry trends toward Na-Cl and Mg dominance typical of terminal lakes. EC and TDS exceed groundwater trigger levels and freshwater guidelines but stabilise, reflecting evaporation rather than contaminant release. Since the Pandora residual void is fully hydrologically contained, elevated salinity remains confined within the pit lake and does not present an off-site environmental risk.

3.6.3.5.1 Chemicals of concern

Potential chemicals of concern (CoCs) for surface water and groundwater at DNM were identified based on the geochemical characterisation (Section 3.6.1.3), water balance and solute pathway modelling (Section 3.6.1.7) and PHREEQC simulations presented in this section.

The assessment considered the quality of inflows from highwall runoff, spoil and groundwater, and the predicted long-term evolution of water chemistry within the Pandora residual void, which represents the hydraulically dominant sink in the post-closure landform.

The results confirm the principal CoCs associated with groundwater and pit lake water in the post-closure landscape are as follows:

- major ions (Na, Cl, SO₄, HCO₃, Ca, Mg, K);
- salinity indicators (EC/TDS);
- redox-sensitive metals (Fe, Mn); and
- pH and redox potential as secondary indicators; they act as ‘master variables’ that control the solubility, speciation and mobility of other contaminants rather than being contaminants themselves.

Other potential CoCs from the EA trigger levels for groundwater monitoring (Table I2 in EPML00561913) were included in the assessment and found to be consistently low or below laboratory reporting limits in both monitoring data and model predictions. They are therefore not considered potential CoCs at DNM.

Geochemical modelling demonstrates that these parameters adequately represent the chemical processes and potential risks at the site. Solute behaviour is governed by evaporative concentration, mineral precipitation and sorption reactions that limit metal mobility under oxidising conditions.

Predicted PHREEQC parameters after 500 years for the potential CoCs in the ‘controlled’ and more realistic simulation model were as follows:

- Fe: 0.02 mg/L < 4.2 mg/L (EA trigger value);
- Mn: 0.07 mg/L < 1.9 mg/L (ANZG 95% freshwater protection trigger level);
- SO₄: 0.002 mg/L < 490 mg/L (EA trigger value);
- pH: 5.35 < 6.5 (lower EA trigger value boundary); and
- EC: 139,000 µS/cm > 20,100 µS/cm (EA trigger value).

Although pH decreases to approximately 5.3 and EC rises to ~139 000 µS/cm under long-term equilibrium conditions, the Pandora residual void is a confirmed terminal sink with no surface water or groundwater outflows. Therefore, these internal salinity and pH conditions do not pose a risk to environmental values.

Note that the ANZG (2018) 95 % freshwater species protection guideline for manganese (1.9 mg/L) was used for context as there is no site-specific EA trigger value for Mn and the residual voids ultimately interact with groundwater systems of predominantly freshwater to brackish salinity rather than marine conditions.

3.6.3.5.2 Limnology

Limnology simulations using the GLM are reported in the Void Closure Plan (ERM, 2026) (Appendix 4.9). Results from the simulation of the Pandora pit over 110 years using hourly timesteps are summarised as follows:

- All three scenarios (low, mid, high rainfall) show strong seasonal thermal and density gradients forming early (around the first 20-30 years) and persisting for the full 110-year simulation.
 - There is no visual evidence of deep permanent overturn or full homogenisation.
 - The density range (996-1006 kg/m³) is narrow, suggesting stratification is reinforced thermally and through salinity but is not extreme.
- For all rainfall scenarios, salinity stratification develops rapidly during the initial filling period as saline groundwater accumulates at depth, producing a strong vertical gradient within the lower 20-30 m of the lake.
 - This gradient collapses after approximately 30-40 years, when full vertical mixing occurs and salinity becomes uniform throughout the water column.
 - After 110 years, the lake is completely mixed and uniformly saline (~9-10 g/L), with only gradual long-term salinity increase from ongoing evaporation and solute concentration.
- The stratification trend is essentially identical across scenarios, indicating that rainfall volume has little influence on stratification behaviour.

Figure 3-53 presents the simulated evolution of thermal, salinity and density stratification in the Pandora pit lake under the mid-rainfall scenario over 110 years. The plots illustrate how surface heating, saline groundwater inflow and evaporative concentration interact to establish the lake's vertical structure through time.

Thermal, salinity and density stratification of the Pandora void across significant decades, representing early pit lake filling, mid-term transition and long-term equilibrium are displayed in Figure 3-54, Figure 3-55 and Figure 3-56.

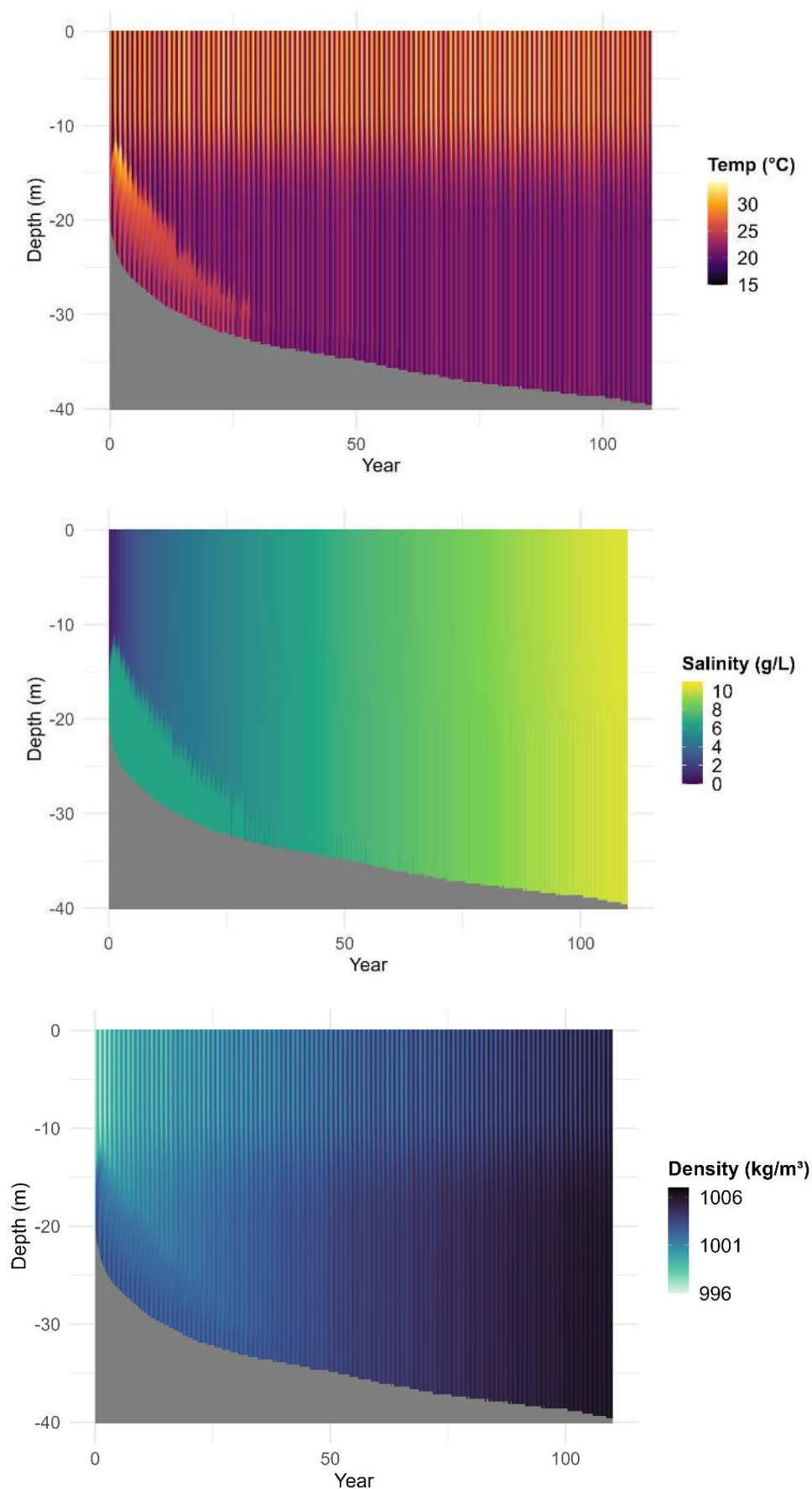


Figure 3-53 Pandora thermal, salinity and density stratification over 110 years – mid rainfall (ERM, 2026)

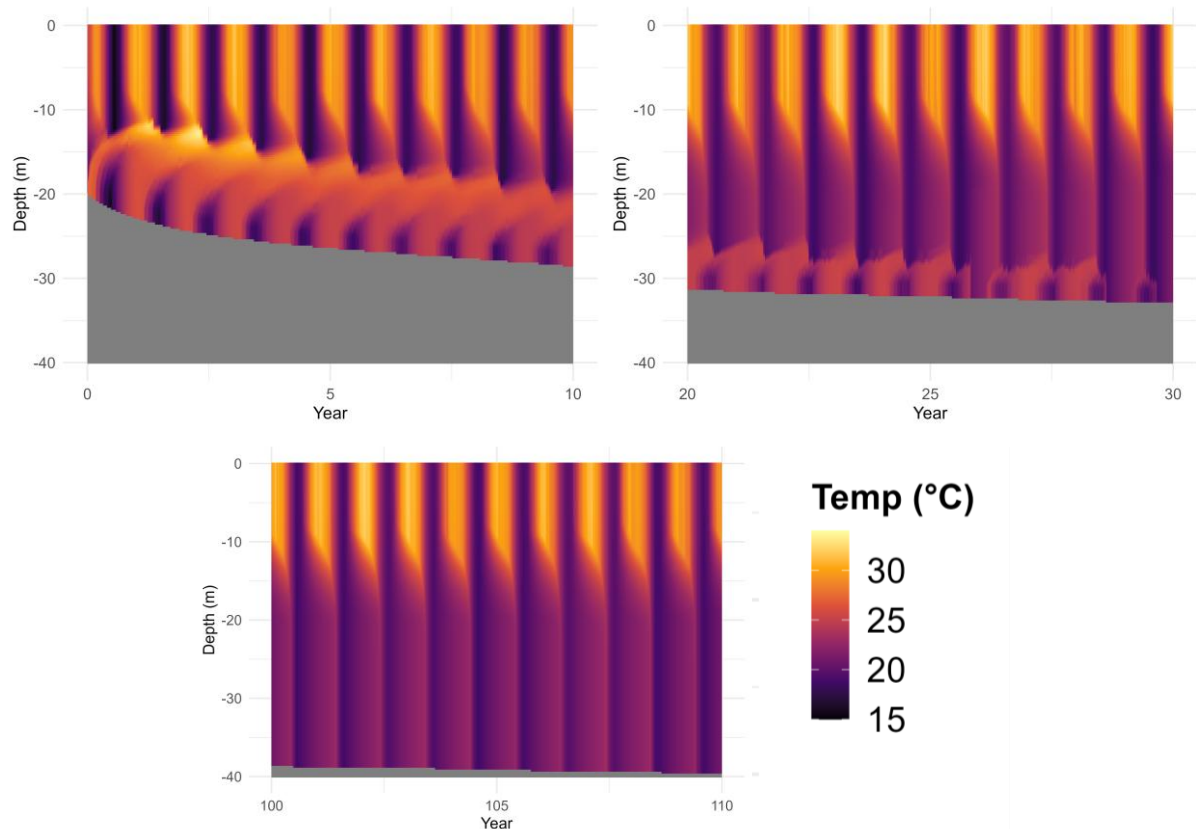


Figure 3-54 Pandora thermal stratification over significant decades – mid rainfall (ERM, 2026)

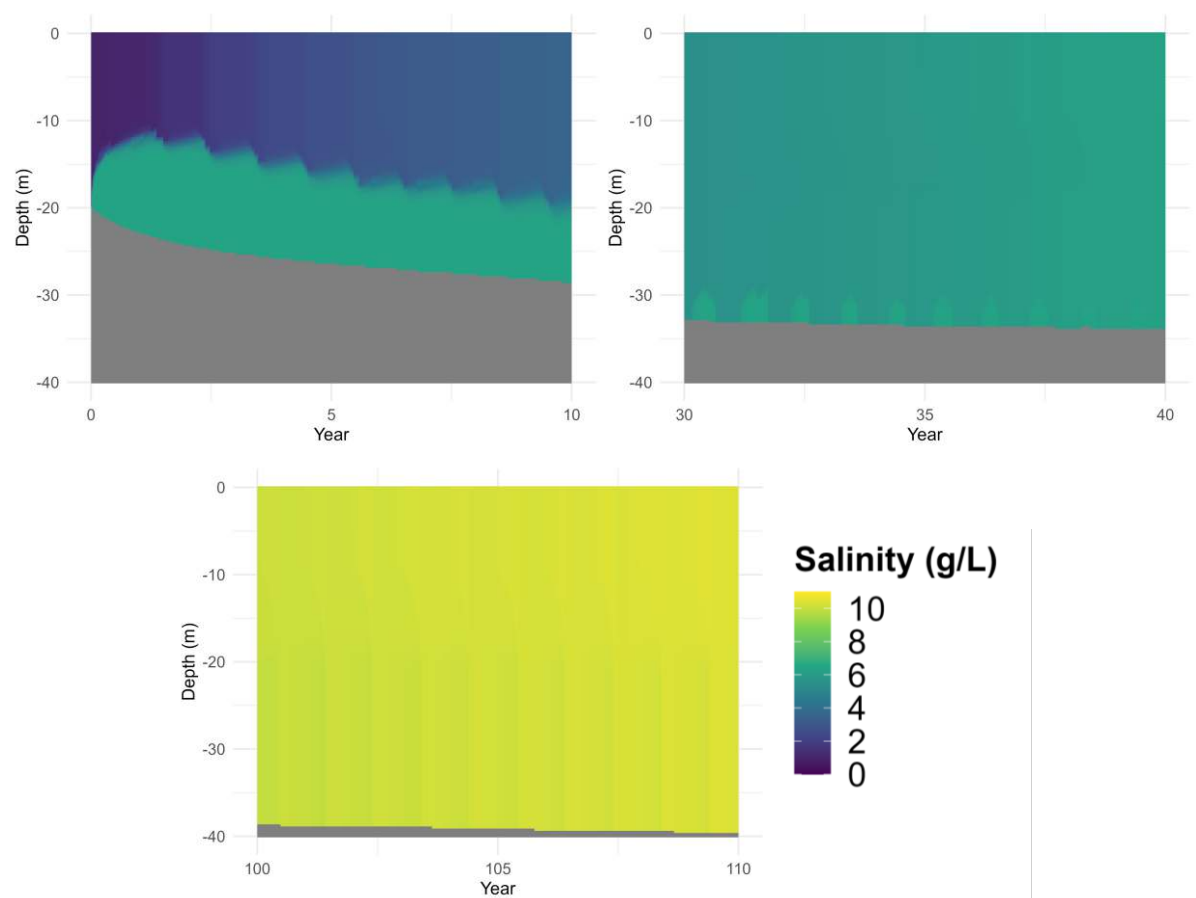


Figure 3-55 Pandora salinity stratification over significant decades – mid rainfall (ERM, 2026)

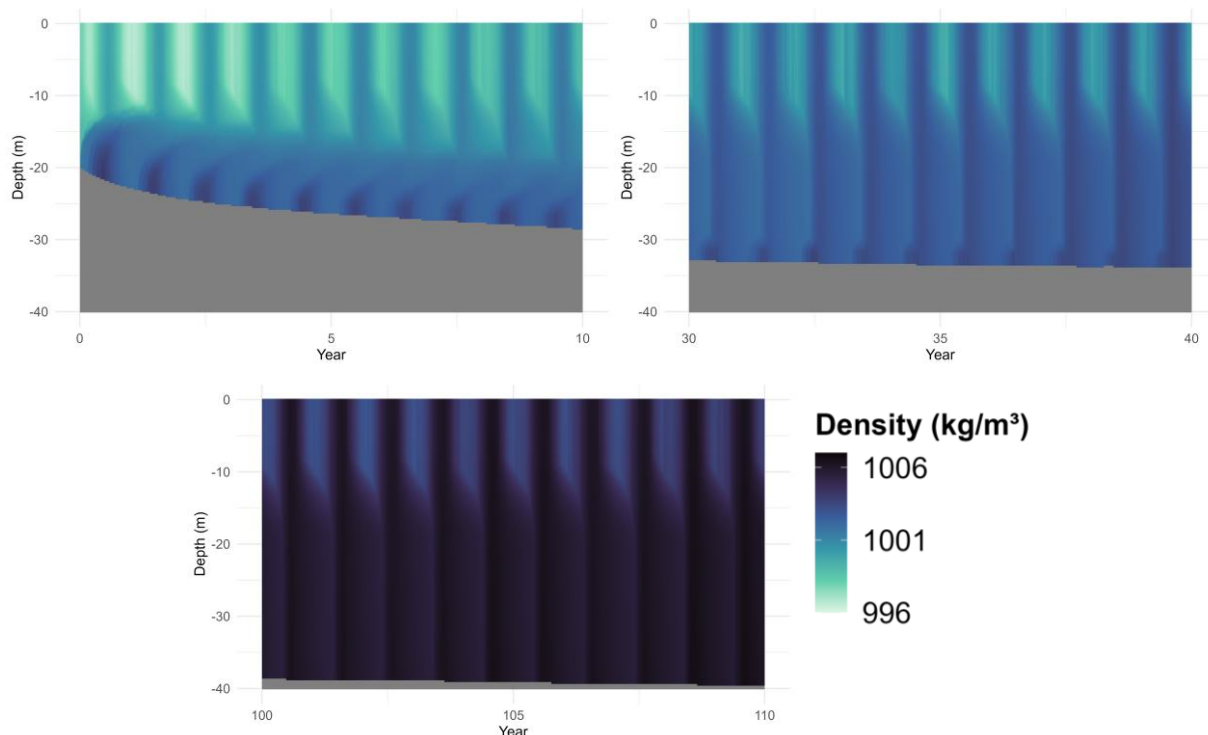


Figure 3-56 Pandora density stratification over significant decades – mid rainfall (ERM, 2026)

3.6.3.5.3 Summary of geochemical stability

The combined PHREEQC and GLM modelling results indicate that the Pandora residual void will evolve toward a hypersaline, geochemically stable system expected to remain internally balanced and chemically self-regulating.

Strongly acidic conditions are not expected to develop in the pit lake over the next 500 years, as there are no significant sources of sulfide oxidation or other acid-generating materials within the closure landform. The predicted pH decline results from Fe(II) oxidation and ferrihydrite formation rather than AMD. The process is self-limiting and buffered by secondary minerals, resulting in a chemically stable, non-acid-forming environment.

The voids are predicted to stabilise as groundwater sinks with no potential for overflow, and solute transport will remain confined to the spoil and coal-measure domains within the mine footprint. Therefore, residual-void water quality is expected to be chemically stable and spatially contained, consistent with the closure objective of maintaining a non-polluting and hydraulically isolated final landform.

In summary modelling showed that:

- Evaporative concentration will dominate water quality evolution relative to groundwater and seepage inflows.
- Strongly acidic conditions are not expected to develop in the pit lake over the next 500 years, as there are no significant exposed acid-generating materials within the closure landform.
- TDS will increase progressively, resulting in hypersaline conditions over time.
- Limnology modelling predicts that thermal and density stratification will occur seasonally throughout the 110-year simulation period, while salinity stratification will dissipate after approximately 30 years.

The water quality within the residual void NUMAs is not expected to be suitable for any identified use at this stage. However, as the final landform is predicted to stabilise as a groundwater sink, void lake water quality is not expected to present an unacceptable risk of environmental harm beyond the tenure boundary.

3.6.3.6 Options for minimising residual void extent and environmental impact

The extent of residual voids at DNM has been progressively reduced through refinement of mine planning and in-pit backfilling strategies. The total proposed NUMA footprint has decreased from 503 ha to approximately 431 ha as a result of the complete backfilling of Atlas West, Atlas East, Calypso Central, Skoll and Titan West pits. Only Titan North, Titan Central, Titan East and Pandora will remain as residual voids in the final landform. Titan Central and Titan East occur within a single NUMA, resulting in three NUMA areas across the site.

Opportunities for further minimisation have been examined through:

- optimised in-pit dumping and spoil re-handling to maximise backfill capacity;
- refinement of batter and bench geometry to improve stability;
- minor catchment realignments to limit inflows to smaller residual voids; and
- adaptive scheduling of final strip mining to enable progressive backfilling.

The EA (EPML00561913) is the primary LOD for DNM and identifies residual voids as an approved post-mining outcome without prescribing their size or location. Accordingly, this PRC Plan demonstrates that the residual voids have been reduced to the minimum practicable extent consistent with operational safety, material availability and environmental performance.

Residual void dimensions and backfilling strategies will continue to be reviewed as mining advances to ensure the design remains consistent with the expectation for progressive refinement and with section 754(4) of the *EP Act 1994* requiring residual risks to be minimised.

In accordance with the PRCP guideline, the placement and configuration of each residual void have been designed to minimise long-term environmental risk. The final void locations were determined through an integrated assessment of hydrology, hydrogeology, geotechnical stability, land-use compatibility and environmental values, as summarised below:

- Surface water values – residual voids are located outside the modelled 0.1% AEP and PMF extents. Residual void crests are well above predicted pit lake water levels, precluding overtopping and uncontrolled discharge.
- GDEs – hydrogeological modelling confirms that the residual void locations do not intersect known GDEs, thereby avoiding potential impacts to connected ecological receptors.
- Soil and landform stability – slope reshaping and transitional benches have been applied where appropriate to achieve long-term geotechnical and erosional stability.
- PMLU compatibility – void placement supports stable drainage, landform integrity and visual integration with the surrounding rehabilitated landscape.
- Water-quality risk management – geochemical modelling of the Pandora void confirms that the residual void pit lake will evolve toward a hypersaline, geochemically stable system expected to remain internally balanced and chemically self-regulating. However, groundwater levels stabilise below pre-mining elevations and maintain sustained inward hydraulic gradients toward the residual void resulting in the formation of a terminal sink.

Alternative PMLUs were also considered during closure planning, including partial or complete backfilling and conversion to land-based rehabilitation. These options were assessed in the context of spoil availability, geotechnical feasibility and environmental performance. Complete backfilling was found to be impractical due to insufficient spoil volumes, significant additional disturbance to adjoining landforms and disproportionate economic implications. Retention of the remaining voids as water bodies is therefore considered the most practicable, safe and environmentally acceptable closure outcome.

3.6.3.7 Final void dimensions and wall angles

The final residual void configurations at Daunia Mine have been defined through integration of the current geotechnical, geochemical and hydrological assessments. The resulting designs optimise void geometry to minimise the overall NUMA footprint while maintaining stable slopes suitable for long-term containment.

Residual void extents are defined by the high wall, end wall and low wall crests at natural ground level. Dimensions and slope angles for each residual void are summarised in Table 3-57.

Table 3-57 Residual void dimensions

Attribute	Unit	Titan East	Titan North	Pandora	Titan Central
Indicative max. length	m	1,085	1,048	1,680	395
Indicative max. width		330	1,276	1,550	165
Max. depth		104	76	134	18
Void catchment Area	ha	185.1	513.6	827.4	38.3
Indicative surface area		54.8	192.4	448.5	6.22
Residual void spill level	mAHD	220	210	190	210
Source: WRM 2026b.					

3.6.3.8 Improvement and management strategies

The residual voids become available for improvement once mining of each pit is complete and reshaping of the spoil dump low wall outside of the NUMA area is complete (RA1). This is for safety reasons to eliminate the risk of any injury or damage within the NUMA area from the reshaping and rehabilitation activities above.

To support attainment of residual voids that are safe and do not present an unacceptable risk of off-tenure environmental harm, the improvement and/or management strategies provided in Table 3-58 will be undertaken.

Table 3-58 Improvement and management strategies for the DNM residual voids

Residual void closure aspect	Closure objective			Improvement and/or management strategy
	Safe	Stable	Non-polluting	
Geotechnical stability	✓	✓	-	- As mining approaches the final limits, re-assess the wall designs and any required geotechnical setbacks based on the latest available data. - Review and adjust the mine plan and closure landform, if needed, to account for any revised set-back requirements. - Use appropriate minimum FOS as a guidance for ongoing void closure planning. This may be refined over the mine life should industry research provide optimised guidance on observational methods and consequence assessment.
Void hydrology	-	-	✓	- Residual void catchments are minimised as far as practicable and predominantly include only the low-wall areas. - At cessation of mining activities, review and update the void water balance modelling, incorporating identified changes to the voids' closure landform and spill point elevations, rainfall and evaporation, surface water runoff and groundwater inflows, and climate projections. - Although not identified in current modelling, if future modelling identifies an unacceptable risk of environmental harm outside the tenure boundary, then management strategies will be implemented. - If necessary, identify and implement mitigation measures for appropriate protection works of landforms where floodwaters from watercourses interact with the closure landform.
Void hydrogeology	-	-	✓	- At cessation of mining activities, review and update the groundwater modelling, incorporating updated void Water Balance Model outputs and in-field groundwater sampling data, as required. - Although not identified in current modelling, if future modelling identifies an unacceptable risk of environmental harm outside the tenure boundary, then management strategies will be implemented. - Obtain certification from an AQP that, upon completion of mining, residual voids do not present an unacceptable risk of environmental harm beyond that of the void itself. - Undertake groundwater and residual void lake level monitoring to confirm the voids are progressing towards acting as sinks.

Residual void closure aspect	Closure objective			Improvement and/or management strategy
	Safe	Stable	Non-polluting	
Void water quality	-	-	✓	- At cessation of mining activities, review and update the void geochemical assessment, including additional or refined data from in-pit surface water samples, surface- and groundwater samples, and biochemical modelling. - Although not identified in current modelling, if future modelling identifies an unacceptable risk of environmental harm outside the tenure boundary, then management strategies will be identified and implemented.
Void access control	✓	-	-	- On cessation of mining activities: - Construct a safety bund at the geotechnical set- back distance. - Erect fencing and signage (where required) around the perimeter of the safety bund.
Vegetation cover	-	✓	✓	When the residual void becomes available for improvement activities, revegetate the low- walls within the PMLU areas.

Relationship with PRCP Schedule

The four DNM residual voids will achieve long-term geotechnical stability of low walls, end walls and high within the NUMA extents.

The residual voids will develop pit lakes that will not overtop. The overall final landform will behave as a groundwater sinks post-mining and will not present an unacceptable risk of environmental harm outside of the tenure boundary.

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.

Not applicable, as there is no underground mining at DNM.

3.6.5 Built infrastructure

PRCP Guideline (Section 3.6.5)

The administering authority's expectation of rehabilitation relating to build 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 E19: "All infrastructure, constructed by or for the environmental authority 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 3.1.2.12).

DNM 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 3-59 details the infrastructure associated with the mining activities at DNM.

Infrastructure not constructed for the purpose of mining, such as dams used 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).

Table 3-59 Infrastructure associated with the approved DNM mining activities

Category		Infrastructure
Built infrastructure	Steel, concrete and brick infrastructure	— CHPP — 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
	Supporting services	— Pipes and pumps — Power lines — Switchyard and substations — Communication and lighting towers — Concrete pads and bitumen — Culverts
Water infrastructure		— Mine 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 3-60, Figure 3-25 and Figure 3-57 outline the third-party owned land and assets (infrastructure) which is located within the DNM mining leases which will not be rehabilitated under this PRC Plan.

The timing of the decommissioning and removal of the infrastructure is based on the proposed timing of the DNM operation, processing of the final coal and rehabilitation activities.

Table 3-60 Third-party owned land and assets within DNM Mining Leases

Infrastructure Item	Owner/Operator	Relevant Land Tenure/Rights	Within Surface Area Rights?	Authorised under DNM EA (as ERA)?
Norwich Park Branch Railway	Queensland Rail	Lot 2 GV83, Lot 26 SP130069 and Lot 40 SP130132 are Lands Leases held by Queensland Rail	No	No – this is third party infrastructure on land over which WHC holds no property or tenement surface rights.
Norwich Park Branch Railway	Queensland Rail	Part of Lot 26 SP130069 that encroaches into Lot 6 GV318	Yes – ML 1781	No – this land is not owned by WHC and is not subject to any agreements relating to ownership post mining. Rights in relation to this land and obligations in relation to the subject infrastructure are held by Queensland Rail.
Easement No 602809939 for railway purposes.	Queensland Rail	AGV99 – Easement 602809939	Yes – ML 1781	No – this is third party infrastructure not owned by WHC. Given WHC is the registered holder of the underlying lands lease, there is no compensation agreement in place in relation to the easement. Rights under the easement and obligations in relation to the subject infrastructure are held by Queensland Rail.
Easement No 708836645 for railway purposes.	Queensland Rail	BSP162522 – Easement 708836645	Yes – ML 1781, ML 70116	No – this is third party infrastructure not owned by WHC. Given WHC is the registered holder of the underlying lands lease, there is no compensation agreement in place in relation to the easement. Rights under the easement and obligations in relation to the subject infrastructure are held by Queensland Rail.
Easement No 601118992 for railway purposes.	Queensland Rail	AGV100 – Easement 601118992	Yes – ML 70116	No – this is third party infrastructure not owned by WHC. Given WHC is the registered holder of the underlying lands lease, there is no compensation agreement in place in relation to the easement. Rights under the easement and obligations in relation to the subject infrastructure are held by Queensland Rail.
Millenium Mine Loop within Lot 4 SP190266	Land owned by Stanmore Coal Pty Ltd	Lot 4 SP190266 – freehold land owned by Stanmore Coal Pty Ltd	No	No – this is third party infrastructure on land over which WHC holds no property or tenement surface rights.

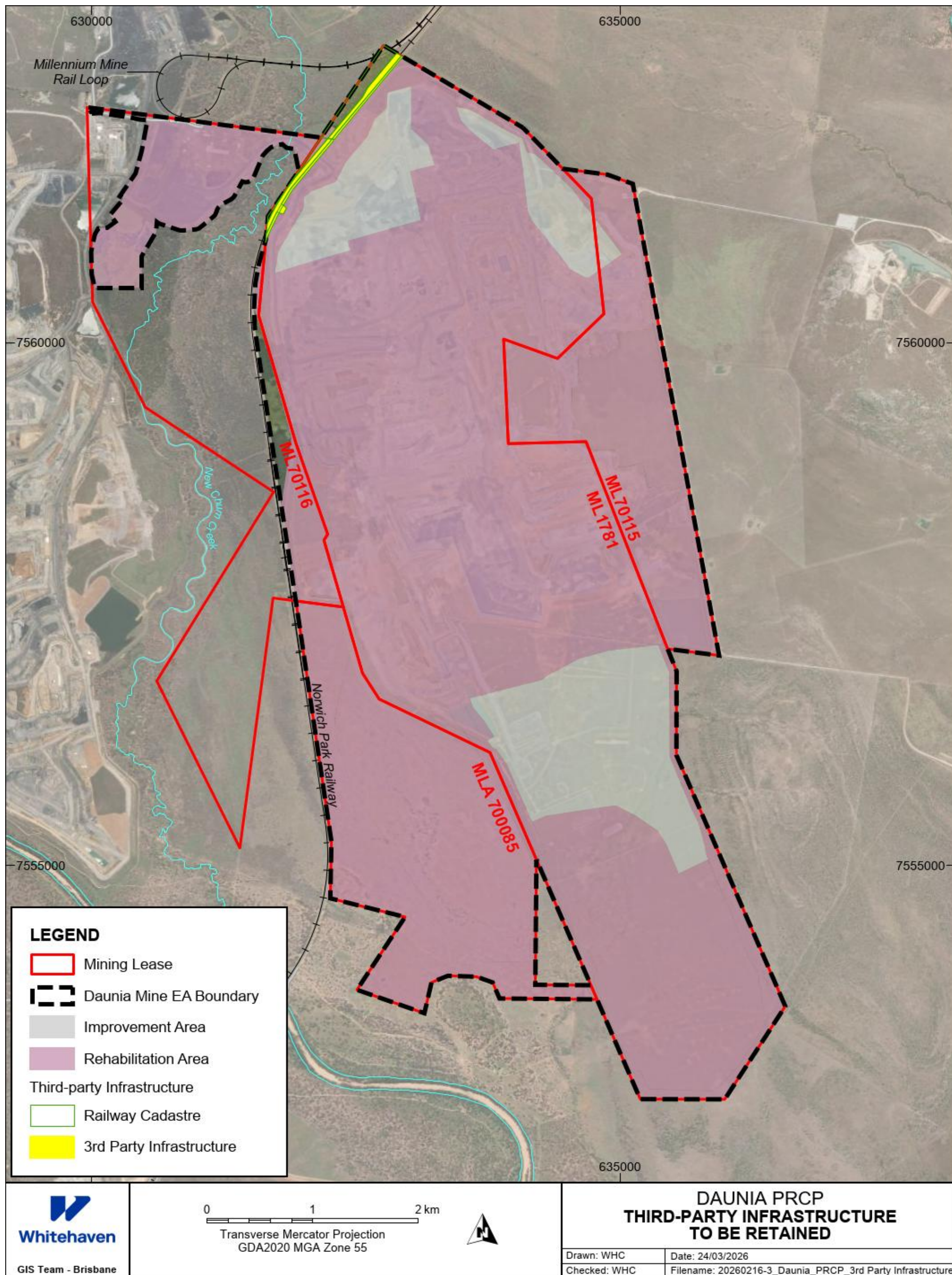


Figure 3-57 Third-party infrastructure to be retained

3.6.5.2 Built infrastructure

With the exception of built infrastructure to remain as part of the PMLU, or where infrastructure is agreed to be retained by the landholder, 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;
- drillholes, bores (not used for the purposes of monitoring per the PRCP Schedule), sediment ponds and sumps are to be removed; and
- areas are to be reshaped and be free-draining with all slopes $\leq 12\%$

3.6.5.3 Water infrastructure

Decommissioning of the water infrastructure constructed for the mining activities with no beneficial use to the PMLU will involve:

- Removing any remaining water from the water infrastructure to the residual voids, or in accordance with:
 - EA condition F23: *“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 for the purpose of: a) supplying stock water subject to compliance with the quality release limits specified in Table F7 (Stock Water Release Limits); or b) supplying irrigation water subject to compliance with quality release limits in Table F8 (Irrigation Water Release Limits); or c) supplying water for construction and/or road maintenance in accordance with the conditions of this environmental authority”.*
 - EA condition F24: *“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 dams or tanks, for the purpose of supplying water to any operation licensed for either ERA13 (mining black coal) or ERA31 (mineral processing). The volume, pH and electrical conductivity of water transferred must be monitored and recorded”.*
 - EA condition F25: *“If the responsibility for mine affected water is given or transferred to another person in accordance with conditions F23 or F24: a) the responsibility for the mine affected water must only be given or transferred in accordance with a written agreement (the third party agreement); and b) the third party agreement must include a commitment from the person utilising the mine affected water to use it in such a way as to prevent environmental harm or public health incidents and specifically make the persons aware of the General Environmental Duty (GED) under section 319 of the Environmental Protection Act 1994, environmental sustainability of the water disposal and protection of environmental values of waters; and c) the third party agreement must be signed by both parties to the agreement”.*
- 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

Assessment of contaminated land risks, completed as part of the project's baseline studies, identified the project site prior to mining was largely cleared and utilised for cattle grazing. There were no homestead sites, cattle dips, chemical storage, fuel storage or waste disposal areas identified within DNM. Built infrastructure identified was limited to fences, access tracks and small stock watering dams. The underlying properties were also not listed on the Queensland Environmental Management Register or Contaminated Land Register.

Since the commencement of mining at DNM, operations have included heavy industrial type activities and supporting infrastructure including:

- Drilling/exploration;
- Extraction and processing of coal;
- Chemical storage and formulation;
- Waste storage and disposal;
- Sewage treatment;
- Operation of a variety of plant/equipment workshops and scrap yards;
- Petroleum product storage and dispensing;
- Explosive production, storage and use; and
- Operation of regulated structures such as mine affected water dams.

The nature of these types of operations, which include the storage, handling, use and disposal of hazardous materials has the potential to result in the contamination of land.

The current DNM EA provides for the conditional on-site disposal of various wastes including:

- Rejects;
- Bulk rubber;
- Inert waste;
- Poly-pipe and other plastic;
- Fibreglass;
- Treated and untreated timber;
- Asphalt;
- Asbestos;
- Treated sewage effluent; and
- Co-disposed hydrocarbons.

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 PRCP Schedule RM2.1-RM2.3.

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 PRCP Schedule requirements (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 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 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 RM2 investigation obligations.

In accordance with 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 to a depth of 0.5 m to enable the establishment of the PMLU. A contaminated land assessment will be undertaken prior to final landform development and shaping. Remediation and/or management of any identified contamination that has the potential to present unacceptable risks to the nominated PMLU or environmental values, will be undertaken.

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 the DNM PRC planning has been undertaken in terms of the methods described in Figure 3-58.

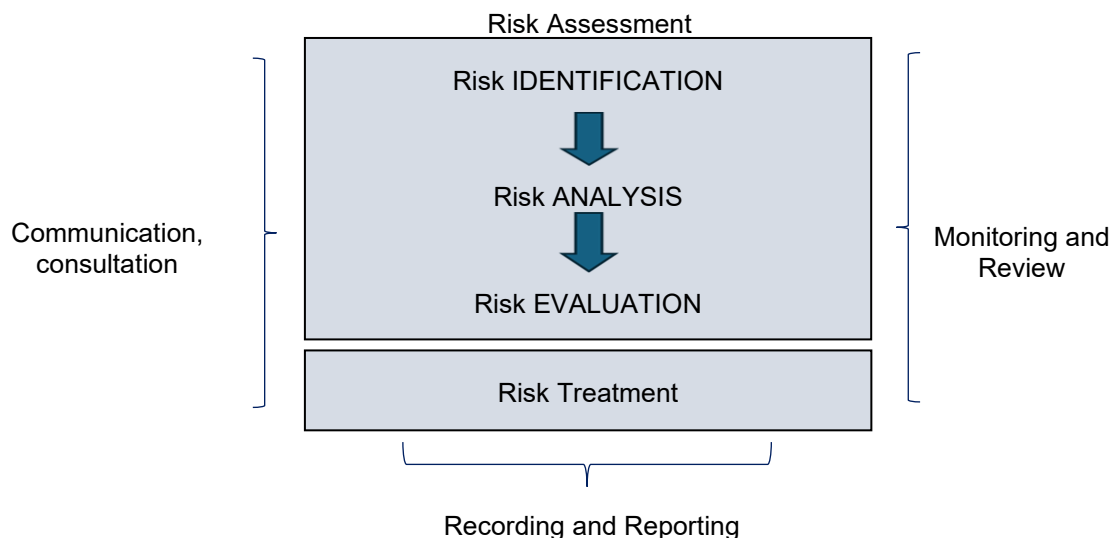


Figure 3-58 ISO 31000-compliant risk based approach followed for the DNM PRC Plan

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 outlined in Whitehaven risk matrix, control effectiveness and risk management action tables below (Figure 3-59). 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 DNM, the assessed PMLUs include cattle grazing, woodland habitat and watercourse (Section 3.2). In addition, the risk event - *NUMA does not achieve safe, structurally stable condition or causes environmental harm* - was assessed in accordance with the ISO 31000 methodology outlined in Figure 3-58 above.

The full risk assessment is provided in Appendix 4.10 – Risk Assessment.

3.7.1.3 Risk analysis, evaluation and relevant treatments

The Whitehaven risk matrix, control effectiveness and risk management action tables are provided in Figure 3-59.

Figure 3-59 Whitehaven risk matrix, control effectiveness and risk management action tables

Table 3-61 and Table 3-62 below provides detailed information on the risk analysis, evaluation and risk treatments identified for the DNM 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 3-61 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	iAchieve 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 — Survey — Rehabilitation monitoring data — AQP to undertake growth media assessment
Performance measures and constraints	— Comparison against design — Tracking against milestone criteria

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
Reporting and monitoring	Rehabilitation monitoring
Risk timing and scheduling	From commencement of rehabilitation activities to final achievement of PMLU
PMLU Scenario 2: Alteration of hydrogeological conditions	
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 — 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

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
	— 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 the disturbed reach of New Chum Creek undertaken — 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 — 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 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 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: 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

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
	— 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 <i>Environmental Protection Act 1994</i>, 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
Risk timing and scheduling	Contaminated land Investigation at closure and water sampling as per PRCP monitoring program
PMLU Scenario 5: 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

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
	— 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 6: 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 — 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)) — Undertake monitoring and maintenance works where required — Landform design to AQP design specifications with consideration of water balance and catchment size — Reduction of catchment with landform and rehabilitation — Flood modelling for 0.1% AEP by AQP to inform landform design — 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

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
Reporting and monitoring	Not required
Risk timing and scheduling	Not required
PMLU Scenario 7: 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
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 8: Insufficient management of mineral waste	
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	— 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

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
	- 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 DNM, 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 DNM, 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 coarse 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 DNM, 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 - If further testing is required in addition to what has already been completed for DNM, 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 9: 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

Aspect	Risk treatment
Risk event: Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU is not achieved	
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

The risk treatments for each scenario that are necessary for achieving a safe and structurally stable NUMA are provided in Table 3-62.

Table 3-62 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
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

Aspect	Risk treatment
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	
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 — 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	
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

Aspect	Risk treatment
	— 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 — 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 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.

Although no rehabilitation trials are currently planned at DNM, rehabilitation trials may be conducted at DNM as part of continuous improvement. Current rehabilitation practices will be executed in line with the PRC Plan rehabilitation and management methodologies outlined 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 DNM. 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 DNM rehabilitation and improvement milestones is provided in Table 3-78 at the end of this section.

3.8.1.1 Purpose

The purpose of rehabilitation monitoring at DNM 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.

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 milestone 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 DNM, 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) to provide a detailed assessment of the current state of rehabilitation, and then conducted every four years.

Monitoring is undertaken on an annual basis for the first three-years to assess the trajectory of rehabilitation as it relates to stability, vegetation establishment and achieving initial surface requirements (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 (RM6) and achievement of the PMLU to a stable condition (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 PMLU reference sites is also undertaken for the parameters listed in

Table 3-63 and is implemented as per the monitoring schedule from Year 3.

Table 3-63 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	-	-	✓	✓	✓

3.8.1.2.2 Surface water monitoring

During operations, surface water monitoring will continue as per the applicable EA conditions.

Surface water monitoring of the DNM rehabilitated areas will be established under RM6 (achievement of surface requirements) when surface flows occur and it is safe to do so. Monitoring will be in accordance with Section 3.8.2 below.

3.8.1.2.3 Groundwater monitoring

During operations, groundwater monitoring will continue as per the applicable EA conditions.

Groundwater monitoring of the DNM rehabilitated areas will be established under RM7 (achievement of PMLU to a safe, stable, non-polluting and self-sustaining condition). Monitoring will be in accordance with Section 3.8.3 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 should 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 3-57) (Table 3-63). 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.

In terms of erosion, whilst LiDAR cannot reliably detect every individual rill due to vegetation cover, slope and data resolution, it is highly effective at identifying erosive areas that warrant closer inspection. Field assessments will also be undertaken to assist with identifying erosion features not adequately captured by LiDAR.

Field-based erosion monitoring will be undertaken at permanent monitoring sites, as well as any new areas identified by LiDAR or field assessments. Field transects are established in accordance with the WHC Rehabilitation Monitoring Methodology (RMM), which requires transects to be randomly located and placed along the contour. The methodology also allows for additional transects to be installed where LiDAR or field observations suggest erosion risk is unacceptably high. This approach prevents selective placement and ensures that transects are located in representative and erosion affected areas, consistent

with accepted state monitoring methods and sampling densities e.g. BioCondition Assessment and the Australian Soil and Land Survey Field Handbook (Yellow Book).

For each erosion transect, the following parameters will be recorded:

- Erosion severity
- Erosion type
- State of erosion

The results of transect monitoring are extrapolated or averaged across the Work Plan area/s to assess erosion performance in accordance with

Table 3-64, which is also included in Attachment 3 of the PRCP Schedule (Appendix 4.1). Erosion is classified per the revised Australian Soil and Land Survey Handbook (CSIRO, 2024). Rehabilitation area, in terms of erosion performance, is defined by the battery limits of Work Plan area- specific detailed designs for that location.

Table 3-64 Erosion classification framework

Erosion classification	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.
Rill⁶	<7 active ³ rills / 50 m transect ⁵	7-15 active ³ rills / 50 m transect ⁵	>15 active ³ rills / 50 m transect ⁵
Gully erosion	Stabilised ⁴ gullies 30 cm–100 cm depth; isolated, linear, discontinuous and restricted to primary or minor drainage lines.	Active ³ gullies 30 cm–100 cm depth; isolated, linear, discontinuous and restricted to primary or 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 form 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: One 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 50m 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 an existing monitoring transect).

3.8.1.3.3 Soil and spoil

Should additional soil and spoil monitoring be required the parameters listed in Table 3-65 will be analysed during all soil and spoil monitoring events. Sampling locations will be established in close proximity to the permanent rehabilitation monitoring sites to ensure representative assessment of soil conditions.

Soil profile pits or cores will be collected to characterise both surface and sub-surface conditions. The surface sampling depth refers to the 0–10 cm layer, while sub-surface samples will be collected from depths of 10–30 cm, 30–60 cm, and 90–100 cm (or to refusal where applicable).

Table 3-65 Soil and spoil analysis parameters for rehabilitation monitoring

Category	Parameter	Purpose	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.	✓	✓
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 dominance of Na ions on the soil's cation exchange complex. Sodidity 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 and Nitrate Nitrogen	Indicator of soil nutrient store and is also a major plant nutrient.	✓	-
	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

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 provided 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 DNM will be the following:

- *Leucaena* (*Leucaena leucocephala*) stem density, 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 previously 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. Targeting anything less than a 10% cover threshold would require disproportionately intensive weed control efforts considered well in excess of normal management practices on surrounding lands, without providing meaningful additional environmental benefit.

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 perennial, productive and palatable (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 3-66. 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 3-66 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 (perennial, productive, palatable) 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 3-67.

Table 3-67 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 3-68). 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 3-68, 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 3-68.

Table 3-68 Grazing rule-set: land suitability class for cattle grazing on rehabilitation (Short, 2025)

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

Limitation	Indicator	Unit	Land Suitability Class				
			1	2	3	4	5
			Suitable			Unsuitable	
Salinity	ECe at ERD (0-0.6 m)	dS/m	<2	2-4	>4-10	>10-16	≥16
Rockiness	Gravel, 20 – 60 mm	%	<20	20-50	>50-70	>70-85	>85
	Cobble, 60 – 200 mm		<10	10-20	>20-50	>50-75	>75
	Stone, 200 – 600 mm		<2	2-10	>10-20	>20-50	>50
	Boulders, >600 mm		0	<2	2-10	>10-20	>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

The following woodland habitat rehabilitation monitoring parameters are consistent with the QBEIS Tertiary level assessment as recommended for monitoring hybrid native ecosystems in the 'Evaluating methods for assessing native ecosystem mine rehabilitation success – Technical Paper (Spain, Nuske, & Gagen, 2023)'. Areas of woodland habitat associated with a hybrid ecosystem are monitored against existing woodland habitat completion criteria under the DNM EA.

Areas of woodland habitat rehabilitation with characteristics of a natural historic regional ecosystem (i.e. RE11.5.3 and 11.9.2) are assessed using Tertiary level vegetation assessments as per the 'Methodology for Surveying and Mapping Vegetation Communities and Regional ecosystem in Queensland. Version 7 (Neldner, et al., 2023) and modified BioCondition method, excluding parameters unlikely to be achieved in mine site rehabilitation in the short term including large trees and coarse woody debris (Eyre, 2015).

3.8.1.5.1 Groundcover

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.

3.8.1.5.2 Species richness

Species richness will be assessed at the permanent rehabilitation monitoring sites as part of all monitoring phases. Species richness is assessed for tree, shrub, grasses and other ground species by recording the number of flora species at each site. Exotic species are also recorded separately whilst assessing species richness.

3.8.1.5.3 Tree canopy height

Tree height and height range will be assessed at the permanent rehabilitation monitoring sites from Year 3. Tree 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)

3.8.1.5.4 Tree canopy and shrub covers

Tree canopy cover and shrub cover will be assessed at the permanent rehabilitation monitoring sites from Year 3. Canopy and shrub 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 the crown of all shrubs (i.e. single stemmed plant <2 m or multi-stemmed at base) are summed as a total canopy distance and converted to a percent cover.

3.8.1.5.5 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.

3.8.1.5.6 Invasive plants

'Restricted' invasive plants as described in Section 3.8.1.3.6 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.

3.8.1.5.7 BioCondition assessment

A modified BioCondition assessment will also be undertaken for planned 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 3-69 (noting the representative REs are as per Section 3.1.2.9.1 and the revegetation objectives in Section 3.6.1.8.7).

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 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 criteria 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 Attachment 5; and
- ≥ 30 out of 60 for the Watercourse PMLUs, assessed against the relevant representative RE benchmark in Attachment 5.

Table 3-69 Modified BioCondition benchmarks for Woodland and Watercourse Regional Ecosystems

BioCondition Accessible Attribute	Maximum score for attributes	Hybrid RE11.53 / RE11.92	RE11.3.25
Recruitment of woody perennial species in ecologically dominant layer (%)	5	100	100
Native plant species richness - trees	5	4	4
Native plant species richness - shrubs	5	8	4
Native plant species richness - grasses	5	7	8
Native plant species richness - forbs	5	11	13
Tree canopy height (m)	5	16	23

BioCondition Accessible Attribute	Maximum score for attributes	Hybrid RE11.53 / RE11.92		RE11.3.25
Tree canopy cover (average of emergent, canopy and sub-canopy layers) (%)	5	23		34
Shrub canopy cover (%)	5	14		7
Native grass cover (%)	5	19		35
Organic litter (%)	5	25		21
Non-native plant cover (%)	10	0		0
Maximum score	60	RM6: ≥15 RM7: ≥33	RM6: ≥15 RM7: ≥33	RM6: ≥15 RM7: ≥30

3.8.1.6 Watercourse monitoring

As described in Section 3.3.3.3, rehabilitation of the 0.3 ha area of haul road and culvert crossing over New Chum Creek will be undertaken during the watercourse PMLU (RA3). The removal of the crossing and associated culverts will follow the completion of mining, once the haul road is no longer required.

Following rehabilitation, the area will be monitored to evaluate the performance of the restored watercourse in meeting the RM7 PMLU milestone criteria per the PRCP Schedule. Monitoring will be undertaken in accordance with the schedule identified in Table 3-63 and the BioCondition assessment methodology outlined in Section 3.8.1.5.6, with specific reference to RE 11.3.25.

3.8.2 Surface water monitoring

Surface water monitoring will be undertaken and assessed against the rehabilitation milestone criteria listed in PRCP Schedule (Table 3-70).

Table 3-70 Surface water monitoring milestone criteria

Rehabilitation Milestone	Description of PRCP Schedule criteria
RM6 (achievement of surface requirements)	During the RM6 milestone, surface water monitoring network features within rehabilitated areas will be installed and monitoring will commence. The locations to be monitored are identified in <i>PRCP Schedule Attachment 6 – Surface water monitoring locations</i> . Attachment 6 notes that Monitoring Points 01, 02 and 03 require confirmation / amendment of new location names and coordinates following completion of the ‘as constructed’ rehabilitated landform. Water quality sampling will be undertaken in accordance with <i>PRCP Schedule Attachment 7 – Surface water quality limits</i> . At least one year of sampling is required to be undertaken to validate achievement of surface requirements.
RM7 (achievement of PMLU to a safe, stable, non-polluting and self-sustaining condition)	During the RM7 milestone surface water runoff will be collected from representative areas of rehabilitation when surface flow occurs and when it is safe to do so. Surface water runoff will be monitored in accordance with <i>Attachment 6 – Surface water monitoring locations</i> . The results are to comply with <i>PRCP Schedule Attachment 7 – Surface water quality limits</i> .

Rehabilitation Milestone	Description of PRCP Schedule criteria
RM8 (achievement of PMLU to a safe, stable, non-polluting and self-sustaining condition)	During the RM8 milestone, surface water quality will be monitored monthly during flow for at least five (5) consecutive years at, but not limited to, the downstream monitoring locations specified in <i>PRCP Schedule Attachment 6 – Surface water monitoring locations</i>, and for the quality characteristics listed in <i>PRCP Schedule Attachment 7 – Surface water quality limits</i>. The following must be demonstrated prior to surrender: - Surface water quality must not exceed PRCP Schedule Attachment 7 limits within the five (5) year period immediately prior to surrender; - If the surface water quality exceeds the criteria in a), the applicable upstream site must be compared to the downstream site result; and quality result measured at the downstream site must be equal to or less than the quality result measured at the applicable upstream site¹. Where surface water quality exceedances of PRCP Schedule Attachment 7 are identified, an AQP must within three (3) months of receiving relevant sampling results, complete and provide to the administering authority an assessment of the cause of the exceedance and risk of rehabilitation not achieving a stable condition within the schedule timeframe. Where the assessment concludes: - there is a low risk to achieving a stable condition, no further action is required. - there is a risk greater than low to achieving a stable condition, then an assessment of potential environmental harm and any changes or rectification actions to rehabilitation activities must be determined and implemented. Surface water quality exceedances may only occur up to three (3) times within the five (5) year period prior to surrender.

¹ For pH, the quality result measured at the downstream location must be within the prescribed range. However, where pH at the downstream location is greater-than (>) the highest limit in the range, the pH at the applicable upstream location must be greater-than or equal-to (≥) the downstream location. Conversely, where pH at the downstream location is less than (<) the lowest limit in the range, the upstream pH at the applicable upstream location must be less-than or equal-to (≤) the downstream location

Water quality monitoring will be undertaken in accordance with the DES *Monitoring and Sampling Manual: Environmental Protection (Water) Policy* (DES, 2018).

3.8.2.1 Surface water quality

To demonstrate that a stable and non-polluting land condition has been achieved, a suite of surface water quality characteristics and limits has been established for DNM. These limits were derived by the administering authority using a combination of local upstream water quality objectives (WQOs), ANZG (2018) default guideline values, and site-specific upstream site monitoring data where sufficient datasets were available to support percentile-based derivations. The final adopted surface water quality limits for DNM are provided in Table 3-71 and PRCP Schedule Attachment 7.

Table 3-71 Surface water quality limits

Quality characteristics (units) ¹	Unit	Limit	Source
pH	pH Units	6.5-9.0	WQO
Electrical Conductivity	µS/cm	720	WQO
Turbidity	NTU	50	WQO

Quality characteristics (units) ¹	Unit	Limit	Source
Sulphate (Isaac River)	mg/L	9	Site-specific 80th percentile
Sulphate (New Chum Creek)	mg/L	153	Site-specific 80th percentile
Aluminium	µg/L	480	Site-specific 80th percentile
Antimony	µg/L	9	ANZG 2018
Arsenic	µg/L	13	ANZG 2018
Boron	µg/L	110	Site-specific data at 80th percentile
Cadmium	µg/L	0.2	ANZG 2018
Chromium	µg/L	1	ANZG 2018
Cobalt	µg/L	1.4	ANZG 2018
Copper	µg/L	4	Site-specific 95th percentile
Iron	µg/L	280	ANZG 2018
Lead	µg/L	3.4	ANZG 2018
Manganese	µg/L	300	Site-specific 95th percentile
Mercury	µg/L	0.06	ANZG 2018
Molybdenum	µg/L	8	Site-specific 95th percentile
Nickel	µg/L	11	ANZG 2018
Selenium	µg/L	5	ANZG 2018
Silver	µg/L	0.05	ANZG 2018
Uranium	µg/L	0.5	ANZG 2018
Vanadium	µg/L	6	ANZG 2018
Zinc	µg/L	8	ANZG 2018
Ammonia	mg/L	0.9	ANZG 2018
Nitrate	mg/L	1.1	ANZG 2018
Fluoride	mg/L	0.3	Site-specific 80th percentile
Total recoverable hydrocarbons (C6-C9) (µg/L)	µg/L	20	
Total recoverable hydrocarbons (C10-C36) (µg/L)	µg/L	100	
Major ions (mg/L): Calcium, chloride, potassium, magnesium, sodium, bicarbonate, carbonate			For interpretation purposes
Hardness (mg/L)			For interpretation purposes

Notes:

¹ All metals and metalloids must be measured as 'dissolved' (from analysis of a field filtered sample) and total (unfiltered). Limits for metals and metalloids apply to dissolved results.

² Interim limit due to insufficient data. Limit remains enforceable until amended by application.

ANZG (2018) Aquatic ecosystem protection for moderately disturbed system (95% protection).

WQO – Upper Isaac River catchment waters.

3.8.2.2 Surface water monitoring schedule

As the watercourses at DNM 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. Due to the temporal nature of the surface waters within the ephemeral drainage lines, rehabilitation-related surface water monitoring will be undertaken opportunistically during appropriate surface water runoff events. This approach aligns with the hydrological characteristics of the site and ensures monitoring captures representative flow conditions relevant to assessing stable and non-polluting performance.

Opportunistic surface water monitoring will be undertaken for the analytes listed in Table 3-71 and the PRCP Schedule Attachment 7. These analytes reflect the adopted WQOs, ANZG (2018) guideline values, and site-specific percentile-based trigger values established for DNM. This sampling will supplement the surface water monitoring completed under the EA conditions including the Fitzroy Basin Receiving Environment Monitoring Program (EA Conditions F20 to F22).

3.8.2.3 Surface water sample locations

The preferred approach for surface water monitoring is to collect samples from relevant upstream and downstream monitoring points. The locations to be monitored are identified in Table 3-72 and *PRCP Schedule Attachment 6 – Surface water monitoring locations*, which also notes that Monitoring Points 01, 02 and 03 require confirmation or amendment of with updated location names and coordinates following completion of the ‘as constructed’ rehabilitated landform. Monitoring locations are illustrated in Figure 3-60.

Surface water monitoring locations may be amended in the future as required and agreed with the administering authority, to account for changes in upstream land uses and/or stream dynamics or to improve the effectiveness of the monitoring program for capturing runoff from progressively rehabilitated areas.

Table 3-72 Surface water monitoring locations

Monitoring points	Receiving waters location description	Latitude (decimal degrees, GDA2020)	Longitude (decimal degrees, GDA2020)
Upstream background monitoring points			
MP1	Upstream New Chum Creek, on the lease boundary with Millennium Mine.	-22.04166	148.27809
MP3	Isaac River – upstream of the confluence of New Chum Creek and Isaac River.	-22.09258	148.23915
Downstream monitoring points			
MP4	Isaac River – downstream of the confluence of New Chum Creek and the Isaac River.	-22.11697	148.27792
Future PRCP Monitoring Point 01 ¹	Unnamed watercourse west of lease boundary, downstream of Pandora spoil dumps.	-22.121563	148.30308
Future PRCP Monitoring Point 02 ¹	Unnamed watercourse south of lease boundary, downstream of Pandora spoil dumps.	-22.1421	148.32265
Future PRCP Monitoring Point 03 ¹	Downstream in unnamed drainage line on eastern lease boundary.	-22.08184	148.31179

¹ Monitoring point name and coordinates are to be confirmed or amended (if required) to reflect final positioning relative to the ‘as constructed’ landform

As a consequence of progressively rehabilitating spoil dumps, downstream surface water monitoring locations may not always be representative of surface water runoff from the discrete rehabilitated land subject to the milestone criteria. Therefore, it may be necessary to collect surface water runoff samples directly down gradient of the rehabilitated land (i.e. at the toe of slope or within a drainage feature) utilising a water collection device (such as a bucket or flume). The method of sample collection and/or the water collection device may change as required to incorporate improved technologies or to improve the effectiveness of the monitoring program.

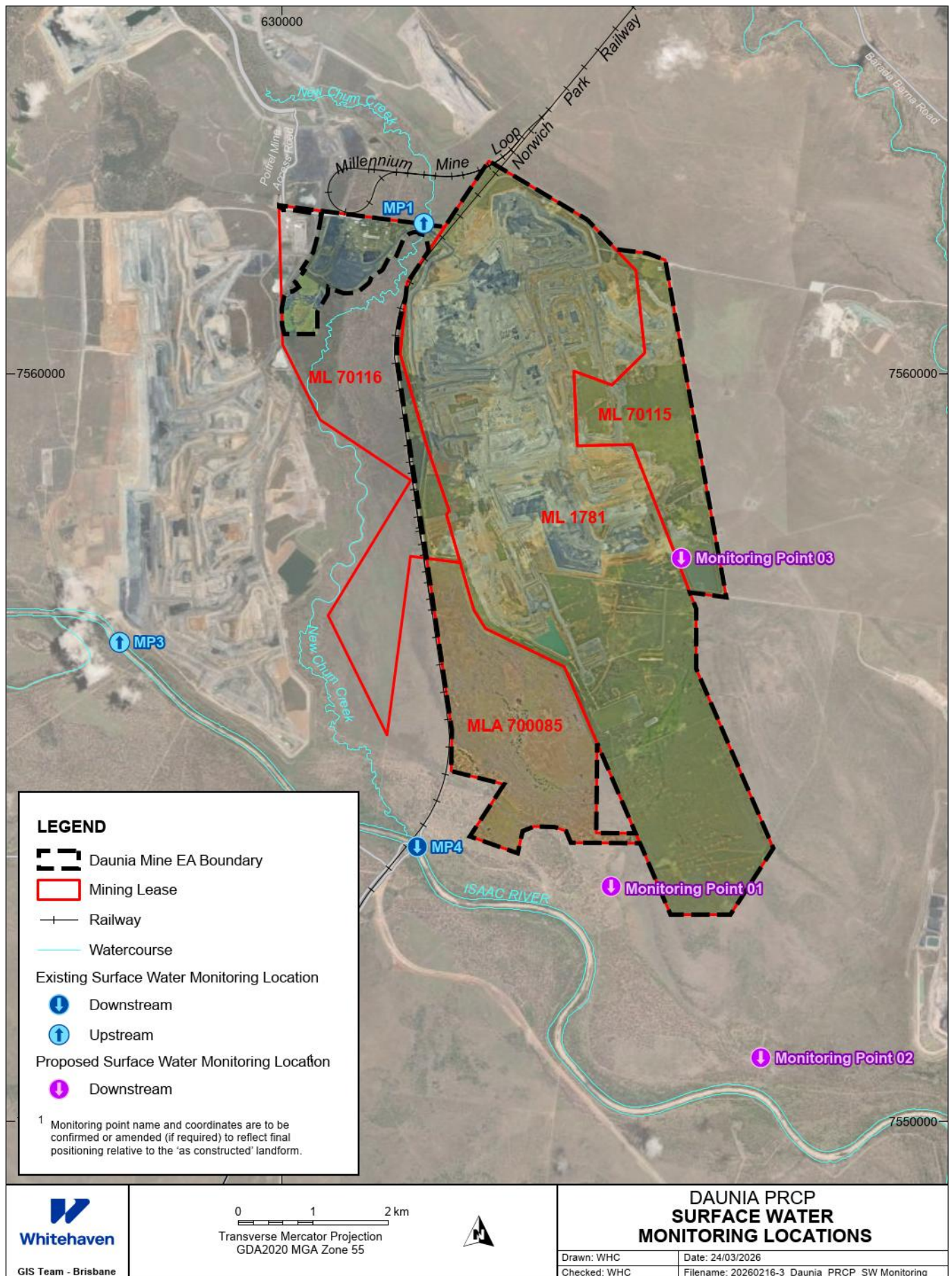


Figure 3-60 Surface water monitoring locations

3.8.3 Groundwater monitoring

In line with the Queensland Government Guideline '*Progressive certification for resource activities*' (ESR/2022/5900 v1.03), EA conditions relating to groundwater will be "addressed holistically for a site at surrender". The objective and acceptance criteria for groundwater are not considered relevant to progressive rehabilitation of discrete packages of rehabilitated land due to the scale and nature of groundwater aquifers. Therefore, deep drainage acceptance criteria for rehabilitation will be applied holistically towards completion of mining operations across the entire DNM area. Groundwater monitoring during operations will continue as per the applicable EA conditions.

Towards the end of mining and in accordance with the PRCP Schedule, groundwater quality monitoring will be undertaken and assessed against the rehabilitation milestone criteria listed in Table 3-73 as follows.

Table 3-73 Groundwater monitoring milestone criteria

Rehabilitation Milestone	Description of PRCP Schedule criteria
RM7 (achievement of PMLU to a safe, stable, non-polluting and self-sustaining condition)	During the RM7 milestone, groundwater monitoring network features will be installed, and monitoring will commence at the locations identified in <i>PRCP Schedule Attachment 8 – Groundwater monitoring locations</i> . Sampling will be undertaken in accordance with <i>PRCP Schedule Attachment 9 – Groundwater quality limits</i> to validate achievement of the PMLU to a safe, non-polluting and self-sustaining condition. At least one year of sampling is required.
RM8 (achievement of PMLU to a safe, stable, non-polluting and self-sustaining condition)	During the RM8 milestone, groundwater quality will be monitored quarterly for at least five (5) consecutive years at, but not limited to, the monitoring locations specified in <i>PRCP Schedule Attachment 8 – Groundwater monitoring locations</i> , and for the quality characteristics listed in <i>PRCP Schedule Attachment 9 – Groundwater quality limits</i> . Groundwater quality limit exceedances per the PRCP Schedule, may only occur up to three (3) times within the five (5) year period prior to surrender.

3.8.3.1 Groundwater quality and levels

The groundwater quality limits applicable to DNM closure have been derived by the administering authority and are set out in Table 3-74 and *PRCP Schedule Attachment 9 – Groundwater quality limits*. DNM will monitor groundwater quality in accordance with PRCP Schedule Attachments 8 and 9 and assess results against the adopted limits.

Results will also be interpreted with reference to the DNM closure groundwater and water balance model maintained under PRCP Schedule PRCP17 and explained in Section 3.6.1.1.6. Post-mining monitoring will focus on groundwater level trends and their relationship to residual void-lake levels to verify progression towards modelled equilibrium and to confirm that residual voids act as long-term sinks. Model updates and recalibration (PRCP17) will be used to contextualise observed trends, refine predictions of groundwater levels, residual void behaviour, seepage/inflows and interactions with surrounding hydrogeological units, and to progressively update drawdown and groundwater-level elevation predictions, including potential impacts on GDEs and third-party bores.

Table 3-74 Groundwater quality limits

Quality Characteristics	Units		Limit
pH	pH units	All Bores	6.5-9.0
Electrical Conductivity	µS/cm	All Bores, except bores in table below	16,000
Sulphate	mg/L	All Bores, except bores in table below	398
Aluminium	µg/L	All Bores	55 ²
Antimony	µg/L	All Bores	9 ²
Arsenic	µg/L	All Bores, except bores in table below	13 ²
Arsenic	µg/L	All bores	77
Iron	µg/L	All Bores, except bores in table below	280 ²
Mercury	µg/L	All Bores	0.06 ²
Molybdenum	µg/L	All Bores	10 ¹
Selenium	µg/L	All Bores	5 ²
Silver	µg/L	All Bores	0.05 ²
Major ions - calcium, chloride, potassium, magnesium, sodium, bicarbonate, carbonate	mg/L	All Bores	Interpretation
Hardness	mg/L	All Bores	Interpretation
Water level	mAHD	All Bores	Interpretation

Quality Characteristic	Unit	PZ02	PZ04	PZ05-R5	PZ06	PZ07	MB20DNM01P	MB02P
Electrical Conductivity	µS/cm	11,300 ¹	20,700	7,055 ¹	19,430 ¹	7,202 ¹	8,143 ³	15,060 ³
Sulphate	mg/L	422 ¹	423	486 ¹	7 ¹	280 ¹	1 ³	422 ³
Iron	µg/L	1,306	3,140	1,315	3,550	440	280	5,960

All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered). Limits for metal/metalloids apply to dissolved results.

¹Site specific 95th percentile based on data ranging from May 2008 - November 2024

²ANZG values for 95% aquatic ecosystem protection

⁵ Data for PZ05-R is from the replaced PZ05 bore which was consumed by the advancing mining operation.

3.8.3.2 Groundwater monitoring schedule

Given the long timeframes for stabilisation of residual void lakes and surrounding groundwater systems, post-mining groundwater monitoring (levels and quality) will demonstrate progress towards modelled equilibrium and compliance with PRCP Schedule limits. Trend evaluation and comparison to the PRCP17 model will be undertaken by an AQP. Where monitoring indicates divergence from modelled behaviour, model recalibration and management responses will be considered in line with PRCP17 and Schedule investigation/notification requirements.

As outlined in Section 3.8.3, during RM7 the groundwater monitoring network will be established and quarterly monitoring will commence for groundwater level and quality, with monitoring events spanning wet and dry season conditions each year.

Quarterly monitoring will continue for at least five (5) consecutive years per RM8. Monitoring outcomes will be used to validate the updated long-term post-mining numerical groundwater predictions prepared under PRCP18, and to determine any further monitoring requirements and frequencies to support EA surrender.

Exceedance management is to be undertaken in accordance with the PRCP Schedule. Groundwater quality limit exceedances per the PRCP Schedule, may only occur up to three (3) times within the five (5) year period prior to surrender .

3.8.3.3 Groundwater monitoring locations

Groundwater monitoring to support the assessment of closure conditions will be undertaken at the locations specified in Table 3-75, Figure 3-61 and *PRCP Schedule Attachment 8 – Groundwater monitoring locations*. The network will include existing bores that remain operational at closure and where required, new bores installed to address data gaps or replace bores affected by mining. Monitoring locations will be updated as necessary in agreement with the administering authority.

Table 3-75 Rehabilitation groundwater monitoring locations

Hydrogeological unit	Monitoring location	Latitude (decimal degrees, GDA2020)	Longitude (decimal degrees, GDA2020)	mAHD
RCM Interburden	PZ02	-22.057411	148.3112275	229.82
RCM Leichhardt Overburden	PZ04 ¹	-22.108722	148.3139405	193.2
RCM Vermont Underburden	PZ05-R	-22.042473	148.2846968	232.15
RCM Vermont Coal Seams	PZ06	-22.048829	148.2770026	220.73
FCCM combined coal seams	PZ07	-22.063996	148.2756949	219.38
Vermont Coal Seams	MB10	-22.0741	148.28291	210.8
Leichhardt and Vermont Coal	MB18 ¹	-22.122526	148.311432	198.4
FCCM	MB20DNM01P ¹	-22.07297	148.313658	208.6
RCM Vermont Underburden	MB02P	-22.125431	148.3118656	195.09
Tertiary Sediments	DNMMB08_01 ¹	-22.07461	148.31274	208.8
Tertiary Sediments	MB02A	-22.12546	148.31181	196.1
Quaternary – tertiary sediments	Bore 01 ¹	-22.04964	148.26476	
FCCM Overburden	MB01P_HY_R01	-22.11536	148.30482	188.9

¹ Monitoring location is planned to be mined out in the future. Following this, monitoring location name and coordinates will be confirmed or amended, as required, to reflect their final replacement positioning relative to the 'as constructed' landform.

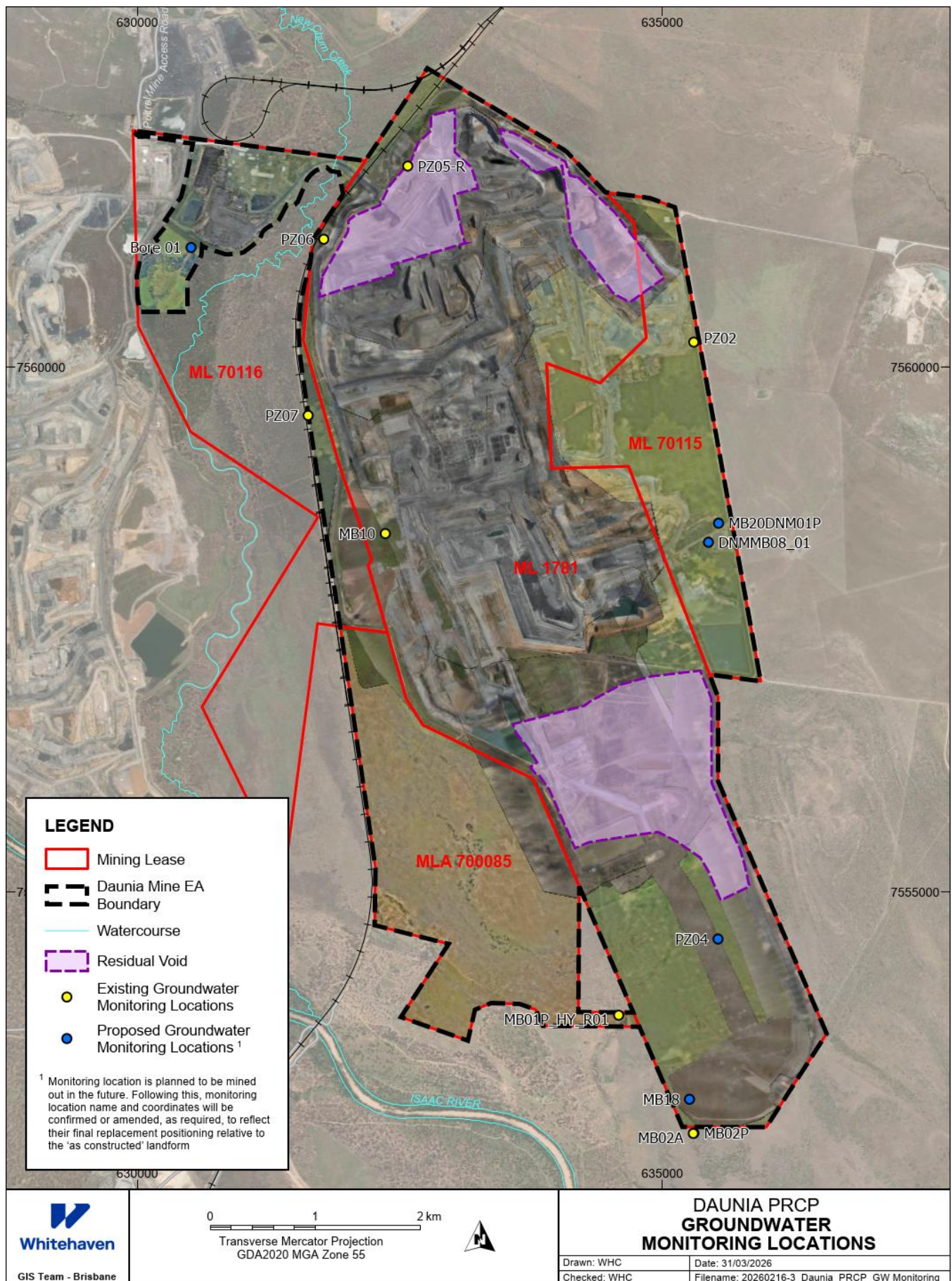


Figure 3-61 DNM rehabilitation groundwater monitoring bores

3.8.4 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.

3.8.5 Achievement schedule

3.8.5.1 PMLUs

The timing of the rehabilitation milestones specific to achievement of surface requirements (RM6) and achievement of PMLUs to a safe, stable, non-polluting and self-sustaining condition (RM7) is summarised in Table 3-76. Timeframes differ between PMLUs to reflect establishment needs and natural development trajectories of each land type.

For clarity, PRCP Schedule condition PRCP19 provides that the requirements for achievement of progressive rehabilitation certification do not include the requirements of RM8.

For cattle grazing PMLUs, RM6 and RM7 are proposed to be achieved within a five-year timeframe from revegetation (RM5).

For the woodland habitat and watercourse PMLUs, RM6 is planned to be achieved within a five-year timeframe from revegetation. RM7 timeframes of up to 20 years apply to the woodland habitat and watercourse PMLUs, allowing adequate time for natural recruitment, structural development and ecological maturation, consistent with rehabilitation monitoring data. Earlier certification may occur where PMLU values are demonstrated sooner. Consistent with PRCP19, progressive rehabilitation certification can be sought upon satisfaction of RM6/RM7 (as applicable) without the completion of RM8.

Table 3-76 Timeframes for achievement of surface requirements and PMLUs rehabilitation milestones

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 PMLUs)	Achievement of post-mining land use to a safe, stable, non-polluting and self-sustaining condition	5-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

3.8.5.2 NUMAs

The timing of the management milestones specific to achievement of sufficient improvement (MM3) is listed in Table 3-77.

Table 3-77 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 (RM7) to ensure maximum monitoring period

3.8.6 Data analysis and reporting

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

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

A schedule for monitoring, reporting and review for each milestone described in the PRCP schedule is provided in Table 3-78.

3.8.7 Quality assurance and quality control

A dedicated QA/QC process will be followed as part of DNM'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.

3.8.8 Maintenance

Maintenance will be implemented when monitoring identifies issues with the rehabilitation, or when milestone criteria are not being met; refer to Table 3-78. 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 PRCP 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.

Table 3-78 Schedule of monitoring, reporting and review for rehabilitation and management milestones

Criteria	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
RM1 Infrastructure decommissioning and removal					
Redundant services (water, electricity, gas, etc.) disconnected and removed	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	Trained and competent person/s to review services documentation, complete visual inspection and document	Once, upon closure	Arrange removal by an AQP	Services inspection report Internal	Upon receipt of report
All hardstand, concrete and bitumen within 0.5 m of the final landform surface removed	Trained and competent person/s to review services documentation, complete visual inspection and document	Once, upon closure	Arrange removal by an AQP	Services inspection report Internal	Upon receipt of report
No below-ground built or service infrastructure within 0.5 m of the final landform surface	Trained and competent person/s to review services documentation, complete visual inspection and document	Once, upon closure	Arrange decommissioning by an AQP	Services inspection report Internal	Upon receipt of report
All dams dewatered and de-silted, and dam liners removed. All surface water drainage infrastructure (incl. watercourse crossings and culverts) removed.	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)
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 or disposed of under EA EPML00561913	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
RM2 Identification, remediation and removal of contaminated land					
Contaminated Land Investigation Document completed in accordance with the <i>Environmental Protection Act 1994</i> , 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

Criteria	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
RM3 Landform development (re-profiling and reshaping)					
Construction of landforms completed to achieve design intent: 1. Relevant structures developed and/or reshaped consistent with the closure landform design report. For disturbed land that does not appear in the closure landform design report, this is to be reshaped to approximate original contours. 2. As-Constructed report/s prepared that details and justifies all variations to designs, including a certification that such variations will not affect design performance. 3. All major earthworks are undertaken, and erosion and sediment control systems installed, in accordance with the detailed design specifications provided by an AQP. 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) ≥ 1.5 at the safety bund which includes consideration of flood stress, unless an alternative is justified by an AQP. 6. Slopes $\geq 15\%$ covered with rock-soil mix per AQP recommendations and in line with PRCP Schedule requirements. 7. For the cattle grazing PMLU, landforms reshaped with: a. At least 70% of slopes $\leq 20\%$ gradient. b. At least 50% of slopes $\leq 15\%$ gradient. c. No slopes $\geq 25\%$. 8. For woodland habitat PMLU: a. Landforms reshaped with $\leq 25\%$ slopes. 9. For watercourse PMLU: a. Disturbed natural watercourse bed and banks returned to a profile similar to the pre-disturbance condition. 10. For spoil dumps: a. For spoil dumps including rejects, capping of at least 1 meter of competent benign spoil is to occur and be in addition to any rock:soil mix prescribed by an AQP. b. Cover surface is water shedding and does not display surface ponding. c. Flood mitigation measures installed for outer landform slopes that interact with flood waters up to 0.1% AEP (modelled on the closure landform). Measures must include parameters to mitigate the impacts of high-energy flow ($\geq 2.5\text{m/s}$) against the constructed landforms, to reduce flow energy and ensure the stability of the landform, as determined by the AQP.	Visual inspection by trained and competent person/s during construction (documented). Survey/ LiDAR of landform (documented).	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 (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

Criteria	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
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
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 the attached PRCP schedule: 1. For cattle grazing PMLU: a. At least four (4) species of 3P (preferred, palatable and perennial) grasses, including at least two (2) native species, two (2) native shade tree species and two (2) legume species are to be seeded per cattle grazing rehabilitation area. 2. For woodland habitat PMLU: a. Include at least six (6) species from revegetation lists for framework trees, woody understorey (shrub) species grass species. 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 for cattle grazing of at least 12 kg/ha of coated pasture seed and 3 kg/ha of uncoated legume seed are to be used, unless adjusted by an AQP. 2. For woodland habitat PMLU: a. Minimum seeding rates of 4.5 kg/ha tree species, 3 kg/ha of woody understorey species and 10 kg/ha of grasses to be used unless adjusted by an AQP. 3. For watercourse PMLU:	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

Criteria	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
a. Minimum seeding rates for upper and mid banks of 6 kg/ha tree species, 4 kg/ha of woody understorey species and 10 kg/ha of grasses and other ground species. b. Minimum seeding rates for lower banks of 5 kg/ha tree species, 10 kg/ha of grasses and other ground species.					
RM6 Achievement of surface requirements					
Weeds comprise <5% of total vegetation groundcover, with the exception of <i>Parthenium hysterophorus</i> which must not exceed 10% of vegetation groundcover and be assessed by an AQP as appropriately managed.	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
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, 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
Surface water monitoring network established in rehabilitated areas	Trained and competent person/s to develop and install features of the networks, and complete sampling once established	One year prior to surface preparation of rehabilitated area	Arrange for monitoring network features to be installed by an AQP and for sampling to be undertaken	Surface water monitoring report Internal	Upon receipt of report
Groundcover is established in accordance with the below: 1. For slopes ≤15%, total vegetative groundcover is to be ≥80%. 2. For slopes ≥15%, total vegetative groundcover is to be ≥50%.	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 for the cattle grazing PMLU applies: 1. Vegetative groundcover: ≥50% established and self-sustaining vegetation cover, of which at least 50% of vegetative dry matter is comprised of 3P pasture species as listed in Section 3.6.1.8 and Appendix 4.1 (PRCP Schedule).	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 for the woodland habitat and watercourse PMLUs apply: 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.	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

Criteria	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
RM7 Achievement of PMLU to a safe, stable, non-polluting and self-sustaining 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 is removed.	Trained and competent person/s to review any remaining infrastructure, complete visual inspection and document.	Once, upon closure	Arrange removal by an AQP	Inspection report, removal report Internal	Upon receipt of report
An AQP certifies that: a. There is no moderate or severe erosion present as defined in the PRCP Schedule 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
Surface water runoff is collected from representative areas of rehabilitation during surface flow events, when safe to do so. Monitoring, analysis, limits assessment and reporting is to be in accordance with the PRCP Schedule.	An AQP to complete surface water monitoring and analysis, as outlined in Section 3.8.2	As per the surface water monitoring schedule outlined in Section 3.8.2.2	Arrange for surface water monitoring to be completed by an AQP and/ or arrange correction actions as required	Surface water runoff monitoring report Internal	Upon receipt of report and/ or completion of corrective actions and as per the surface water monitoring schedule outlined in Section 3.8.2.2
Groundwater monitoring network established in rehabilitated areas	Trained and competent person/s to develop and install features of the networks, and complete sampling once established	One year prior to surface preparation of rehabilitated area	Arrange for monitoring network features to be installed by an AQP and for sampling to be undertaken	Groundwater monitoring report Internal	Upon receipt of report
For existing rehabilitation (RA5) additional criteria for the cattle grazing PMLU applies: 1. Vegetative groundcover: $\geq 50\%$ established and self-sustaining vegetation cover, of which at least 50% of vegetative dry matter is comprised of 3P pasture species as listed in Section 3.6.1.8 and Appendix 4.1 (PRCP Schedule). 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 $>2\text{m}$ 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
For future rehabilitation (RA2, RA4) additional criteria for the cattle grazing PMLU applies: 1. 60% of vegetative dry matter is to be comprised of 3P pasture species as listed in Section 3.6.1.8. 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	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

Criteria	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
limiting factors present in representative reference sites. 3. Leucaena >2m high: stem density is <250 stems per hectare (1 per 40m²) mean total area.					
For existing rehabilitation (RA6) additional criteria for the woodland habitat PMLU applies: 1. Species richness: native trees ≥2; native shrubs ≥3; native grasses* ≥4 2. Tree canopy cover: ≥16% <i>*Existing rehabilitation may contain a mixture of native and exotic grass species</i>	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
For existing rehabilitation (RA1 and RA3) additional criteria for the woodland habitat and watercourse PMLUs apply: 1. A BioCondition assessment is completed by an AQP using the methodology outlined in the latest version of the Queensland Herbarium's 'BioCondition Assessment Manual'. 2. Woodland habitat: Modified BioCondition assessment demonstrates achievement of an overall score of ≥33 out of a possible 60 for the hybrid regional ecosystem as defined in the PRCP schedule. 3. Watercourse: Modified BioCondition assessment demonstrates achievement of an overall score of ≥30 out of a possible 60 for the representative regional ecosystem as defined in the PRCP schedule.	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 Water management in the final landform					
Surface water quality is monitored monthly during flow for at least 5 years at, but not limited to, locations specified in the PRCP schedule and Section 3.8.2.3 for all quality characteristics listed in the PRCP schedule and Section 3.8.2.1.	An AQP to complete surface water monitoring and analysis, as outlined in Section 3.8.2	As per the surface water monitoring schedule outlined in Section 3.8.2.2	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 3.8.2.2
Surface water quality must not exceed the limits listed in the PRCP schedule and Section 3.8.2.1 within the 5-year period immediately prior to surrender. If the surface water quality exceeds the limits, the applicable upstream site must be compared to the downstream site result; and quality result measured at a downstream site must be equal to or less than the quality result measured at the applicable upstream site.	An AQP to complete surface water monitoring and analysis, as outlined in Section 3.8.2	The five years immediately prior to surrender.	Arrange corrective actions as required	Surface water monitoring report Internal	Upon completion of corrective actions.
An assessment must be conducted if surface water quality results exceed the criteria listed, noting the cause of the exceedance and risk of rehabilitation not achieving a stable condition within the PRCP schedule timeframe.	An AQP to complete surface water quality exceedance investigation	Any surface water quality exceedance within five-year period prior to surrender	Arrange corrective actions as required	Exceedance investigation assessment External (to go to administering authority within three months of exceedance)	Upon completion of assessment and administering authority's response.
Groundwater quality is monitored quarterly for at least five (5) consecutive years at, but not limited to the monitoring locations specified in the PRCP schedule and	An AQP to complete groundwater monitoring and analysis, as outlined in Section 3.8.3	As per the groundwater monitoring schedule outlined in Section 3.8.3.2	Arrange corrective actions as required	Groundwater monitoring report Internal	Upon completion of corrective actions and as per the groundwater

Criteria	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
Section 3.8.3.3 for all quality characteristics listed in the PRCP Schedule.					monitoring schedule outlined in Section 3.8.3.2
MM1 Achievement of structural stability					
Certification by AQP that: a. The closure landform design has been updated by an AQP based on the latest flood modelling and materials data prior to construction. b. Final residual voids are not subject to inundation of flood waters up to and including the 0.1% AEP event. c. The pit walls achieve a minimum FOS ≥ 1.5 within the NUMA extents. d. The location of the residual voids and associated safety bunds does not cause instability or degradation to the land outside of the NUMA. e. Residual voids do not overtop to the receiving environment.	Review of AQP certification/s	Upon receipt of certification/s	Arrange remediation as directed by AQP	Relevant AQP reports Internal	Upon completion of remediation
MM2 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: a. Constructed of competent non-weathered, non-dispersive material; b. Minimum height of 2 m; c. Minimum base width of 4 m; d. 1 in 3 batters; and e. 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
Access to highwalls is restricted by fencing with warning signage erected around the perimeter of the safety bund, where required, to warn of void related risks and deter public access. Safety signage to be at 100 m intervals along fence and designed and installed in accordance with Australian Standards.	Visual inspection by an AQP	Annually	Re-install fencing as required	Void safety controls monitoring report Internal	Annually, and upon re-installation
MM3 Achievement of sufficient improvement					
Certification by AQP that: a. The final landform has been constructed in accordance with the closure landform design. b. The NUMAs do not present an unacceptable risk of environmental harm. c. 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. d. The NUMA is safe to humans and livestock. e. The water level and quality in the final voids does not, and will, not cause	Review of AQP certification/s	Upon receipt of certification/s	Arrange remediation as directed by AQP	Relevant AQP reports Internal	Upon completion of remediation

Criteria	Monitoring Methods	Frequency	Contingency/Maintenance	Reporting	Review
environmental harm to the receiving environment, as demonstrated by groundwater level, surface water and groundwater quality monitoring and modelling. f. The residual voids act as groundwater sinks post-closure (through water quality, water level and modelling data). g. Monitoring and maintenance of exclusion fences and bunds confirms they remain effective. h. Flood modelling re-run on the as-constructed landform and calibrated against the closure landform design confirms flood immunity of the residual voids at construction has been maintained for 0.1% AEP events.					

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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 6.01) (DETSI 2025).

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

Appendix 4.2 – Hydrogeology Assessment



Appendix 4.3 – Material Characterisation



Appendix 4.4 – Community Consultation Plan and Register



Appendix 4.5 – Rehabilitation Flood Assessment



Appendix 4.6 – Waste Characterisation



Appendix 4.7 – Landform Design



Appendix 4.8 – Geotechnical Stability of Residual Voids



Appendix 4.9 – Void Closure Plan



Appendix 4.10 – Risk Assessment

