Whitehaven

Blackwater North Extension Project

Environmental Authority Amendment Supporting Document



Executive Summary

ES.1 Introduction

The Blackwater Mine (BWM) is an existing, open cut metallurgical coal mine located approximately 20 kilometres (km) south-west of Blackwater in the Bowen Basin, Queensland (Figure ES-1).

The BWM has been in operation since 1967 and operates in accordance with, amongst other authorisations, Environmental Authority (EA) EPML00717813 granted under the *Environmental Protection Act 1994* (EP Act).

The existing BWM comprises a series of open-cut mining pits along an approximate 80 km long strike length. The BWM extracts coal using drill and blast methods, draglines, dozers and truck and shovel fleets for overburden removal and haulage. Existing infrastructure at BWM includes two rail spurs and balloon loops from the Bauhinia Railway Line, a coal handling and preparation plant (CHPP), thermal coal plant (TCP), product stockpiles, run of mine (ROM) coal stockpiles, tailings storage facility (TSF), in-pit waste rock dumps, train load-out facilities, water management infrastructure and other supporting infrastructure (e.g. haul roads, access roads, laydown areas, electricity transmission lines, workshops and offices).

Whitehaven Blackwater Pty Ltd (Whitehaven Blackwater) proposes to develop the Blackwater North Extension Project (the Project), which would extend the current open cut mining development at the BWM to within Surface Area (SA) 7 on Mining Lease (ML) 1762 and SA 10 on ML 1759. The Project is expected to optimise mining operations at BWM, allowing ongoing employment and economic benefits from the BWM to the local area, region and State of Queensland.

On 15 August 2025, Whitehaven Blackwater lodged an application to determine the assessment pathway under the EP Act to the Department of the Environment, Tourism, Science and Innovation (DETSI) under section 73 of the EP Act. On 12 September 2025, the DETSI provided a section 73 decision notice confirming that an Environmental Impact Statement is not required for the Project.

The EA Amendment Supporting Document describes the outcomes of the environmental assessment undertaken for the Project. This document addresses the requirements of section 226 and 226A of the EP Act.

This EA Amendment Supporting Document provides a detailed description of the Project, an assessment of the potential environmental impacts, as well as proposed management measures and mitigation strategies.

ES.2 Project Overview

Whitehaven Blackwater is seeking an amendment of EA EPML00717813 to extend open cut operations within the northern section of the BWM to the east of current operations until approximately 2055 at an extraction rate of up to 19 million tonnes per annum (Mtpa) (Figure ES-2). The Project has an approximate start date of 2030.

The focus of the Project would be on the proposed areas and activities within SA 7 and SA 10, which are located within ML 1759 and ML 1762.

The Project would include the following main components:

- extension of open cut operations into SA 7 on ML 1762 and SA 10 on ML 1759 to allow mining of additional coal reserves to approximately 2055;
- extraction of an additional 200 million tonnes (Mt) (approximately) of ROM coal;
- continued extraction of up to 19 Mtpa of ROM coal;
- continued use of existing BWM infrastructure (e.g. CHPP, TCP, ROM and product coal stockpiles, train load-out, water management, tailings management and other supporting infrastructure);
- construction and operation of new water management and water storage infrastructure in support of extended mining operations;
- development of waste rock emplacement areas;
- continued co-disposal of coarse rejects with waste rock and disposal of tailings into an approved TSF or in-pit void;
- construction of semi-permanent tailings cells to be utilised for the disposal of fine rejects;
- progressive rehabilitation of the Project;
- ongoing exploration activities in the Project area; and
- other associated infrastructure, equipment and activities.



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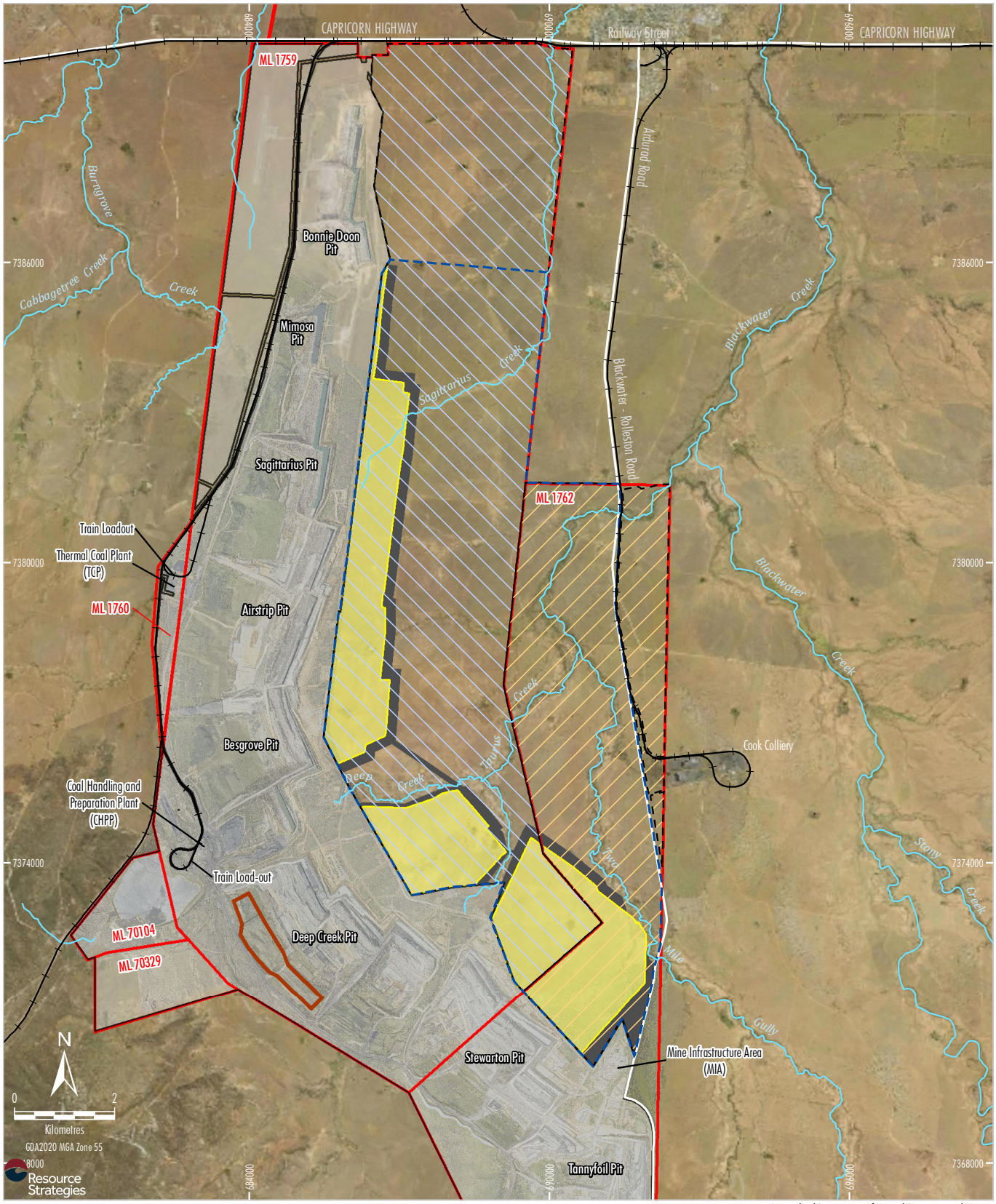
Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Geoscience Australia (2018)

LEGEND
- Road
- Railway
- Coal Terminal
- Blackwater North Extension Project

BLACKWATER NORTH EXTENSION PROJECT

Regional Location

Figure ES-1



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint
- SA 7
- SA 10

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area
- Potential Semi Permanent Tailings Cell

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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BLACKWATER NORTH EXTENSION PROJECT

Project General Arrangement

Figure ES-2

The Project is consistent with the conditions of EA EPML00717813 as proposed to be amended and described within this EA Amendment Supporting Document. The BWM would continue to operate the existing BWM and the Project in accordance with the amended EA EPML00717813.

ES.3 Environmental Assessment

A number of environmental assessment studies were completed to assess the potential environmental impacts of the Project.
A summary of the key findings of these studies and key commitments with respect to managing potential impacts is provided in Table ES-1.

Table ES-1
Key Outcomes of the Project Environmental Assessment

Summary of Environmental Assessment Conclusions	Key Management, Mitigation or Monitoring Measures for the Project
Land	
- A Soils and Land Suitability Assessment has been prepared. - The Project would alter the landforms and topography within the Project area. Some topographic changes would be temporary (e.g. temporary infrastructure) and some would be permanent (e.g. final mine landforms). - The Project would increase the extent of the existing approved open cut mining areas. - Potential impacts of the Project on soils would relate primarily to disturbance of *in situ* soil resources within additional disturbance areas, alteration of soil structure beneath infrastructure items, hardstand areas and roads, possible soil contamination from spillage of chemicals, increased erosion and sediment movement due to exposure of soils during construction and alteration of physical and chemical soil properties due to soil stripping and stockpiling operations. - The Project would result in the progressive disturbance (and rehabilitation) of existing agricultural lands in the short-term. A total disturbance area of approximately 2,317 hectares (ha) is expected. - The development of the Project (e.g. vegetation clearance and extension of the open cut pits) would alter the visual landscape of the Project area similar to the impacts associated with the existing BWM operation. - No acid sulphate soils were observed during field surveys of the Project area and it is highly unlikely that the Project area would include actual acid sulphate soils and/or potential acid sulphate soils.	- The Project area would be rehabilitated to land suitable for beef cattle grazing, or woodland habitat, consistent with the post-mining land use described in the Progressive Rehabilitation and Closure Plan. - General soil resource management practices would include the stripping and stockpiling of soil resources for use in rehabilitation. - Soil stripping and handling measures would be undertaken in accordance with the *BWM Plan – Topsoil Management Plan*. A soil inventory, consistent with that described in the *BWM Plan – Topsoil Management Plan*, would be maintained for the life of the Project. - Erosion and sediment control works would be conducted in accordance with the current *BWM Plan – Erosion and Sediment Control Management Plan*. The current *BWM Plan – Erosion and Sediment Control Management Plan* would be updated to include the Project. - Progressive rehabilitation of the Project landforms would be undertaken to reduce the contrast between the Project landforms and surrounding environment. - Any potential contamination risks associated with the Notifiable Activities would be managed in accordance with the relevant legislation, guidelines and/or policies. - On-site consumable storage areas would be operated, where applicable, in compliance with the requirements of Australian Standard (AS) 1940-2017 *The Storage and Handling of Flammable and Combustible Liquids* and AS 2187.1 *Explosives – Storage, Transport and Use – Storage*.
Surface Water	
- A Surface Water Assessment has been prepared. - Potential sources of contamination at BWM that may impact the receiving environment have been identified as follows: runoff from disturbed and rehabilitated land, release of recycled waters from sewage treatment plants and industrial areas and release of water from pits, water storages and dams. - The Project would involve an expansion of the mining pits, which would result in the loss of undisturbed catchment reporting to Taurus Creek and Sagittarius Creek. - At the completion of mining, surface runoff from rehabilitated in-pit and out of pit waste rock emplacement areas would flow to the receiving environment, with the exception of 2,726 ha which would report to residual voids associated with the Project.	- The controlled release of mine affected water would continue to be restricted by the existing EA release conditions for the duration of the Project. - No specific requirements for sediment basins have been identified. However, there is potential additional sediment dams may be required for the Project associated with disturbance in advance (to the east) of mining operations including infrastructure corridors, pre-stripping and soil stockpiles. - Operational flood levees would be established to provide flood immunity for events up to and including the 0.1 percent (%) Annual Exceedance Probability (AEP) event. Conceptual designs for the temporary operational levees have been prepared by TerraQ (2026).

Table ES-1 (Continued)
Key Outcomes of the Project Environmental Assessment

Summary of Environmental Assessment Conclusions	Key Management, Mitigation or Monitoring Measures for the Project
Surface Water (Continued)	
- Based on the water balance modelling undertaken, the Project is not expected to increase the risk of uncontrolled discharges from site storages to receiving waterways. - The Project would result in minor changes to annual controlled release volumes, with an increase of approximately 11 to 20% under median climatic conditions (50th percentile). - Flood modelling results indicated that the proposed levees would provide flood immunity to the future mining pits for all events up to and including the 0.1% AEP, with levee crest levels above the adjacent 0.1% AEP peak flood level. - Erosion potential and sediment transport characteristics of existing waterway channels under the Project scenario would be similar to those under existing conditions. - Final landform flood modelling indicated that the Mimosa/Besgrove void would be located outside riverine flood extents in Sagittarius Creek for all events up to the Probable Maximum Flood (PMF), the Deep Creek, Stewarton North and Stewarton South voids would have flood immunity for all events up to and including the PMF and the R30 void would have flood immunity for all events up to and including the 0.1% AEP event, with floodwater ingress predicted to occur during the PMF event.	- A clean water drain along the south-eastern side of the future Stewarton Pit extent would be in place during the operational stage of the Project and would also form part of the final landform post-closure. - Whitehaven Blackwater is a participant in the Fitzroy Regional Receiving Environment Monitoring Program. - Surface water quality monitoring of receiving waters would continue to be undertaken in accordance with the requirements of EA EPML00717813. Current monitoring locations are sufficient to cover any additional disturbance because of the Project. - Contaminant investigation levels in the EA (Table F3) would be amended to align with current default guideline values in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Governments, 2018). - The existing *BWM Water Management Plan* would be updated, as required as mine plans are refined, to reflect any changes to the site water management system and surface water monitoring locations resulting from the Project.
Groundwater	
- A peer reviewed Groundwater Assessment has been prepared. - The groundwater quality within the alluvium across the study area, when sufficiently saturated, is mostly suitable for stock water supply and irrigation. - The Project does not directly intercept groundwater from Highlands Groundwater Unit 1 (Quaternary alluvium) under the *Water Plan (Fitzroy Basin) 2011*. - The incremental drawdown extent of the weathered zone is largely confined to near the pit and is influenced by the distribution of predicted saturated zones in the weathered zone. - No incremental drawdown was mapped for Layer 1 of the groundwater model, which represents the Alluvium and Tertiary units in the northern portion of BWM. Note that Alluvium is limited in extent and is not laterally continuous across BWM. - There is limited potential for groundwater contamination expected to occur as a result of hydrocarbon and chemical contamination with provision for immediate clean-up of spills. - There are no predicted incremental or cumulative drawdowns at the two landholder bores identified within a 5 km of the Project area that exceed the *Water Act 2000* bore trigger thresholds.	- A groundwater monitoring network has been established at BWM, which includes groundwater level and water quality monitoring stations within and surrounding the mine site, in accordance with EA EPML00717813. - The Groundwater Assessment recommended five additional monitoring bores are installed in the vicinity of the Project area. – The Groundwater Assessment also proposed that the five additional monitoring bores, in addition to two existing bores, are included in the EA monitoring network to support monitoring associated with the Project. - Groundwater level monitoring would continue to be undertaken at an appropriate frequency (e.g. monthly to quarterly) to establish baseline datasets for groundwater levels in each monitoring bore. - Estimation of groundwater pit inflows would be undertaken routinely in consultation with a suitably qualified person. - Whitehaven Blackwater would continue to report the annual water take of associated water take from ML 1759 and ML 1762 as required for the Project.

Table ES-1 (Continued)
Key Outcomes of the Project Environmental Assessment

Summary of Environmental Assessment Conclusions	Key Management, Mitigation or Monitoring Measures for the Project
Groundwater (Continued)	
- As a result of the Project, five proposed final voids would remain post-closure. Three are predicted to become long-term sinks and the other two are predicted to be flow through systems reporting to neighbouring voids.	- Continued.
Biodiversity	
- Terrestrial Ecology, Aquatic Ecology and Groundwater Dependent Ecosystems (GDEs) assessments have been prepared, based on contemporary field surveys in accordance with State and Commonwealth relevant guidelines. - Relevant Matters of State Environmental Significance (MSES) and Matters of National Environmental Significance (MNES) have been identified. - The Project has the potential to result in an impact on MSES. The following species have been identified in the field surveys: Brigalow Threatened Ecological Community (TEC), Squatter Pigeon (southern), Australian Painted Snipe, Latham's Snipe and Koala. - Ground-truthing of the Regional Ecosystems (REs) confirmed the presence of Endangered REs in the Project area including REs 11.3.1, 11.4.9 and 11.9.5. - One conservation significant flora species (*Solanum elachophyllum*) listed as Endangered under the *Nature Conservation Act 1992* (NC Act) is known to occur within the Project area. - The Project would remove or modify aquatic habitats in the Project area; however, these habitats are unlikely to support aquatic species of conservation significance listed under the NC Act or *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), due to the absence of suitable habitat features and the highly variable, ephemeral flow regime. - As noted above, the alluvium is limited in extent and is not laterally continuous across BWM. The Project is unlikely to significantly impact subterranean or surface-expression GDEs as it was found that there was no evidence of subterranean GDEs and no surface expression GDEs occurring within the broader Study Area. - The Project is unlikely to result in a significant cumulative impact to the aquatic flora and fauna of Taurus Creek, Two Mile Gully and downstream receiving environments.	- Continued implementation of land clearance measures to minimise impacts on fauna. - Implementation of weed hygiene protocols for all vehicles, equipment and materials to be used in areas of native vegetation. - The existing *BWM Plan – Land and Biodiversity Management Plan* would be updated to include mitigation and species specific management measures for relevant MSES and MNES species. - Continued implementation of invasive plant and animal management in line with *WHC QLD PRO Weed and Feral Management*. - Implementation of bushfire management techniques to maintain vegetation structure and composition. - A Protected Plants Clearing Permit from the DETSI would be required prior to undertaking any clearing (e.g. removing or destroying) of *Solanum elachophyllum*. - Secure and implement biodiversity offsets for significant residual impacts on MNES (Brigalow TEC) (to be addressed through the Project's EPBC Act Referral) and MSES (RE 11.3.1 and *Solanum elachophyllum*).
Air Quality	
- An Air Quality Assessment for the Project has been prepared. - Predicted cumulative maximum 24-hour average ground-level particulate matter with an equivalent aerodynamic diameter of 10 micrometres (µm) or less (PM_{10}) concentrations were predicted to exceed the criteria at six privately-owned sensitive receivers. - Predicted cumulative annual average ground-level PM_{10} concentrations were predicted to exceed the criteria at one privately owned sensitive receiver.	- Ongoing implementation of proactive dust mitigation measures would continue to be implemented at the BWM. - Continued implementation of air quality management controls, as currently detailed in the existing *BWM Plan – Air Quality Management Plan*.

Table ES-1 (Continued)
Key Outcomes of the Project Environmental Assessment

Summary of Environmental Assessment Conclusions	Key Management, Mitigation or Monitoring Measures for the Project
Air Quality (Continued)	
- There were no predicted exceedances of the 24-hour and annual average ground-level particulate matter with an equivalent aerodynamic diameter of 2.5 µm or less ($PM_{2.5}$) criteria at any of the sensitive receivers for any of the assessed scenarios. - There were no predicted exceedances of the annual average total suspended particle criteria at any of the sensitive receivers for any of the assessed scenarios. - There were no predicted exceedances of the dust deposition criteria at any of the sensitive receivers for any of the assessed scenarios.	- For those receptors where it is proposed that potential exceedances would be managed using real-time controls, should monitoring show that these controls are not effective, Whitehaven Blackwater intends to enter commercial agreements (i.e. "Alternative Arrangements" under EA EPML00717813) with these landowners (R20 and R21). - Whitehaven Blackwater intends to enter commercial agreements (i.e. "Alternative Arrangements" under EA EPML00717813) with landowners that may be subject to potential air quality impacts from the Project (R5, R6, R7 and R17).
Greenhouse Gas	
- The projected Scope 1, 2 and 3 greenhouse gas (GHG) emissions have been estimated for the Project. - The Project's contribution to Australian emissions would be relatively small, as estimated annual average Scope 1 and 2 emissions would represent approximately 0.09% and 0.41% in 2030 and 2035, respectively, of the estimated total GHG emissions in Queensland (133 and 48 Mt carbon dioxide equivalent (CO_2-e) in 2030 and 2035 respectively) and approximately 0.03% and 0.11% of Australia's projected GHG emissions in 2030 and 2035, respectively, (349 and 184 Mt CO_2-e in 2030 and 2035, respectively). - If the Project is approved and proceeds, the Project's contribution to global climate change would be proportional to its contribution to global GHG emissions. - The Project's incremental contribution to temperature change would be sufficiently minor that no additional impacts on the environmental values would arise.	- A peer reviewed Greenhouse Gas Management and Abatement Plan has been developed for the Project. - Should the Project be approved, Whitehaven Blackwater would implement adaptive management of GHG emissions over the life of the BWM, consistent with Australia's emissions reduction requirements as set out under the Safeguard Mechanism, and to meet any applicable EA conditions imposed by the Queensland Government. - A Three-Year Action Plan has been developed to align with the current stage of the Project (i.e. environmental approvals) and the information that is presently available for the BWM. The Three-Year Action Plan would be revisited during the course of the Project as the regulatory, operational, technological and commercial context evolves.
Noise and Blasting	
- A Noise and Blasting Assessment has been prepared for the Project. - The operational noise assessment indicated that the majority of surrounding privately-owned noise-sensitive receivers would comply with the applicable criteria under all assessed scenarios, with residual exceedances identified at eight privately owned receivers and three industrial receivers. - The assessment of night-time maximum noise level events predicted compliance at all but five receivers, including three privately-owned receivers and two industrial receivers. - The Project is unlikely to generate low-frequency noise that could be perceived by the community and cause annoyance. - The Project would have a negligible influence on overall cumulative noise levels. Notwithstanding the Project together with nearby industries would generally comply with the current site-specific EA EPML00717813 noise criteria. - Based on blast management practices currently implemented at the BWM, it is expected that airblast overpressure and ground vibration from the Project can be effectively controlled to meet all blasting criteria and minimise the risk of significant impacts at surrounding receivers and infrastructure.	- Implementation of a proactive noise management system that would integrate predictive forecasting and real time noise monitoring to support day to day operational planning, monitoring and response to potential criteria exceedance through a dedicated Trigger Action Response Plan. - Continued implementation of noise and vibration management controls, as currently detailed in the existing *BWM Plan – Air Quality Management Plan*. - Whitehaven Blackwater intends to enter commercial noise agreements (i.e. "Alternative Arrangements" under EA EPML00717813) with landowners that may be subject to potential noise and blasting impacts from the Project (R03, R04, R05, R06, R07, R13, R17 and R19).

Table ES-1 (Continued)
Key Outcomes of the Project Environmental Assessment

Summary of Environmental Assessment Conclusions	Key Management, Mitigation or Monitoring Measures for the Project
Waste	
- The key waste streams generated by the Project would comprise waste rock and coal rejects, recyclable and non-recyclable general wastes, sewage and wastewater and other wastes from mining and workshop related activities. - The waste streams expected to be produced during operation of the Project would be consistent with existing operations at the BWM.	- Whitehaven Blackwater would continue to manage the waste produced at the Project in accordance with the waste and resource management hierarchy in the *Waste Reduction and Recycling Act 2011* (i.e. "avoid, reduce, reuse, recycle, recover, treat and dispose"). - Whitehaven Blackwater would continue to use the existing *BWM Plan – Waste Management Plan* to manage waste generated by the Project.
Cultural Heritage	
- Currently, there is an undetermined native title claim which has been lodged over the Project area (QC2012/009). - There are no State heritage places within 50 km of the Project area. There are no local heritage places within 25 km of the Project area. - The Project area, in general, is considered to have minimal, to no archaeological potential for non-Indigenous heritage, apart from the Old Coach Road Scatter. The Old Coach Road Scatter consists of a low-density scatter of bottle glass, ceramics, metalwork, and a potential stone open campfire.	- Continued implementation of existing *Cultural Heritage Management Agreement* (CHMA) with the Ghungalu People and Kangoulu People (representatives of the Gaangalu Nation People). This CHMA would continue to be utilised for the Project. - Whitehaven Blackwater would demonstrate diligence whilst undertaking works within the Project area, particularly during any clearing or construction associated with the Project. - Ground disturbance of new disturbance areas would adhere to the management measures prescribed in the approved CHMA.
Social (Community) Values	
- The Project would provide continued employment to the existing BWM workforce as well as require an additional 500 full time equivalent (FTE) direct mine operational personnel by approximately 2032 due to increased mining equipment requirements. Direct mine operational FTE personnel numbers would then increase by a further 150 in the period from 2033 to 2055. - The Project would continue to utilise existing local services and amenities as per the operations of the existing BWM.	- The Project would continue to operate under Whitehaven's existing Queensland Site Transport and Accommodation Policy. Where eligible, housing may be provided to employees in Blackwater or subsidies for employees who elect to reside within 50 km of Blackwater or in Emerald.

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1 Introduction

The Blackwater Mine (BWM) is an existing, open cut metallurgical coal mine located approximately 20 kilometres (km) south-west of Blackwater in the Bowen Basin, Queensland (Figure 1-1 and 1-2).

The BWM has been in operation since 1967 and operates in accordance with, amongst other authorisations, Environmental Authority (EA) EPML00717813 granted under the *Environmental Protection Act 1994* (EP Act).

The existing BWM comprises a series of open-cut mining pits along an approximate 80 km long strike length. The BWM extracts coal using drill and blast methods, draglines, dozers and truck and shovel fleets for overburden removal and haulage. Existing infrastructure at BWM includes two rail spurs and balloon loops from the Bauhinia Railway Line, a coal handling and preparation plant (CHPP), thermal coal plant (TCP), product stockpiles, run of mine (ROM) coal stockpiles, tailings storage facility (TSF), in-pit waste rock dumps, train load-out facilities, water management infrastructure and other supporting infrastructure (e.g. haul roads, access roads, laydown areas, electricity transmission lines (ETLs), workshops and offices).

Whitehaven Blackwater Pty Ltd (Whitehaven Blackwater) proposes to develop the Blackwater North Extension Project (the Project), which would extend the current open cut mining development at the BWM to within Surface Area (SA) 7 on Mining Lease (ML) 1762 and SA 10 on ML 1759. The Project is expected to optimise mining operations at BWM, allowing ongoing employment and economic benefits from the BWM to the local area, region and State of Queensland.

On 15 August 2025, Whitehaven Blackwater lodged an application to determine the assessment pathway under the EP Act to the Department of the Environment, Tourism, Science and Innovation (DETSI) under section 73 of the EP Act. On 12 September 2025, the DETSI provided a section 73 decision notice confirming that an Environmental Impact Statement (EIS) is not required for the Project.

This EA Amendment Supporting Document describes the outcomes of the environmental assessment undertaken for the Project. This EA Amendment Supporting Document addresses the requirements of section 226 and 226A of the EP Act (Attachment 1). An assessment against the EIS triggers has been completed and is detailed in Attachment 2.

This EA Amendment Supporting Document provides a detailed description of the Project, an assessment of the potential environmental impacts, as well as proposed management measures and mitigation strategies.

1.1 Project Proponent

The BWM is a joint venture between Whitehaven Coal Limited (Whitehaven) (70 percent [%]), Nippon Steel Corporation Limited (20%) and JFE Steel Corporation Pty Ltd (10%). Whitehaven Blackwater, a wholly owned subsidiary of Whitehaven, is the operator of the BWM.

The contact details for the proponent are:

Whitehaven Blackwater Pty Ltd
Level 28, 259 George St
SYDNEY NSW 2000
Phone: (02) 8222 1100
Website: https://whitehavencoal.com.au/

1.2 Description of the Existing Blackwater Mine

1.2.1 SITE AND LOCALITY DESCRIPTION

The BWM is located in the Bowen Basin, in Central Queensland, within the Central Highlands Regional Council (CHRC) Local Government Area (LGA). The surrounding towns which support the BWM include Blackwater, Comet, Bluff and Emerald.

The BWM is located on 21 granted MLs including ML 1759, ML 1760, ML 1761, ML 1762, ML 1767, ML 1771, ML 1772, ML 1773, ML 1792, ML 1800, ML 1812, ML 1829, ML 1860, ML 1862, ML 1907, ML 70091, ML 70103, ML 70104, ML 70139, ML 70167 and ML 70329 (Figure 1-2).

Existing agricultural land uses surrounding the BWM include dryland cropping and cattle grazing. Regionally, the Blackdown Tablelands National Park is used for recreational activities and the town of Blackwater is used for residential purposes.

Prior to operations commencing at the BWM, a large portion of the land had been cleared for stock grazing use. The BWM is located where coal mining is a primary land use. Coal mining and coal seam gas extraction and exploration have been conducted around the BWM since 1967.

All properties adjacent to the BWM MLs are currently used for either coal mining or cattle grazing.



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Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Geoscience Australia (2018)

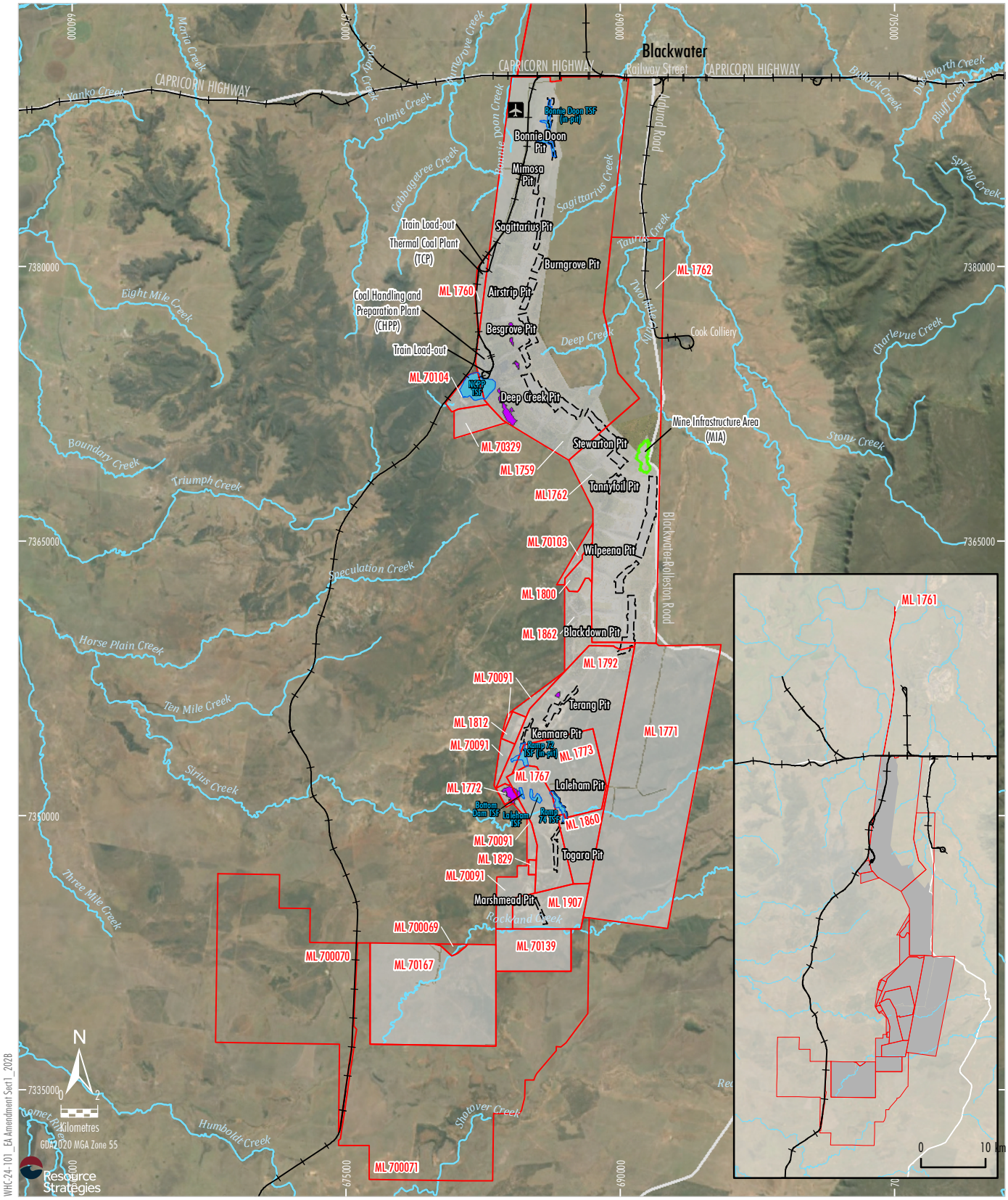
LEGEND

- Road
- Railway
- Coal Terminal
- Blackwater North Extension Project

BLACKWATER NORTH EXTENSION PROJECT

Regional Location

Figure 1-1



WHC-24-101_EA Amendment Sect1_202B

Resource Strategies

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Airport
- Approved Disturbance Footprint
- Pit
- Indicative MIA Extent
- Tailings Storage Facility (TSF)
- Reject Stockpile

Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Esri (2025); Whitehaven (2025)

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Existing BWM

Figure 1-2

1.2.2 GEOLOGY AND COAL RESOURCE

The BWM extends across multiple stratigraphic units, which include the Rangal Coal Measures, Burngrove Formation, Fair Hill Formation, Macmillan Formation, Croker Formation and German Creek Formation (Figures 1-3 and 1-4).

The BWM deposit is located in the Bowen Basin, which is one of five major foreland sedimentary basins which were formed along the eastern side of Australia during the Permian geologic period. The Bowen Basin is the largest productive coal basin in Australia. The structural geology of the region is characterised by gently folded sediments and a major north to north-west striking fault system which forms the Jellinbah thrust fault.

The strata in the vicinity of the BWM are heavily influenced by a series of easterly dipping north to northwest striking faults (Australasian Groundwater and Environmental Consultants Pty Ltd [AGE], 2008), of which the Shotover Fault is of major importance due to a displacement of up to 23 km (AGE, 2013).

The coal deposits mined at the BWM are found within the Rangal Coal Measures, which in the Project area, consist of up to 100 metres (m) of interbedded sandstone, siltstone, mudstone and coal with tuff. The stratigraphic sequence overlying the Rangal Coal Measures across the BWM comprises consolidated Quaternary aged sediment layers (0.5 m to 12 m) of unconsolidated clays, silts and sands. This is associated with the floodplains of the major drainage channel. Underneath is the Tertiary sediments and basalts that unconformably overly the Triassic aged Rewan Group of variable thicknesses (5 m to 115 m) of claystone, siltstone, sandstones and weathered basalts. This overlies the Permian coal measures comprised of 50 m to 300 m of siltstone and mudstone with interbeds of lithic and volcanic sandstones.

The Clematis Group conformably overlies the Rewan Group to the east of the BWM where it outcrops and forms an elevated plateau which is associated with the Blackdown Tablelands National Park. This unit consists of quartzose, sandstone, siltstone, mudstone and conglomerate. The three main economic coal seams are the Aries Seam, Castor Seam and Pollux Seam occurring in the Late Permian Rangal Coal Measures. At BWM, these measures are locally referred to as the Top Seam, Middle Seam and Lower Seam, respectively. A schematic of the seam stratigraphy and further details on the seams and their occurrence at BWM are presented in Figure 1-4.

1.2.3 GENERAL ARRANGEMENT

The existing/approved general arrangement of the BWM is shown on Figure 1-2.

1.2.4 MINING OPERATIONS

The current primary features and infrastructure at the existing BWM are summarised in Table 1-1.

Workforce

Full time equivalent (FTE) workforce numbers at the existing BWM fluctuate over time due to operational requirements, stay-in-business capital works, maintenance shutdowns and infrastructure projects.

The current BWM operational workforce comprises approximately 1,150 FTE Whitehaven Blackwater staff and employees. In addition, there are approximately 600 FTE contractors engaged in direct mine operational works such as overburden removal, drill/blast and pit services. Operational contractor numbers would also vary over time depending primarily on coal sales demand.

There can also be up to 750 FTE intermittent temporary contractors engaged in various support, capital and project works. This temporary contractor support workforce fluctuates depending on the level of support, capital and project works required at any time.

Hours of Operation

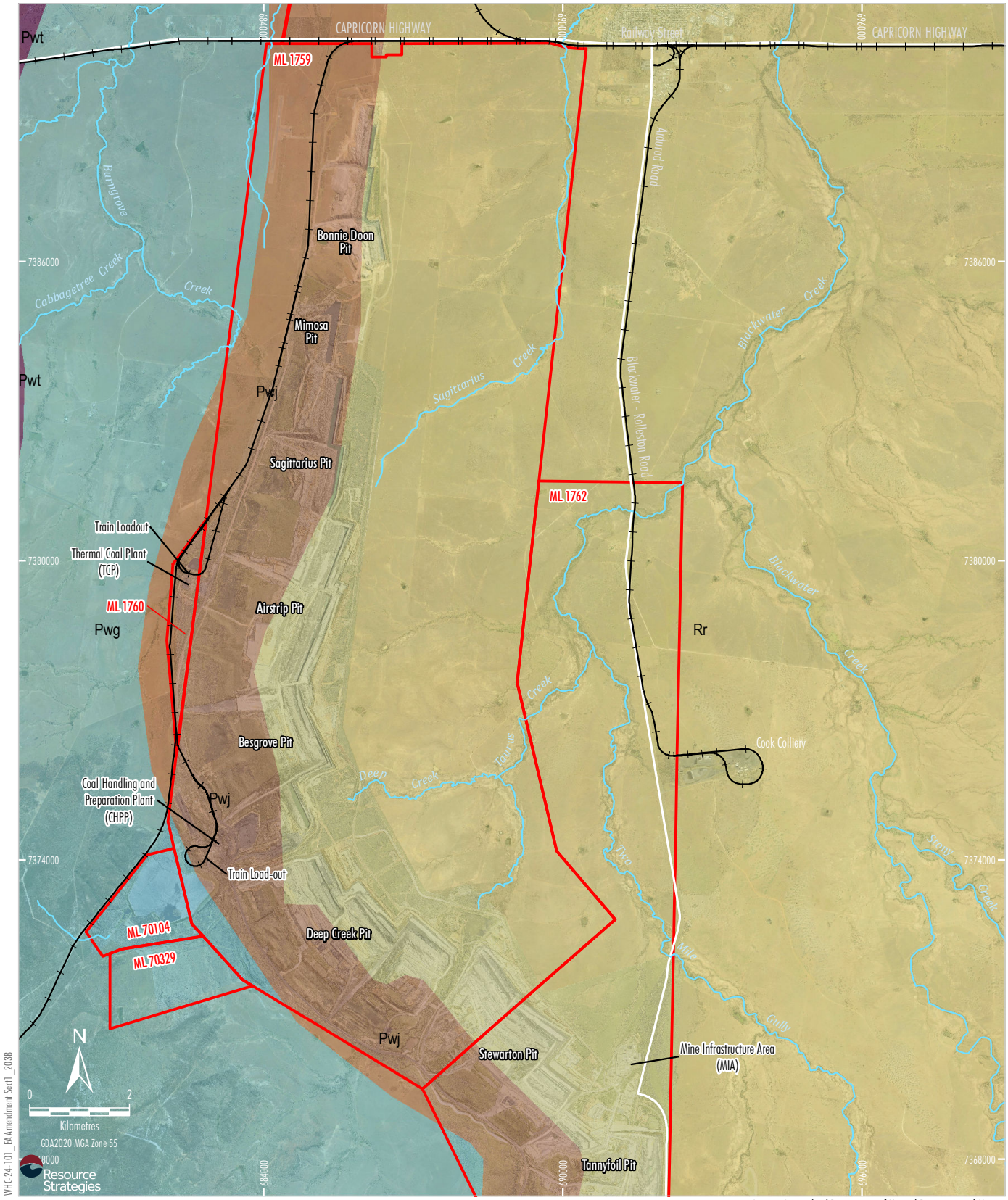
The existing BWM operates 24 hours per day, seven days per week. Nominal shifts start and finish times are as follows:

- Administration Personnel – 7.00 am to 4.00 pm weekdays.
- Mining Operations (Day) Personnel – 6.00 am to 6.00 pm.
- Mining Operations (Night) Personnel – 6.00 pm to 6.00 am.

Start/finish times are staggered to enable smooth transition of the workforce between shifts.

Operational Workforce Accommodation

Approximately 40% of the existing workforce lives within the CHRC LGA. The BWM workforce utilises local housing, including in Blackwater and Emerald, along with workforce accommodation villages in Blackwater.



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse

Stratigraphic Unit

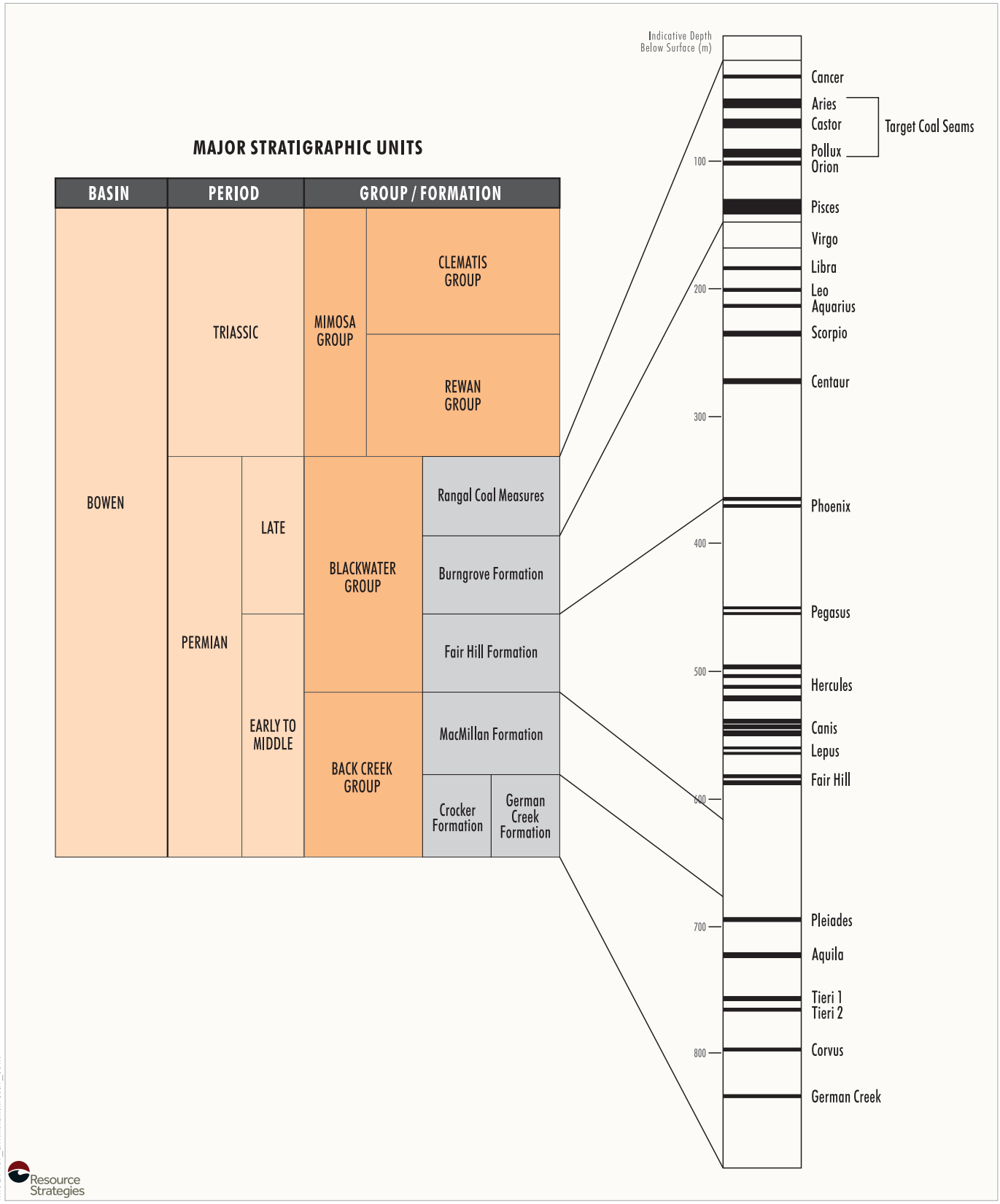
- Pwg — Burngrove Formation
- Pwt — Fair Hill Formation, Fort Cooper Coal Measures
- Pwj — Rangal Coal Measures, Bandanna Formation, Baralaba Coal Measures
- Rr — Rewan Formation

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Regional Geology

Figure 1-3



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Resource Strategies

Source: Whitehaven (2025)

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Representative Stratigraphic Column

Figure 1-4

Table 1-1
Primary BWM Components

Primary BWM Component	Feature Name
Open Cut Pits and Waste Rock Emplacements	– Boonie Doon Pit. – Mimosa Pit. – Sagittarius Pit. – Burngrove Pit. – Airstrip Pit. – Besgrove Pit. – Deep Creek Pit. – Stewarton Pit. – Tannyfoil Pit. – Wilpeena Pit. – Blackdown Pit. – Terang Pit. – Kenmare Pit. – Laleham Pit. – Togara Pit. – Marshmead Pit.
Historic Underground Mining Areas	– Kenmare 1 and 2. – Laleham. – Sirius Creek No. 1 and No. 2. – Ballamoo. – Clutha Trial Mine.
Stockpiles	– ROM coal stockpiles. – Coal stockpiles. – Topsoil stockpiles.
Dams	– Mine-affected water (MAW) dams. – Sediment dams. – Process water dams. – Raw water dams.
Tailings Storage Facilities and Rejects	– Boonie Doon TSF (in-pit). – North Coal Processing Plant (NCPP) TSF. – Ramp 72 TSF. – Laleham TSF (rehabilitated). – Ramp 74 TSF (in-pit). – Bottom Dam TSF (and ROM3 Rejects Area). – Ramp 36 Rejects.

Table 1-1 (Continued)
Primary BWM Components

Primary BWM Component	Feature Name
Creek Diversions	– Deep Creek Diversion. – Sirius Creek Diversion. – Taurus Creek Diversion. – Burngrove Creek Diversion. – Rockland Creek Diversion.
Processing Infrastructure	– NCPP. – South Coal Processing Plant (decommissioned). – TCP. – Conveyors and transfer stations. – Stackers and reclaimers.
Rail Infrastructure	– Rail line. – Train load-out facility. – Conveyors.
General Infrastructure	– Administration buildings. – Warehouses. – Workshops and associated infrastructure.

Whitehaven's Queensland Site Transport and Accommodation Policy provides incentive for workers living in the local area. Where eligible, housing is provided to employees in Blackwater or rental subsidies for employees who rent within 50 km of Blackwater or Emerald.

Mine Infrastructure Area

The existing mine infrastructure area (MIA), offices and workshops are located south of the Project (Figure 1-5) and include but are not limited to:

- heavy vehicle workshop (including a lubricant bay, boiler making shed and tyre bay);
- emergency response and paramedic facilities;
- administration facilities;
- warehouse and light vehicle parking and delivery facilities;
- fuel and liquid petroleum gas;
- storage facilities;
- waste transfer station;
- light and heavy vehicle roads;
- substation and electricity distribution infrastructure;
- vehicle wash facilities;
- sewage treatment plant; and
- other associated minor ancillary infrastructure.

1.2.5 COAL HANDLING AND TRANSPORT

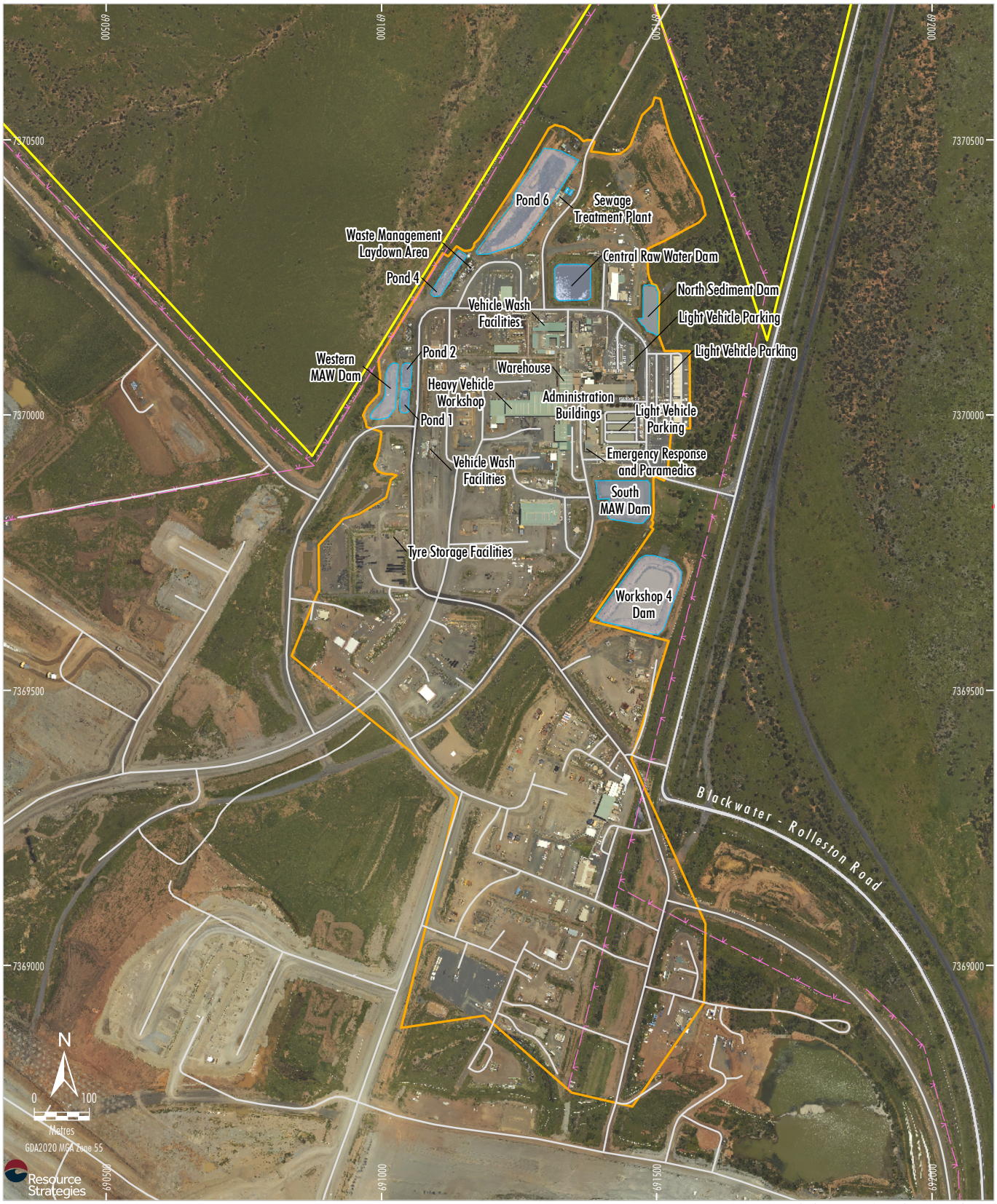
The existing BWM includes ROM coal stockpile and crushing facilities, CHPP, TCP, product stockpiles and train load-out facilities. A schematic of the coal processing and handling process at the BWM is shown in Figure 1-6.

Coal Handling and Processing

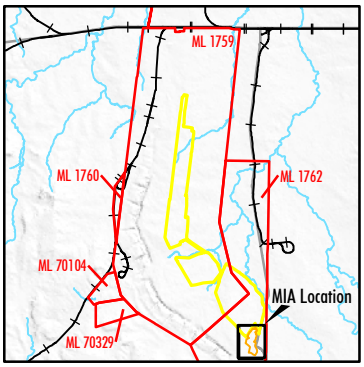
The existing CHPP is located west of the Project area. ROM coal mined at the existing BWM is handled and processed at the CHPP.

The CHPP employs conventional dense medium and microcell froth flotation circuits and operates on a 24 hours a day, seven days a week routine, shutting down only for maintenance periods. BWM also includes a small TCP, which crushes and sizes the ROM coal for sale as thermal coal (i.e. no washing of the ROM coal is required).

The CHPP and TCP together have existing capacity to process up to 19 million tonnes per annum (Mtpa) of ROM coal to produce a total of up to 17.6 Mtpa of product coal.



WHC-24-101_EA Amendment Sect1_204C



LEGEND
- Mining Lease
- Proposed Project Area
- Indicative MIA Extent
- Waterbody
- Road
- Powerline

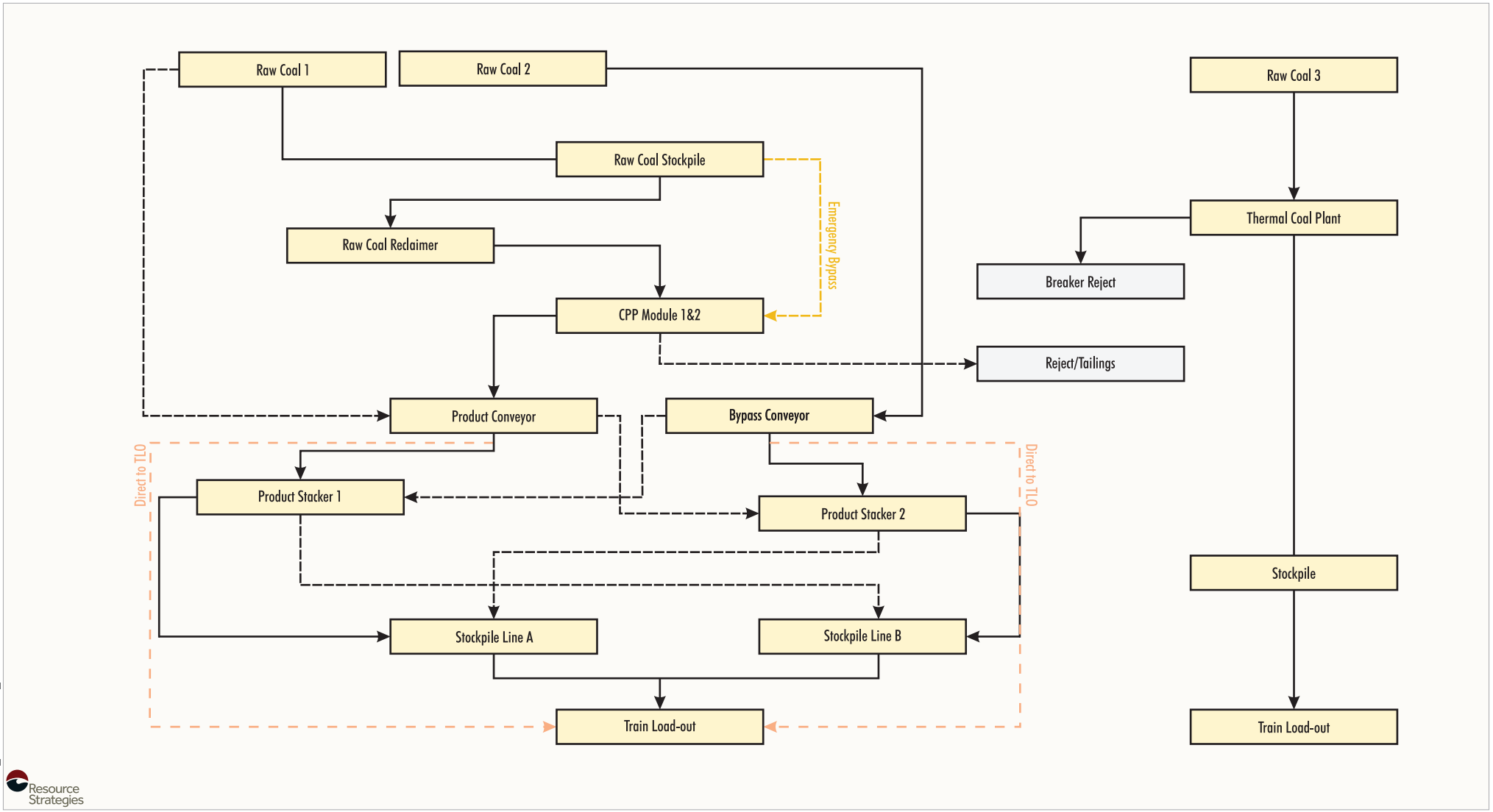
Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Whitehaven (2025)

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

BWM Mine Infrastructure Area
General Arrangement

Figure 1-5



WHC-24-101_EA Amendment Sect1_002B

Resource Strategies

Source: Whitehaven (2025)

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Coal Processing and Handling
Process Schematic

Figure 1-6

Train Load-out Facilities

Product coal is transported offsite via the existing BWM train load-out facilities and the existing export rail network operated by Aurizon connecting Blackwater to the Port of Gladstone (the Blackwater Rail System).

Coal Reject Management

Coarse rejects from the CHPP are co-disposed with waste rock in accordance with the BWM EA (e.g. placed into disused mine ramps and in-pit waste rock dumps and progressively buried consistent with existing operations).

Tailings are disposed into an approved TSF, in-pit void or other disposal options in accordance with the EA.

Waste Rock Management

Waste rock is emplaced behind advancing mining operations within in-pit waste rock dumps. In-pit waste rock dumps are progressively shaped for rehabilitation activities (e.g. final landform contouring, soil placement and revegetation).

Waste rock produced by mining is preferentially placed in-pit within previously mined areas to progressively backfill the open cut pits.

Mining Methods and Equipment

BWM is an open cut mining operation that uses conventional open cut strip mining techniques.

The mining process involves land clearing, the removal and stockpiling of topsoil material, drilling and blasting of overburden and interburden as required, stripping of overburden and interburden material utilising a combination of draglines, dozers and/or truck/shovel/excavator operations.

Mining Methods and Equipment

Overburden and interburden is removed to uncover coal from the pit and is relocated to backfill the mined-out pits (as in-pit waste rock dumps) as mining advances. Coal is excavated from the pit via loader/excavator and trucked via mine haul truck to the CHPP or the TCP.

ROM coal is hauled from the pits to the CHPP ROM area, or to designated interim stockpiles and subsequently rehandled and hauled to the CHPP or TCP. The ROM coal is processed at the CHPP to produce a predominantly hard coking coal product (referred to as either Blackwater Coke or Blackwater Weak), for the export market. In addition, some coal is processed at the TCP to produce thermal coal for export.

Product coal is loaded onto coal trains via an existing train load-out facility located adjacent to the CHPP and product stockpiles.

The mining sequence for the existing BWM can be summarised as follows:

1. Progressive land clearing and topsoil removal.
2. Stockpiling topsoil from disturbed areas for storage and use in future rehabilitation of the site.
3. Drill and blasting of overburden/interburden material (including through seam blasting).
4. Pre-stripping/excavation of overburden material using excavators/shovels and trucks, draglines and dozers.
5. Side casting of lower overburden into the previously mined strip using a dragline.
6. Removal of overburden/interburden and placement in the in-pit waste rock dumps.
7. Loading and hauling of ROM coal using a combination of excavators, loaders and trucks.
8. Progressive rehabilitation of completed waste rock dump areas, including reshaping dumps, topsoiling/alternate growth media and revegetation in accordance with EA requirements and the Progressive Rehabilitation and Closure Plan (PRCP).
9. Final voids remain at the conclusion of mining with final rehabilitation and closure activities commencing once mining has ended.

Open Cut Extent

BWM consists of a series of open cut mining pits along an approximately 80 km long strike length.

Open cut mining occurs in multiple pits across the deposit with mining direction and methodology determined based on geological complexity, depth, and other constraints.

Mining from multiple pits is required to maintain productivity across structurally complex mining environments, to reduce fleet interactions and to maximise blending opportunities to meet product specifications.

The typical pit design criteria at BWM are summarised in Table 1-2.

Table 1-2
BWM Typical Pit Design Criteria

Detail	Criteria
Strip Width	60 to 70 m
Highwall Bench Angle[1]	45 to 70 degrees
Highwall Berm	10 to 30 m
Low wall Angle[1]	37 degrees

[1] Overall wall angles are lower slope.

Telecommunications

High speed telecommunication data services are provided to the BWM and coal mines in the Bowen Basin via an existing fibre optic network.

Explosives Magazines and Reload Facilities

Explosives magazines and reload facilities are currently used for the BWM. These facilities are relocated progressively during the mine life to remain in close proximity to active pits.

Disturbance Area

The approved disturbance footprint is shown in Figure 1-2.

The existing BWM has an approved disturbance footprint of approximately 32,230.5 hectares (ha).

Sewage

Sewage treatment comprises three existing plants, located at the MIA, CHPP and decommissioned South Coal Processing Plant. Effluent from the sewage treatment plants is managed in accordance with EA EPML00717813.

Treated sludge is removed off-site by a licenced waste management contractor. Sludge or septic waste that is generated in-field shall be pumped out by the licenced waste management contractor and taken to the on-site sewage treatment plant for processing.

Exploration Activities

Exploration activities (including geotechnical investigations) currently occur at BWM to progressively refine the understanding of geological features, seam structure, and coal/overburden characteristics, providing input to detailed mine planning and engineering, and inform mine closure planning.

Exploration activities currently include the investigation of potential construction material borrow pits within the indicative surface disturbance extent. Exploration activities also comprise drilling, test pits, surface mapping, and airborne and ground based geophysical surveys.

Current exploration drilling activities only disturb a small surface area and involve the use of typical surface drilling rigs and supporting equipment.

Monitoring Activities

A collection of environmental baseline data and monitoring of impacts currently occur at the existing BWM in accordance with relevant management plans.

1.2.6 EXISTING TRANSPORT INFRASTRUCTURE

Road Infrastructure

The existing major road transport routes in the vicinity of the Project area are the Capricorn Highway and Ardurad Road. The Capricorn Highway links the BWM to major towns and cities including Blackwater, Emerald and Rockhampton.

Site Access and Internal Roads

BWM is accessed via the Whitehaven owned Blackwater CHPP access road to the BWM CHPP and Ardurad Road access route to the MIA. Both routes cross the Bauhinia Railway at level crossings that are proximate to Capricorn Highway, which links BWM to major towns and cities including Blackwater, Emerald and Rockhampton.

Internal light vehicle back access roads are run north to south and are located to the east of the high wall. This road would be relocated further to the east as mining progresses, to ensure they remain within a certain distance (less than [<] 2 km) of the high wall.

The heavy vehicle haul road is located to the west of the pits and runs north to south of the mine. This haul road allows direct access from the active pits to the NCPP or TCP.

Corridor access roads run west to east, extending from haul roads on the western site of BWM. They are periodically extended to the east. As with back access roads, corridor access roads are extended along with the corridor road depending on the mine plan for individual ramps.

Rail Infrastructure

Rail access in the region is serviced by the Queensland Blackwater Railway System which primarily transports coal from the Bowen Basin to the Port of Gladstone.

Product coal from BWM is currently transported via rail to the Port of Gladstone from the BWM train load-out facilities.

Port/Sea Infrastructure

The Port of Gladstone is located approximately 250 km to the south-east of the Project and is used by the existing mine to export coal from the BWM to international customers.

Air Infrastructure

Emerald Airport is the closest major regional airport located approximately 65 km west of the BWM. It is the primary airport used for Fly-In Fly-Out (FIFO) workers. Rockhampton Airport is the next closest major regional airport located approximately 170 km north-east of the BWM.

Blackwater Airport (Whitehaven owned) is the closest local airport located within the BWM MLs and can currently only accommodate emergency services use.

1.2.7 WATER MANAGEMENT

Surface Water

The existing surface water management infrastructure includes clean water dams, mine affected water (MAW) dams and erosion and sediment control (ESC) structures. MAW is sent to inactive pits for storage, where it is used for various site demands as required. MAW is also stored across BWM in dust suppression fill points, environmental dams, tailings dams and MAW release dams including New Deep Creek Dam and New Taurus Creek Dam (WRM Water & Environment Pty Ltd [WRM], 2026; Appendix B).

Water is supplied to BWM via Bedford East and Bedford West pipelines from BWM water allocations (Appendix B). BWM has allocations to draw a maximum of 678 megalitres and 1,603 megalitres per annum of water from the Bedford East and Bedford West pipelines respectively (Appendix B).

Water for potable purposes is sourced via pipeline and treated on site at separate treatment facilities for the Central, Southern and CHPP areas of the mine (Appendix B). The raw water for potable purposes is sourced from the Mackenzie River at the Bedford Weir pumping station (Appendix B).

Pipelines are used to transfer MAW during dewatering and between storages (Appendix B).

BWM has licenced creek diversions in place to allow for the continuation of mining and/or diverting water away from active mining areas. The current creek diversions are as below:

- Deep Creek;
- Sirius Creek;
- Taurus Creek;
- Burngrove Creek; and
- Rockland Creek.

Key water management activities and associated infrastructure are summarised in Table 1-3. Water is supplied/produced for the existing BWM operations from the following sources:

- rainfall runoff captured in onsite water storage facilities;
- incidental groundwater in mining pits; and
- external pipeline water supply.

External pipeline water supply is provided via the existing external pipeline water network supplying BWM supplemented by the capture of rainfall runoff which forms part of the sites MAW inventory. External pipeline water is supplied from the Fitzroy River catchment via Fairbairn Dam and the Bedford Weir on the Mackenzie River. MAW is prioritised over external pipeline water to meet the operational demands of the BWM. External pipeline water allocation for the current BWM operation is 2,281 megalitres per year (HydroBalance, 2026; Appendix B).

Table 1-3
Existing BWM Water Management Overview

Activity	Infrastructure	Description
Pit dewatering	Highwall pumps and pipelines	Pumps exist in all major operational pits to dewater pit floors of water accumulated from groundwater ingress and rainfall events. Water is transferred via backbone pipelines to designated water storages. These pipelines are located both on the east (along the corridor road) and west (along the haul road) of the pits and are relocated as the pits progress. A backbone pipeline refers to a pipeline that receives inflow from multiple smaller pipelines and delivers this to key storages in the site's mine water management system (WMS) for use, management and release in accordance with the EA.
Water transfer to storages/release point	Backbone pipelines, transfer pumps and staging dams	Cross-site transfers occur via backbone pipelines and are staged across various dams including Tannyfoil Dam and New Taurus Creek Dam.
Water storage	Dedicated dams, and water storage pits	MAW is currently sent to inactive pits for storage where it is called on to meet the various site demands as required. MAW is also stored across the site in dust suppression fill point dams, environmental dams, and release dams.
Release to environment	Release gates, release dam storage capacity	Controlled mine water releases are made from the existing release points as per the current EA.
Flood management	Diversion drains and levees	A number of waterways intersect the existing mining area, notably Deep Creek and Taurus Creek. which also have constructed licenced diversions. Water is conveyed downstream, from upstream undisturbed areas, along existing watercourses and/or diversions between mining areas. The potential for flood ingress from clean catchments into mining areas is managed through flood levees. Small diversion drains and bunding also divert clean catchments from minor tributaries around mining areas.
Groundwater management	Groundwater bores	There are no groundwater extraction bores required for the existing mining operations at BWM.
Water quality management	Environmental dams, ESC structures	The current operations utilise environmental dams and ESC devices to progressively manage water which comes in contact with disturbed areas of the BWM.

The existing BWM primary water demands include:

- coal processing at the CHPP;
- dust suppression; and
- potable water for drinking, fire suppression, workshops and related employee facilities.

Groundwater

There are no groundwater extraction bores required for the existing mining operations at BWM.

1.2.8 ENERGY INFRASTRUCTURE

Electricity supply to BWM is via the existing connection to the Queensland electricity grid at the combined Powerlink/Ergon Energy 132/66 kilovolt (kV) Rangal Substation, located on the Capricorn Highway and adjacent to the northern BWM ML.

Whitehaven owns and operates the overhead ETL from the Rangal Substation to and throughout the existing BWM leases. The BWM connection is via a 66 kV transmission line.

The BWM internal electricity network comprises a main line and stub lines to the mining areas (e.g. for dragline use).

1.2.9 WASTE MANAGEMENT

The transportation, handling and storage of dangerous goods at the existing BWM is done in accordance with the existing *BWM Plan – Waste Management Plan*, which satisfies the requirements of the EP Act.

BWM has an established landfill on site which is managed in accordance with BWM EA EPML007178313, which authorises the disposal of general waste on site.

1.3 Project Overview

Whitehaven Blackwater is seeking an amendment of EA EPML00717813 to extend open cut operations within the northern section of the BWM to the east of current operations until approximately 2055 at an extraction rate of up to 19 Mtpa.

The focus of the Project would be on the proposed areas and activities within SA 7 and SA 10, which are located within ML 1759 and ML 1762.

The Project would include the following main components:

- extension of open cut operations into SA 7 on ML 1762 and SA 10 on ML 1759 to allow mining of additional coal reserves to approximately 2055;
- extraction of an additional 200 million tonnes (Mt) (approximately) of ROM coal;
- continued extraction of up to 19 Mtpa of ROM coal;
- continued use of existing BWM infrastructure (e.g. CHPP, TCP, ROM and product coal stockpiles, train load-out, water management, tailings management and other supporting infrastructure);
- construction and operation of new water management and water storage infrastructure in support of extended mining operations;
- development of waste rock emplacement areas;
- continued co-disposal of coarse rejects with waste rock and disposal of tailings into an approved TSF or in-pit void;
- construction of semi-permanent tailings cells to be utilised for the disposal of fine rejects;
- progressive rehabilitation of the Project;
- ongoing exploration activities in the Project area; and
- other associated infrastructure, equipment and activities.

The approximate extent of additional surface disturbance associated with the Project is shown on Figure 1-7. The approximate extent of the Project open cut mining components (including open cut pits, waste rock emplacements, coal rejects emplacement structures and residual voids) are shown on Figure 1-7.

Whitehaven Blackwater owned land and mining and exploration tenements in the Project area are shown on Figure 1-8 and 1-9.

A detailed description of the Project is provided in Section 2.

1.4 Consultation

Consultation has been conducted with relevant stakeholders during the preparation of this EA Amendment Supporting Document. A summary of this consultation is provided below. It is anticipated that consultation with these stakeholders would continue during the assessment of the Project by the Queensland and Commonwealth Governments.

1.4.1 DEPARTMENT OF THE ENVIRONMENT, TOURISM, SCIENCE AND INNOVATION

On 16 July 2025, Whitehaven Blackwater lodged a draft Initial Advice Statement to the DETSI. On 28 July 2025, the DETSI advised that an EIS would not be required for the Project and instead a Major EA Amendment would be the required assessment pathway.

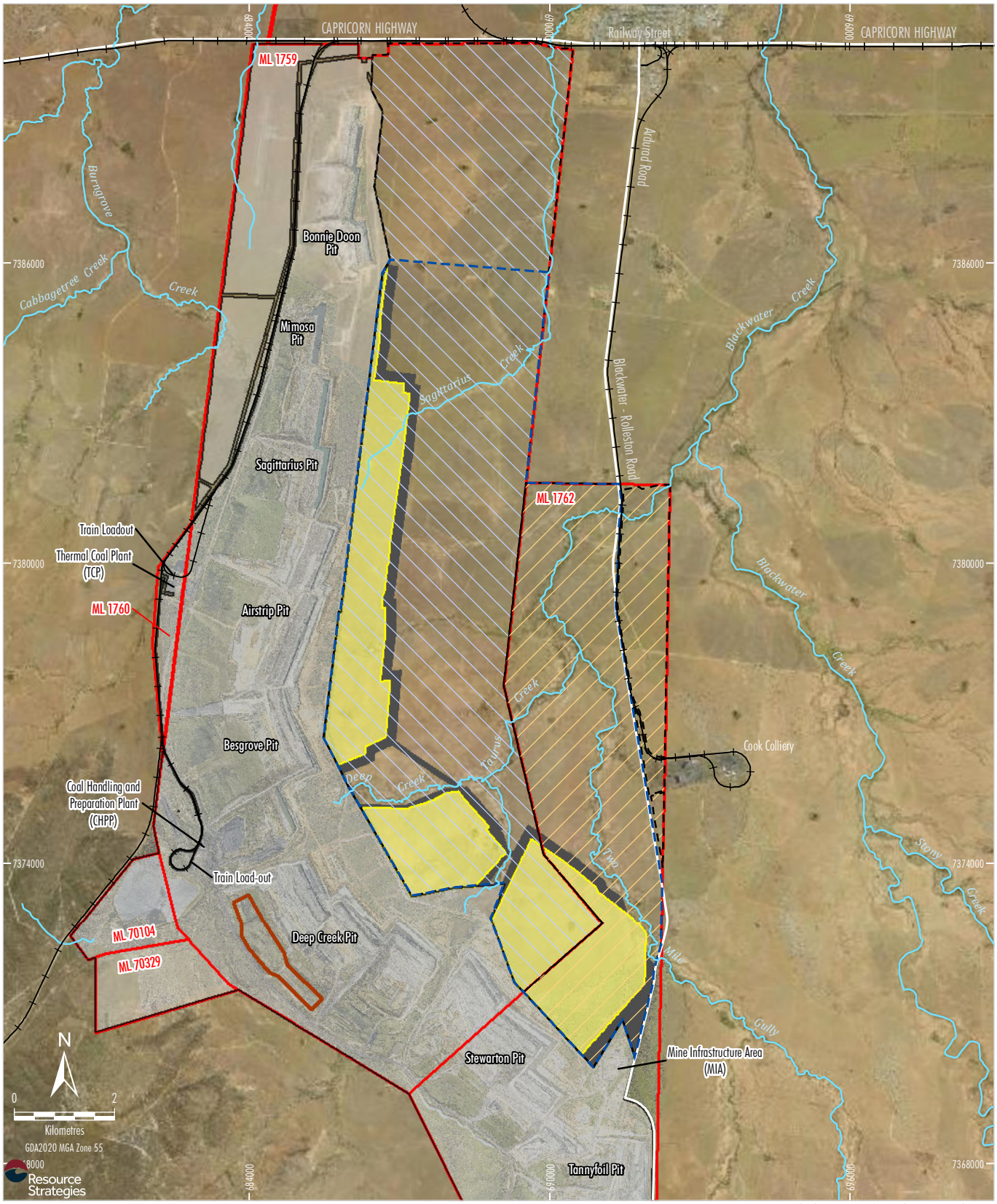
Subsequently, on 15 August 2025, Whitehaven Blackwater lodged an application to the DETSI under section 73 of the EP Act. On 12 September 2025, the DETSI provided a section 73 decision notice confirming that an EIS is not required for the Project.

On 30 March 2026, Whitehaven Blackwater held a pre-lodgement meeting with the DETSI to discuss the Project and the scope of works undertaken as part of this EA Amendment Supporting Document.

1.4.2 COMMONWEALTH DEPARTMENT OF CLIMATE CHANGE, ENERGY, THE ENVIRONMENT AND WATER

On 1 September 2025, Whitehaven Blackwater met in person with the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW). The Commonwealth DCCEEW supported the decision to withdraw a previous *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Referral lodged by BHP Mitsubishi Alliance (previous owners of the BWM) and lodge a new Referral to support the proposed Project.

On 30 September 2025, the Commonwealth DCCEEW attended a site visit of the BWM with Whitehaven Blackwater. During the site visit, the Commonwealth DCCEEW was shown key operational areas of the existing BWM as well as the proposed Project area.



LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint
- SA 7
- SA 10

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area
- Potential Semi Permanent Tailings Cell

Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

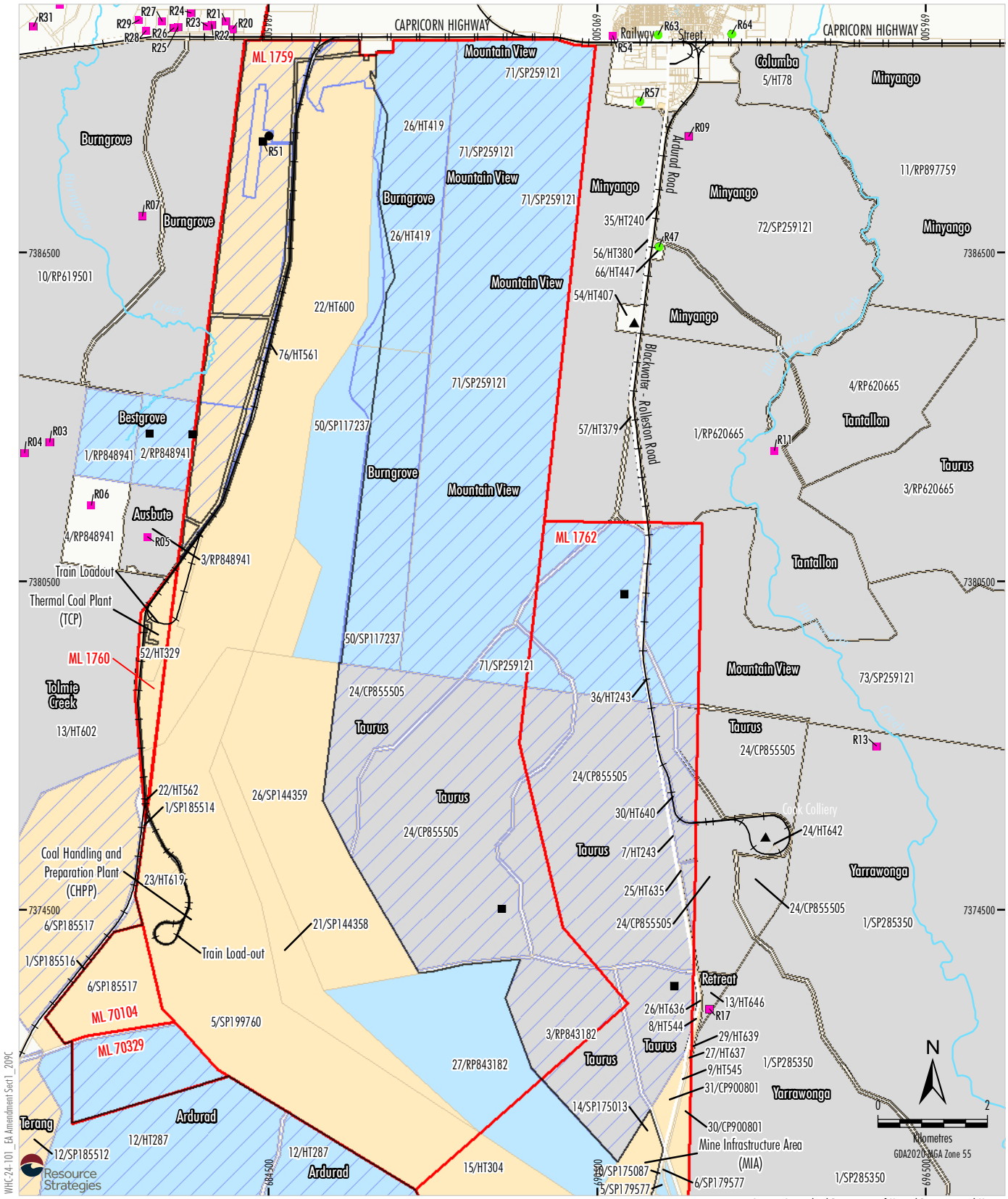
Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Project General Arrangement

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Figure 1-7



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Property Boundary
- Approved Disturbance Footprint
- Rural Property Name
- Lessee or Agistee Boundary
- Whitehaven Freehold Land
- Whitehaven Leasehold Land

Sensitive Receiver
- Community
- Private

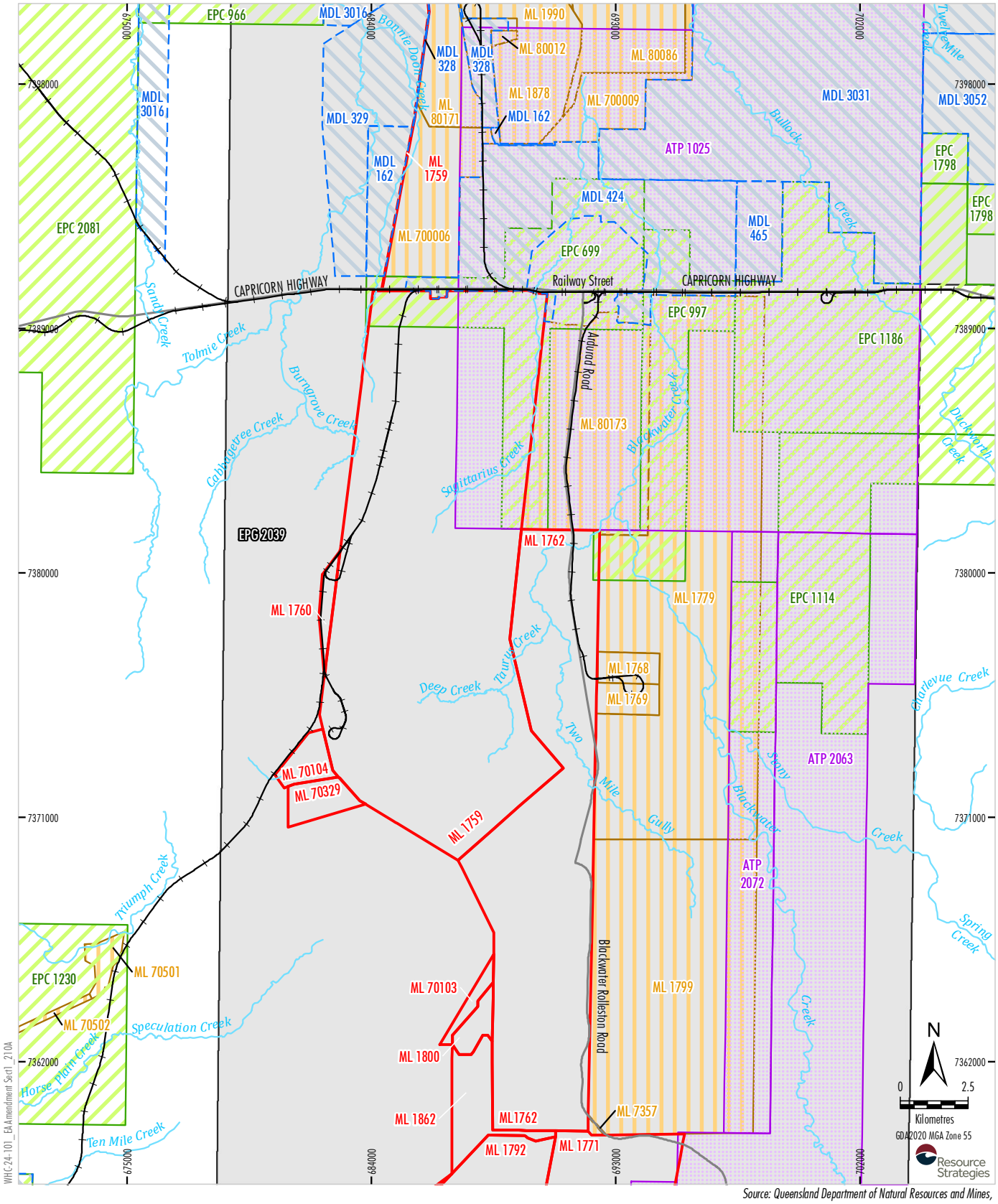
Non-sensitive Receiver
- Mine-owned or Privately-owned
- Under Agreement
- Commercial
- Community

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Relevant Key Cadastral Boundaries and Underlying Properties

Figure 1-8



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)

LEGEND
- Blackwater Mining Leases
- Railway
- Road
- Watercourse
- Mining Leases
- Mineral Development Licence
- Exploration Permits for Petroleum
- Exploration Permits for Coal
- Exploration Permits for Geothermal

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Relevant Mining and Petroleum Tenements

Figure 1-9

On 31 March 2026, Whitehaven Blackwater held a pre-lodgement meeting with the Commonwealth DCCEEW to discuss the EPBC Act Referral.

1.4.3 CENTRAL HIGHLANDS REGIONAL COUNCIL

Whitehaven Blackwater would continue consultation with the CHRC post lodgement of this EA Amendment Supporting Document.

1.4.4 ABORIGINAL COMMUNITY

Consultation with the Aboriginal Community regarding the Project would continue to be undertaken during the assessment of this EA Amendment Supporting Document.

1.4.5 SURROUNDING LANDHOLDERS AND LOCAL COMMUNITY

Two representatives from Whitehaven attended the Blackwater Community Reference Group on 26 March 2026 to inform the local community of the Project. A Project factsheet was prepared and distributed at the Community Reference Group (Attachment 3). Overall, community members present reacted positively to the Project.

Whitehaven Blackwater would continue consultation with the surrounding landholders and local community post lodgement of this EA Amendment Supporting Document including further distribution the Project factsheet (Attachment 3).

1.5 Relevant Legislation and Policy Requirements

Table 1-4 describes the principal statutory approvals relevant to mining projects and establishes their relevance to the Project. The list of approval requirements in Table 1-4 is confined to principal approval requirements and is not an exhaustive list of all approval requirements for the Project.

Whitehaven Blackwater is seeking approval of the Project through a major amendment of the EA in accordance with Chapter 5, Part 7 of the EP Act.

Under section 230 of the EP Act, the administering authority (DETSI) must require public notification of the EA Amendment Application (for the Project), if:

(a) an amendment application is for an environmental authority for a resource activity; and

(b) the assessment level decision is that the amendment is a major amendment.

Given the above, public notification of the Project under Chapter 5, Part 4 of the EP Act would be required.

1.6 Document Structure

This EA Amendment Supporting Document comprises a main text component and supporting attachments and appendices. An overview of the main text is presented below.

Section 1 Introduction

Provides an introduction to the approved BWM, the Project and the function of this EA Amendment Supporting Document as part of the assessment and approvals process.

Section 2 Project Description

Describes the various components and stages of development of the Project.

Section 3 Project Justification and Alternatives

Details the justification for the Project and potential alternatives.

Section 4 Environmental Assessment

Details the environmental assessment undertaken for the Project.

Section 5 Rehabilitation

Describes the rehabilitation strategy for the Project.

Section 6 Summary of Environmental Management Commitments

Provides a consolidated description of the commitments to implement management measures for the Project.

Section 7 Proposed Environmental Authority Condition Amendments

Lists the EA conditions proposed to be amended to support the Project and continued mining at BWM.

Section 8 References

Lists the documents referenced in Sections 1 to 7 of the EA Amendment Supporting Document.

Attachments to the main text are provided as follows:

Attachment 1	Environmental Protection Act Requirements – Reconciliation Table
Attachment 2	Environmental Impact Statement Triggers
Attachment 3	Consultation – Project Fact Sheet
Attachment 4	Groundwater Assessment Peer Review

Appendices A to I contain the supporting documentation referred to throughout this EA Amendment Supporting Document, including a number of specialist/technical reports:

Appendix A	Soils and Land Suitability Assessment
Appendix B	Surface Water Assessment
Appendix C	Groundwater Assessment
Appendix D	Terrestrial Ecological Assessment
Appendix E	Aquatic Ecology and Groundwater-Dependent Ecosystems Assessment
Appendix F	Air Quality Assessment
Appendix G	Greenhouse Gas Management and Abatement Plan
Appendix H	Noise and Blasting Assessment
Appendix I	Geochemistry Assessment

Table 1-4
Potential Statutory Approvals Required for the Project

Legislation	Approval	Approval Trigger	Relevance to Project	Administering Authority	Within Scope
Queensland Government Approvals					
Mineral Resources Act 1989 (MR Act) (Chapter 6)	Mining Lease	A ML under the MR Act is required to permit the conduct of specified mining and associated activities within the ML.	Surface rights have been granted on ML 1762 (including SA 7) and ML 1759 (including SA 10) under the MR Act, which provide rights to access minerals in the Project area. No further approval or grant of mining tenure is required under the MR Act.	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (DNRMMRRD)	Existing ML 1762 and ML 1759 to be utilised for the Project.
EP Act (Chapter 5, Part 7)	Amended EA	An amendment to the existing BWM EA EPML00717813 is required for the Project (section 226 of the EP Act). The amended EA would authorise the Project, and in particular, activities under the EP Act on areas within SA 7 on ML 1762 and SA 10 on ML 1759. It is considered that the Project would be a major amendment given that the scale of works proposed would exceed the minor amendment threshold.	The EA covers the Project area, however EA Condition E23 currently prohibits coal mining (other than certain activities) within SA 7 on ML 1762 and SA 10 on ML 1759. Environmentally Relevant Activities (ERAs), including mining black coal (Schedule 3, 13), would be conducted as part of the Project. The EA Amendment application is required to be prepared in accordance with the requirements of section 226 of the EP Act.	DETSI	Yes

Table 1-4 (Continued)
Potential Statutory Approvals Required for the Project

Legislation	Approval	Approval Trigger	Relevance to Project	Administering Authority	Within Scope
Queensland Government Approvals (Continued)					
EP Act (section 126D) (Continued)	PRCP Schedule	A PRCP and its supporting schedule must be prepared, submitted, and approved before Whitehaven Blackwater may carry out any activities under the EA.	The PRCP and its supporting schedule must collectively set out the relevant activities and their duration, including: – a detailed description including maps of how and where the activities are to be carried out; – details of the consultation undertaken by Whitehaven Blackwater in preparing the plan and to be carried out moving forward; – the extent to which the PRCP is consistent with local and State planning and the outcomes of consultations; – for each post-mining land use (PMLU), the proposed methods and techniques for rehabilitation to a stable condition (noting the rehabilitation milestones (RMs) set out in the schedule to the PRCP); – the risk of not achieving a stable land condition – and how that risk is to be minimised; – the proposed management and rehabilitation plan for each non-use management area (NUMA); and – detailed RMs to achieve the rehabilitation objectives of the PRCP.	DETSI	Yes

Table 1-4 (Continued)
Potential Statutory Approvals Required for the Project

Legislation	Approval	Approval Trigger	Relevance to Project	Administering Authority	Within Scope
Queensland Government Approvals (Continued)					
Nature Conservation Act 1992 (NC Act) *Nature Conservation (Plants) Regulation 2020*	Protected Plant Clearing Permits	'Protected plant clearing permit' is required if: – the area to be cleared is within a 'high risk area'; or – Whitehaven Blackwater is aware of any endangered, vulnerable or near threatened (EVNT) species within the area to be cleared. Whether an area is 'high risk' is determined by the 'flora survey trigger map' which allocates certain areas where EVNT species are known or likely to exist. If an area to be cleared is not identified on a flora survey trigger map as a high-risk area, a flora survey is not required. If clearing is proposed in an area that is not identified as a high-risk area, however, Whitehaven Blackwater becomes aware that there are plants that are an EVNT species within the area to be cleared, and the plants would be taken by the proposed clearing or there would be clearing within 100 m of the plants, then a protected plant clearing permit is required. An 'exempt clearing notification' must be submitted to the DETSI within one year of a flora survey being undertaken and at least one week prior to commencement of clearing where: – the clearing activities are to be carried out in a 'high risk area'; and – a flora survey has been carried out and did not identify any EVNT species within the area.	Flora survey trigger maps for clearing protected plants, obtained for the land underlying the Project, indicate that there are no high-risk areas. The flora survey trigger map must be reviewed every 12 months and can be amended by the DETSI at any time to add or remove a high-risk area. Under the *Nature Conservation (Plants) Regulation 2020*, a current flora survey trigger map obtained for checking an area to be cleared is valid for 12 months from the day the person obtains a copy of the map either online or from the chief executive. Ecological surveys of the Project area have ground-truthed the presence of *Solanum elachophyllum* (E2M Pty Ltd [E2M], 2026), therefore a Protected Plant Clearing Permit would be required.	DETSI	Yes

Table 1-4 (Continued)
Potential Statutory Approvals Required for the Project

Legislation	Approval	Approval Trigger	Relevance to Project	Administering Authority	Within Scope
Queensland Government Approvals (Continued)					
Water Act 2000 (Water Act) (Chapter 3) *Water Legislation Amendment Act 2016* MR Act (section 334ZP)	Exercise of Underground Water Rights	Chapter 3 of the Water Act then deals with the management of water related impacts resulting from such an exercise of underground water rights, including where the exercise of underground water rights had happened prior to the commencement of the *Water Legislation Amendment Act 2016* per s1283 of the Water Act.	The exercise of underground water rights occurred on ML1759 and ML1762 prior to the commencement of the *Water Legislation Amendment Act 2016* (per correspondence to the Department of Environment and Heritage Protection (DEHP) (now the DETSI) on 3 March 2017). No additional water licence or Underground Water Impact Report is required for the Project.	Department of Local Government, Water and Volunteers	Underground Water Rights have been exercised on ML 1759 and ML 1762
Environmental Offsets Act 2014 (EO Act) (sections 10 and 18)	Approval of notice of election and offset delivery plan	A significant residual impact on a prescribed environmental matter.	Where an activity has a significant residual impact on a prescribed environmental matter, an environmental offset may be required, to counterbalance this impact. The EO Act establishes the framework for delivery of environmental offsets at the State level. Any applicable offsets would be conditioned as part of the amended EA EPML00717813.	DETSI	Yes
Aboriginal Cultural Heritage Act 2003	*Cultural Heritage Management Agreement* (CHMA)	Activity that has the potential to harm places, artefacts, and landscapes of Aboriginal cultural heritage.	The Project would include vegetation clearance and earthworks. Whitehaven Blackwater has an existing CHMA with the Ghungalu People and Kangoulu People (representatives of the Gaangalu Nation People). This CHMA would continue to be utilised for the Project.	Department of Women, Aboriginal and Torres Strait Islander Partnerships and Multiculturalism	Existing BWM CHMA to be utilised for the Project.

Table 1-4 (Continued)
Potential Statutory Approvals Required for the Project

Legislation	Approval	Approval Trigger	Relevance to Project	Administering Authority	Within Scope
Commonwealth Government Approvals					
Native Title Act 1993	Indigenous Land Use Agreement (ILUA) or other agreement with Aboriginal Party.	Native Title claim and negotiation process triggered.	Existing ILUA (QI2001/035) with Ghungalu and Kangoulu People.	National Native Title Tribunal	Existing BWM ILUA to be utilised for the Project.
EPBC Act	EPBC Act Referral and approval	Referral to the Commonwealth Minister of Environment is required if the Project may have a significant impact on Matters of National Environmental Significance (MNES) to determine if the Project is a 'Controlled Action' requiring approval under the EPBC Act.	Approval from the National Environmental Protection Agency (National EPA) would be required for the Project, however, this application would be submitted separately to the EA Amendment as it is not subject to the bilateral assessment agreement (as the water resources trigger would apply). Any applicable offsets would be conditioned as part of the amended EA EPML00717813 and the EPBC Act approval.	National EPA	No. Subject to separate application for the National EPA.
Local Government Approvals					
Planning Regulation 2017 (Schedule 21, Part 1), MR Act (Section 4A)	Development Application	Development approvals pursuant to the *Planning Regulation 2017*. The *Central Highlands Regional Council Planning Scheme 2016* (CHRC, 2024a) may be required for operational works (such as excavation and filling, clearing of native vegetation and works that allow taking or interfering with water), material change of use, building works and reconfiguring a lot.	All Project components are located inside the MLs and no additional planning applications are required.	CHRC	No

2 Project Description

2.1 Project Title and Objectives

The focus of the Project would be on the proposed areas and activities within SA 7 and SA 10, which are located within ML 1762 and ML 1759, respectively (Figure 1-7).

The Project would continue to use the existing infrastructure at the BWM, including but not limited to the existing CHPP, TCP and MIA.

The Project would allow mining of additional coal reserves of approximately 200 Mt of ROM coal until 2055 with an approximate Project start date of 2030, at a rate of up to 19 Mtpa ROM coal.

2.2 Project Summary

The Project is expected to optimise mining operations at BWM, allowing ongoing employment and economic benefits from the BWM to the local area, region and State of Queensland.

Table 2-1 and Figure 2-1 provide a comparison between the existing approved BWM and the Project.

2.3 General Arrangement

The Project layout has been designed to maximise recovery of the resource while minimising impacts to environmental values of significance, including Taurus Creek (and tributaries) and the ecological values along its riparian corridor.

Key components of the BWM and Project layout include (Figure 1-7):

- open cut pits;
- internal haul roads;
- access tracks;
- creek crossings;
- MIA;
- water management infrastructure (e.g. clean water diversions, mine water dams and sediment dams);
- ROM pads;
- waste rock emplacement areas; and
- temporary rehabilitation and construction material stockpiles.

The extent of the Project open cut mining area, waste rock emplacements and infrastructure areas (i.e. the Project disturbance footprint) is approximately 2,317 ha.

Indicative Project general arrangements for Financial Year (FY) 2030, FY 2032, FY 2046, FY 2050 and FY 2055 of the Project are shown in Figures 2-1 to 2-5.

These indicative general arrangements are representative of mine progression over the life of the Project and are based on the maximum production, mine progression and proximity of operations to sensitive receivers. The indicative mining layout and sequence may vary with consideration to local geologic features, coal market demands, mining economics and detailed engineering design.

The sequence of mining (Figures 2-1 to 2-5) and/or the general arrangement may also be modified throughout the life of the Project to maintain compliance with applicable conditions in the amended EA.

Infrastructure would be decommissioned at the completion of mining activities, unless an agreement to retain infrastructure is in place with relevant stakeholders, and the landform would be reshaped and revegetated to support the PMLUs. The final landform and rehabilitation strategy for the Project is described in Section 2.13 and Section 5.

A detailed description of the mining sequence and rehabilitation program is documented in the supporting PRCP as required by the EP Act. Section 2.13 and Section 5 provide more details on mine sequencing and rehabilitation progression.

2.4 Site and Locality Description

The following section gives a site description summary of the Project area.

2.4.1 REGIONAL CONTEXT

The topographic elevations in and around the Project area range from approximately 188 metres Australian Height Datum (mAHD) (north-east of the Project area) to 230 mAHD (in the south of the Project area). Most of the Project area is situated on gently undulating lowlands and plains with slopes of between 0% to 5%.

Table 2-1
Summary of Approved BWM and Proposed Project

Relevant Approval Component	Approved BWM	Proposed Project
Mining Leases	ML 1759, ML 1760, ML 1761, ML 1762, ML 1767, ML 1771, ML 1772, ML 1773, ML 1792, ML 1800, ML 1812, ML 1829, ML 1860, ML 1862, ML 1907, ML 70091, ML 70103, ML 70104, ML 70139, ML 70167 and ML 70329.	Extension of open cut mining within ML 1759 and ML 1762.
Mine Life	No specified end date in EA EPML00717813. Total coal extraction at BWM expected to cease in 2090.	Based on the additional coal reserves, continuation of mining into SA 7 and SA 10 until 2055. Total coal extraction at BWM expected to cease in 2093.
Mining Method	Open cut strip mining using both draglines, and truck and shovel fleets.	Unchanged.
Surface Disturbance Extent	32,230.5 ha.	An additional approximately 2,317 ha of surface disturbance.
Target Coal Seams	Extraction of the Rangal Coal measures, including the Aries, Castor and Pollux seams.	Unchanged.
Hours of Operation	Mining operations occur 24 hours per day, seven days per week.	Unchanged.
Coal Processing and Offsite Transport	ROM coal is trucked to the CHPP or TCP for processing and then transported offsite via the BWM train load-out facilities and existing export rail network, which connects Blackwater to Gladstone.	Unchanged.
Site Access	Site access via the Blackwater CHPP access road and Ardurad road access route to the MIA.	Unchanged.
Employment	Average operational workforce of 1,750 FTE personnel.	Additional workforce of up to 650 FTE personnel.
Coal Rejects	Emplaced within residual voids and TSFs.	Approximately an additional 36 Mt of coarse rejects and 32 Mt of fine rejects to be emplaced in residual voids, TSFs and semi-permanent tailings cells.
Water Supply	Water supply from: – rainfall runoff captured in onsite water storages; – incidental groundwater in mining pits; and – external pipeline water supply.	Unchanged.
Water Infrastructure	Existing dams, pumps, pipelines, diversions and drains.	Additional dams, pumps, pipelines, diversions and drains, as required.
Electricity Supply	External electricity supply is via the existing connection to the Queensland electricity grid at the combined Powerlink/Ergon Energy 132/66 kV Rangal Substation. The internal electricity network comprises a main line and stub lines to the mining areas.	Maintenance, upgrades and new onsite electricity infrastructure (e.g. additional ETL) would be developed as required.
Residual Voids	Approved for 15 residual voids.	Unchanged.
ROM Coal Extraction Rate	Up to 19 Mtpa.	Unchanged.

Table 2-1 (Continued)
Summary of Approved BWM and Proposed Project

Relevant Approval Component	Approved BWM	Proposed Project
Product Coal	Up to 17.6 Mtpa.	Unchanged.
General Infrastructure	Existing infrastructure areas including, but not limited to, the MIA, workshop and supporting facilities and services, administrative office areas, haul roads and light vehicle access roads, CHPP, TCP, ROM pads, ROM and product stockpiles, hardstand and laydown areas, sewage treatment plants and explosive magazines.	Use of existing infrastructure, with development of new infrastructure as required.
Rehabilitation and PMLU	Rehabilitation to a safe, stable and non-polluting PMLU with a mixture of cattle grazing, dryland cropping, woodland habitat, water storage and watercourse. All residual voids require flood protection from flood events up to and including 1 in 1,000 annual exceedance probability (AEP) events.	Unchanged. The Project would build upon approved PMLUs at BWM.

The watercourses in the Project area are ephemeral and include Sagittarius Creek and Taurus Creek, with tributaries including Two Mile Gully and Deep Creek. Taurus Creek flows into Blackwater Creek east of the Project area.

The surrounding landscape is similarly flat to gently undulating with < 3% gradients until it rises to the east. The Blackdown Tableland National Park is located approximately 11.5 km to the south-east of the Project and is the highest regional landform with an elevation of approximately 900 mAHD and has steeper topography in comparison to the landscape immediately surrounding the Project.

The Project would be located within the following geographic areas:

- the Mackenzie River floodplain, as defined by the *Queensland floodplain assessment overlay* (DNRMMRRD, 2026a) (Figure 2-6);
- the Brigalow Belt North Bioregion as defined by the *Interim Biogeographic Regionalisation for Australia* (Commonwealth DCCEEW, 2023a) (Figure 2-7);
- the Mackenzie River Catchment which is subject to the *Water Plan (Fitzroy Basin) 2011* (Figure 2-8);
- the Highlands Groundwater Management Area (Figure 2-9); and
- the area covered by the *Inland Fitzroy and Southern Burdekin Suitability Framework* (Department of Natural Resources and Mines [DNRM] and the Department of Science, Information Technology, Innovation and the Arts [DSITIA], 2013).

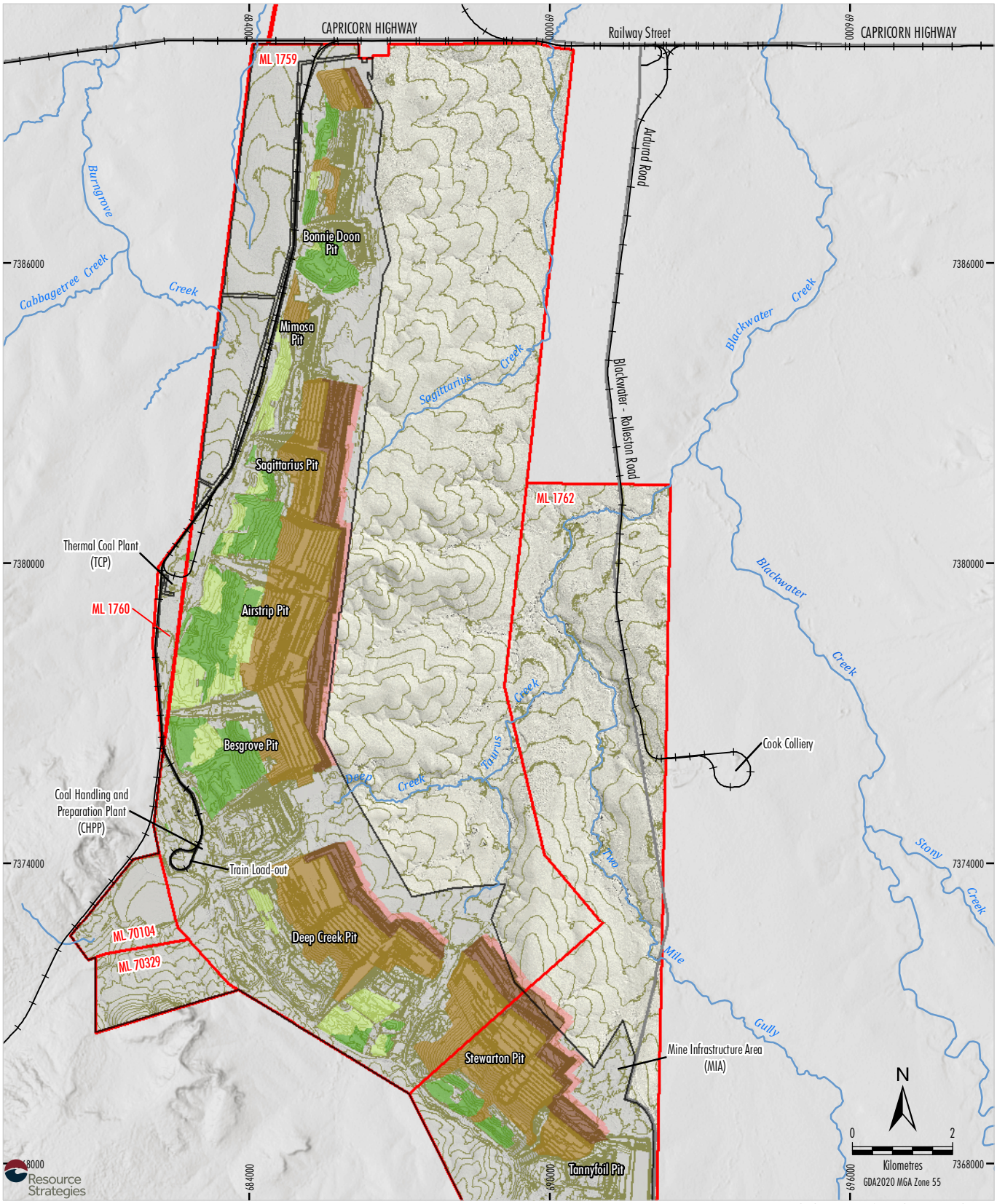
The Project would not be located within:

- an area of regional interest under the *Regional Planning Interests Act 2014* (RPI Act). Areas of regional interest include priority agricultural areas (PAAs), priority living areas, strategic environmental areas and strategic cropping areas (SCAs) (a priority living area is located within the north of ML 1759 but does not intersect the Project area);
- a declared underground groundwater area under the *Water Regulation 2016*;
- SCAs mapped as potential Strategic Cropping Land (SCL) under section 10 of the RPI Act (Figure 2-10); or
- areas containing sites with a Community Infrastructure Designation (or Designation) under the Planning *Act 2016*.

2.4.2 LOCAL CONTEXT

The Project is located in the Bowen Basin mining region with multiple brownfield/active coal mines within its vicinity.

Figure 1-9 shows relevant mining and petroleum tenements in the vicinity of the existing BWM. These include MLs, exploration permits for coal, exploration permits for geothermal and authority to prospect.



LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

FY2030 General Arrangement

- Active Mining
- Active Overburden Emplacement
- Established Rehabilitation
- Initial Rehabilitation
- Topsoil Stripping

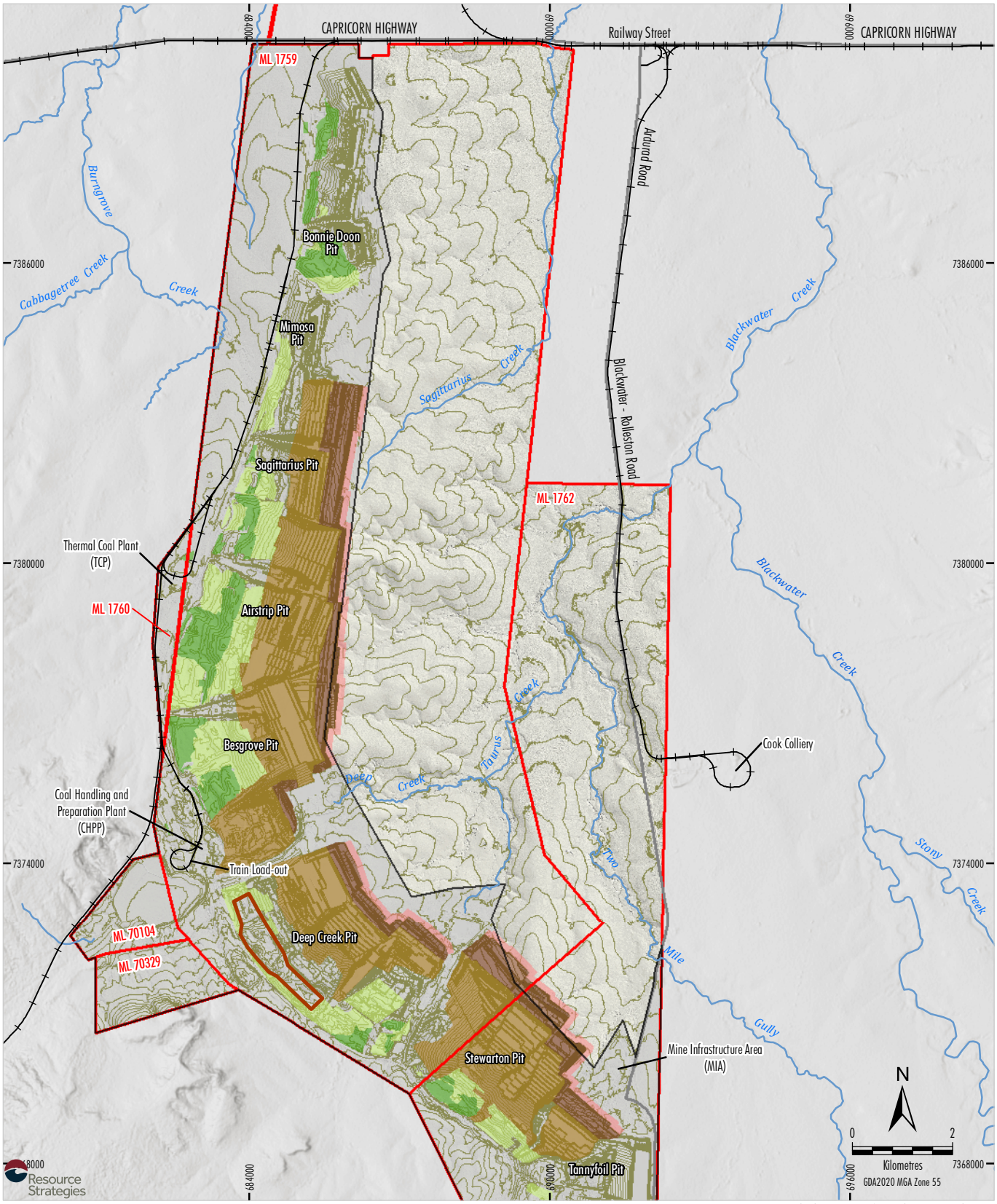
Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Indicative General Arrangement Year FY 2030

Figure 2-1



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

FY2032 General Arrangement

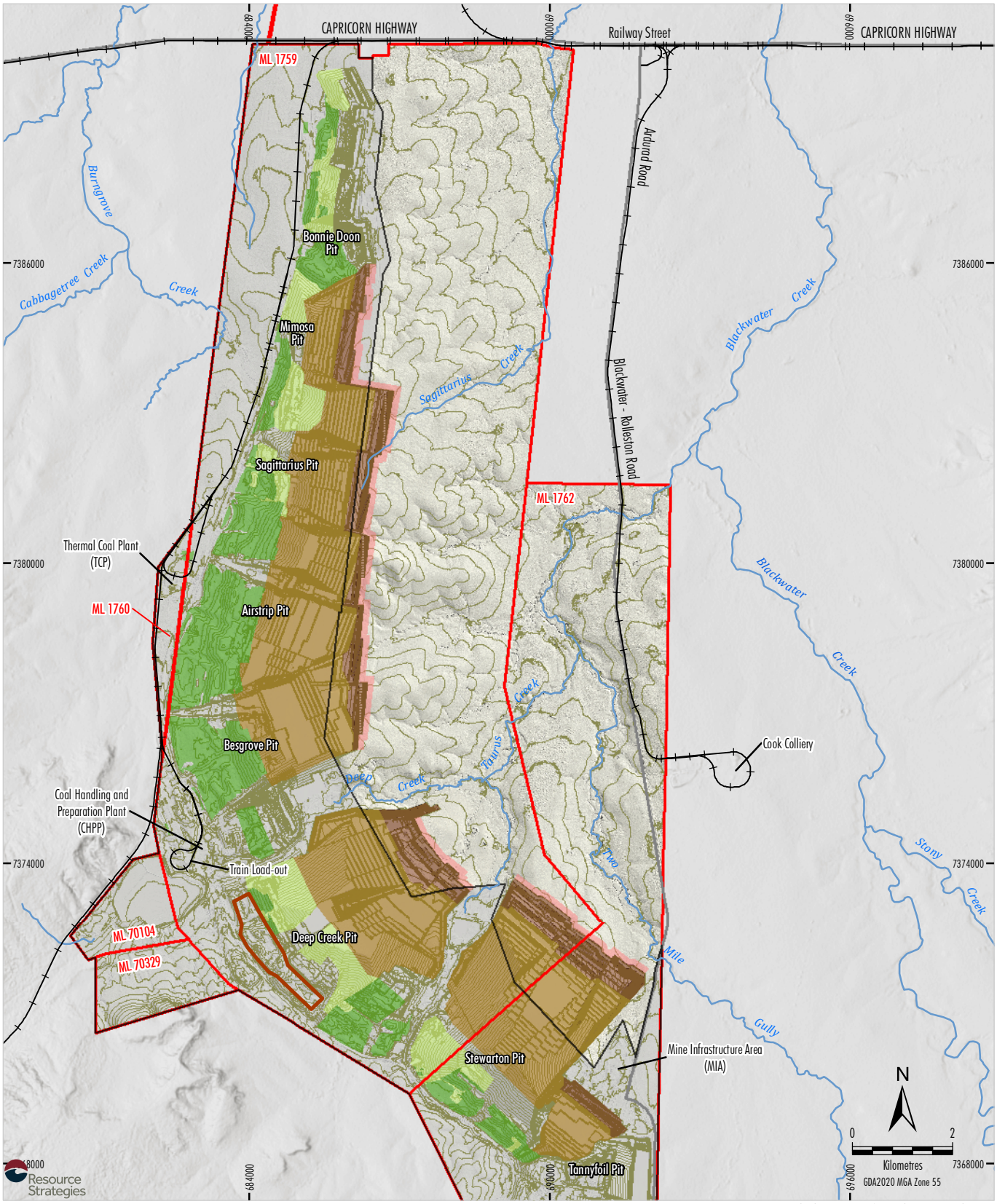
- Active Mining
- Active Overburden Emplacement
- Established Rehabilitation
- Initial Rehabilitation
- Topsoil Stripping
- Potential Semi Permanent Tailings Cell

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Indicative General Arrangement
Year FY 2032

Figure 2-2



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

FY2046 General Arrangement

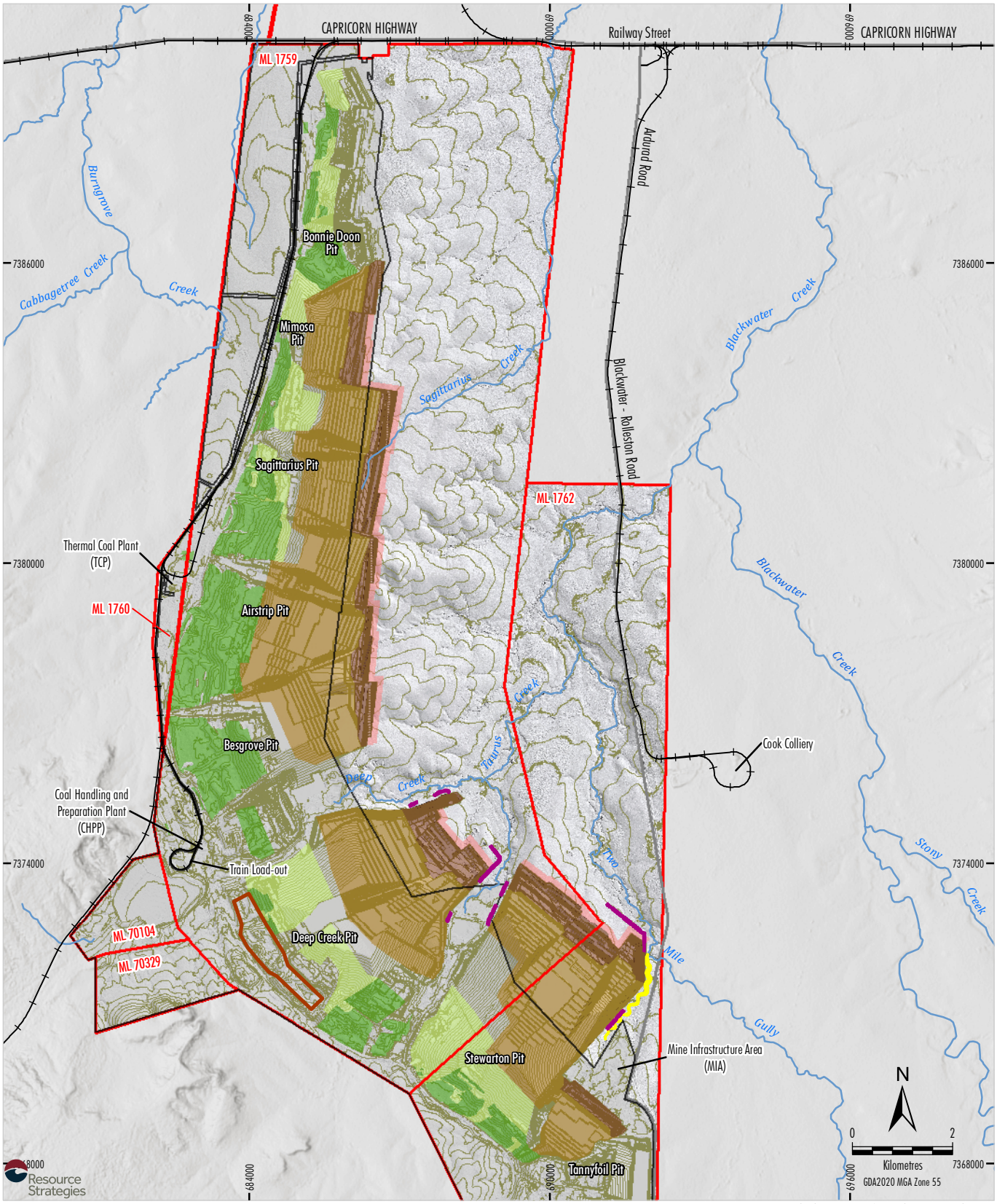
- Active Mining
- Active Overburden Emplacement
- Established Rehabilitation
- Initial Rehabilitation
- Topsoil Stripping
- Potential Semi Permanent Tailings Cell

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Indicative General Arrangement
Year FY 2046

Figure 2-3



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); TerraQ (2026); Whitehaven (2026)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

FY2050 General Arrangement

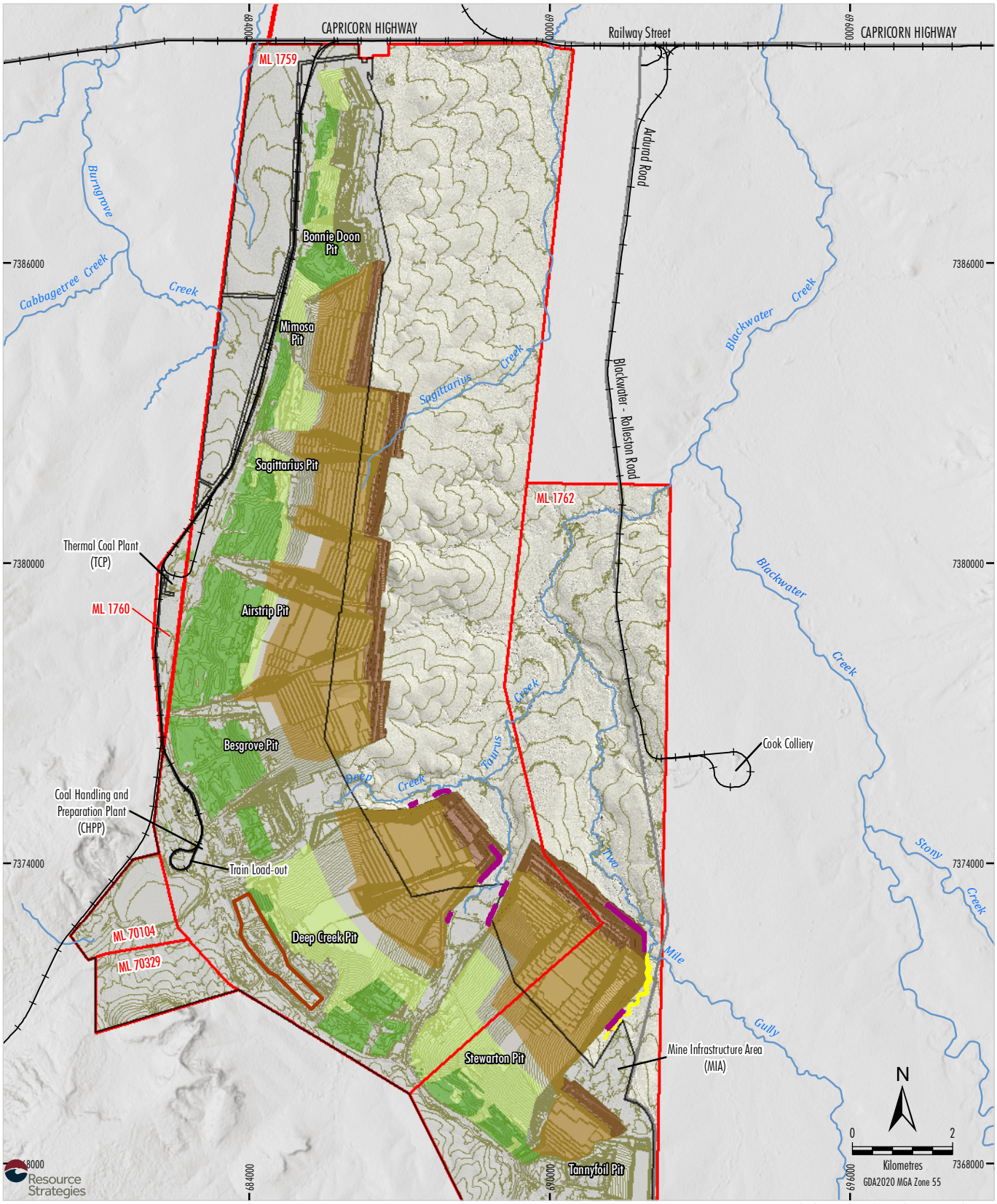
- Active Mining
- Active Overburden Emplacement
- Established Rehabilitation
- Initial Rehabilitation
- Topsoil Stripping
- Potential Semi Permanent Tailings Cell
- Proposed Temporary Flood Levees
- Clean Water Drain

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Indicative General Arrangement Year FY 2050

Figure 2-4



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); TerraQ (2026); Whitehaven (2026)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

FY2055 General Arrangement

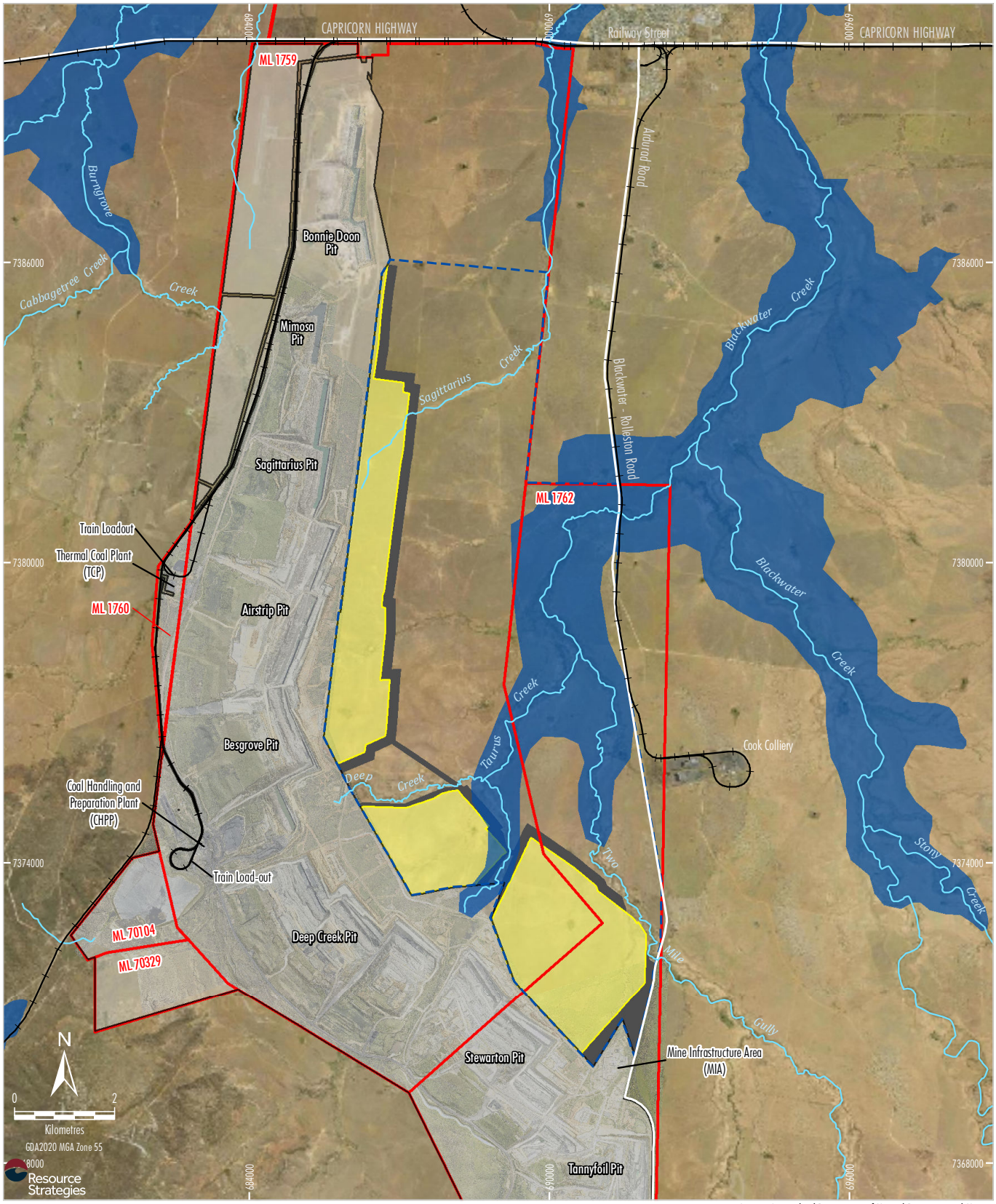
- Active Mining
- Active Overburden Emplacement
- Established Rehabilitation
- Initial Rehabilitation
- Potential Semi Permanent Tailings Cell
- Proposed Temporary Flood Levees
- Clean Water Drain

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Indicative General Arrangement Year FY 2055

Figure 2-5



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND
- Mining Lease
- Railway
- Road
- Watercourse
- Queensland Floodplain Assessment Overlay (DNRMMRRD, 2025)
- Approved Disturbance Footprint

Project Components[1]
- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Mackenzie River Floodplain

Figure 2-6



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Geoscience Australia (2018).

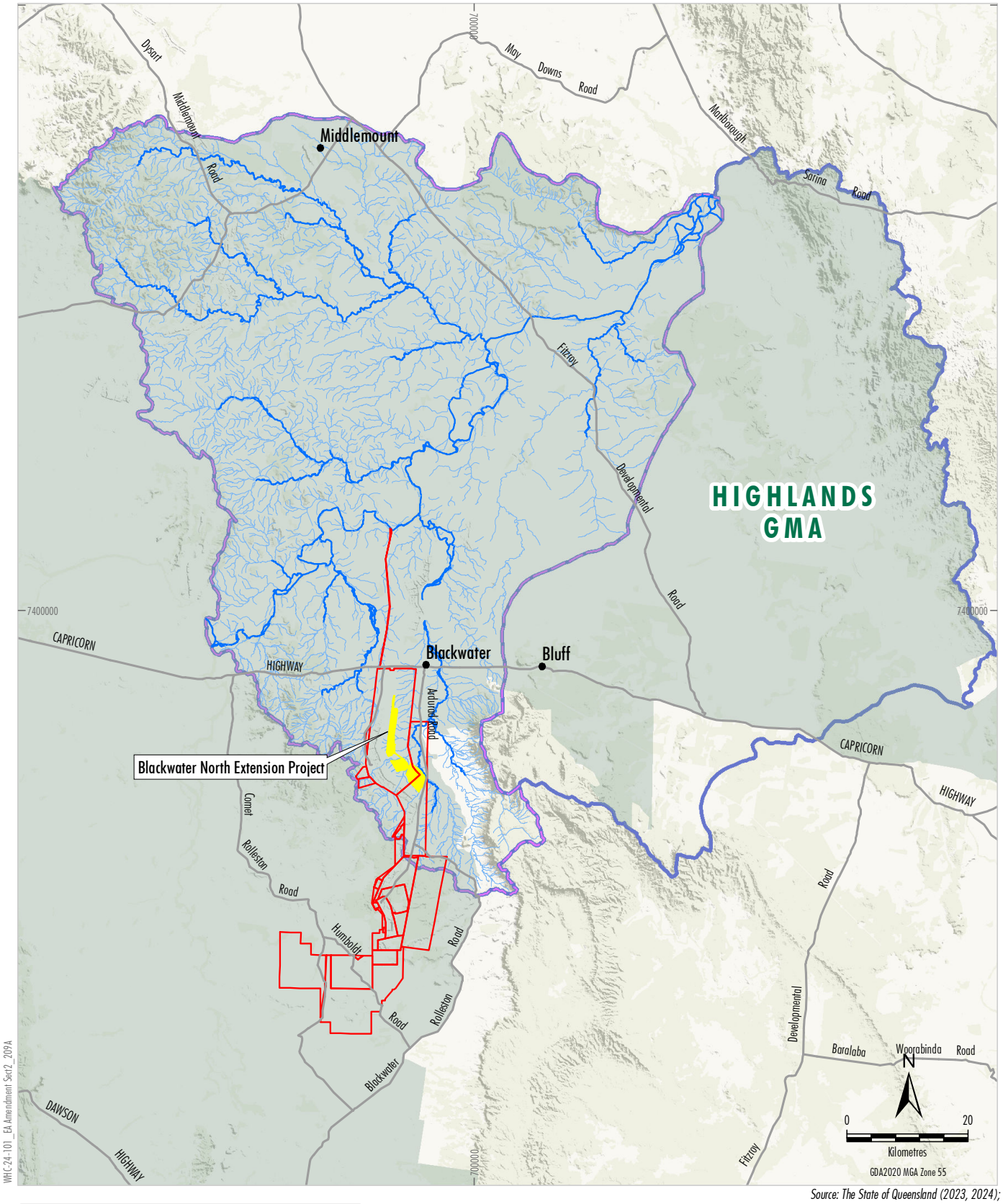
LEGEND
- Road
- Railway
- Brigalow Belt North Bioregion
- Coal Terminal
- Blackwater North Extension Project

Whitehaven

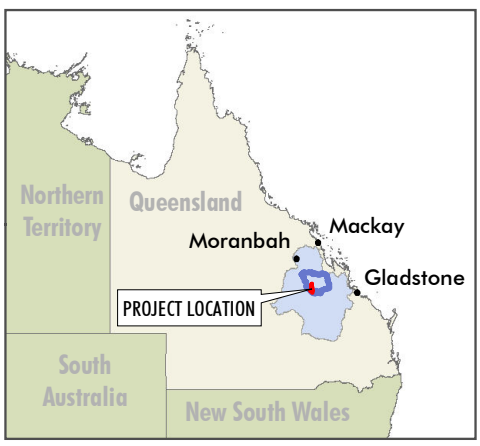
BLACKWATER NORTH EXTENSION PROJECT

Brigalow Belt North Bioregion

Figure 2-7



Source: The State of Queensland (2023, 2024); Geoscience Australia (2018)



LEGEND
- Mining Lease
- Road
- Proposed Project Area
- Highlands Groundwater Management Area
- Minor Watercourse (Order 1 and 2)
- Major Watercourse (Order 3 - 8)
- Fitzroy Basin
- Mackenzie Subcatchment
- Upper Mackenzie River Catchment

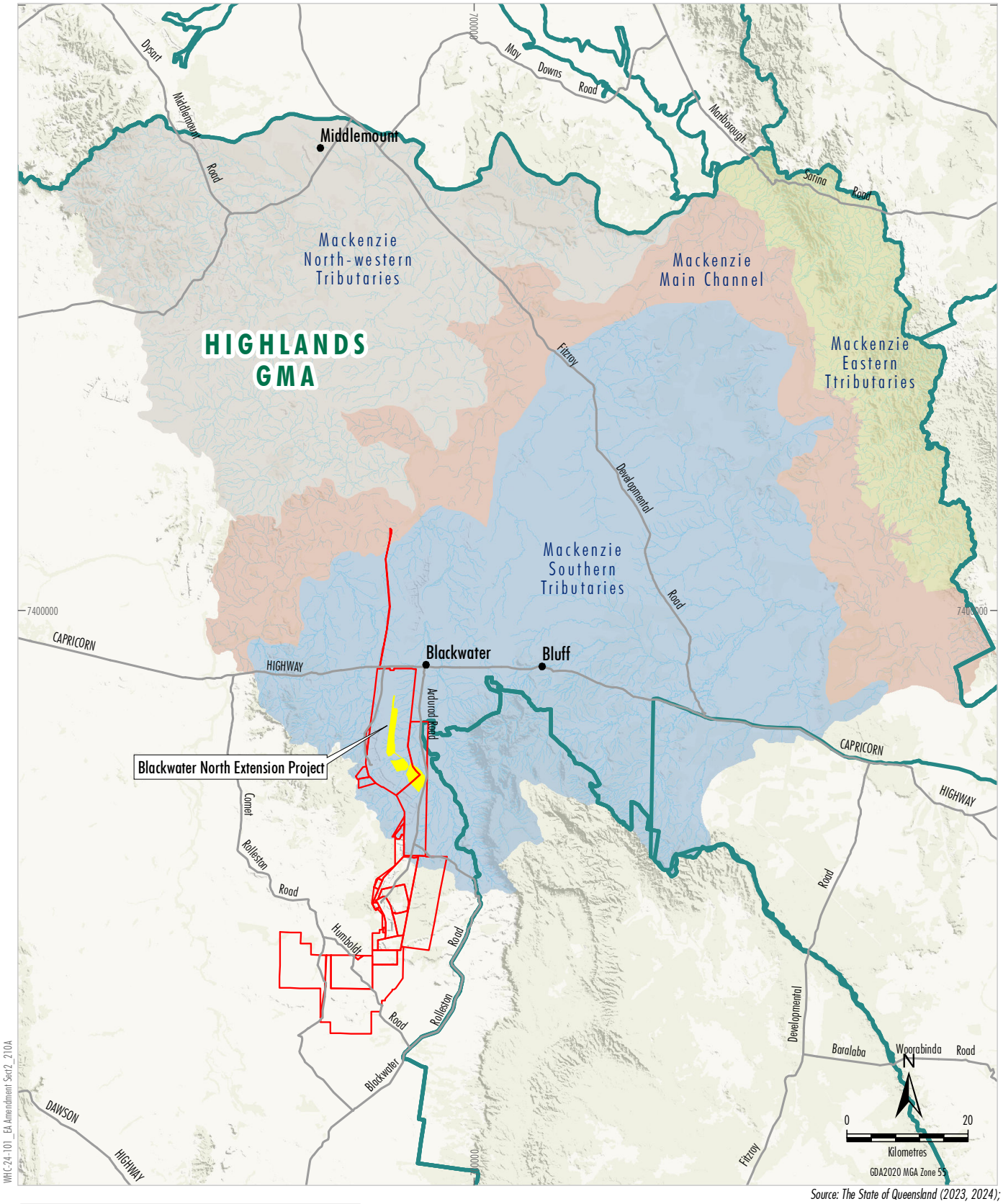
Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Mackenzie River Catchment

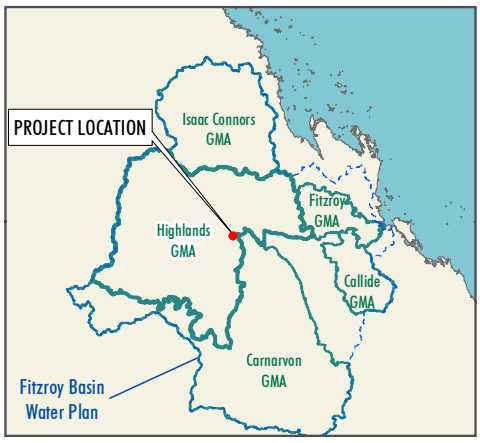
Figure 2-8

WHC-24-101_EA Amendment Sect2_209A



WHC-24-101_EA Amendment Sect2_210A

Source: The State of Queensland (2023, 2024); Geoscience Australia (2018)



LEGEND

- Mining Lease
- Road
- Proposed Project Area
- Watercourse
- Groundwater Management Area (GMA)

Sub-catchment Areas of the Mackenzie River Catchment

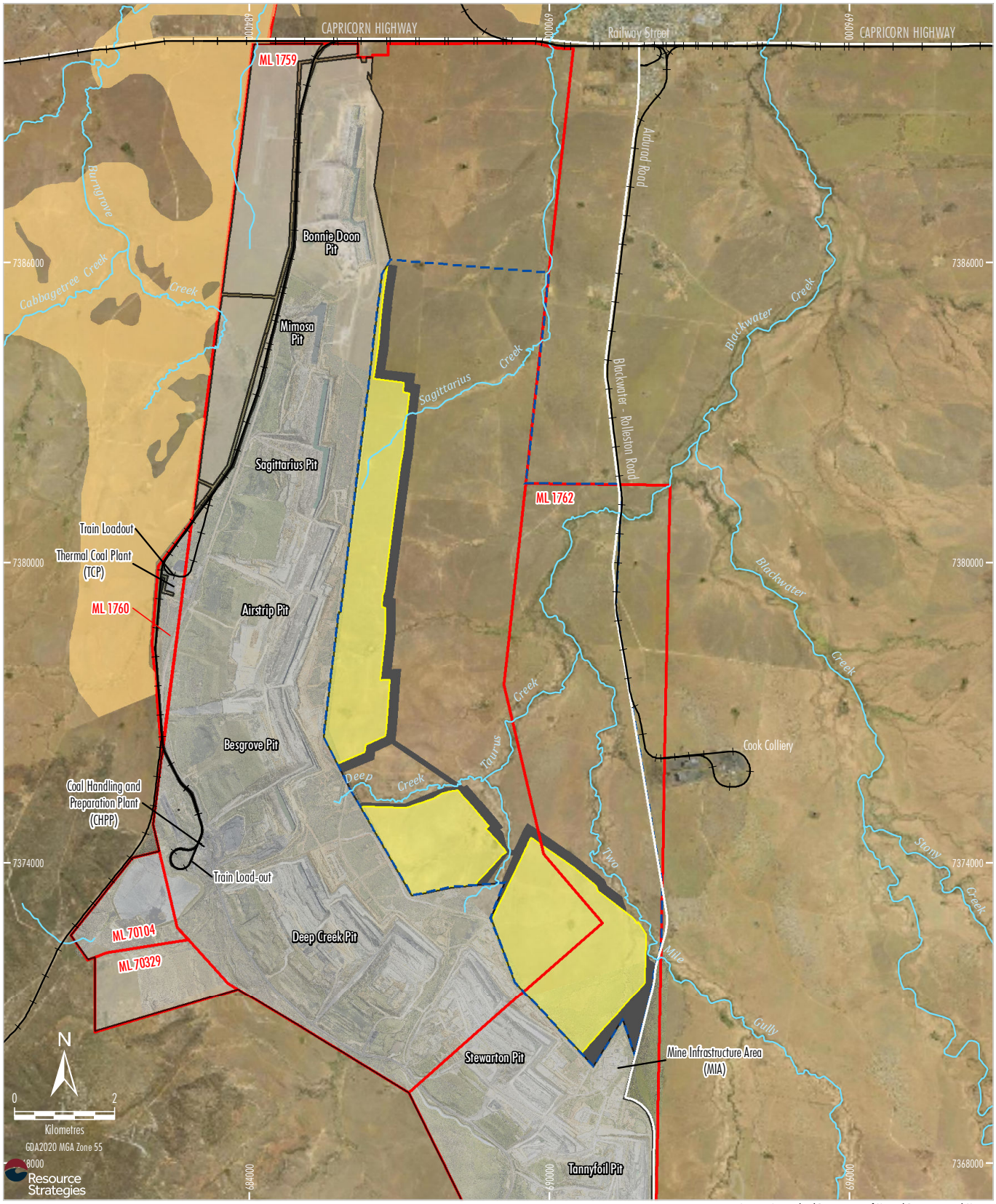
- Mackenzie eastern tributaries
- Mackenzie main channel
- Mackenzie north-western tributaries
- Mackenzie southern tributaries

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Groundwater Management Areas

Figure 2-9



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND
- Mining Lease
- Railway
- Road
- Watercourse
- Strategic Cropping Land
- Approved Disturbance Footprint
- Project Components[1]
- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Strategic Cropping Land Mapping

Figure 2-10

The four closest operating coal mines within the vicinity of the Project are:

- Curragh Mine Complex (approximately 20 km to the north of the Project).
- Jellinbah Coal Mine (approximately 35 km to the north-east of the Project);
- Ensham Coal Mine (approximately 40 km to the north-west of the Project); and
- Yarrabee Coal Mine (approximately 45 km to the north-east of the Project).

2.4.3 LAND USE

The Project is located within the Bowen Basin mining precinct, surrounded by existing and approved mining operations and projects, including Ensham Coal Mine, Jellinbah Coal Mine, Yarrabee Coal Mine and Curragh Mine Complex.

Coal and petroleum (e.g. coal seam gas) mining exploration activities have been conducted within the Project area and surrounds for decades, and continue in the present.

The majority of the Project area has a land suitability of Class 3 or 4, considered to be unsuitable land with severe to extreme limitations (Appendix A).

The Project would be located outside of any areas mapped as potential SCA (Figure 2-10), and areas of regional interest under the RPI Act.

In addition to the SCAs, the RPI Act also identifies PAAs of which none are located within the Project area of the existing BWM.

2.4.4 GEOLOGY AND COAL RESOURCE

The geology of the Project area is consistent with the existing BWM as described in Section 1.2.2.

A description of the local geological features, including faulting, is provided in the Groundwater Assessment (Appendix C).

Depending on geological complexity and economics across the deposit, the Project would target the Aries, Castor and Pollux Seams, consistent with the existing approved mine.

2.4.5 PROPERTY AND TENURE

Table 2-2 lists the tenure which intersects the Project area.

Table 2-2
Tenure Within Proposed Project Area

Mining Lease	Lot on Plan	Landholder
ML 1762	- Lot 31 CP900801. - Lot 14 SP175013.	Whitehaven Blackwater Pty Ltd. NS Blackwater Pty Ltd. JFE Steel Australia (BW) Pty Ltd.
	- Lot 3 RP843182. - Lot 24 CP855505.	Private residence (agreement in-place).
ML 1759	- Lot 27 RP843182. - Lot 26 HT419. - Lot 50 SP117237. - Lot 71 SP259121.	Whitehaven Blackwater Pty Ltd. NS Blackwater Pty Ltd. JFE Steel Australia (BW) Pty Ltd.
	- Lot 3 RP843182. - Lot 24 CP855505.	Private residence (agreement in place).

Real Property and Land Ownership

The Project is primarily located on land owned by Whitehaven Blackwater and one private landowner (Figure 1-8).

The Project area is surrounded by multiple rural properties. Homesteads located in the vicinity of the existing BWM and the Project include (Figure 1-8):

- Tolmie Creek Homestead (located approximately 5.5 km west of the Project);
- Ausbute Homestead (located approximately 3.5 km west of the Project);
- Burngrove Homestead (located approximately 3.9 km north-west of the Project);
- Minyango Homestead (located approximately 3.6 km north-east of the Project);
- Cardona Homestead (located approximately 8.0 km north-east of the Project);
- Tantallon Homestead (located approximately 2.7 km east of the Project);
- Yarrawonga Homestead (located approximately 3.9 km east of the Project);
- Taurus Homestead (located within the Project area);
- Retreat Homestead (located approximately 0.3 km east of the Project);

- Tannyfoil Homestead (located approximately 5.4 km south-east of the Project);
- Tulloch Ard Homestead (located approximately 7.6 km north-west of the Project);
- Maryvale Homestead (located approximately 8.9 km north-west of the Project);
- Malamy Homestead (located approximately 9.1 km north-west of the Project);
- Sherborne Homestead (located approximately 9.6 km north-west of the Project); and
- Monash Homestead (located approximately 17.5 km south-west of the Project).

Figure 1-8 also shows the locations of non-sensitive receivers within the vicinity of the Project area.

Tenements

The mining and associated activities that are the subject of this Project would occur within SA 7 on ML 1762 and SA 10 on ML 1759. All Project activities are located within existing tenements (Figure 1-9 and Table 2-2).

Native Title

Currently, there is an undetermined native title claim which has been lodged over the Project area (QC2012/009).

BWM has an approved CHMA with the Ghungalu People and Kangoulu People (representatives for the Gaangalu Nation People) for the Project and is committed to ongoing engagement and consultation.

The Project area is located within the extent of the BWM and South BWM's ILUA (QI2001/035). This ILUA took effect on 31 May 2002 between the Ghungalu and Kangoulu People.

Nature Conservation Areas

There are seven State Reserves located within the region surrounding the Project (Commonwealth DCCEEW, 2026). These include:

- Blackwater Conservation Park (located approximately 5.5 km north of the Project);
- Blackdown Tableland National Park (located approximately 11.5 km south-east of the Project);
- Kenmare Nature Refuge (located approximately 16.5 km south-west of the Project);
- Ghungalu Conservation Park (located approximately 21 km east of the Project);
- Wallaby Lane Nature Refuge (located approximately 33.5 km north-east of the Project);
- Humboldt National Park (located approximately 35 km south of the Project); and
- Taunton National Park (located approximately 35 km north-east of the Project).

There are no Ramsar protected wetland sites, nationally important wetland sites, National Heritage Areas or World Heritage Areas within the Project area or its vicinity (Commonwealth DCCEEW, 2026).

2.4.6 QUEENSLAND AGRICULTURAL LAND AUDIT

The Queensland Agricultural Land Audit (the Audit) was prepared by the then Department of Agriculture and Fisheries (DAF) (now the Department of Primary Industries) in 2013 and is updated annually. The Audit identified land important to current and future agricultural production and the constraints to agricultural development.

The Audit defines 'important agricultural areas' as (DAF, 2013):

> *… land that has all the requirements for agriculture to be successful and sustainable, is part of a critical mass of land with similar characteristics and is strategically significant to the region or the state.*

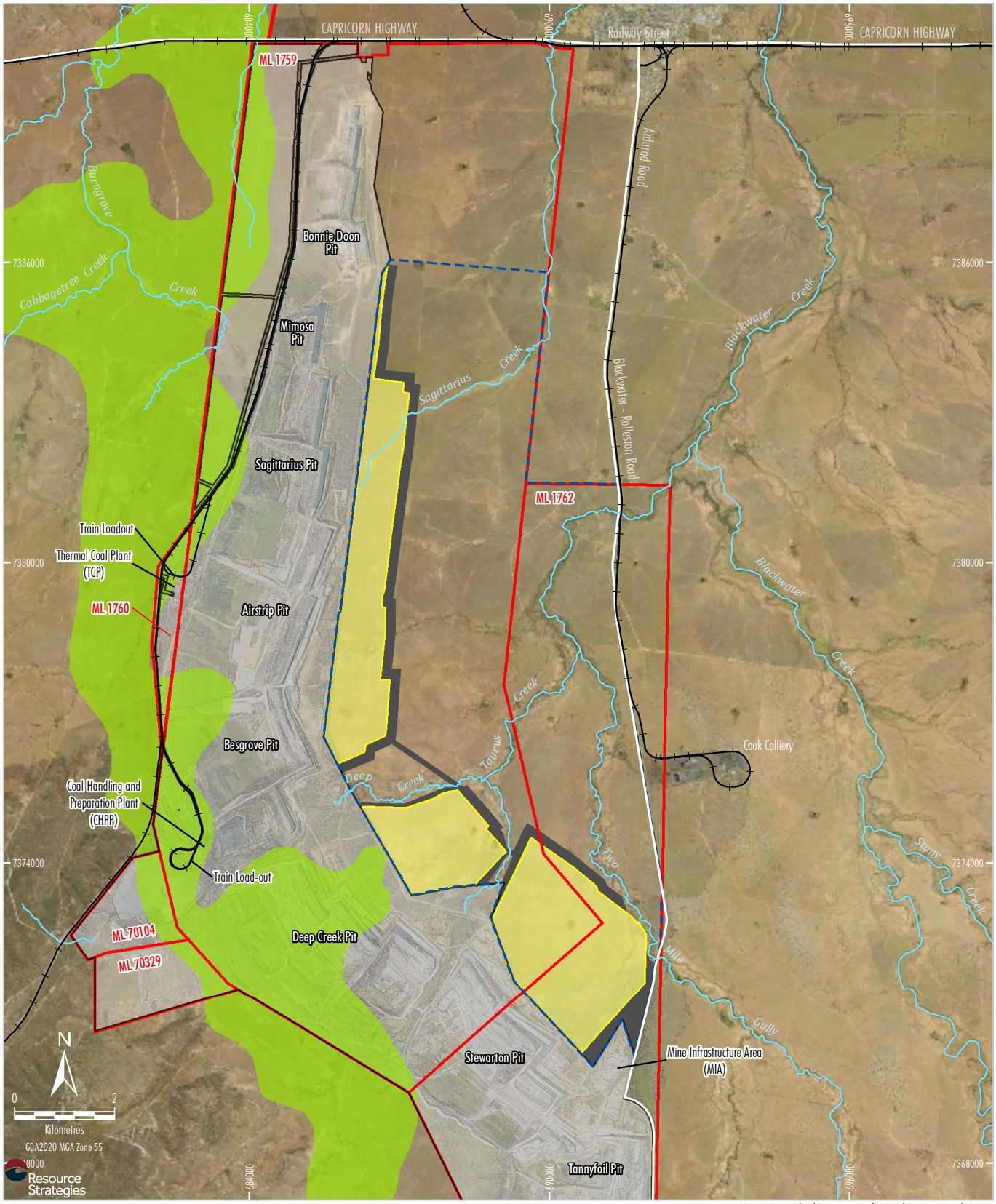
The Project would be located outside of any of Queensland's important agricultural areas.

Agricultural Land Class (ALC) A is land suitable for current and potential crops, and ALC B is only suitable for a narrow range of current and potential crops. There is no land with an ALC A or B within the Project area (DNRMMRRD, 2026b) (Figure 2-11).

2.5 Construction

2.5.1 PROJECT CONSTRUCTION AND OTHER DEVELOPMENT

The Project largely comprises continued open cut mining activities at the existing BWM and, therefore, there is no distinct construction period. Minor construction activities throughout the life of the Project would occur in parallel with the progression of the mine. The Project would utilise the existing coal handling, processing and transport infrastructure for the life of the Project.



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND
- Mining Lease
- Railway
- Road
- Watercourse
- Regional Agricultural Land Class A and B
- Approved Disturbance Footprint

Project Components[1]
- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Regional Agricultural Land Class A and B Mapping

Figure 2-11

Minor construction activities located within the Project area would be undertaken 24 hours a day, seven days a week, consistent with existing operations. If approved, the Project's mining activities would commence as soon as practicable after all relevant consents, approvals and licences are obtained. Initial construction activities for the Project would be focused on the development of the following key infrastructure components:

- water management infrastructure;
- water and electricity supply infrastructure; and
- infrastructure corridors to support the expansion of the open cut pit.

The Project would also involve the following additional ongoing construction activities carried out progressively throughout its lifespan:

- progressive development of internal haul roads and light vehicle access roads and services;
- progressive development of water management and water storage infrastructure; and
- construction of other associated infrastructure, equipment and mining.

2.5.2 TRANSPORT INFRASTRUCTURE

No changes would be required to existing major transport routes for the Project (Section 1.2.6). However, several internal roads would need to be relocated to accommodate the Project:

- Back access roads would continue to be relocated to the east, such that they always remain within approximately 2 km distance of the mining front.
- Existing light vehicle access roads and haul roads would be extended to the east in generally west-east alignments as the ramps and pits extend eastwards into and through the Project area.
- Corridor access roads run west-east, extending from haul roads on the western side of BWM. Existing corridor access routes would continue to be progressively extended to the east.

The Project would involve progressive development of unsealed internal haul roads between the open cut operations, waste emplacements and the ROM pad. Active haul roads would be regularly watered (or applied with dust suppressants) to minimise dust generation potential.

Mine-authorised light vehicles would utilise the haul roads to access the open cut and other infrastructure. Dedicated internal access roads for light vehicles would also be constructed progressively within the Project mining area as required, and would provide access to other areas, such as the MIA.

The Project would continue to use existing rail infrastructure to transport coal to the Port of Gladstone (Section 1.2.6). Whitehaven Blackwater would continue to use the Port of Gladstone to export coal to international customers.

Where required, the Project would continue to use existing air infrastructure to accommodate emergency services (Section 1.2.6).

2.5.3 VEGETATION CLEARING AND SOIL STOCKPILES

Progressive vegetation clearing and soil stripping would be undertaken ahead of the advancing open cut mining operation.

Soil stripping would be undertaken progressively, and stockpiling procedures would aim to minimise soil degradation prior to its use for progressive rehabilitation. Soil stockpile volumes and locations would vary over the life of the Project.

Topsoil stockpiles would be maintained to a maximum height of approximately 2 m, and be contour ripped to encourage revegetation. Long term topsoil stockpiles would continue to be marked using a global positioning system and volumes estimated for inventory purposes.

Additional temporary soil stockpiles may be constructed within the approved disturbance area for the Project and/or unused areas of the overburden emplacements.

2.5.4 EARTHWORKS

Earthworks would be required for Project construction activities (e.g. to establish and/or augment existing infrastructure and for the development of internal access roads/tracks).

Excavated material from construction activities would be used as construction fill or stockpiled on site for rehabilitation.

Borrow pits may be developed within the proposed disturbance areas to provide material for use during construction or rehabilitation activities (e.g. gravel).

2.5.5 CONSTRUCTION MATERIALS

The majority of the additional infrastructure components (e.g. buildings, pipelines and ETLs) would be manufactured off-site and transported to site for assembly and installation.

The Project is expected to require gravel for the relocation, construction and maintenance of mine access roads (including internal access and haul roads), construction and maintenance of hardstands and the use as stemming product in the blasting process.

Additional quarried material would be required for drainage aggregate, bedding, rock armour and construction. This material is expected to be sourced at a rate of up to 800,000 Mtpa (over a period of 12 months).

BWM is permitted under EA EPML00717813 for crushing, milling, grinding or screening of more than 5,000 tonnes (t) of material per year. This crushing, milling, grinding or screening for quarrying would be continued for the Project. To assist with the Project and continued operations at BWM, ERA 33 would be extended over ML 1767, ML 1772, ML 1773, ML 1812, ML 1907 and ML 70091 (Figure 2-12).

It is estimated that approximately 300,000 to 800,000 t of rock would be processed per year across eight different locations with a daily rate of approximately 3,000 to 5,000 t per day. One quarry location would be utilised at a time with the use of a mobile screening plant. No blasting activities associated with the quarrying is expected to occur.

Table 2-3 details the anticipated equipment list to support the additional quarry locations.

Table 2-3
Additional Quarry Locations Equipment List

Equipment	Quantity (At Each Quarry Location)	Operating Hours
Excavator (49 to 100 t)	1	12 hours per day during daylight
Jaw Crusher	1	12 hours per day during daylight
Cone Crusher	1	12 hours per day during daylight
Screen	1	12 hours per day during daylight

Table 2-3 (Continued)
Additional Quarry Locations Equipment List

Equipment	Quantity (At Each Quarry Location)	Operating Hours
Trommel	1	12 hours per day during daylight

2.5.6 DISTURBANCE AREA

The Project requires additional disturbance of approximately 2,317 ha (Figure 1-7). This is in addition to the approved footprint for the existing BWM (Figure 1-2).

2.6 Operation

2.6.1 SCHEDULE OF WORK

Whitehaven Blackwater anticipates that construction activities associated with the Project would commence as soon as practicable after all relevant planning and environmental approvals (where relevant) and the EA are granted.

Table 2-4 presents the approximate timeframes currently planned for the Project.

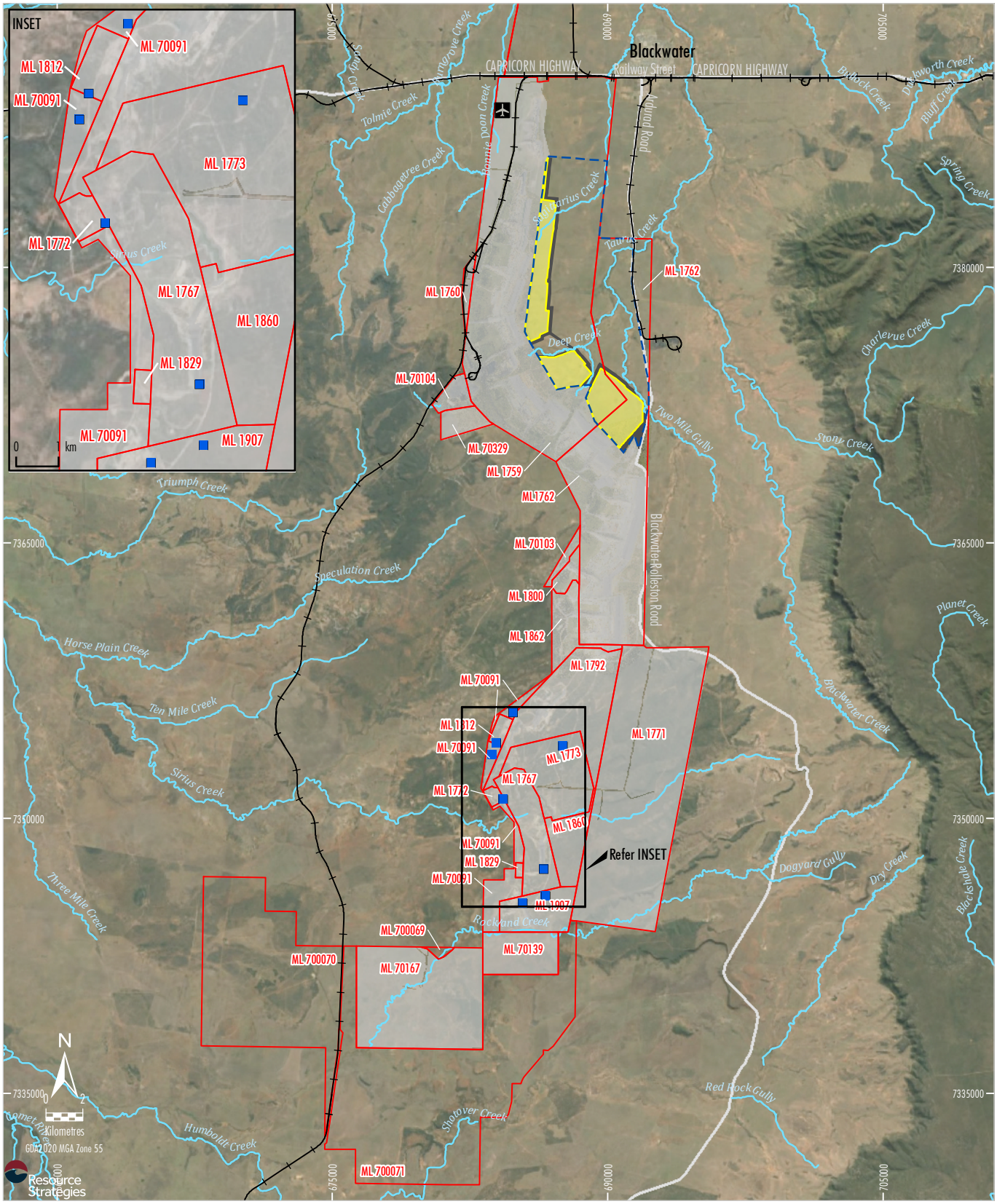
Table 2-4
Project Timeframe

Approximate Timeframe	Project Phase
2030	Operations extend into the Project area. Commencement of ROM coal extraction in the Project area.
2032	ROM coal extraction reaches the peak extraction of 19 Mtpa.
2055	Mining ceases within the Project area however, continues elsewhere at the BWM.

2.6.2 WORKFORCE AND ASSOCIATED ACCOMMODATION

Workforce

The Project would require an additional 500 FTE direct mine operational personnel by approximately 2032 due to increased mining equipment requirements. Direct mine operational FTE personnel numbers would then increase by a further 150 in the period from 2033 to 2055.



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2026)
Orthophoto: Esri (2025); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Airport
- Approved Disturbance Footprint
- Proposed Quarry Location

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Proposed Quarry Locations

Figure 2-12

In summary, employment for direct mine operational purposes would increase from 1,750 FTE personnel (existing) to 2,250 FTE personnel (Project commencement to approximately 2032) and 2,400 FTE personnel (approximately 2032 to 2055). Intermittent temporary contractors employed for discrete tasks would continue at approximately an additional 750 FTE at times throughout the life of the mine.

Workforce Shifts and Rosters

As per the existing operations, the Project's mining operations would be conducted up to 24 hours per day, seven days per week. Nominal shift start and finish times would be:

- Administration Personnel – 7.00 am to 4.00 pm weekdays.
- Mining Operations (Day) Personnel – 6.00 am to 6.00 pm.
- Mining Operations (Night) Personnel – 6.00 pm to 6.00 am.

Operational Workforce Accommodation

The existing accommodation facilities would be used for the Project (Section 1.2.4).

2.6.3 OPEN CUT EXTENT

The Project would include open cut mining within the Late Permian Rangal Coal Measures. The three main economic coal seams are the Aries Seam, Castor Seam and Pollux Seam. Mining of these seams would produce an additional 200 Mt of ROM coal over the life of the Project.

Open cut mining would occur in multiple pits across the deposit with mining direction and methodology determined based on geological complexity, depth and other constraints.

Consistent with existing operations, mining from multiple pits is required to maintain productivity across structurally complex mining environments, to reduce fleet interactions and to maximise blending opportunities to meet product specifications.

The indicative extent of the open cut (Figure 1-7) is based on the location of the Project coal reserves and recent mine planning to optimise resource extraction, minimise environmental impacts and improve the final landform.

Minor adjustments to pit extents within the approved disturbance areas may be made (in future) throughout the life of the Project based on inputs from continued exploration work and revised geological information.

2.6.4 INDICATIVE MINING SCHEDULE

An indicative mining schedule for the Project is provided in Table 2-5.

Project open cut mining and ROM coal extraction is expected to occur until 2055. Rehabilitation activities and final landform shaping would occur progressively and continue after 2055.

It is estimated that approximately an additional 200 Mt of ROM coal would be mined over the life of the Project, at a rate of up to 19 Mtpa.

The primary product of the Project would be metallurgical coal for use in steelmaking and thermal coal. The actual timing, mining sequence and annual coal mining profile may vary to take into account localised features, coal quality characteristics, detailed mine design, economics, requirements of the coal market, product specification and/or blending requirements and/or adaptive management requirements.

2.6.5 MINING SEQUENCE, METHODS AND EQUIPMENT

The mining process involves land clearing, the removal and stockpiling of topsoil material, drilling and blasting of overburden and interburden as required, stripping of overburden and interburden material utilising a combination of draglines and/or truck/shovel/excavator operations (Figure 2-13; Plate 2-1).

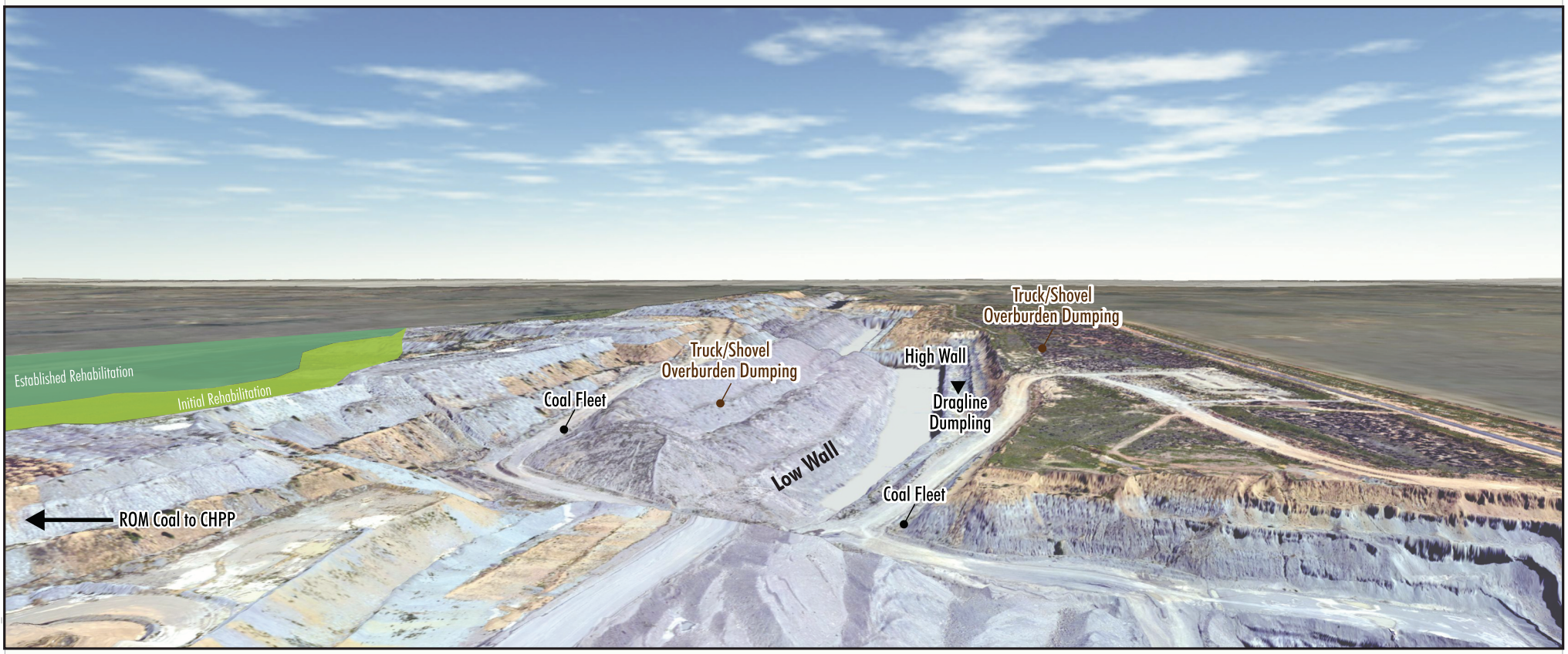


Plate 2-1 Open Cut Mining at BWM

Table 2-5
Indicative Project Mining Schedule

FY	Project ROM Coal Production (Mt)	Open Cut Waste Rock (Mbcm)	Coal Rejects (Mtpa)		Product Coal (Mtpa)		
			Coarse	Fine	Thermal	Coking	Total
2030	14.8	246.4	0.7	0.6	1.1	12.4	13.5
2031	17.5	256.8	1.3	1.1	1.6	13.5	15.1
2032	19.0	279.8	0.9	0.8	2.8	14.5	17.3
2033	19.0	273.5	1.2	1.0	2.3	14.4	16.8
2034	18.4	274.4	1.3	1.2	1.9	14.0	15.9
2035	19.0	264.5	1.1	0.9	2.4	14.6	17.0
2036	19.0	256.4	1.0	0.9	2.4	14.7	17.1
2037	19.0	279.6	1.9	1.7	1.1	14.3	15.4
2038	19.0	284.9	1.1	0.9	2.3	14.6	17.0
2039	19.0	266.6	1.2	1.1	2.9	13.8	16.7
2040	19.0	246.0	1.3	1.1	3.0	13.6	16.6
2041	19.0	278.0	2.1	1.8	1.5	13.6	15.1
2042	19.0	287.2	1.6	1.5	2.3	13.7	15.9
2043	19.0	271.1	1.7	1.5	2.4	13.5	15.8
2044	19.0	279.5	2.1	1.9	1.9	13.1	15.0
2045	17.7	287.2	1.2	1.0	1.9	13.6	15.5
2046	18.8	289.2	1.9	1.7	1.9	13.3	15.2
2047	16.4	282.2	2.1	1.8	1.9	10.6	12.5
2048	16.9	287.3	1.5	1.4	0.5	13.5	14.0
2049	17.2	282.8	0.5	0.5	2.9	13.3	16.2
2050	18.2	290.6	1.3	1.1	2.0	13.8	15.8
2051	18.0	275.5	1.4	1.3	2.4	13	15.3
2052	14.6	284.7	1.9	1.7	1.7	9.4	11.0
2053	16.8	278.7	1.5	1.3	3.3	10.7	14.0
2054	14.7	271.1	1.3	1.2	3.5	8.7	12.2
2055	16.0	275.6	1.3	1.1	3.5	10.1	13.6

Source: Whitehaven (2025a).
Mbcm = million bank cubic metres.
Note: ROM Coal Production in Table 2-5 includes approved BWM production up to 2055.



WHC-24-101_EA Amendment Sect2_006E

Source: Whitehaven (2025)

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Indicative Open Cut Mining Schematic

Figure 2-13

Overburden and interburden is removed to uncover coal from the pit and is relocated to backfill the mined-out pits as in-pit waste rock dumps as mining advances. Coal is excavated from the pit via shovel/excavator and trucked via mine haul truck to the CHPP or the TCP.

The Project would continue to use drill and blast methods, draglines, dozers and truck and shovel fleets consistent with existing operations (Section 1.2.5).

The open cut mining operational areas would generally include supporting infrastructure such as haul roads, bunding, embankments, soil stockpiles, hardstands and water management structures, as required.

Mining Sequence

The Project's mine plan is an extension of mining of the existing open cut pits in the north of the BWM to within SA 7 and SA 10. As mining at BWM approaches the western boundaries of SA 7 and SA 10 the relocation of supporting infrastructure in advance of mining would be required.

Mining would progress to the east and completed overburden dump areas to the west of the active pits would be progressively rehabilitated as mining advances.

The Project does not propose any changes to the existing general mining methods (Section 1.2.4 and 1.2.5). Mining methods across the BWM may change over time with replacement of mine equipment, introduction of new technologies and innovation in mining methods; these changes would be implemented independently from the Project.

Mining Equipment

The mobile equipment used for the Project would vary according to the requirements of the open cut mining operations. Existing mobile equipment used at the BWM would be used for the Project and would include a combination of excavators and/or shovels, haul trucks and draglines, with a support fleet that includes dozers, graders, front-end loaders, drill rigs and water trucks (Plate 2-2).



Plate 2-2 BWM Haul Truck

This would be progressively supplemented by additional equipment as required by the mine schedule over the life of the Project.

An indicative list of major mobile equipment used for impact assessment purposes for the Project is provided in Table 2-6. Mining equipment would be selected as part of the detailed mine design.

It is noted that the draglines and selected shovels in Table 2-6 are powered by electricity, with the remainder being diesel powered. BWM would investigate further opportunities for the use of low emission alternatives to diesel-powered equipment over the life of the Project, based on the commercial feasibility and practicality of the potential alternatives.

2.7 Coal Processing

2.7.1 COAL HANDLING AND PROCESSING

ROM coal mined during the life of the Project (approximately an additional 200 Mt) would be handled and processed at the existing CHPP (Plate 2-3) and TCP.

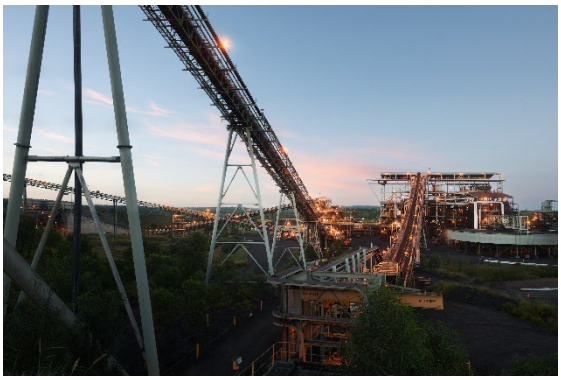


Plate 2-3 BWM CHPP

Table 2-6
Indicative Operation Fleet

Type	Make and Model	Quantity
Dragline	Marion 8200	2
Dragline	Marion 8050	3
Dragline	BucyrusErie 1370W	2
Shovel – Waste	CAT 7495	1
Shovel – Waste	P&H 4100	1
Shovel – Waste	Liebherr 9800	4
Shovel – Waste	CAT 6060/RH340	3 (maximum)
Shovel – Waste	Contracts 600 t excavator	2
Shovel – Waste	CAT 6040	2
Coal Loaders	Komatsu WA1200	4
Shovel – CHPP Reject	CAT 988H	1
Shovel – TCP Reject	CAT 966G	1
Dozer	CAT D10	9 (maximum)
Dozer	CAT D11	42 (maximum)
Wheel Dozer	CAT 854	3
Truck	CAT 930	104 (maximum)
Truck	Kress Truck	8
Truck	CAT 793	13 (maximum)
Drill	Drill	9 (maximum)
Water Truck	CAT 785D	3
Water Truck	CAT 789D	7
Graders	CAT 24M	10
Graders	CAT 18M	15

The CHPP employs conventional dense medium and microcell froth flotation circuits and operates on a 24 hours, seven days per week routine, shutting down only for maintenance periods. BWM also hosts a small TCP, which does not wash ROM coal, but rather utilises crushing and screening methods and sizes the ROM coal for sale.

The existing CHPP and TCP together, have an existing capacity to process 19 Mtpa of ROM coal to produce a total of 17.6 Mtpa product coal and can accommodate the peak ROM coal production rates for the Project.

The Project's processing rate would be determined by the requirements of the coal market, product specification and/or blending requirements. Notwithstanding, the maximum processing rate would not exceed 19 Mtpa of ROM coal.

No upgrades to the existing CHPP or TCP are planned as part of the Project.

2.7.2 COAL QUALITY

The Project is expected to produce on average, approximately 85% metallurgical and approximately 15% thermal coal throughout the life of the mine. The exact percentage of metallurgical and thermal coal is dependent on coal quality, detailed mine design, mine economics and market volume requirements.

2.7.3 COAL MINING

An additional approximately 200 Mt of ROM coal would be mined over the life of the Project. BWM's approved coal mining process would be used for the Project.

2.7.4 COAL REJECT MANAGEMENT

An additional approximately 36 Mt of coarse rejects and 32 Mt of fine rejects would be produced from the processing of ROM coal over the life of the Project (Table 2-5).

Coal Reject Geochemistry

Coal rejects (coarse and fine) generated by the processing of ROM coal from the Project (i.e. based on Project coal samples) were assessed as part of the Geochemistry Assessment (Appendix I) by Terrenus Earth Sciences (Terrenus) (2026).

The results of the geochemical test work conducted for the Project by Terrenus (2026) indicate that the characteristics of potential coal reject material and tailings produced by the Project would be consistent with the characteristics of the materials at the existing BWM, where:

- approximately half of tailings have a moderate to high potential of Acid and Metalliferous Drainage (AMD), with the remaining half having low potential; and
- fresh rejects have a low potential for AMD, whereas, aged rejects having moderate to high potential.

Rejects had electrical conductivity (EC) values ranging from 229 to 2,830 microSiemens per centimetre (µS/cm), with median and 95th percentile values of 761 and 2,404 µS/cm, respectively, and generally low to low-moderate total sulphur (S) concentrations, similar to coal (Appendix I). Contact water (run-off and seepage) from coal is expected to be non-saline, either as a result of dissolution of geogenic salts and/or from sulphide oxidation (sulphate salinity) (Appendix I).

Coal Reject Disposal Strategy

BWM's existing mine waste management strategy would be used for the Project.

Coarse rejects would be disposed of in accordance with the EA (e.g. placed into disused mine ramps and in-pit waste rock dumps and progressively buried).

Fine rejects (tailings) would be disposed of in an approved TSF, in-pit void or other disposal options in accordance with the EA.

Semi-permanent tailings cells would also be utilised for fine rejects. These tailings cells would be established by 2032 for ongoing use and would be constructed from coarse rejects to promote drainage.

Semi-permanent tailings cells would be constructed in areas shown in Figures 2-2 to 2-5 as part of the Project. These would be used to store fine tailings only (with coarse tailings component co-disposed with waste rock as above).

Semi-permanent tailings cells would indicatively commence in 2032 and the general steps would involve:

- cells would be constructed of homogeneous clay floor and drains;
- slurried fine tailings would be pumped to the cell and discharged via a pipe with the pipe outlet at one end of the cells, to encourage beaching and water flow to the opposite end of the cell;
- return water would be pumped to the CHPP;
- flocculants may be used to encourage settlement of tailings;
- tailings would be left to dry in the cell; and
- upon decommissioning, a cover system would be implemented on the completed cells.

2.7.5 WASTE ROCK MANAGEMENT

Waste Rock Quantities

Approximately 2,770 Mbcm of additional overburden/interburden material would be mined over the life of the Project.

The annual volumes of waste rock handled during the life of the Project are provided in Table 2-5.

Waste Rock Emplacement Strategy

Waste rock produced by mining would be preferentially placed in-pit within previously mined areas to progressively backfill the open cut pit, consistent with existing operations.

Waste Rock Geochemistry

An assessment of the geochemical characteristics of the waste rock associated with the development of the Project is provided in the Geochemistry Assessment prepared by Terrenus (2026) (Appendix I). A summary of the findings of the assessment is provided below.

The majority of the 'parent' waste rock material is non-carbonaceous and has a negligible potential to generate AMD (Appendix I). The contact water (run-off and seepage) from the non-carbonaceous waste rock is expected to be non-saline to slightly saline, as a result of dissolution of geogenic salts more so than from sulphide oxidation (Appendix I).

Non-carbonaceous waste rock, as a bulk material, is expected to generate pH-alkaline to highly alkaline contact water (run-off and seepage) (Appendix I).

The total S concentration of non-carbonaceous waste rock is very low, with a 95th percentile total S concentration of 0.09% (Appendix I). As such, more than 99% of samples tested were classified as non-acid forming (NAF), and due to the very low S concentration, the waste rock has a negligible potential to generate saline drainage (SD) due to sulphide oxidation (Appendix I).

Acid neutralising capacity is expected to be about 40 to 70% available under field conditions, with iron-dolomite and calcite being the main carbonate minerals contributing to the acid buffering potential of the waste rock (Appendix I).

In summary, waste rock comprises approximately 99% of the mineral waste at BWM, of which about 92% is non-carbonaceous. The non-carbonaceous waste rock has a negligible potential to generate AMD as either acid drainage (AD) and/or neutral and metalliferous drainage (NMD) and/or SD (Appendix I).

2.7.6 TRAIN LOAD-OUT FACILITIES AND PRODUCT COAL STOCKPILES

Product coal would continue to be transported offsite via the existing BWM train load-out facilities and the Blackwater Rail System (Section 1.2.6).

2.8 Water Management

The water management strategy for the Project would be consistent with existing BWM operations including sourcing raw water from incidental rainfall capture, natural/stormwater runoff and via two Whitehaven owned pipelines sourced from the Mackenzie River at the Bedford Weir pumping station.

The waterways within the Project area and downstream are shown on Figure 2-14. Waterways within the Project area include the following (WRM, 2026):

- Two Mile Gully and its associated tributaries, the headwaters of which are located to the south-east and within the southern part of the Project area.
- Deep Creek, the tributaries of which originate to the west of BWM and flow in a north easterly direction between active mining areas of BWM (parallel with Taurus Creek) and joins Taurus Creek immediately downstream of Taurus Road.
- Taurus Creek, the tributaries of which originate to the west of the BWM and flow in a north easterly direction between active mining areas of BWM as well as immediately west of the Project area in a north easterly direction, where it joins with Blackwater Creek.
- Sagittarius Creek, the upstream tributaries of which originate in the Project area, flows off-site passing to the west of Blackwater, then joining Blackwater Creek.
- Blackwater Creek, which is located to the east of the Project area and flows in a northerly direction to the east of Blackwater, joining the Mackenzie River approximately 40 km downstream of the Project area, and ultimately joining the Fitzroy River and flowing to the Coral Sea near Rockhampton.

A description of the BWM's existing water management infrastructure is described in Section 1.2.7.

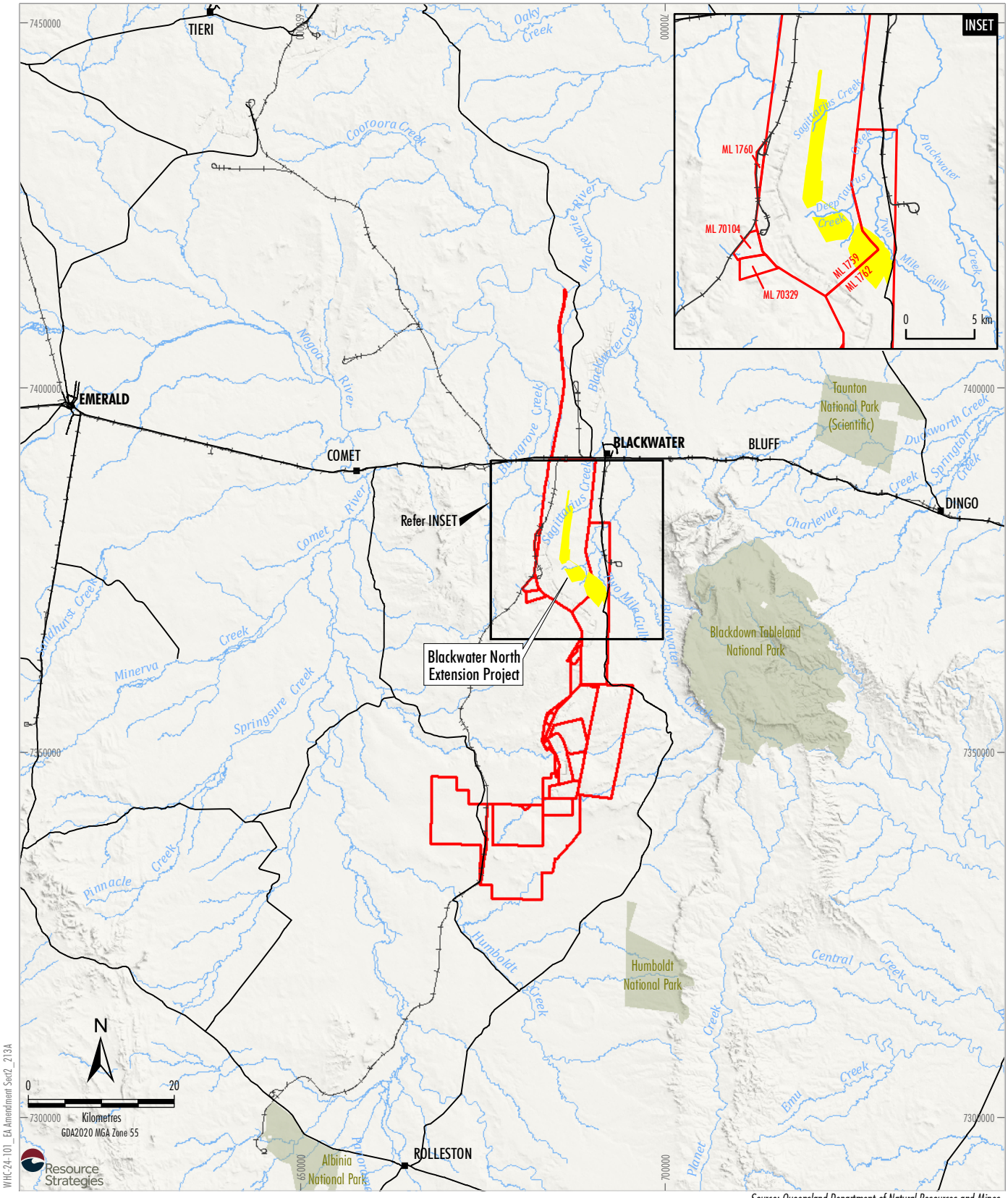
2.8.1 PROJECT WATER MANAGEMENT SYSTEM

The Project's water management schematic is shown on Figures 2-15 to 2-17.

The approved mine's WMS would be progressively developed and augmented as water management requirements change over the life of the Project.

Water management infrastructure which may be developed and/or existing infrastructure that may be augmented for the Project includes:

- sediment dams to collect and treat runoff from overburden emplacement areas;
- clean water diversion drains and dams to divert runoff from undisturbed catchments around areas disturbed by mining where reasonable and feasible;
- surface water drains to divert sediment-laden runoff from overburden emplacement areas to sediment dams;
- MAW system to release MAW from MAW dams; and
- other ancillary water management infrastructure (including pumps, piping, and drains), as required.





LEGEND
- Mining Lease
- Proposed Project Area
- National Park
- Railway
- Road
- Watercourse

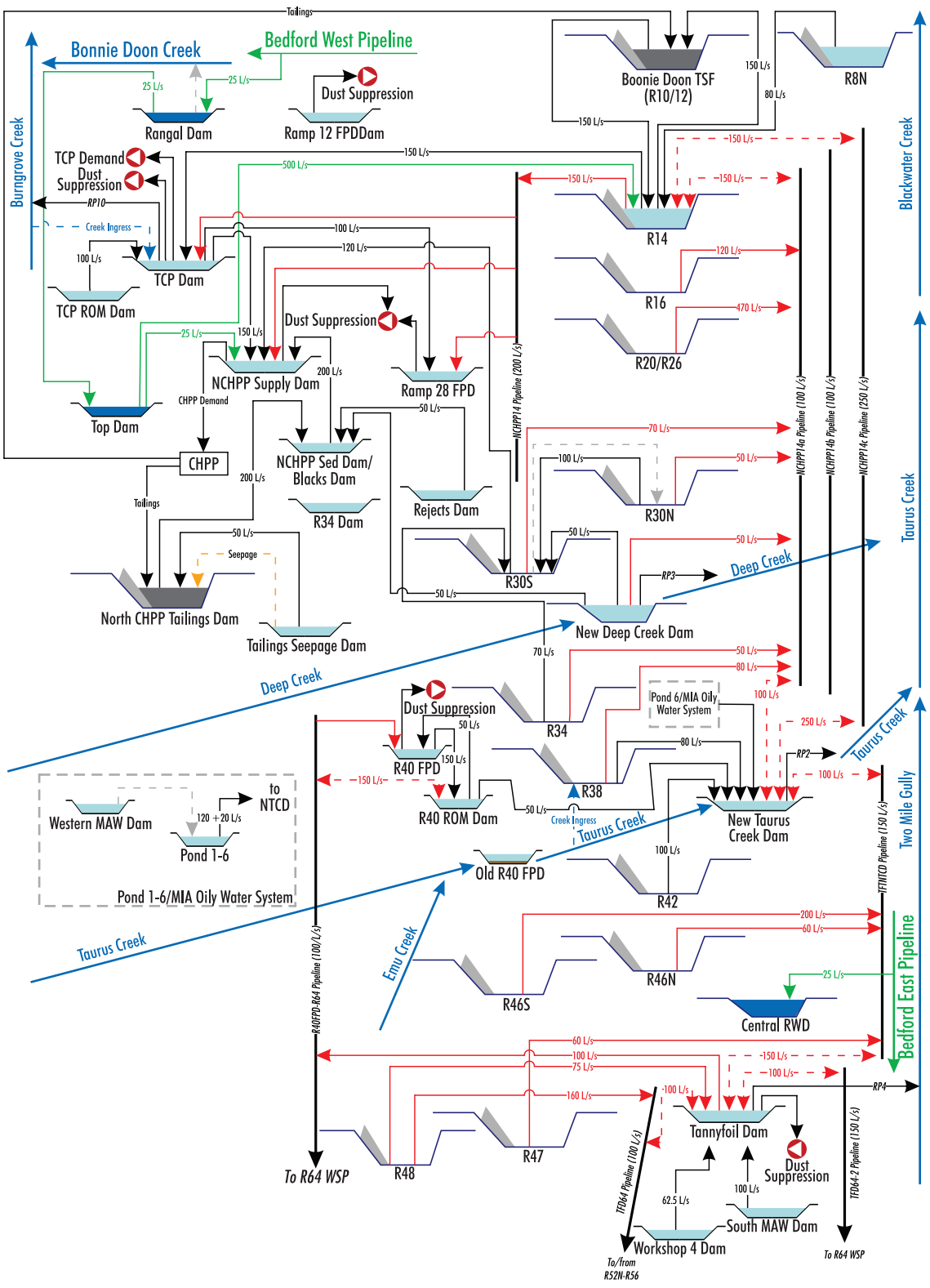
Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Mapped River Tributaries within Vicinity of the Project

Figure 2-14



WHC-24-101_EA Amendment Sect2_0038

Source: HydroBalance (2026)

LEGEND

- System Outflow
- Pumped Transfer
- Overflow Path
- BBP One-way Transfer
- BBP Two-way Transfer
- Creek/Waterway
- Creek Ingress
- Raw Water Pipeline/Connection
- Open Cut
- Sediment Dam
- Mine Affected Dam
- Clean/Raw Dam
- Tailings Dam

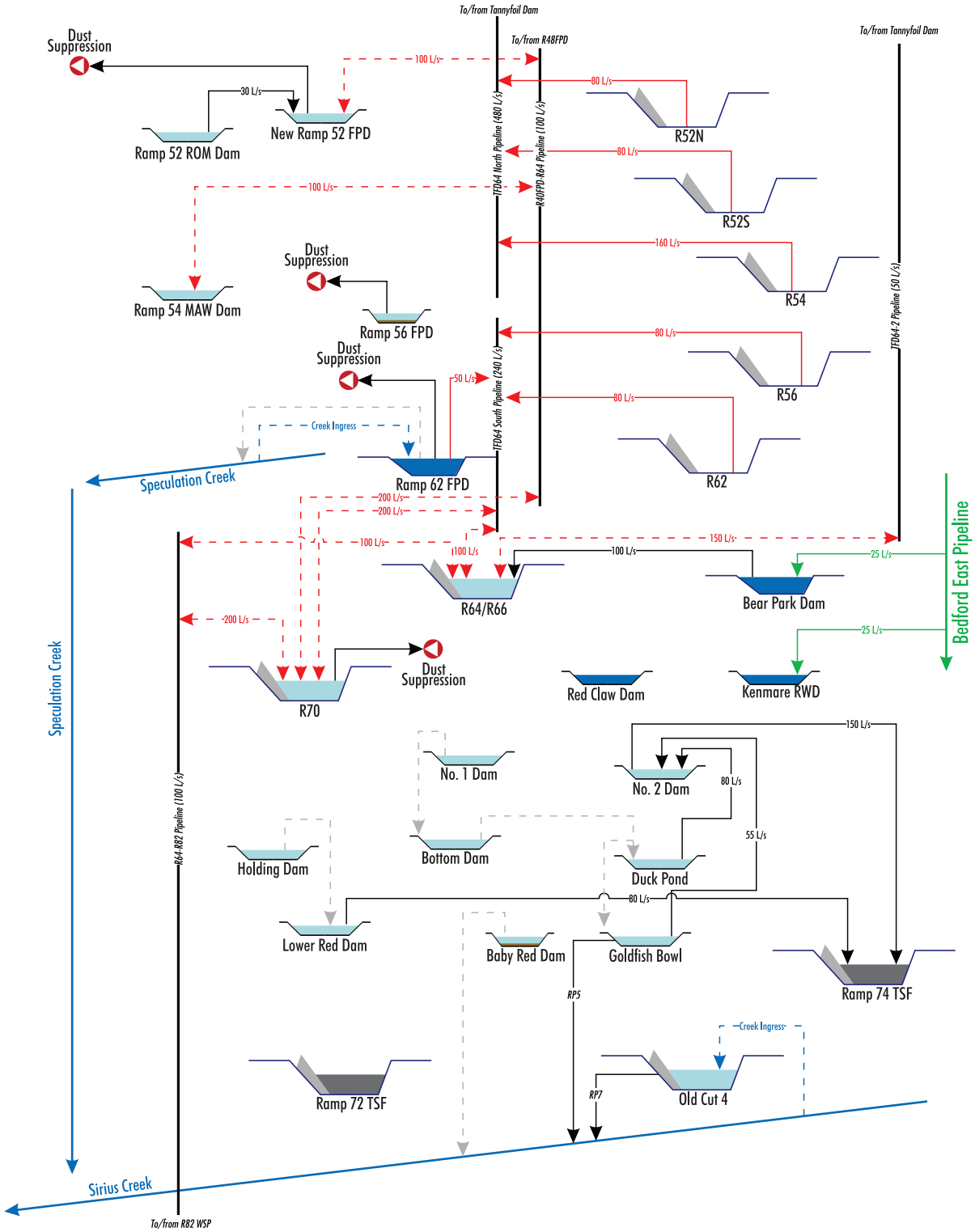
Note:
To avoid unnecessary clutter, the following are not shown on the schematic:
1 - Authorised release points that are not in active use.
2 - Overflow paths from most pits and storages.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

BWM Deep Creek North and South Water Management System Schematic

Figure 2-15



WHC-24-101_EA Amendment Sect2_004B

Source: HydroBalance (2026)

LEGEND

- System Outflow
- Pumped Transfer
- Overflow Path
- BBP One-way Transfer
- BBP Two-way Transfer
- Creek/Waterway
- Creek Ingress
- Raw Water Pipeline/Connection
- Open Cut
- Sediment Dam
- Mine Affected Dam
- Clean/Raw Dam
- Tailings Dam

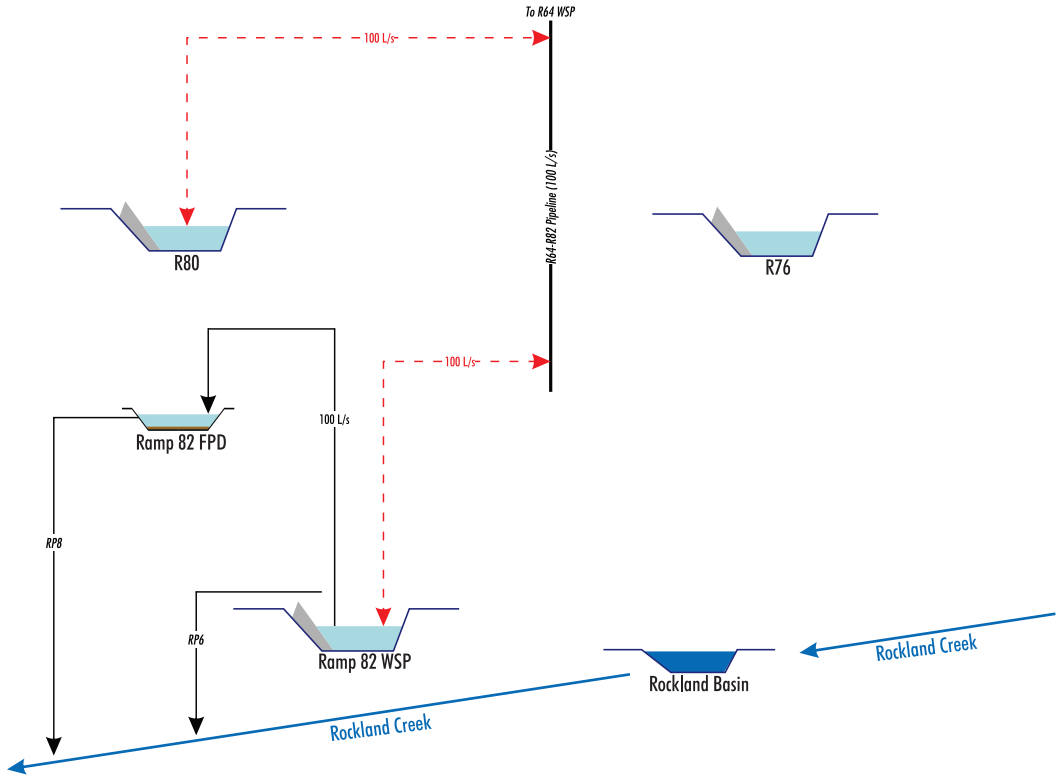
Note:
To avoid unnecessary clutter, the following are not shown on the schematic:
1 - Authorised release points that are not in active use.
2 - Overflow paths from most pits and storages.

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BLACKWATER NORTH EXTENSION PROJECT

BWM Emu Creek South and Sirius Creek North Water Management System Schematic

Figure 2-16



WHC-24-101_EA Amendment Sect2_0058

Source: HydroBalance (2026)

LEGEND

- System Outflow
- Pumped Transfer
- Overflow Path
- BBP One-way Transfer
- BBP Two-way Transfer
- Creek/Waterway
- Creek Ingress
- Raw Water Pipeline/Connection
- Open Cut
- Sediment Dam
- Mine Affected Dam
- Clean/Raw Dam
- Tailings Dam

Note:
To avoid unnecessary clutter, the following are not shown on the schematic:
1 - Authorised release points that are not in active use.
2 - Overflow paths from most pits and storages.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

BWM Sirius Creek South Water Management System Schematic

Figure 2-17

Consistent with existing operations, the objective of the site WMS would be to manage all types of water on site to meet operational, social and environmental objectives. Key WMS objectives for the Project (with specific objectives for each water category provided in Appendix B) are to:

- minimise the production of MAW, minimise the risk of uncontrolled discharges and maintain sufficient water for the operation in periods of dry climatic conditions;
- protect the integrity of regional and local water sources; and
- provide sufficient water for the Project's requirements, with minimal requirement for external supply.

The progressive development of water management infrastructure is described in Appendix B.

The controlled release of MAW would continue to be restricted by the existing EA release conditions for the duration of the Project. Current release points and related monitoring are shown on Figure 2-18.

2.8.2 UP-CATCHMENT DIVERSIONS

No significant watercourse diversions or modifications to existing or approved watercourse diversions are proposed for the Project. However, a clean water drain along the south-eastern side of the future Stewarton Pit extent would be in place during the operational stage of the Project and would also form part of the final landform post-closure (Figures 2-4 and 2-5). The details are provided in Appendix B (WRM, 2026).

2.8.3 FLOOD LEVEES AND FLOOD PROTECTION LANDFORMS

Temporary flood levees are a management measure that can be implemented to provide immunity for infrastructure and mining operations during a 1 in 1,000 AEP flood event (incorporating cumulative effects from other approved mining operation flood levees). These would be implemented and managed in accordance with BWM's EA.

Additional temporary flood levees to support the Project are detailed in Appendix B (WRM, 2026), with conceptual designs for the temporary operational levees prepared by TerraQ (2026).

The proposed temporary levees would provide the future mining pits with immunity from flooding for all events up to 1 in 1,000 AEP. The proposed levees would be constructed with crest levels above the adjacent 1 in 1,000 AEP peak flood level (Appendix B).

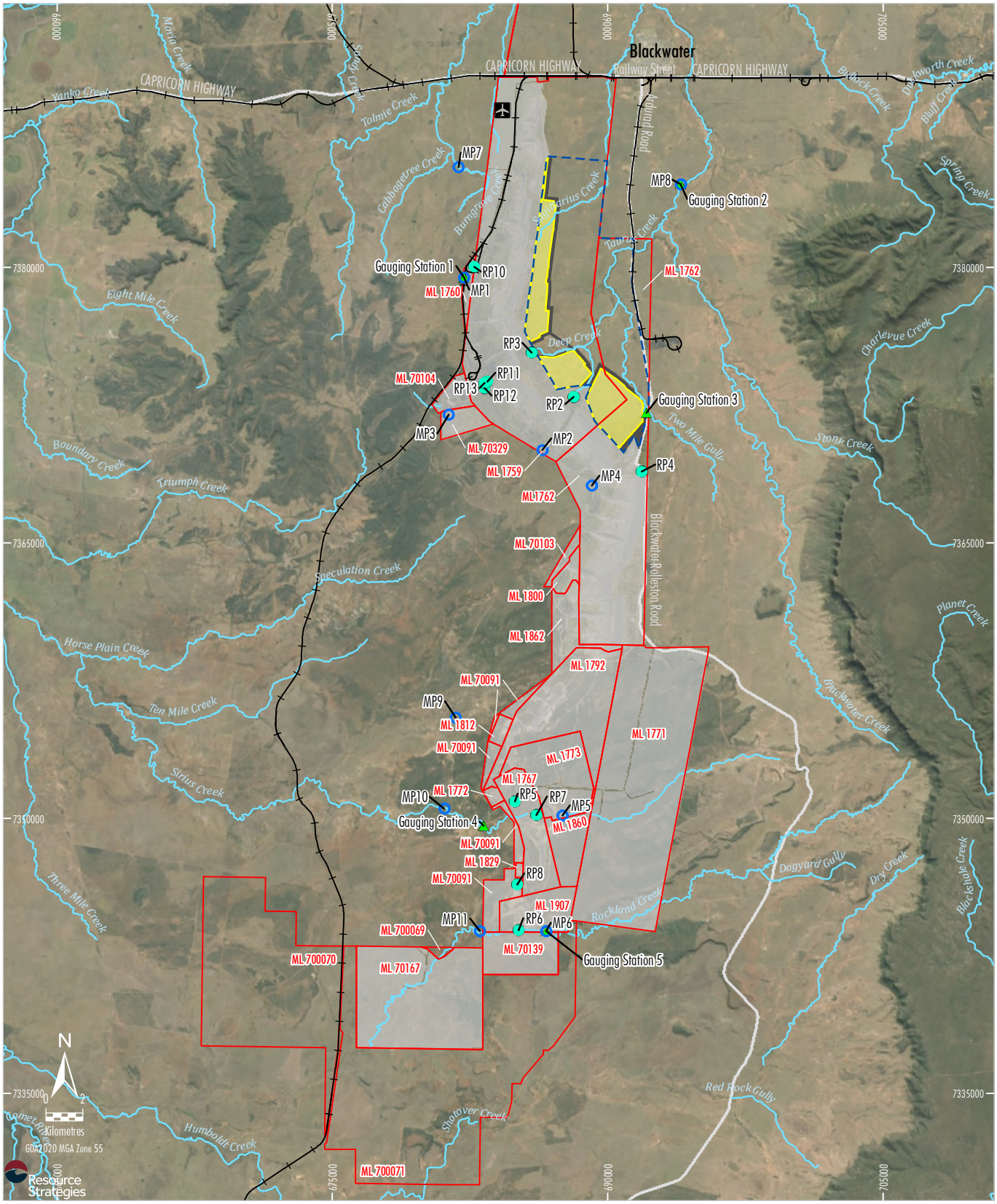
The final landform around the final voids would be constructed to prevent floodwater from entering. The temporary flood protection levees (in place during mining) adjacent to the R30, Deep Creek and Stewarton North pits would be removed and would be replaced by flood protection landforms constructed within the cattle grazing PMLU to provide separation between the modelled 1 in 1,000 AEP floodplain (2100 climate scenario) and the residual voids (Appendix B).

To achieve this, the final landform has been designed such that the crest levels of the rehabilitated out-of-pit overburden areas would be above the adjacent 1 in 1,000 AEP peak flood level for the R30 void and above the adjacent Probable Maximum Flood peak flood level for the Deep Creek and Stewarton North pits (Appendix B).

In addition, the south-eastern corner of the Deep Creek Pit would be backfilled. As a result, the toe of the final landform at this location would be located further from Deep Creek than the maximum extent of the Deep Creek Pit during operations, providing additional floodplain conveyance around the final landform compared to the operational mining phase (Appendix B).

The south-eastern corner of the Stewarton North Pit would also be backfilled, resulting in the toe of the final landform being located further away from Taurus Creek than the maximum extent of the Stewarton North Pit during operations (Appendix B). Where spatial constraints require a flood protection landform to be constructed near the highwall crest, the adjacent void would be partially backfilled to form a 30% slope, supporting long-term stability and reducing potential for highwall failure.

The proposed clean water drain, which would realign an unnamed tributary of Two Mile Gully during mining, would be retained as part of the final landform. The drain has been designed to be geomorphically stable and self-sustaining (Appendix B).



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2026)
Orthophoto: Esri (2025); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Airport
- Approved Disturbance Footprint
- Gauging Station
- Release Point
- Receiving Water Monitoring Location

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Environmental Authority Water Release Points and Related Monitoring

Figure 2-18

2.8.4 WATER CONSUMPTION

The water consumption requirements for the Project and the water balance would fluctuate with climatic conditions, production rates and as the extent of the mining operations change over time. Consistent with existing operations, water would primarily be required for operation of the CHPP and dust suppression. The CHPP would continue to consume approximately 3,000 megalitres per annum of water (HydroBalance, 2026). The TCP requires less water, estimated at approximately 100 megalitres/annum (HydroBalance, 2026).

In addition, water would be required for coal crushing/conveyor dust suppression, ROM pad dust suppression and other miscellaneous demands, including washdown of mobile equipment and other minor non-potable uses, such as firefighting. Water used in these applications would also be transferred back to the WMS prior to reuse in the CHPP, or for treatment and discharge as required.

The estimated annual demand for dust suppression (primarily made up of haul road dust suppression) is 3,000 megalitres per annum on average (HydroBalance, 2026).

2.8.5 WATER SUPPLY AND DISTRIBUTION

The existing BWM sources water from incidental rainfall capture, natural/stormwater runoff and via two Whitehaven owned pipelines sourced from the Mackenzie River at the Bedford Weir pumping station.

The Project's water requirements and the source of supply would be similar to existing operations. The Project's primary water demands would include:

- coal processing at the CHPP;
- dust suppression;
- maintenance (e.g. washing of heavy mobile equipment); and
- potable water for drinking, fire suppression, bathhouse and incidental use (e.g. cleaning) for the existing operations.

To meet site water demand, water would continue to be supplied by the existing onsite MAW inventory, rainfall runoff, external pipeline water delivered from the Bedford Weir and through BWM water allocations supplied from the Bedford East and Bedford West pipelines.

2.8.6 GROUNDWATER INFLOWS

Licensing of the predicted groundwater inflows for the Project is assessed and described in Appendix C.

2.8.7 SEDIMENTATION CONTROL

Existing sediment control practices (i.e. sediment dams) would continue to be utilised for the Project. No specific requirements for additional sediment basins have been identified for the Project (HydroBalance, 2026). However, additional sediment basins may potentially be required for the Project associated with disturbance in advance (to the east) of mining operations including infrastructure corridors, pre-stripping and soil stockpiles.

Where required, new sediment basins would be designed, constructed, operated and maintained in accordance with *BWM Plan – Erosion and Sediment Control Management Plan* (Whitehaven, 2026a) and relevant contemporary guidance, including the *Best Practice Erosion and Sediment Control Guideline* (International Erosion Control Association, 2025).

Sediment dams would be maintained until such a time that vegetation within the catchment area successfully establishes and where runoff has similar water quality characteristics to areas that are undisturbed by mining activities.

Sediment dams would be maintained in rehabilitated areas where required by the site water demand, or retained via an agreement with future landholders. Where an agreement with the future landholders is not in place, mine dam sediment would be disposed of following consideration of any potential contamination.

Open Cut Dewatering

Water accumulated on pit floors from groundwater inflows and incidental rainfall would be transferred via backbone pipelines to designated water storages. These pipelines would be relocated as the pits progress.

Sumps would be required in the open cuts in order to manage potential inflows. Water that accumulates in the open cut sumps would be pumped out and transferred to the Project WMS for use in dust suppression and vehicle washdown. Additional pipe and pumping infrastructure would be progressively developed throughout the Project to support the change in open cut extent (Appendix B).

2.8.8 CONTROLLED RELEASE STRATEGY

As per existing operations, MAW may be released from approved release points, in accordance with conditions outlined in amended EA EPML00717813. Release practices would remain consistent with the EA.

2.8.9 SIMULATED PERFORMANCE OF THE PROJECT WATER MANAGEMENT SYSTEM

A predictive assessment of the performance of the Project WMS (including supply, containment, risk of disruption to mining operations and controlled release volumes) is presented in Appendix B.

The forecast model was run for 107 climatic realisations developed using 136 years of rainfall data.

The Project water balance model includes the following 10 representative stages to represent the progression of mining over the 50-year simulation:

- Stage 0;
- Stage 1 (FY 2026);
- Stage 2 (FY 2027);
- Stage 3 (FY 2028);
- Stage 4 (FY 2029);
- Stage 5 (FY 2030 to FY 2034);
- Stage 6 (FY 2035 to FY 2040);
- Stage 7 (FY 2041 to FY 2045);
- Stage 8 (FY 2046 to FY 2050); and
- Stage 9 (FY 2051 to FY 2055).

Key outcomes from the overall water balance are as follows (Appendix B):

- the existing Bedford East and Bedford West pipeline allocations are sufficient to maintain operations at BWM, with no additional external water supply allocation required as a result of the Project.
- Forecast annual external water demands for both the Bedford East and Bedford West pipelines do not exceed their respective water allocations under any scenarios.
- Controlled releases are primarily required under very wet (5th percentile), wet (10th percentile) and median (50th percentile) climatic conditions, with occasional releases during dry (90th percentile) conditions in some years.
- Forecast controlled release volumes increase with wetter climatic conditions, ranging from approximately 760 to 1,120 megalitres per annum under median conditions to 2,950 to 5,130 megalitres per year under very wet conditions.
- The currently approved controlled release strategy is sufficient to manage excess MAW volumes, with no changes required as a result of the Project.

Water Demand

The major components of the BWM operational water demand include:

- dust suppression of haul roads; and
- operation of the BWM CHPP, including coal processing, wash down and other associated uses.

Water demand for the Project would be met through a combination of on-site water storages and raw water imported to site. Raw water for BWM is sourced from the Bedford West and Bedford East pipelines, which have annual available allocations of 1,603 megalitres and 678 megalitres, respectively. Pipeline water is imported to site when the site wide water storage inventory falls below 14,701 megalitres, consistent with the Green Trigger Action Response Plan (TARP) (Appendix B).

The existing Bedford West and Bedford East pipeline allocations are sufficient for maintaining operations at BWM. Additional external water supply allocation is not required as a result of the Project (Appendix B).

2.8.10 SEWAGE

The Project would use the existing sewage treatment plant (Section 1.2.5). Effluent from the sewage treatment plant would be managed in accordance with EA EPML00717813 as per existing operations.

2.9 Infrastructure Requirements

2.9.1 ELECTRICITY INFRASTRUCTURE AND ENERGY SUPPLY

The estimated maximum electricity demand for the Project when fully operational would be approximately 231 gigawatt-hours per annum.

The existing electricity infrastructure (onsite ETLs and substations [Section 1.2.8]) would be relocated as required due to the progression of the open cut and development of other infrastructure.

Maintenance, upgrades and new onsite electricity infrastructure (e.g. additional ETLs) would be developed for the Project as required.

2.9.2 TELECOMMUNICATIONS

The existing communication systems would be retained for the Project. The communication system would be progressively upgraded as the mine expands and would include the use of mobile and/or fixed installations that are suitably located to maximise communications efficiency, as required.

2.9.3 EXPLOSIVES MAGAZINES

Explosives magazines and reload facilities are currently used at BWM. These facilities would be relocated progressively during the Project to remain in close proximity to active pits.

2.10 Waste Management

The key waste streams produced by the BWM that would continue to be produced by the Project include:

- waste rock;
- coal rejects;
- recyclable and non-recyclable general wastes;
- sewage and wastewater; and
- other wastes from mining and workshop related activities (e.g. used tyres, drill cuttings and waste hydrocarbons).

Management of waste streams generated by the Project would be governed by the following relevant Queensland legislation:

- EP Act;
- *Environmental Protection Regulation 2019* (EP Regulation);
- *Waste Reduction and Recycling Act 2011* (WRR Act); and
- *Waste Reduction and Recycling Regulation 2011*.

In addition, heavy mobile equipment tyres would continue to be disposed of in a designated on-site tyre disposal area, in accordance with conditions outlined in amended EA EPML00717813.

The existing on site landfill would continue to be utilised to support the Project, in accordance with conditions outlined in amended EA EPML00717813 and the *BWM Plan – Landfill Management Plan* (Whitehaven, 2018).

An underlying principle of all waste management in Queensland is the waste management hierarchy. The waste management hierarchy (WRR Act), identifies the most to the least-preferred management option, as follows; “avoid, reduce, reuse, recycle, recover, treat, and dispose”.

This hierarchy would continue to be used to manage waste at the Project. If waste must be disposed of, Whitehaven Blackwater would do so in a way that prevents or minimises adverse effects on environmental values.

Waste management at the Project would be consistent with the current Waste Management Strategy for the BWM and follow the waste management hierarchy described in the WRR Act:

a) avoid unnecessary resource consumption;

b) reduce waste generation and disposal;

c) re-use waste resources without further manufacturing;

d) recycle waste resources to make the same or different products;

e) recover waste resources, including the recovery of energy;

f) treat waste before disposal, including reducing the hazardous nature of waste; and

g) dispose of waste only if there is no viable alternative.

2.10.1 CHEMICAL AND HAZARDOUS MATERIALS WASTE MANAGEMENT

Hazardous materials are currently transported to site by relevant suppliers as required. As per current operations, the hazardous waste generated is then removed by the supplier for safe disposal. Where the supplier is unable to remove the waste, an authorised contractor would collect and transport the hazardous material offsite for safe disposal in accordance with the EP Act. This practice would be continued for the Project.

The chemical and hazardous materials management for the Project would be consistent to that approved under EA EPML00717813. This includes storing more than 500 cubic metres (m^3) of chemicals of class C1 or C2 combustible liquids under the Australian Standard (AS) 1940:2017 or dangerous good class 3 under subsection (1) (c) of the EP Regulation.

Chemicals and hazardous materials used or stored on-site would be managed in accordance with Queensland and Commonwealth Government legislation and policy requirements, including the removal from the site by authorised contractors as required. Refuelling facilities, bunding, and storage facilities for hydrocarbons and chemicals are at appropriately designed sites and comply with the AS (e.g. *AS 1940:2017 The storage and handling of flammable and combustible liquids*).

2.10.2 FUEL SUPPLY AND STORAGE

Fuel (including diesel) is transported to the existing BWM by contractors.

Fuel storage and dispensing occur at the MIA and CHPP. Self-bunded storage tanks, bunded delivery areas and electronic process controls are in place at these locations.

In-field servicing and fuelling of equipment including bulldozers, excavators, loaders, lighting plants and pumps is provided by service trucks.

The transport, storage and handling of fuels (including diesel) on-site is done in accordance with relevant legislation and guidelines.

Fuels and chemicals are not stored or handled within 200 m of waterbodies.

2.11 Environmentally Relevant Activities and Notifiable Activities

The EP Act identifies a number of ERAs (including mining activities) for which an EA is required, provides the process for applying for and assessing an EA for mining activities, and also establishes an enforcement regime for complying with conditions of granted EAs.

The EA imposes environmental management conditions on the mining activities undertaken on the relevant ML and outlines the environmental management requirements that Whitehaven Blackwater must undertake.

The ERAs under Schedule 2 and Schedule 3 of the EP Regulation proposed to be undertaken as part of the Project are listed in Table 2-7, with corresponding aggregate environmental scores (AESs) and thresholds.

The Schedule 2 activities are ancillary activities proposed to be carried out as part of the resource activity and are listed below the Schedule 3 activity.

Table 2-7
ERAs at BWM

ERA		AES
Schedule 3		
ERA 13 – Mining Black Coal		128
Schedule 2		
ERA 8 – Chemical Storage	Storing more than 500 cubic metres of chemicals of class C1 or C2 combustible liquids under AS 1940 or dangerous goods class 3 under subsection (1)(c).	85
ERA 31 – Mineral Processing	Processing, in a year, the following quantities of mineral products, other than coke (b) more than 100,000 t.	280
ERA 33 – Crushing, Milling, Grinding or Screening	Crushing, grinding, milling or screening more than 5,000 t of material in a year.	0
ERA 60 – Waste Disposal	Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection (1)(b) (h) more than 200,000 t.	107
ERA 62 – Resource Recovery and Transfer Facility Operation	Operating a facility for receiving and sorting, dismantling, baling or temporarily storing (c) category 2 regulated waste.	26
ERA 63 – Sewage Treatment	Operating sewage treatment works, other than no-release works, with a total daily peak design capacity of, (b-ii) more than 100 EP but not more than 1,500 EP otherwise.	53

EP = equivalent persons.

The EA for the Project would authorise the carrying out of those prescribed ERAs. Proposed land uses that may result in land becoming contaminated are known as “Notifiable Activities” and are listed in Schedule 3 of the EP Act. The following Notifiable Activities are relevant to the Project:

- 1 – Abrasive blasting;
- 7 – Chemical Storage (greater than [>] 10 t);
- 15 – Explosive production or storage;
- 24 – Mine wastes; and
- 29 – Petroleum product or oil storage.

2.12 Rehabilitation and Mine Closure Activities

Whitehaven Blackwater has developed a PRCP for the Project in accordance with section 126B and 126C of the EP Act (Section 5.1). Progressive rehabilitation would continue to occur throughout the life of the Project. The approach to rehabilitation and the final landform design is based on the following key design principles, which are further detailed in Section 5:

- The final landform is sympathetic to and generally consistent with the topography of the surrounding land and consistent with the landform characteristics of the region.
- PMLUs are compatible with surrounding land uses and can achieve long-term stability and compatibility with the surrounding landform.
- PMLUs and rehabilitation of the Project is undertaken in consultation with relevant stakeholders.
- Minimising environmental impacts.

PMLUs for the Project build on existing approved PMLUs at BWM. These include cattle grazing, dryland cropping, woodland habitat, water storage and watercourse.

Whitehaven Blackwater is committed to undertaking progressive rehabilitation as land becomes available. Rehabilitation would continue to be monitored at the Project as per the existing mine’s rehabilitation monitoring methodology, which includes:

- measuring the progress and success of the rehabilitation program against performance indicators and Rehabilitation Success Criteria for the applicable targeted PMLU;
- inform the continuous improvement process and refine rehabilitation methodologies and success criteria; and
- identify when rehabilitation is not trending toward success criteria in an appropriate timeframe, triggering adaptive management.

Once specific infrastructure is no longer required, it would be decommissioned (where required) and rehabilitated in consultation with relevant stakeholders and with the approval of the DETSI. Infrastructure would be retained if agreement is reached with the background landowner.
The conceptual final landform and final land use distribution for the Project are shown in Figure 2-19.

As described in Section 2.8.3, residual voids would be partially backfilled in some areas and flood protection landforms would be incorporated into the final landform. Where spatial constraints require the flood protection landform to be constructed near the highwall crest, the adjacent void would be backfilled to 30% slope, supporting long-term stability.
Long-term landform stability would be achieved through the implementation of the PRCP Schedule requirements, including preparation of certified closure landform designs, permanent diversion designs, flood impact assessments, implementation of any required flood protection measures and subsequent monitoring and certification requirements.

2.13 Other Activities

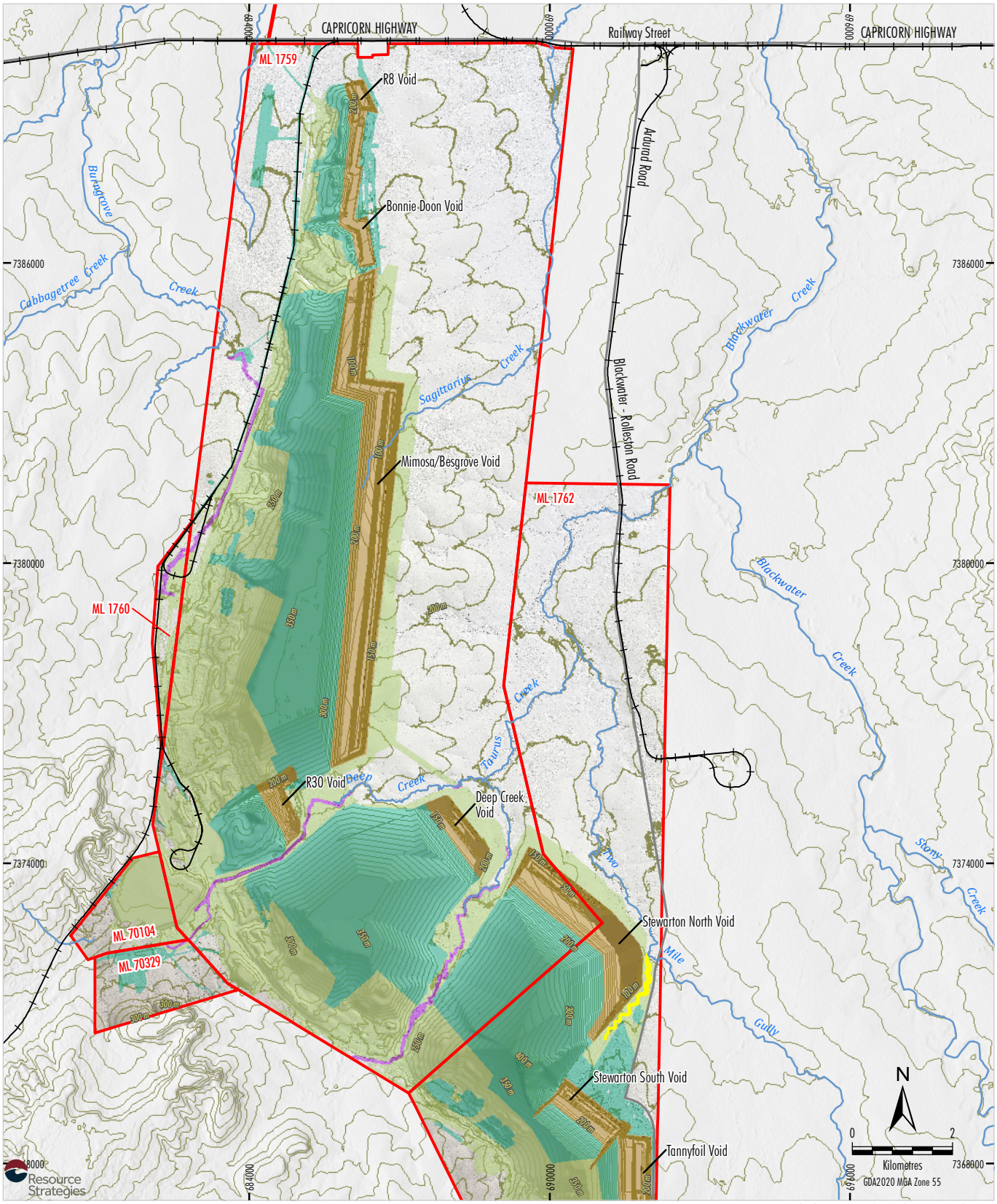
2.13.1 EXPLORATION ACTIVITIES

Exploration activities (including geotechnical investigations) would continue over the life of the Project to progressively refine the understanding of geological features, seam structure, and coal/overburden characteristics, providing input into detailed mine planning and engineering and informing mine closure planning. Exploration activities would comprise drilling, test pits, surface mapping, and airborne and ground based geophysical surveys.

Drilling activities would require only small surface areas and would involve the use of typical surface drilling rigs and supporting equipment.

Exploration activities would also include investigation of potential construction material borrow pits within the indicative surface disturbance extent.

Geochemical assessments of materials from exploration sites would continue over the life of the Project to refine overburden and coal reject management strategies and inform mine closure planning.



WHC-24-101_EA Amendment Sect2_214C

Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2026)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Clean Water Drain

Post Mining Land Use

- Cattle Grazing
- Woodland Habitat
- Permanent Infrastructure
- NUMA

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BLACKWATER NORTH EXTENSION PROJECT

Conceptual Final Landform and Land Use

Figure 2-19

2.13.2 MONITORING ACTIVITIES

Collection of environmental baseline data and monitoring of impacts would occur throughout the life of the Project in accordance with relevant approvals and management plans.

The location, extent, and methods adopted for monitoring would be adjusted throughout the life of the Project based on results and stakeholder feedback.

3 Project Justification and Alternatives

3.1 Justification

3.1.1 PROJECT NEED

Recent life of mine (LOM) planning has identified an opportunity to optimise mining operations at BWM by improving resource extraction efficiency within the existing MLs. This would allow Whitehaven Blackwater to mine existing approved resources more efficiently and extract an additional 200 Mt of ROM coal.

The Project seeks the extraction of an additional approximate 200 Mt ROM coal to 2055. The Project is a physical extension of the existing BWM and would facilitate the continuation of the existing benefits derived from the BWM.

The existing operations at the BWM play a fundamental role in creating employment opportunities within the local and regional communities, which in turn, increases regional prosperity and domestic productivity.

The BWM has approximately 1,750 FTE employees, including labour hire and contractors. These jobs are reliant on maintaining continuity of mining operations at the BWM.

The local and regional community has established itself to service the existing BWM and is therefore accustomed to the benefits, costs and demands associated with mining operations. Development of the Project would provide continued direct employment opportunities to the regional communities and long-term flow-on social and economic benefits.

The Project facilitates an opportunity to further contribute to Australia's position as a primary global producer of high-quality coking coal products.

3.1.2 PROJECT BENEFITS

The Project would optimise the BWM, thereby providing ongoing significant direct employment opportunities to the regional communities and long-term flow on social and economic benefits.

The benefits arising from ongoing operations facilitated by the Project would be greatest in areas where direct activity would occur, such as the nearby major population and service centres (i.e. Blackwater and Emerald). The Project would continue to:

- Support economic activity in the region and Queensland through direct and flow-on activity, and thus contribute to local, regional and State economic growth.
- Provide local businesses with opportunities to continue to secure new contracts and increase sales to service the Project and workforce needs.
- Enable the local sourcing of goods and services as well as labour from the local region, preferentially to elsewhere in Queensland and Australia.
- Employ local, regional then State-based employees as an order of preference. Benefits may be further enhanced through skills transfer and on-the-job skills development. Over 1,750 direct jobs are anticipated to be sustained as a result of the Project and the ongoing BWM operations.
- Directly contribute to infrastructure development in the region.

The Project was selected by Whitehaven Blackwater for its potential to deliver strong economic outcomes, local employment and regional investment, while supporting ecologically sustainable development goals.

Should the Project not be developed, the proposed optimised mine would not contribute to the significant economic growth provided by Queensland's growing export industry, the value that the coal resource would provide through State royalties and Commonwealth tax revenue would be foregone and the employment opportunities and social and community benefits for the region would not be realised.

3.1.3 SUITABILITY OF THE SITE

Whitehaven Blackwater considers that the development of the Project, being a brownfield development (extension of the existing BWM) and its use of the significant existing on-site infrastructure already developed to service the BWM (e.g. CHPP, TCP, rail, road, power and water infrastructure) would result in less demand and impact on existing services and providers compared to a greenfield development.

3.2 Alternatives

Alternatives to the Project that have been considered include alternative mining methods and layouts, and alternative infrastructure and processing options.

As part of the development of the Project, Whitehaven Blackwater carefully considered potential environmental, social and economic impacts as well as feedback provided by the local community, government agencies and other stakeholders. Significant design constraints have been incorporated into the Project to address these considerations.

The location for the Project is determined by the presence of coal seams that are amenable to be economically mined and are within coal tenements held by Whitehaven Blackwater.

The Project layout has been designed to maximise recovery of the resource and make use of existing infrastructure while avoiding impacts to environmental values of significance, such as Taurus Creek and the ecological values along its riparian corridor.

The coal resource is structurally complex and occurs within close proximity to the surface. As such, it is amenable to economic extraction via open cut methods. The structural complexity of the resource does not generally make it suitable for underground extraction.

Refinement of the mine plan, emplacement strategy, landform design and sequencing during the Major EA Amendment process has considered the principles of the Queensland Government's mining rehabilitation reforms, in particular, progressive rehabilitation opportunities and PMLU outcomes, noting that transitional arrangements would apply to areas of existing authorisation.

3.2.1 NOT CARRYING OUT THE PROJECT

If the Project was not pursued, mining activities would continue to occur at the BWM (including Blackwater Central), however the efficiency of these activities would not be optimised. The consequence of this would be a reduced recovery of the coal resource and less efficient operations compared to the Project, making the operation more susceptible to external factors, such as commodity prices and escalating capital and operating costs.

Should the Project not proceed, the following high-level impacts are highly likely to be realised:

- A reduction in the overall life of the existing BWM and reduced LOM ROM production.
- Potential for curtailment of production and earlier mine closure in response to external factors.
- A reduction in State and Federal royalty and tax revenues.
- An earlier reduction in the workforce, with the earlier ramping down from the existing 1,750 employees.
- Negative economic impacts on local businesses in Blackwater and Emerald.
- Flow-on impacts to the local communities of Blackwater and Emerald.

4 Environmental Assessment

4.1 Land

A Soils and Land Suitability Assessment has been prepared for the Project by GT Environmental Pty Ltd [GTE] (2026) and is presented in Appendix A. This section summarises the findings of GTE (2026).

Section 4.1.1 provides a description of the relevant environmental values, including a description of the existing environment relating to land resources. Section 4.1.2 describes the potential impacts of the Project on land and Section 4.1.3 outlines the proposed mitigation measures, management and monitoring.

4.1.1 ENVIRONMENTAL VALUES

The environmental values relevant to land in the Project area have been identified with consideration of the DETSI *Guideline – Application requirements for activities with impacts to land (ESR/2015/1839)* (DETSI, 2025a).

Landforms and Topography

Terrain within the Project area is comprised of level and gently undulating plains. Elevation across the Project area ranges from approximately 188 mAHD in the north-east of the Project area, to approximately 230 mAHD in the south of the Project area.

Land Use

The major land uses within the Bowen Basin include agriculture, coal mining and cattle grazing.

The Project is located within a rural area that is predominantly used for beef cattle grazing, agricultural activities on sown pastures and native pastures on high fertility soils (DNRMMRRD, 2026b).

Soils

A Soils and Land Suitability Assessment has been prepared by GTE (2026) for the Project and is presented in Appendix A. Soil surveys were undertaken across the Project area to identify and assess the dominant soil types and their relevant distribution.

The soil surveys were conducted in accordance with the:

- *Guidelines for Surveying Soil and Land Resources – Second Edition* (McKenzie et al., 2008);
- *Queensland Soil and Land Resource Survey Information Guideline* (Department of Resources [DoR], 2021); and
- *Queensland Land Resource Assessment Guidelines – Volume 1: Soil and land resource assessment* (Department of Environment and Science [DES], 2021a).

Soil characteristics and soil profiles have been described in accordance with the *Australian Soil and Land Survey Field Handbook – Fourth Edition* (National Committee on Soil and Terrain, 2024), DoR (2021) and DES (2021a).

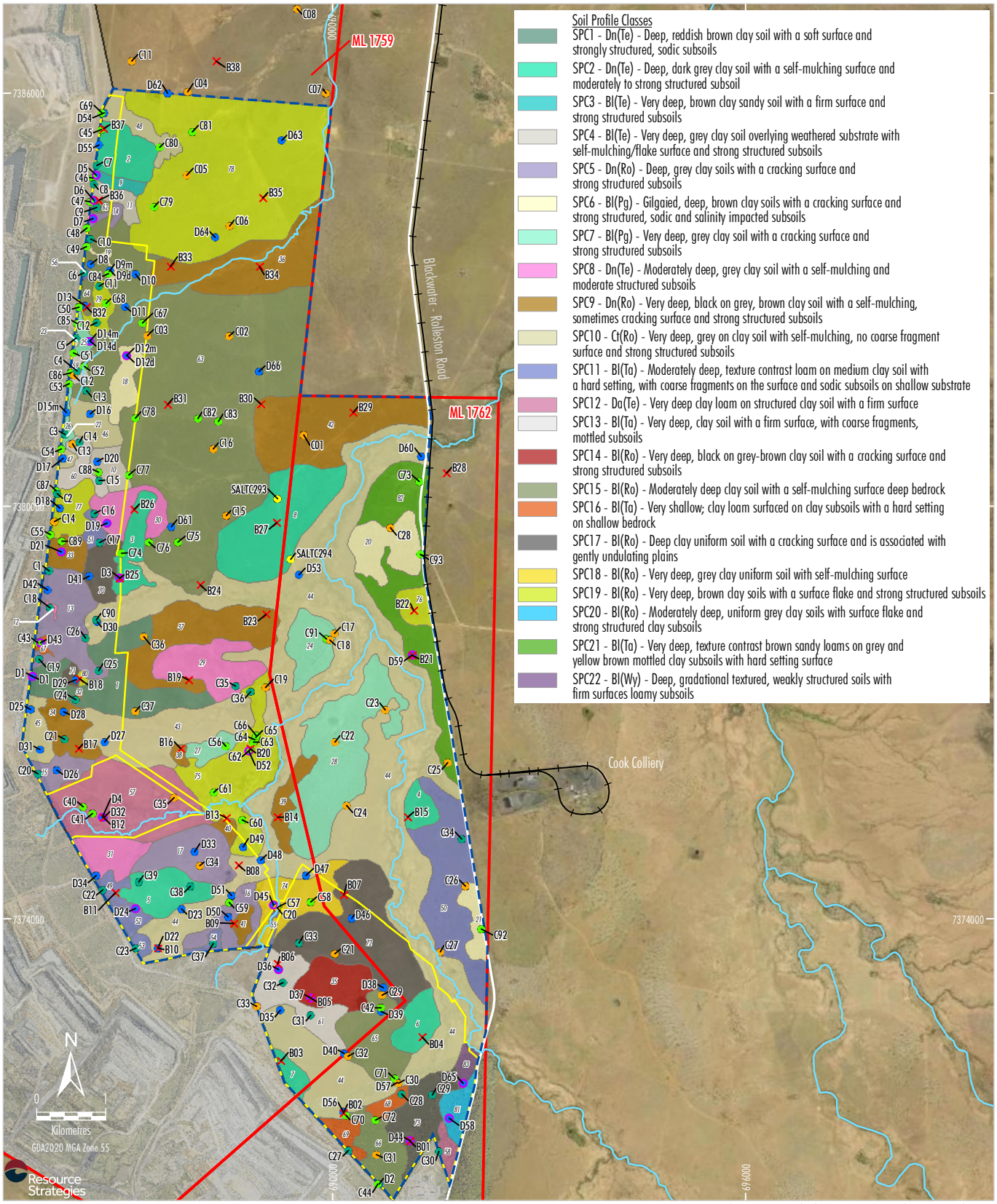
Soils have been grouped according to their parent material and position in the landscape and classified in accordance with the *Australian Soil Classification – Third Edition* (Isbell, 2021). Soils have also been correlated to soils mapped within key regional soil assessments, the major assessment being *Lands of the Isaac-Comet Area, Queensland* (Story et al., 1967) (Appendix A).

Collection of soil samples for laboratory analysis was undertaken based on Land Suitability Assessment Techniques (LSATs) outlined in the *Technical Guidelines for Environmental Management of Exploration and Mining in Queensland* (Department of Minerals and Energy [DME], 1995), DoR (2021) and DES (2021a) (Appendix A).

GTE (2026) has mapped 22 soil profile classes (SPCs) within the Project area (refer Figure 4-1). Each SPC representing a group of similar soil profiles with a defined central concept and range of values (DES, 2021). SPCs mapped within the Project area have been further classified into 83 unique mapping areas (UMAs) based on:

- 44 detailed sites;
- 22 analysed sites; and
- 93 observation sites.

The UMAs across the Project area are shown in Figure 4-1 and 4-2. Further information on the UMAs, and detailed sites, analysed sites and observation sites is included in Appendix A.



Source: GT Environmental (2026); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Project Area

- 10 UMA Number
- Site - Class I - Detailed profile description
- Site - Class II (b) / III - Detailed profile description, laboratory analysis
- Site - Class IV (a) (Queensland Government, 2004) - Brief profile description
- Site - Class IV (a) (SLR, 2023) - Brief profile description
- Site - Class IV (a) - Brief profile description
- Site - Class IV (b) (SLR, 2023) - Brief mapping observation
- Site - Class IV (b) - Brief mapping observation

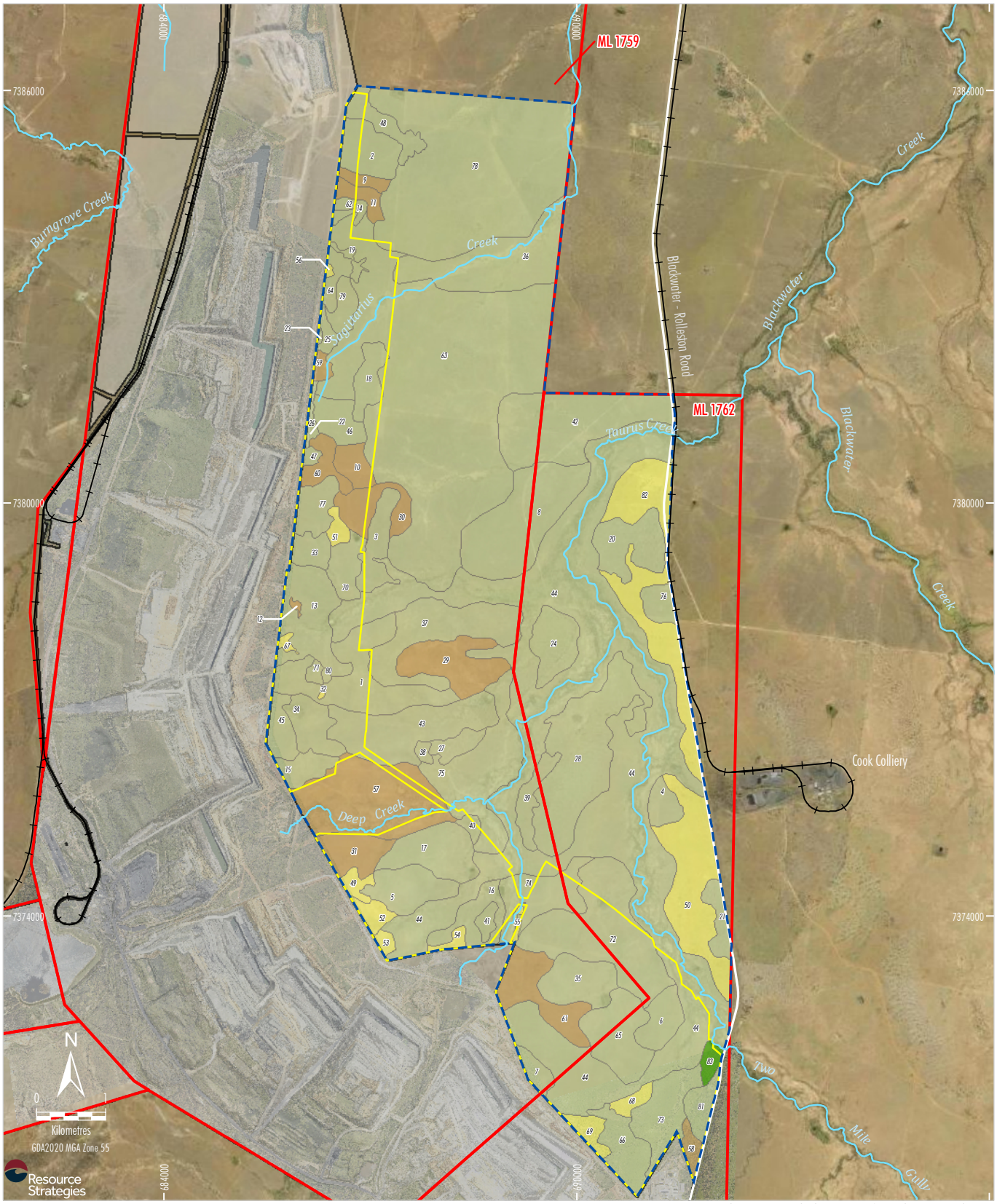
Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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BLACKWATER NORTH EXTENSION PROJECT

Soil Profile Classes

Figure 4-1



Source: GT Environmental (2026); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint
- Project Components[1]
- Study Area
- Proposed Project Area

10 UMA Number

Australian Soil Classification

- Dermosol
- Kandosol
- Sodosol
- Vertosol

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Australian Soil Classification

Figure 4-2

The SPCs within the Project area have been classified under the following Australian Soil Classification orders (Figure 4-2):

- Dermosols – Soils with a structured B2 horizon and minimal texture contrast between the A and B horizons.
- Kandosols – Soils with a massive or weakly structured B horizon, minimal texture contrast between the A and B horizons and that are not calcareous throughout the profile.
- Sodosols – Soils with a strong texture contrast between the A and B horizons, that contain sodic subsoils and are not strongly acid throughout the profile.
- Vertosols – Clay soils with shrink-swell properties that exhibit strong cracking when dry and have slickensides and/or lenticular peds at depth.

The SPCs across the Project area and their corresponding UMAs and Australian Soil Classification Suborder classification have been provided in Table 4-1.

Acid sulphate soils were not observed during the soil surveys and actual acid sulphate soils and/or potential acid sulphate soils are highly unlikely to occur within the Project area (Appendix A).

Soil Condition

A broad range of physical and chemical constraints for agricultural land use were identified from soils within the Project area, including:

- plant available water capacity;
- soil wetness;
- surface condition;
- salinity;
- sodicity; and
- nutrient deficiencies.

Further detail on the condition of soils is provided in Appendix A.

Land Suitability

Land suitability mapping for the Project has been prepared by GTE (2026) and is presented in Figure 4-3 and 4-4.

Land suitability for the Project area has been determined based on the *Guidelines for Agricultural Land Evaluation in Queensland* (GALE) (Department of Science, Information, Technology and Innovation [DSITI] and DNRM, 2015), *Regional Land Suitability Frameworks for Queensland* (DNRM and DSITIA, 2013), DoR (2021) and DES (2021a) (Appendix A).

The GALE (DSITI and DNRM, 2015) and *Regional Land Suitability Frameworks for Queensland* (DNRM and DSITIA, 2013) provides detailed information on appropriate land uses and associated limitations (Appendix A).

The five standard land suitability classes defined within the GALE (DSITI and DNRM, 2015) are described below:

- Class 1 – Suitable land with negligible limitations.
- Class 2 – Suitable land with minor limitations.
- Class 3 – Suitable land with moderate limitations.
- Class 4 – Unsuitable land with severe limitations.
- Class 5 – Unsuitable land with extreme limitations.

Land Suitability for Cropping

Land suitability assessment for cropping followed the framework and methodology prescribed in:

- the GALE (DSITI and DNRM, 2015); and
- the Regional Land Suitability Frameworks for Queensland (DNRM and DSITIA, 2013).

A summary of the spatial extent of the mapped land suitability classes for cropping within the Project area and broader Study area is provided in Table 4-2.

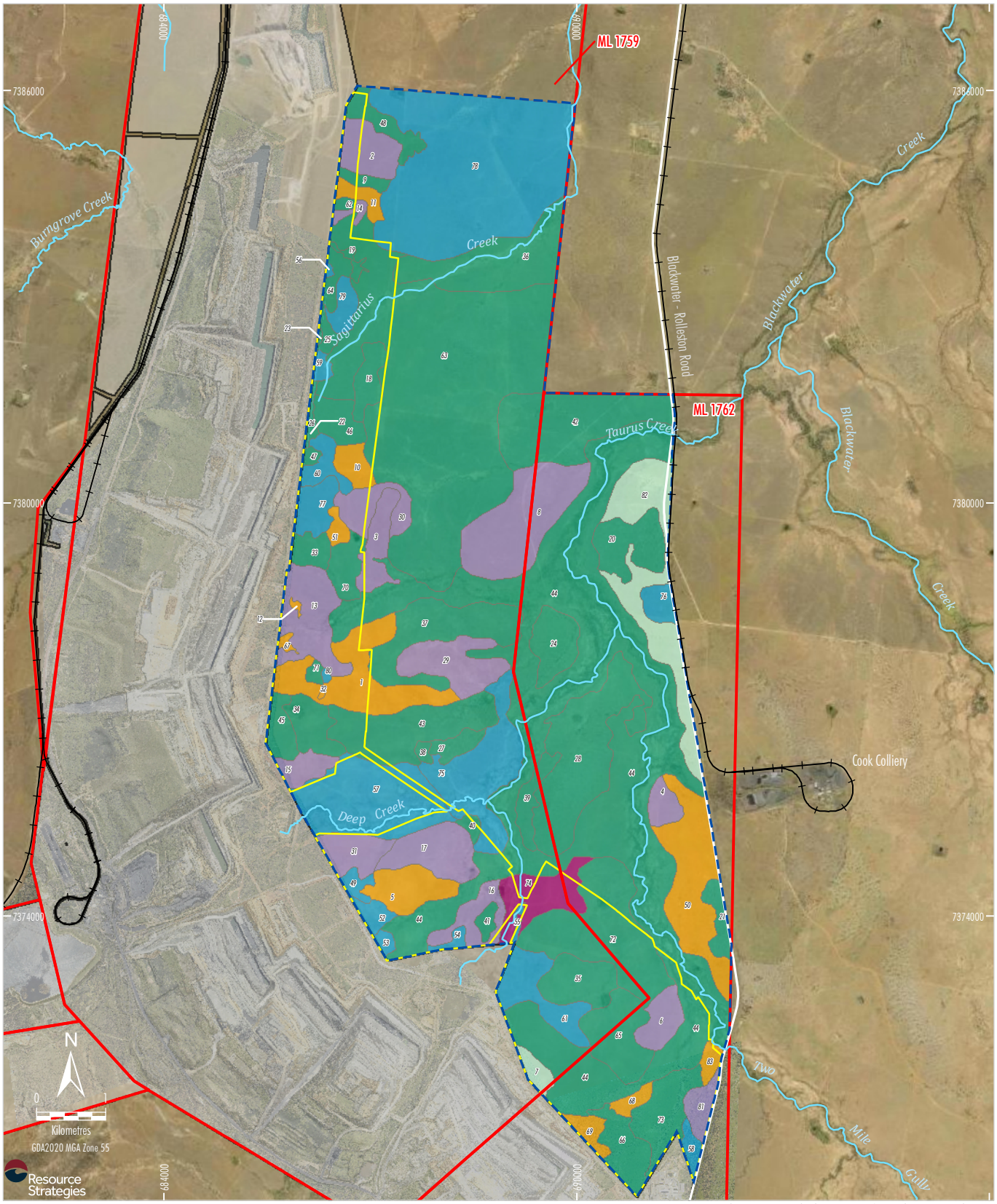
Table 4-1
Summary of SPCs within the Study Area

SPC	SPC Concept	Australian Soil Classification (Dominant to Suborder)	UMA (*Analysed)	Detailed Sites (*Analysed)
1Dn(Te)	Deep, reddish brown clay soil with a soft surface and strongly structured, sodic subsoils and is associated with flat to gently undulating plains with Bauhinia.	Brown Vertosol	1*	D1*
2Dn(Te)	Deep, dark grey clay soil with a self-mulching surface and moderately to strong structured subsoil and is associated with flat to gently undulating plains with cleared Bauhinia vegetation.	Black Vertosol	2, 3*, 4, 5, 6, 7, 8	D3*, D55
3Bl(Te)	Very deep, brown clay sandy soil with a firm surface and strong structured subsoils and is associated with flat to gently undulating rises with sparse woodlands of whitewood vegetation and grasslands.	Black Dermosol	9*	D5*
4Bl(Te)	Very deep, grey clay soil overlying weathered substrate with self-mulching/flake surface and strong structured subsoils and is associated with gently undulating plains with grasslands.	Grey Dermosol	10, 11	D6*, D20
5Dn(Ro)	Deep, grey clay soils with a cracking surface and strong structured subsoils and is associated with gently undulating rises with drainage and depressions with sparse acacia vegetation and grasslands.	Grey Vertosol	13, 14*, 15, 16, 17	D7*, D26, D33, D42, D50
6Bl(Pg)	Gilgaied, deep, brown clay soils with a cracking surface and strong structured, sodic and salinity impacted subsoils and is associated with gently undulating plains with open Brigalow scrub vegetation.	Brown Vertosol	18*, 19, 20, 21, 22, 23	D12m/d*, D9m/d
7Bl(Pg)	Very deep, grey clay soil with a cracking surface and strong structured subsoils and is associated with gently undulating plains with sparse Brigalow scrub.	Grey Vertosol	24, 25*, 26, 27, 28	D14m/d*, D15
8Dn(Te)	Moderately deep, grey clay soil with a self-mulching and moderate structured subsoils and is associated with gently undulating rises with lower lying and drainage areas.	Grey Dermosol	12, 29, 30*, 31	D19*, D34
9Dn(Ro)	Very deep, black on grey, brown clay soil with a self-mulching, sometimes cracking surface and strong structured subsoils and is associated with flat plains with Mitchell grasslands and sparse Prickly Acacia vegetation.	Black Vertosol	33*, 34, 36, 37, 38, 39, 40, 41, 42	D21*, D28
10Ct(Ro)	Very deep, grey on clay soil with self-mulching, no coarse fragment surface and strong structured subsoils and is associated with flat and gently undulating plains associated with drainage and low-lying areas with sparse bauhinia and brigalow.	Grey Vertosol	43, 44*, 45, 46, 47, 48	D16, D17, D22*, D23, D25, D27, D30, D31, D35, D40, D47, D48, D51, D53, D54, D56, D57, D60
11Bl(Ta)	Moderately deep, texture contrast loam on medium clay soil with a hard setting, with coarse fragments on the surface and sodic subsoils on shallow substrate and is associated with flat plains with sparse Prickly Acacia and Vine tree.	Brown Sodosol	49, 50, 51, 52*, 53, 54, 55, 56	D24*

Table 4-1 (Continued)
Summary of SPCs within the Study Area

SPC	SPC Concept	Australian Soil Classification (Dominant to Suborder)	UMA (*Analysed)	Detailed Sites (*Analysed)
12Da(Te)	Very deep clay loam on structured clay soil with a firm surface and is associated with residual rises with sparse brigalow.	Grey Dermosol	57, 58	D4, D32*
13Bl(Ta)	Very deep, clay soil with a firm surface, with coarse fragments, mottled subsoils and is associated with flat, gently undulating plains with sparse current bush.	Brown Dermosol	59, 60, 61*	D36*
14Bl(Ro)	Very deep, black on grey-brown clay soil with a cracking surface and strong structured subsoils and is associated with low lying areas and drainage depressions located near residual rises with sparse bauhinia vegetation.	Black Vertosol	35*	D37*
15Bl(Ro)	Moderately deep clay soil with a self-mulching surface deep bedrock and is associated with gently undulating plains with sparse bauhinia.	Brown Vertosol	62, 63, 64, 65*, 66	D2, D8, D10, D11, D13, D39*, D61, D66
16Bl(Ta)	Very shallow; clay loam surfaced on clay subsoils with a hard-setting on shallow bedrock and is associated with hillslopes and Bauhinia.	Grey Sodosol	32, 67*, 68, 69	D43*
17Bl(Ro)	Deep clay uniform soil with a cracking surface and is associated with gently undulating plains and is associated with sparse bauhinia and brigalow.	Grey Vertosol	70, 71, 72, 73*	D29, D38, D41, D44*, D46
18Bl(Ro)	Very deep, grey clay uniform soil with self-mulching surface and is associated with gently undulating plains with sparse bauhinia and brigalow.	Grey Vertosol	74*	D45*
19Bl(Ro)	Very deep, brown clay soils with a surface flake and strong structured subsoils and is associated with gently undulating plains and rises with sparse bauhinia and brigalow vegetation.	Brown Vertosol	75*, 76, 77, 78, 79, 80	D18, D49, D52*, D62, D63, D64
20Bl(Ro)	Moderately deep, uniform grey clay soils with surface flake and strong structured clay subsoils and is associated with gently undulating plains with open woodland including brigalow vegetation.	Grey Vertosol	81*	D58*
21Bl(Ta)	Very deep, texture contrast brown sandy loams on grey and yellow brown mottled clay subsoils with hard setting surface and is associated with gently undulating plains with sparse Brigalow vegetation on grasslands.	Grey Sodosol	82*	D59*
22Bl(Wy)	Deep, gradational textured, weakly structured soils with firm surfaces loamy subsoils and is associated with gently undulating plains with sparse brigalow and bauhinia vegetation.	Brown Kandosol	83*	D65*

Source: Appendix A.
[1] SPC name codes are based on the dominant land system in which they occupy. The letters in the brackets are based on the soil type within the landscape it resembles. The number is an internal number order system used by GTE (2026).



Source: GT Environmental (2026); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Project Area

10 UMA Number

Crop Land Use Suitability

- All Land Uses (Class 4)
- All Land Uses (Class 5)
- Cotton (Class 3). Maize, Mungbean, Safflower, Sorghum, Soybean, Sunflower (Class 4). Barley, Chickpea, Millet, Oat, Triticale, Wheat (Class 5)
- Cotton (Class 4). Remaining Land Uses (Class 5)
- Cotton, Maize, Mungbean, Safflower, Sorghum, Soybean, Sunflower (Class 3). Barley, Chickpea, Millet, Oat, Triticale, Wheat (Class 4)
- Cotton, Maize, Mungbean, Safflower, Sorghum, Soybean, Sunflower (Class 4). Barley, Chickpea, Millet, Oat, Triticale, Wheat (Class 5)
- NOT ASSESSED

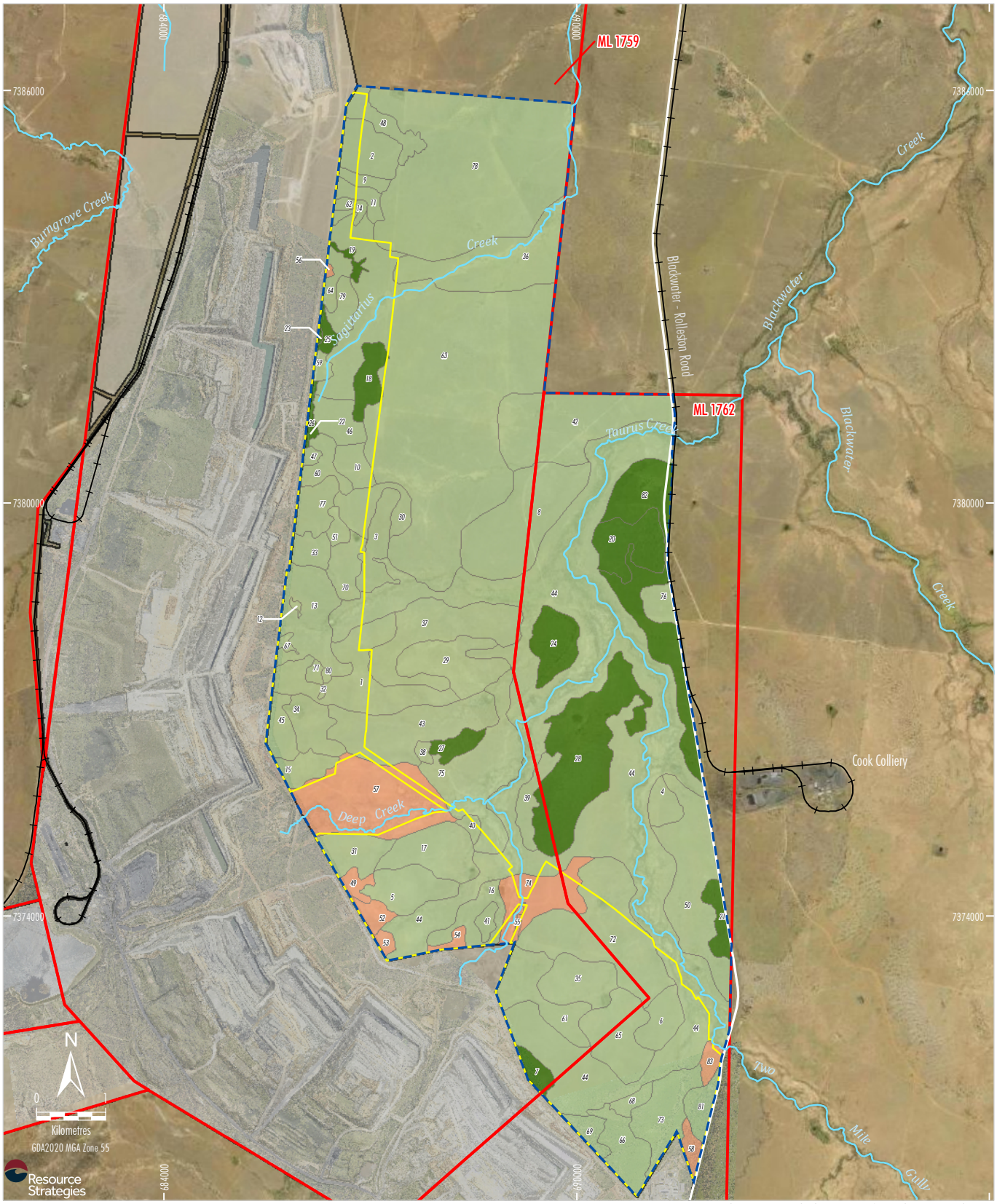
Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Crop Land Use Suitability

Figure 4-3



Source: GT Environmental (2026); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Project Area

10 UMA Number

Beef Cattle Grazing Land Use Suitability

- Class 3
- Class 4
- Class 5

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Beef Cattle Grazing Land Use Suitability

Figure 4-4

Table 4-2
Land Suitability – Cropping

Regional Frameworks Assessment	SPC	Area within the Project area (ha)
Cotton, Maize, Mungbean, Safflower, Sorghum, Soybean, Sunflower (Class 3). Barley, Chickpea, Millet, Oat, Triticale, Wheat (Class 4)	18Bl(Ro)	54.59
Cotton (Class 3). Maize, Mungbean, Safflower, Sorghum, Soybean, Sunflower (Class 4). Barley, Chickpea, Millet, Oat, Triticale, Wheat (Class 5)	2Dn(Te), 5Dn(Ro), 8Dn(Te), 20Bl(Ro)	438.27
All land uses (Class 4)	3Bl(Te), 6Bl(Pg), 7Bl(Pg), 9Dn(Ro), 10Ct(Ro), 14Bl(Ro), 15Bl(Ro), 17Bl(Ro)	1,265.76
Cotton, Maize, Mungbean, Safflower, Sorghum, Soybean, Sunflower (Class 4). Barley, Chickpea, Millet, Oat, Triticale, Wheat (Class 5)	11Bl(Ta), 12Da(Te), 13Bl(Ta), 19Bl(Ro)	292.3
Cotton (Class 4). Remaining land uses (Class 5)	1Dn(Te), 2Dn(Te) (UMA 5) 4Bl(Te), 8Dn(Te) (UMA 12), 11Bl(Ta) (UMAs 50,51), 16Bl(Ta), 22Bl(Wy)	247.39
All land uses (Class 5)	2Dn(Te) (UMA 7), 21Bl(Ta)	18.23

Source: Appendix A.

No Class 1 or Class 2 land suitable for cropping were identified within the Project area and surrounds. All land was assessed to be Class 3, Class 4 or Class 5 due to soil water availability, wetness, surface condition and/or erosion hazard that limits cropping success (Appendix A).

Land Suitability for Grazing

Land suitability assessment for grazing within the Project area followed the framework prescribed in the Suitability for Beef Cattle Grazing LSAT (DME,1995) with reference to beef cattle grazing in the *Land resource survey and evaluation of the Kilcummin area, Queensland* (Shields and Williams, 1991).

A summary of the spatial extent of the mapped land suitability classes for grazing within the Project area is provided in Table 4-3.

Table 4-3
Land Suitability – Grazing

Beef Cattle Grazing Assessment	SPC	Area within the Project area (ha)
Class 3	11Bl(Ta), 12Da(Te), 18Bl(Ro), 22Bl(Wy)	167.23
Class 4	1Dn(Te), 2Dn(Te), 3Bl(Te), 4Bl(Te), FDn(Ro), 8Dn(Te), 9Dn(Ro), 10Ct(Ro), 11Bl(Ta) (UMAs 50, 51), 13Bl(Ta), 14Bl(Ro), 15Bl(Ro), 16Bl(Ta), 17Bl(Ro), 19Bl(Ro), 20Bl(Ro)	2,065.57
Class 5	2Dn(Te) (UMA 7), 6Bl(Pg), 7Bl(Pg), 21Bl(Ta)	83.74

Source: Appendix A.

The suitability of land within the Project area for beef cattle grazing has been assessed as suitable with some limitations (Appendix A).

All land was assessed to be Class 3, Class 4 or Class 5 due to soil water availability, nutrient deficiencies, salinity and/or topography that limits beef cattle grazing success (Appendix A).

Agricultural Land Class

ALCs are based on a simple hierarchical scheme that is applicable across Queensland.

It allows the interpreted land evaluation data to indicate the location and extent of agricultural land that can be used for a wide range of land uses with minimal land degradation (Appendix A).

Three classes of agricultural land and one class of non-agricultural land are defined in the GALE (DSITI and DNRM, 2015):

- Class A – crop land:
  - A1 – broadacre and horticultural crops; and
  - A2 – horticultural crops only.
- Class B – limited crop land, suitable for sown pastures.
- Class C – pasture land:
  - C1 – grazing of sown or native pastures;
  - C2 – grazing of native pastures; and
  - C3 – light grazing of native pastures.
- Class D – non-agricultural land.

The classes indicate the range of land use choice, the range of land use limitations and land degradation hazard. Further definition and description of ALC is provided in Appendix A.

The ALCs mapped within the Project area (and corresponding SPCs) are provided in Table 4-4 and shown in Figure 4-5 (Appendix A).

Table 4-4
Agricultural Land Classification Assessment Summary

ALC	SPC	Area within the Project area (ha)
A	-	0
A1	18Bl(Ro)	54.59
A2	-	0
B	2Dn(Te), 5Dn(Ro), 8Dn(Te), 20Bl(Ro)	438.27
C	-	0
C1	4Bl(Te), 9Dn(Ro), 10Ct(Ro), 11Bl(Ta), 12Da(Te), 17Bl(Ro), 19Bl(Ro), 22Bl(Wy)	1,031.45
C2	1Dn(Te), 2Dn(Te) (UMA 5), 3Bl(Te), 6Bl(Pg), 7Bl(Pg), 11Bl(Ta) (UMAs 50, 51), 13Bl(Ta), 14Bl(Ro), 15Bl(Ro), 16Bl(Ta)	774.00
C3	2Dn(Te) (UMA 7), 21Bl(Ta)	18.23
D	-	0

Source: Appendix A.

The ALC mapping generally reflects the land suitability class mapping, in that the Project area is generally suitable for cattle grazing, with limited suitability for cropping.

SPC 18Bl(Ro) was assessed to have an ALC of A1 and would be suitable for a wide range of current and potential broadacre and horticultural crops.

SPCs 2Dn(Te), 5Dn(Ro), 8Dn(Te) and 20Bl(Ro) were assessed to have an ALC of B and would be suitable for a narrow range of crops. The land would be suitable for sown pastures and may be suitable for a wider range of crops.

All other SPCs were assessed to have an ALC of C1 to C3 and would be suitable for beef cattle grazing activities.

Strategic Cropping Areas

SCAs consist of the areas shown on the SCL Trigger Map (DNRMMRRD, 2025a).

A desktop review of the SCL Trigger Map confirmed that no SCAs were mapped within the Project area, therefore, a SCA Assessment in accordance with RPI Act was not undertaken.

Priority Agricultural Areas

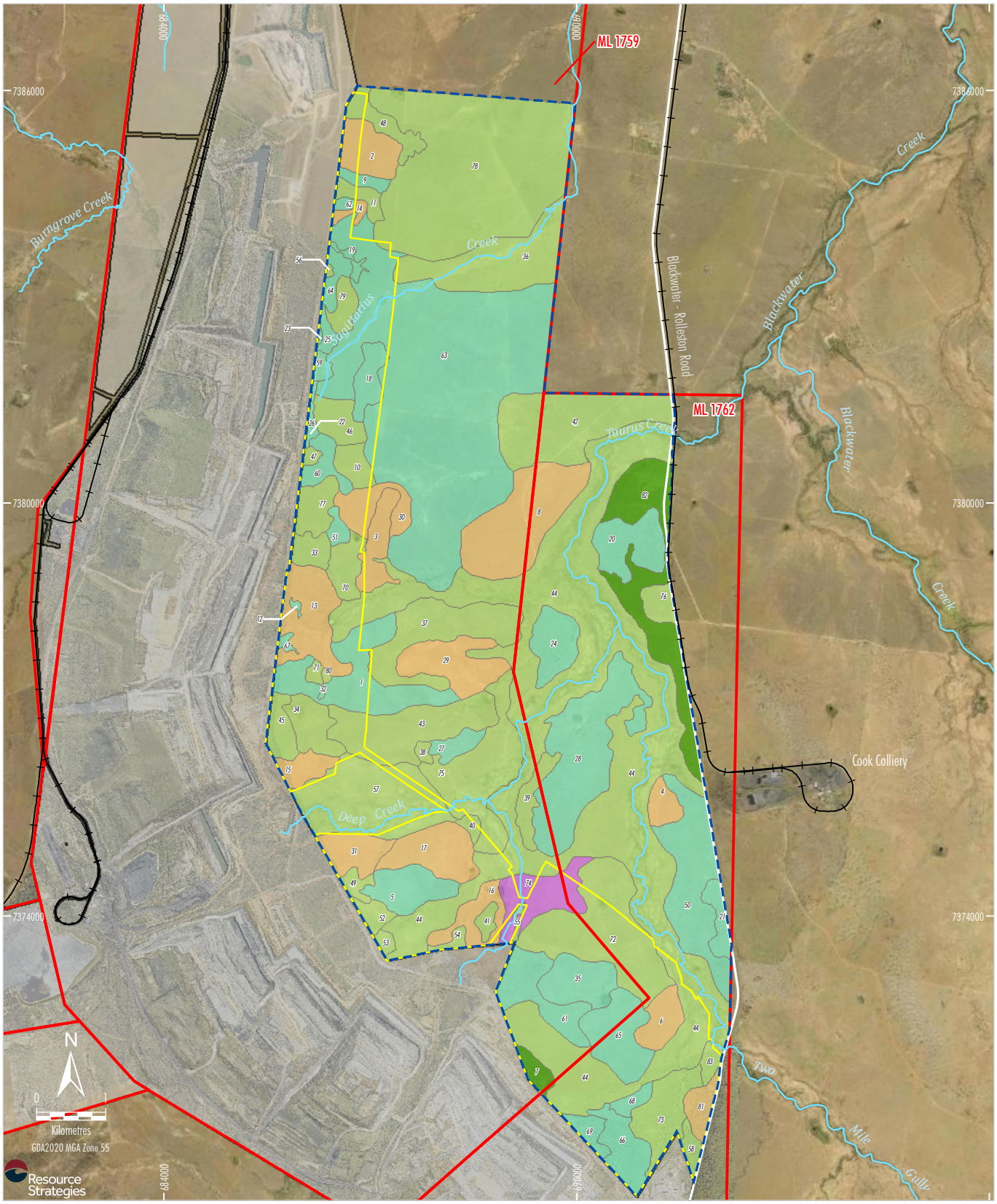
PAAs are areas of regionally significant agricultural production as identified in a regional plan. A desktop review of the Project area compared to Queensland Government Development Assessment Mapping System confirmed that no PAAs were located within the Project area (DNRMMRRD, 2025b).

Contaminated Land

The *Contaminated Land Search (Environmental Management and Contaminated Land Registers)* (DES, 2020a) were searched on 11 February 2026 for any records of contaminated or potentially contaminated lands occurring within or near the Project area. The lots within the Project area were not included on the Contaminated Land Register, however, several were included on the Environmental Management Register.

The Notifiable Activities or Hazardous Contaminant associated with each of these lots is detailed below:

- Lot 14 SP175013:
  - engine reconditioning works; and
  - petroleum product or oil storage.



Source: GT Environmental (2026); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint
- Project Components[1]
- Study Area
- Proposed Project Area

10 UMA Number

Agricultural Land Classes

- Class A1
- Class B
- Class C1
- Class C2
- Class C3

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Agricultural Land Classes

Figure 4-5

- Lot 24 CP855505:
  - abrasive blasting;
  - metal treatment or coating;
  - mine wastes; and
  - petroleum product or oil storage.
- Lot 27 RP843182:
  - chemical storage (other than petroleum products or oil under item 29); and
  - hazardous contaminant.

The Environmental Management Register does not provide specific locations within lots. However, the lots mentioned above are partially located within the existing BWM and therefore, it can be inferred that the Notifiable Activities mentioned above relate to existing operations.

Visual Amenity

The Project is located within a rural area that comprises a number of distinct land uses including beef cattle grazing, agricultural activities on sown pastures and native pastures on high fertility soils (DNRMMRRD, 2026b).

The visual character of the Project area and surrounds reflects these distinct land use types.

Topographic features within the Project area are described above.

4.1.2 POTENTIAL IMPACTS

Landforms and Topography

The Project would alter the landforms and topography within the Project area. Some topographic changes would be temporary (e.g. temporary infrastructure) and some would be permanent (e.g. final mine landforms).

The Project would increase the extent of the existing approved open cut mining areas (Figures 2-1 to 2-5).

Waste rock mined during the development of the Project would be placed within mined-out sections of pits as in-pit waste rock dumps, consistent with existing BWM operations.

Soils

Potential impacts of the Project on soils would relate primarily to:

- disturbance of *in situ* soil resources within additional disturbance areas (e.g. development of new open cut mining areas);
- alteration of soil structure beneath infrastructure items, hardstand areas and roads (i.e. compaction);
- possible soil contamination resulting from spillage of fuels, lubricants and other chemicals;
- increased erosion and sediment movement due to exposure of soils during construction; and
- alteration of physical and chemical soil properties (e.g. structure, fertility, permeability and microbial activity) due to soil stripping and stockpiling operations.

A review of the physical and chemical properties of the soils has established that there is soil resources present that would be suitable as a rehabilitation medium on the Project area post-mining (Section 4.1.3) (Appendix A).

Land Use – Agricultural Resources

The Project would result in the progressive disturbance (and rehabilitation) of existing agricultural lands in the short-term. A total disturbance area of approximately 2,317 ha is expected.

Land within the Project area would not sustain the existing land use during construction and operation of the Project. As described in Appendix A, the Project area has been identified as:

- Land Suitability Class 3 (suitable land with moderate limitations) to Class 5 (unsuitable land with extreme limitations) for cropping.
- Land Suitability Class 3 (suitable land with moderate limitations) to Class 5 (unsuitable land with extreme limitations) for grazing.

All disturbance associated with the Project has been recorded in a PRCP in accordance with the *Statutory Guideline – Progressive rehabilitation and closure plans (PRC Plans)* (DETSI, 2026a). The objectives of rehabilitation would be to return all disturbed areas to their pre-mining land suitability class or to the land suitability class described in the PRCP for the Project (Section 5).

Proposed Post Mine Land Uses

Post-mining, the Project area would be rehabilitated to land suitable for beef cattle grazing or woodland habitat, consistent with the PMLUs described in the BWM PRCP (Section 5).

The nominated PMLUs are shown on Figure 2-19.

Contaminated Land

Land uses that may result in land becoming contaminated are known as 'Notifiable Activities' and are listed in Schedule 3 of the EP Act. The following Notifiable Activities are relevant to the Project:

- 1 – Abrasive blasting;
- 7 – Chemical storage (other than petroleum products or oil under item 29);
- 15 – Explosives production or storage;
- 24 – Mine wastes; and
- 29 – Petroleum product or oil storage.

Unsuitable storage, handling and disposal of chemicals, explosives and wastes could result in land within the Project area becoming contaminated and listed on the Contaminated Land Register.

Whitehaven Blackwater would implement appropriate mitigation and management measures to prevent or reduce the potential for land contamination from the Project.

Visual Amenity

The development of the Project (e.g. vegetation clearance and extension of the open cut pits) would alter the visual landscape of the Project area similar to the impacts associated with the existing BWM operation.

4.1.3 MANAGEMENT PRACTICES AND MITIGATION STRATEGIES

Land Use

The Project area would be rehabilitated to land suitable for beef cattle grazing, or woodland habitat, consistent with the PMLUs described in the PRCP.

Soils

General soil resource management practices would include the stripping and stockpiling of soil resources for use in rehabilitation. The objectives of soil resource management for the Project would be to:

- identify and quantify potential soil resources for rehabilitation;
- optimise the recovery of usable soil reserves during soil stripping operations;
- manage soil reserves as not to degrade the resource when stockpiled; and
- establish effective soil amelioration procedures for future rehabilitation works.

Soil stripping and handling measures would be undertaken in accordance with the *BWM Plan – Topsoil Management Plan* (Whitehaven, 2025b).

A soil inventory, consistent with that described in the *BWM Plan – Topsoil Management Plan* (Whitehaven, 2025b), would be maintained for the life of the Project. The soil inventory would account for the volumes and locations of soil to be progressively stripped, stockpiled and reapplied.

GTE (2026) recommended the following treatments and amelioration for soils used in rehabilitation:

- Gypsum may be used on sloped surfaces and when stockpiling SPCs with sodic to extremely sodic subsoils (refer Table 9-3 of Appendix A). Further, sodic subsoils should be stockpiled separately to non-sodic subsoils.
- All SPCs, excluding 2Dn(Te), would benefit from an application of fertiliser. Fertiliser application would be most appropriate during final soil replacement and seed bed preparation.
- Sandier, firm setting SPCs with low cation exchange capacity and plant-available water capacity, including 22BI(Wy), 12Da(Te), 17BI(Ro) and 21BI(Ta) may benefit from amelioration with organic matter.

Recommended stripping depths are described in Appendix A and a preliminary soil balance is detailed in Table 4-5.

Soil Reserves

GTE (2026) has characterised and assessed the SPCs within the Project area and completed a preliminary soil balance to determine the quantity of soil available for rehabilitation over the Project area.

Table 4-5
Available Topsoil and Subsoil Volumes within the Proposed Project Area

SPC	Area (ha) within the Project area	Available Topsoil Volume (m^3)	Available Subsoil Volume (m^3) Double Stripping[1]	Available Subsoil Volume (m^3) Treated Subsoil
1Dn(Te)	82.69	165,380	165,380	0
2Dn(Te)	147.06	147,060	1,323,540	0
3Bl(Te)	4.51	9,020	27,060	36,080
4Bl(Te)	34.47	68,940	137,880	206,820
5Dn(Ro)	242.45	484,900	606,125	363,675
6Bl(Pg)	45.46	90,920	0	727,360
7Bl(Pg)	20.05	30,075	70,175	190,475
8Dn(Te)	73.92	36,960	332,640	295,680
9Dn(Ro)	93.53	93,530	0	1,215,890
10Ct(Ro)	431.00	431,000	0	7,327,000
11Bl(Ta)	63.77	127,540	0	510,160
12Da(Te)	48.03	96,060	336,210	0
13Bl(Ta)	115.90	231,800	1,390,800	347,700
14Bl(Ro)	66.77	133,540	200,310	934,780
15Bl(Ro)	321.19	642,380	1,284,760	963,570
16Bl(Ta)	40.06	40,060	0	120,180
17Bl(Ro)	312.81	312,810	0	3,440,910
18Bl(Ro)	54.59	109,180	436,720	0
19Bl(Ro)	76.56	153,120	918,720	612,480
20Bl(Ro)	28.92	57,840	173,520	0
21Bl(Ta)	0.00	0	0	0
22Bl(Wy)	12.80	57,600	70,400	0
Total	**2,316.54[2]**	**3,519,715**	**7,474,240**	**17,292,760**

Source: Appendix A.
[1] Double stripping of nominated SPC subsoils may be undertaken to supplement topsoil volumes.
[2] Total area does not equal 2,316.58 ha due to rounding.

Majority of the topsoil reserves across the Project area are considered suitable for reuse as topsoil in rehabilitation activities (refer Figure 4-6). Subsoil reserves are considered suitable supporting material for topsoil, by either selectively placing below the topsoil to increase total soil depth or mixing with topsoil to increase soil reserves or fertility (refer to Appendix A for further information on the recommended topsoil and subsoil stripping depths for each SPC).

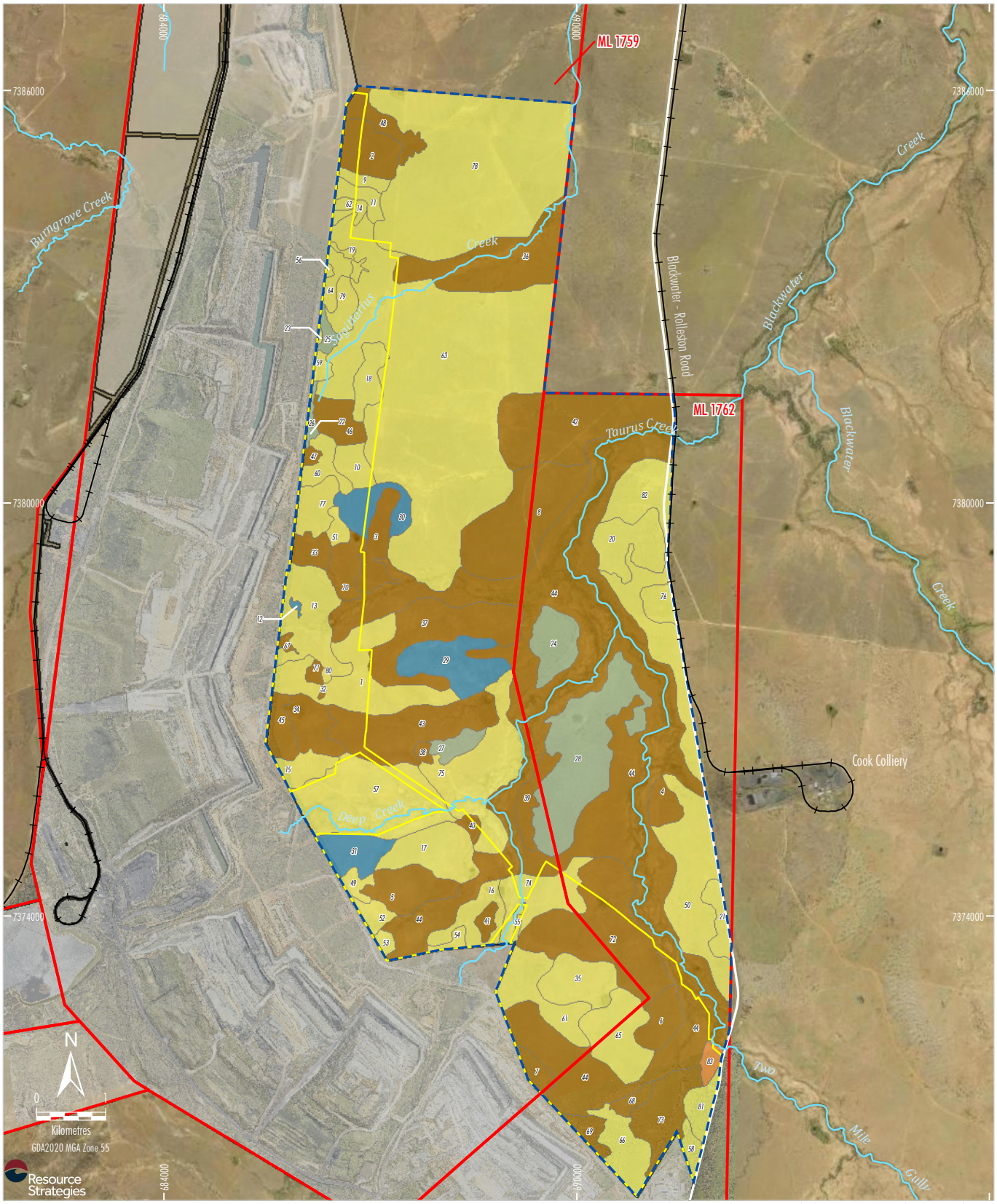
GTE (2026) recommends a topsoil placement depth of 0.15 to 0.20 m with a minimum depth of 0.10 m. GTE (2026) also recommends that subsoils are placed underneath topsoil at a depth of 0.20 to 0.60 m to allow sufficient depth for shallow scarifying and ripping of topsoils (if required) and vegetation establishment.

The soil balance indicates that sufficient topsoil would be available for rehabilitation based on a nominal minimum re-application depth of 0.20 m. Subsequently, there would be sufficient soil (topsoil and subsoil) available to meet the recommended placement depths (i.e. 0.20 m to 0.60 m).

Further details of the soil resources, stripping depth recommendations and stockpile management are presented in Appendix A.

Acid Sulphate Soils

As described in Section 4.1.1, no acid sulphate soils were observed during the surveys by GTE (2026) and it is highly unlikely that the Project area would include actual acid sulphate soils and/or potential acid sulphate soils.



Source: GT Environmental (2026); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint
- Project Components[1]
- Study Area
- Proposed Project Area

10 UMA Number

Topsoil

- 0.00-0.05 m
- 0.00-0.10 m
- 0.00-0.15 m
- 0.00-0.20 m
- 0.00-0.45 m

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Topsoil Stripping Depths

Figure 4-6

Erosion and Sediment Control

ESC works are to be managed in accordance with the existing *BWM Plan – Erosion and Sediment Control Management Plan* (Whitehaven, 2026a), which has been implemented in accordance with Condition F35 of the EA.

Contaminated Land

Any potential contamination risks associated with the Notifiable Activities (Section 4.1.2) would be managed in accordance with the relevant legislation, guidelines and/or policies.

On-site consumable storage areas would be operated, where applicable, in compliance with the requirements of AS 1940-2017 *The Storage and Handling of Flammable and Combustible Liquids* and AS 2187.1 *Explosives – Storage, Transport and Use – Storage*.

Visual Amenity

Progressive rehabilitation of the Project landforms would be undertaken to reduce the contrast between the Project landforms and surrounding environment.

Whilst considering operational safety, Whitehaven Blackwater would minimise light emissions from the Project by select placement, configuration and direction of lighting so as to reduce off-site nuisance effects where practicable.

4.2 Surface Water

A Surface Water Assessment has been prepared for the Project by WRM (2026) and is presented in Appendix B. This section summarises the findings of WRM (2026).

Section 4.2.1 provides a description of the relevant environmental values and includes a description of the regional and local hydrology, surface WMS and updated site water balance model.

Section 4.2.2 describes the potential impacts of the Project on surface water resources (including potential releases to the receiving environment and flooding impacts).

Section 4.2.3 outlines the proposed mitigation measures, management and monitoring, including conceptual designs of the drainage feature diversions.

4.2.1 ENVIRONMENTAL VALUES

The environmental values relevant to surface water have been identified with consideration of the *Guideline – Application requirements for activities with impacts to water* (DETSI, 2026b).

The EP Act seeks to protect Queensland's water resources while allowing ecologically sustainable development through the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP Water). The EPP Water achieves this within a framework that includes:

- identifying environmental values for aquatic ecosystems and for human uses; and
- determining water quality guidelines (WQGs) and water quality objectives (WQOs) to enhance or protect the environmental values.

Environmental values are the qualities of waterways to be protected from activities in the catchment. Protecting environmental values aims to ensure healthy aquatic ecosystems and waterways that are safe and suitable for community use. Environmental values reflect the ecological, social and economic values and uses of the waterway (such as stock water, swimming, fishing and agriculture).

The processes to identify environmental values and determine WQGs and WQOs are based on the *National Water Quality Management Strategy – Implementation Guidelines* (Agriculture and Resource Management Council of Australia and New Zealand & Australian and New Zealand Environment and Conservation Council, 1998) and further outlined in *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Governments [ANZG], 2018).

The Project area is located within the Southern Tributaries of the Mackenzie River Sub-basin waters. The environmental values relevant to surface water within the Project area have been identified with consideration of the *Environmental Protection (Water) Policy 2009 – Mackenzie River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Mackenzie River Sub-basin* (DEHP, 2013) and include (Appendix B):

- aquatic ecosystems;
- farm supply/use;
- stock water;
- human consumption of aquatic foods;
- primary recreation;

- secondary recreation;
- visual recreation;
- drinking water;
- industrial use; and
- cultural and spiritual values.

Surface water quality monitoring is undertaken at the existing BWM with results compared to site-specific trigger levels provided in EA EPML00717813. These trigger levels are based on environmental values, WQGs and WQOs relevant to the Project. Surface water release point monitoring locations are shown on Figure 4-7.

Regional and Local Hydrology

The Project area is located within the Blackwater Creek catchment, which is a tributary of the Mackenzie River. The Mackenzie River catchment drains to the Fitzroy River, which ultimately terminates at the Coral Sea south-east of Rockhampton, near Port Alma.

Local drainage in the vicinity of the Project is presented on Figure 4-7 and described in the following subsections.

Taurus Creek

Taurus Creek, a major tributary of Blackwater Creek, originates to the east of BWM and drains in a northeasterly direction across the mine (Figure 4-7). It flows as a third order stream between existing overburden dumps, then between the Deep Creek and Stewarton open cut pits, before entering into the New Taurus Creek Dam (Appendix B).

Downstream of the New Taurus Creek Dam, Taurus Creek continues to drain in a northeasterly direction and becomes a fourth order waterway as it joins Deep Creek immediately downstream of the Project area. Taurus Creek ultimately drains to Blackwater Creek, approximately 5 km east of the Project area (Appendix B).

Deep Creek

Deep Creek, a tributary of Taurus Creek, originates to the west of BWM and drains in a northeasterly direction towards the mine (Figure 4-7). It flows as a third order waterway between existing overburden dumps, then between the Besgrove and Deep Creek open cut pits, before entering the New Deep Creek Dam (Appendix B).

Downstream of the New Deep Creek Dam, Deep Creek continues to drain in a northeasterly direction and joins Taurus Creek immediately downstream of the Project area (Appendix B).

Two Mile Gully

Two Mile Gully, a tributary of Taurus Creek, flows in a northerly direction to the east of BWM (Figure 4-7). It drains as a fourth order waterway adjacent to, and along, the southeastern portion of the Project area before forming a confluence with Taurus Creek approximately 5 km east of BWM (Appendix B).

The upper (western) headwaters of the Two Mile Gully catchment have been consumed by mining activities at BWM. However, the central and lower sections of Two Mile Gully adjacent to the Project area remain relatively undisturbed (Appendix B).

Sagittarius Creek

Sagittarius Creek, a tributary of Blackwater Creek, flows in a northerly direction along the eastern side of BWM (Figure 4-7). It drains as a third order waterway across the northern BWM ML boundary, passing to the west of Blackwater township before joining Blackwater Creek immediately downstream of the township (Appendix B).

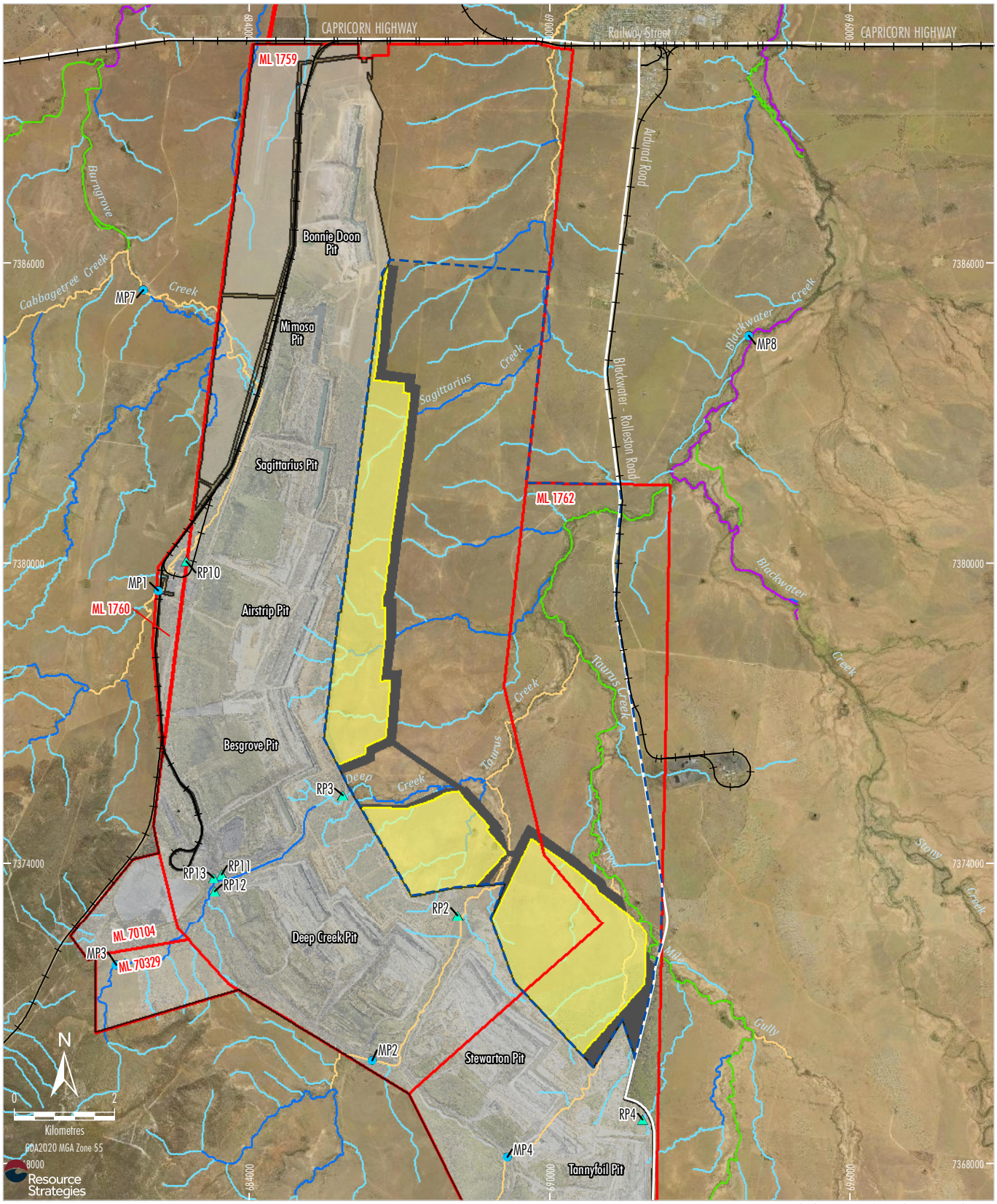
The upper headwaters of the Sagittarius Creek catchment, comprising several first and second order streams, have been consumed by mining activities. However, the central and lower portions of the Sagittarius Creek catchment are relatively undisturbed (Appendix B).

Surface Water Use

Given the ephemeral nature of the local waterways in the vicinity of the Project as well as the insignificant impacts on flow regime and water quality in these waterways compared to the approved operations, no downstream users would be impacted by the Project (Appendix B).

Surface Water Quality

Appendix B provides an analysis of the surface water quality against recognised WQOs, which is summarised for upstream and downstream creeks below.



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Receiving Water Monitoring Point
- Mine Affected Water Release Point
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Watercourse

- 1st Order Waterway
- 2nd Order Waterway
- 3rd Order Waterway
- 4th Order Waterway
- 5th Order Waterway

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Surface Water Features and Existing Monitoring Network

Figure 4-7

Upstream of BWM (Appendix B):

- Median (50th percentile) physiochemical properties such as EC, total suspended solids (TSS), turbidity and fluoride in Taurus Creek and Deep Creek are below the WQOs. In Emu Creek, median EC is below the WQOs, however, turbidity and TSS exceed the WQOs.
- For nutrients, median concentrations of ammonia and nitrate are below the WQOs. Based on two samples, total nitrogen (TN) and total phosphorus (TP) generally exceed the WQOs at Taurus Creek upstream. Based on one sample, TN exceeds the WQOs while TP is below the WQOs at Deep Creek upstream.
- Median concentrations of metalloids are generally below the WQOs.

Downstream of BWM (Appendix B):

- For physiochemical properties, median EC and fluoride are below the WQOs. Median TSS and turbidity generally exceed the WQOs and those observed from upstream monitoring sites.
- For nutrients, median concentrations of ammonia and nitrate at Taurus Creek, Two Mile Gully and Blackwater Creek are below the WQOs. Based on one sample, TN and TP in Taurus Creek, Two Mile Gully and Blackwater Creek downstream, generally exceed the WQOs and those observed from upstream monitoring sites.
- Median concentrations of metalloids downstream of BWM are generally below the WQOs.
- Exceedances compared to the WQOs and/or upstream monitoring sites may be due to existing mining activities (excluding the Project) but is also likely due to the larger catchments and other land uses contributing runoff to these downstream sites.

Surface Water Management System

The site WMS has been developed to manage surface water across the site and support compliance with EA requirements.

The objectives of the surface WMS are as follows:

- divert clean water away from areas disturbed by mining activities;
- contain runoff from mining activity areas that generate MAW;
- release MAW in accordance with the EA; and
- reuse on site water, where practicable, for dust suppression and process requirements.

A description of the water management measures proposed for the Project, including the containment and management systems, is provided in Section 4.2.3.

4.2.2 POTENTIAL IMPACTS

Source, Quality and Quantity of Mine Affected Water

Potential sources of contamination at BWM that may impact the receiving environment have been identified as follows:

- runoff from disturbed and rehabilitated land;
- release of recycled waters from sewage treatment plants and industrial areas; and
- release of water from pits, water storages and dams.

Contaminants may include suspended solids, dissolved solids (e.g. sodium, chloride and sulphate), altered pH and metals (Appendix B).

Runoff from disturbed land at BWM is collected within the various site storages and pits. A summary of historical water quality monitoring results are presented in the Surface Water Assessment (Appendix B).

Impact on Flow Regime

The Project would involve an expansion of the mining pits, which would result in the loss of undisturbed catchment reporting to Taurus Creek and Sagittarius Creek. Table 4-6 shows the catchment that would be excised by the Project.

Table 4-6
Analysis of Catchment Loss Due to the Project

Catchment	Catchment Area (km^2)		Difference (%)
	Existing Conditions	Project Conditions	
Taurus Creek to Taurus Creek down stream gauge	250.4	228.2	-8.9
Sagittarius Creek to northern ML boundary	42.7	39.3	-7.9

Source: Appendix B.
km^2 = square kilometres.

Based on Table 4-6, Appendix B reports potential impacts on the flow regime in local creeks, as summarised below:

- impacts on Taurus Creek flow regime would be insignificant;
- the flow regime in Two Mile Gully would be unaffected by the Project; and
- the impact on flow regime in Sagittarius Creek due to the Project is expected to be similar to those predicted in Taurus Creek and is likely to be insignificant.

At the completion of mining, surface runoff from rehabilitated in-pit and out-of-pit waste rock emplacement areas would flow to the receiving environment, with the exception of 2,726 ha which would report to residual voids associated with the Project (Appendix B).

Releases to the Receiving Environment

The water balance model prepared by HydroBalance (2026) indicates that the Project is not expected to increase the risk of uncontrolled discharges from site storages.

The water management strategy is designed to manage excess water using a combination of storage, controlled releases and temporary storage in active pits, providing resilience during extreme weather events (Appendix B).

As BWM operates as an integrated WMS, MAW generated from the Project area may be transferred and stored within existing MAW storages located in other parts of the mine. Project-related MAW may ultimately contribute to water stored within infrastructure associated with more than one authorised release point (Appendix B).

The release points permitted for controlled releases, RP2 via New Taurus Dam, RP3 via New Deep Creek Dam and RP4 via Tannyfoil Dam, would be used for the Project, with controlled releases undertaken when specified conditions are met in accordance with the current EA EPML00717813. The EA also authorises releases from the following storages, although these are not in active use:

- RP5 - Goldfish Pond;
- RP6 - Marshmead Pit;
- RP7 - Old Cut 4;
- RP8 - R82 Fill Point Dam;
- RP10 - TCP Dam;
- RP11 - North CHPP Sediment Dam[1];
- RP12 - Rejects Stockpile Dam[1]; and
- RP13 - R34[1].

An assessment was undertaken by HydroBalance (2026) to evaluate the potential impact of the Project on controlled release volumes by comparing Project outcomes against an Approved case.

The assessment indicates that the Project would result in minor changes to annual controlled release volumes, with an increase of approximately 11 to 20% under median climatic conditions (50^{th} percentile) (Appendix B).

An assessment of potential controlled-release rates and dilution requirements has also been undertaken for RP2 and RP3 (discharging to Blackwater Creek) and RP4 (discharging to Two Mile Gully) by HydroBalance (2026). The assessment demonstrates that controlled releases can be managed by adjusting the combined release rate in response to (Appendix B):

- the measured receiving-stream flow;
- the receiving-stream EC;
- the EC of the water proposed for release;
- the applicable downstream EC limit; and
- the hydraulic capacity of the release infrastructure.

Erosion and Sediment Control

No specific requirements for sediment basins have been identified. However, there is potential additional sediment dams may be required for the Project associated with disturbance in advance (to the east) of mining operations including infrastructure corridors, pre-stripping and soil stockpiles.

The requirement for, and location and sizing of any new sediment basins would be confirmed during detailed design, having regard to the final disturbance footprint, catchment configuration, drainage design and anticipated sediment-generation risk.

These basins would capture sediment laden runoff and allow sediment to settle before water is released to the environment (Appendix B).

[1] In accordance with Table F1 of the EA, "*RP11, RP12 and RP13 are not 'active' until the completion of Deep Creek Diversion Stage 2.*"

Impacts on Downstream Water Users

Given the ephemeral nature of the local waterways in the vicinity of the Project as well as the insignificant impacts on flow regime and water quality in these waterways compared to the approved operations, there would not be any downstream water users that would be impacted by the Project (Appendix B).

Flooding Impacts

Hydrologic and hydraulic modelling of local catchments was undertaken to (Appendix B):

- assess existing and proposed flood behaviour at BWM and the surrounding area at completion of the Project;
- inform the development of conceptual designs for clean water drains and drainage diversions; and
- assess the conceptual design of flood protection measures for the open cut pits and mine infrastructure.

To estimate design flood discharges and assess flood behaviour under final landform conditions, a range of events were modelled, including:

- 50% (1 in 2) AEP;
- 5% (1 in 20) AEP;
- 2% (1 in 50) AEP;
- 1% (1 in 100) AEP;
- 0.1% (1 in 1000) AEP; and
- the PMF.

Operational Phase

The impacts of the Project on flood levels and velocities during operations were assessed by comparing modelled flood levels and velocities under existing and proposed (Project) conditions for the 50% AEP to 0.1% AEP events (Appendix B).

Flood modelling results for the proposed (Project) scenario indicates that (Appendix B):

- the proposed levees would provide flood immunity to the future mining pits for all events up to and including the 0.1% AEP, with levee crest levels above the adjacent 0.1% AEP peak flood level (Figure 4-8);
- the proposed diversion would have sufficient capacity to convey flood flows from the unnamed Two Mile Gully tributary catchment for all events up to and including the 0.1% AEP event.
- the proposed Project maximum disturbance area would be located outside the Sagittarius Creek flood extent for all modelled events; and
- predicted increases in peak velocities across floodplains within the Project area are generally < 0.1 metres per second (m/s) for all events up to the 1% AEP event and, therefore, are not considered significant.

Waterway Stability Assessment

The impact of the Project on waterway stability (geomorphology), including a hydraulic assessment of the proposed Stewarton Pit clean water diversion, was assessed for the 5% AEP and 2% AEP events.

Model results indicate that erosion potential and sediment transport characteristics of existing waterway channels under the proposed (Project) scenario would be similar to those under existing conditions (Appendix B).

The hydraulic assessment of the proposed Stewarton Pit clean water drain was undertaken in accordance with the *Criteria for Functioning River Landscape Units in Mining and Post Mining Landscapes* (Alluvium Consulting Australia [Alluvium], 2014). Results of this assessment are presented in Appendix B.

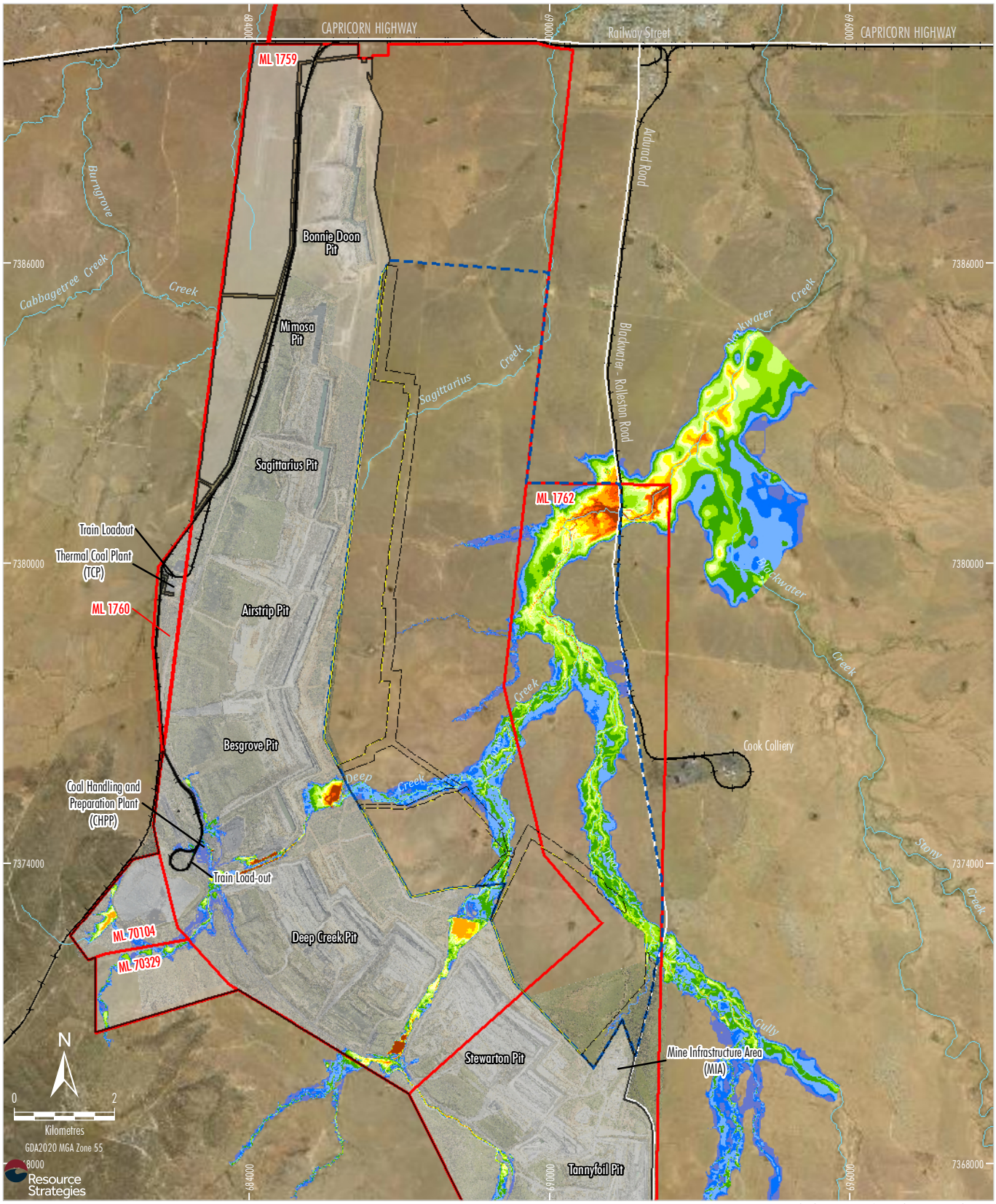
In summary, predicted velocities and stream power along the proposed diversion are well below the Alluvium (2014) upper limits for transport limited streams (Appendix B). Accordingly, the proposed clean water drain is expected to remain stable and self-sustaining during the operational phase of the Project and post closure (Appendix B).

Final Landform

Final landform model results for the 1% AEP, 0.1% AEP and PMF events were used to assess flood immunity of the final voids and the stability of rehabilitated dump landforms under extreme flooding conditions (Appendix B).

Flood modelling results for the final landform scenario indicate that (Appendix B):

- the Mimosa/Besgrove void would be located outside riverine flood extents in Sagittarius Creek for all events up to the PMF (Figure 4-9);



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Source: E2M (2026); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Flood Depths (m)

- up to 0.25
- 0.25 to 0.5
- 0.5 to 1.0
- 1.0 to 1.5
- 1.5 to 2.0
- 2.0 to 2.5
- 2.5 to 3.0
- 3.0 to 3.5
- 3.5 to 4.0
- 4.0 to 4.5
- >4.5

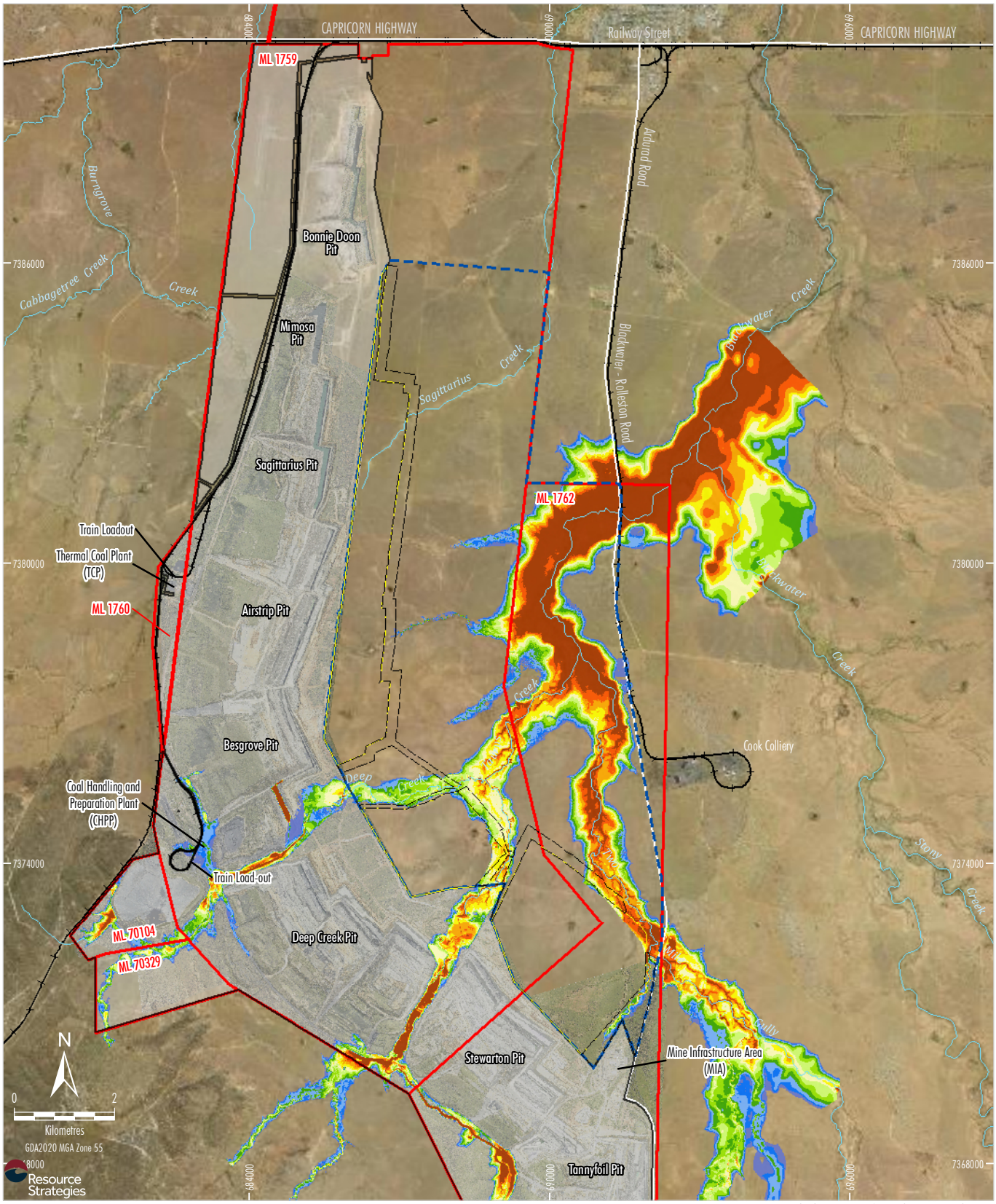
Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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Operational Peak Flood Depths, Levels and Extents for the 0.1% Event

Figure 4-8



Source: EZM (2026); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Flood Depths (m)

- up to 0.25
- 0.25 to 0.5
- 0.5 to 1.0
- 1.0 to 1.5
- 1.5 to 2.0
- 2.0 to 2.5
- 2.5 to 3.0
- 3.0 to 3.5
- 3.5 to 4.0
- 4.0 to 4.5
- >4.5

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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Final Landform Peak Flood Depths, Levels and Extents for the PMF Event

Figure 4-9

- the Deep Creek, Stewarton North and Stewarton South voids would have flood immunity for all events up to and including the PMF (Figure 4-9); and
- the R30 void would have flood immunity for all events up to and including the 0.1% AEP event, with floodwater ingress predicted to occur during the PMF event.

Impacts on Great Barrier Reef Waterways

The Project is an amendment to an existing mining activity and does not propose any new release points, changes to existing authorised release infrastructure, or changes to the release criteria currently approved under the EA. The Project is located within the Fitzroy Basin and therefore consideration of section 41AA of the EP Regulation is required. The *Reef discharge standards for industrial activities guideline* states that, for an amendment to an existing activity, the total load to be considered is limited to the additional point-source releases associated with the amendment and does not include loads already authorised under the existing environmental authority.

In view of the *Reef discharge standards for industrial activities guideline*, the Project is not expected to result in a residual impact to Great Barrier Reef catchment waters for the purposes of section 41AA of the EP Regulation because it does not introduce new release points, new release criteria or a material increase in point-source fine sediment loads beyond those already authorised under the existing EA.

Residual Voids

Five residual voids would remain within the Project area and immediate surrounds, spanning across the reaches of the Sagittarius Creek, Blackwater Creek, Taurus Creek and Two Mile Gully catchments.

A GOLDSIM model was used by Hydrobalance (2026) (Appendix B) to assess the likely long-term water level behaviour of the residual voids. The residual void modelling indicates the following:

- Void water levels will be influenced by groundwater inflow, rainfall, runoff, and evaporation, with equilibrium levels expected below overflow levels at all five residual voids, even after extreme long-duration storm events.
- The salinity of the pit lake in the Mimosa/Besgrove, Deep Creek and Stewarton North voids will increase over time due to evapoconcentration.
- The salinity of the pit lake in the R30 and Stewarton South voids fluctuates over time as the void empties in cycles.

The modelling confirms that the residual voids would comply with the EA, which requires that voids must not cause serious environmental harm to land, surface waters, or recognised groundwater aquifers, other than the harm constituted by the existence of the void itself (Appendix B).

Cumulative Impacts

The proposed release strategy to Blackwater Creek and the Mackenzie River is informed by existing release conditions applied to nearby operating coal mines. These conditions are embedded within a broader strategic framework designed to manage the cumulative impacts of water releases and mining activities. As such, the cumulative effects on surface water quality and associated environmental values are expected to be negligible (Appendix B).

4.2.3 MANAGEMENT PRACTICES AND MITIGATION STRATEGIES

Containment, Management and Disposal Systems for Mine Affected Water

The controlled release of MAW would continue to be restricted by the existing EA release conditions for the duration of the Project.

Erosion and Sediment Control

No specific requirements for sediment basins have been identified. However, there is potential additional sediment dams may be required for the Project associated with disturbance in advance (to the east) of mining operations including infrastructure corridors, pre-stripping and topsoil stockpiles.

The requirement for, and location and sizing of any new sediment basins would be confirmed during detailed design, having regard to the final disturbance footprint, catchment configuration, drainage design and anticipated sediment-generation risk.

These basins would capture sediment-laden runoff and allow sediment to settle before water is released to the environment. The basins would be designed to manage the higher volumes of runoff and sediment expected from the expanded mining footprint and would complement the existing sediment control infrastructure (Appendix B).

Operational Flood Levees

At different stages of the Project's life, a portion of the open cut pit extents may be affected by a 0.1% AEP flood event. The hydrologic and hydraulic modelling of local catchments has been used to estimate flood extents and to inform the required operational levee locations and crest levels, to provide flood immunity for events up to and including the 0.1% AEP event (Appendix B).

Unnamed Two Mile Gully Tributary Clean Water Drain

A clean water drain along the southeastern side of the future Stewarton Pit extent would be in place during the operational stage of the Project and would also form part of the final landform post-closure (Figure 2-19; Appendix B).

The proposed clean water drain is a trapezoidal channel with base width of 5 m, a maximum top width of 65 m, 1V:5H (vertical rise to horizontal run) internal batter slopes and a longitudinal slope of 0.7%.

The clean water drain would convey flood flows from the unnamed Two Mile Gully tributary catchment for all events up to and including the 0.1% AEP event (Appendix B).

Receiving Environment Monitoring Program

Whitehaven Blackwater is a participant in the Fitzroy Regional Receiving Environment Monitoring Program.

Surface Water Monitoring

Surface water quality monitoring of receiving waters would continue to be undertaken in accordance with the requirements of EA EPML00717813. Current monitoring locations are sufficient to cover the additional disturbance associated with the Project (Appendix B).

Water Quality Objectives

Whitehaven Blackwater proposes to amend the contaminant investigation levels in the EA (Table F3) to align with current default guideline values (DGVs) in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018). The rationale for the adopted WQOs is included in Appendix B, with the revised parameters summarised below:

- Ammonia: reduced from 1,000 µg/L to 720 µg/L.
- Fluoride: reduced 2,000 µg/L to 1,700 µg/L.
- Cadmium: reduced from 5.6 µg/L to 0.2 µg/L.
- Iron: reduced from 1,200 µg/L to 280 µg/L.
- Zinc: reduced from 17 µg/L to 8 µg/L.
- Boron: increased from 370 µg/L to 940 µg/L.

The existing contaminant investigation levels for EC, nitrate, aluminium, selenium, uranium, molybdenum and vanadium are proposed to be retained.

Surface Water Management Plan

The *BWM Plan – Water Management Plan* (Whitehaven, 2026b) would be updated, as required as mine plans are refined, to reflect any changes to the site WMS and surface water monitoring locations resulting from the Project.

4.3 Groundwater

A Groundwater Assessment has been prepared for the Project by SLR Consulting Australia Pty Ltd (SLR) (2026) and is presented in Appendix C. This section summarises the findings of SLR (2026).

Section 4.3.1 provides a description of the relevant groundwater environmental values, including the hydrogeological systems, groundwater users and the 2026 calibrated numerical groundwater model.

Section 4.3.2 describes the potential impacts of the Project on groundwater resources (including groundwater levels, quality, users and associated impacts to surface water resources).

Section 4.3.3 outlines the proposed mitigation measures, management and monitoring, including the proposed groundwater monitoring network and trigger values.

The Groundwater Assessment was peer reviewed by Dr Noel Merrick (HydroAlgorithmics Pty Ltd, 2026). The peer review report is presented in Attachment 4.

4.3.1 ENVIRONMENTAL VALUES

The environmental values relevant to groundwater within the Project area and surrounds have been identified with consideration of the Queensland DETSI *Guideline – Application requirements for activities with impacts to water* (DETSI, 2026b).

The EPP Water and Wetland Biodiversity provides a framework to protect and enhance the environmental values and therefore, suitability of Queensland waters (including groundwater) for various beneficial uses.

Groundwater resources within vicinity of the Project area are scheduled under the EPP Water and Wetland Biodiversity as Schedule 1 Plan WQ1310 Groundwaters. The Project area is within groundwater chemistry zone 36 of this plan, in which the environmental values that need to be considered include:

- biological integrity of aquatic ecosystems;
- suitability of water supply for irrigation;
- farm water supply/use;
- stock watering;
- drinking water supply;
- industrial use; and
- cultural and spiritual values.

The Project area also lies within the Highlands and Carnarvon Groundwater Management Areas under the *Water Plan (Fitzroy Basin) 2011*.

Environmental Values – Aquatic Ecosystems

Environmental values associated with Groundwater Dependent Ecosystems (GDEs) are described in Section 4.4.

Environmental Values – Irrigation and Farm Supply Use

The alluvium across the Groundwater Assessment Study Area, is unsuitable for irrigation (due to exceedances of boron, manganese and uranium) (Appendix C).

A landholder bore census was previously conducted for BWM by EMM Consulting Pty Ltd (EMM) (2019). The census identified 18 bores in use and equipped with pumping infrastructure, all of which were used for stock and farm supply purposes (despite the noted water quality limitations).

Environmental Values – Stock Water

The alluvium across the Groundwater Assessment Study Area, is unsuitable for stock water supply (due to exceedances of salinity) (Appendix C).

Environmental Values – Drinking Water

Groundwater quality data collected from the site monitoring bores indicates that groundwater quality in the vicinity of BWM is brackish to saline and generally not suitable for human consumption (Appendix C).

Environmental Values – Industrial Use

There are two registered bores within 5 km of the EA boundary with a registered use of industrial (Appendix C).

Further, EMM (2021) concluded that, based on the bores surveyed as part of the 2019 bore census:

> *The environmental values for groundwater in the area are limited to farm supply/use, stock water and industrial use (i.e. mining).*

Environmental Values – Cultural and Spiritual Values

No environmental values relating to cultural and spiritual values of groundwater have been identified within the Project area (Appendix C).

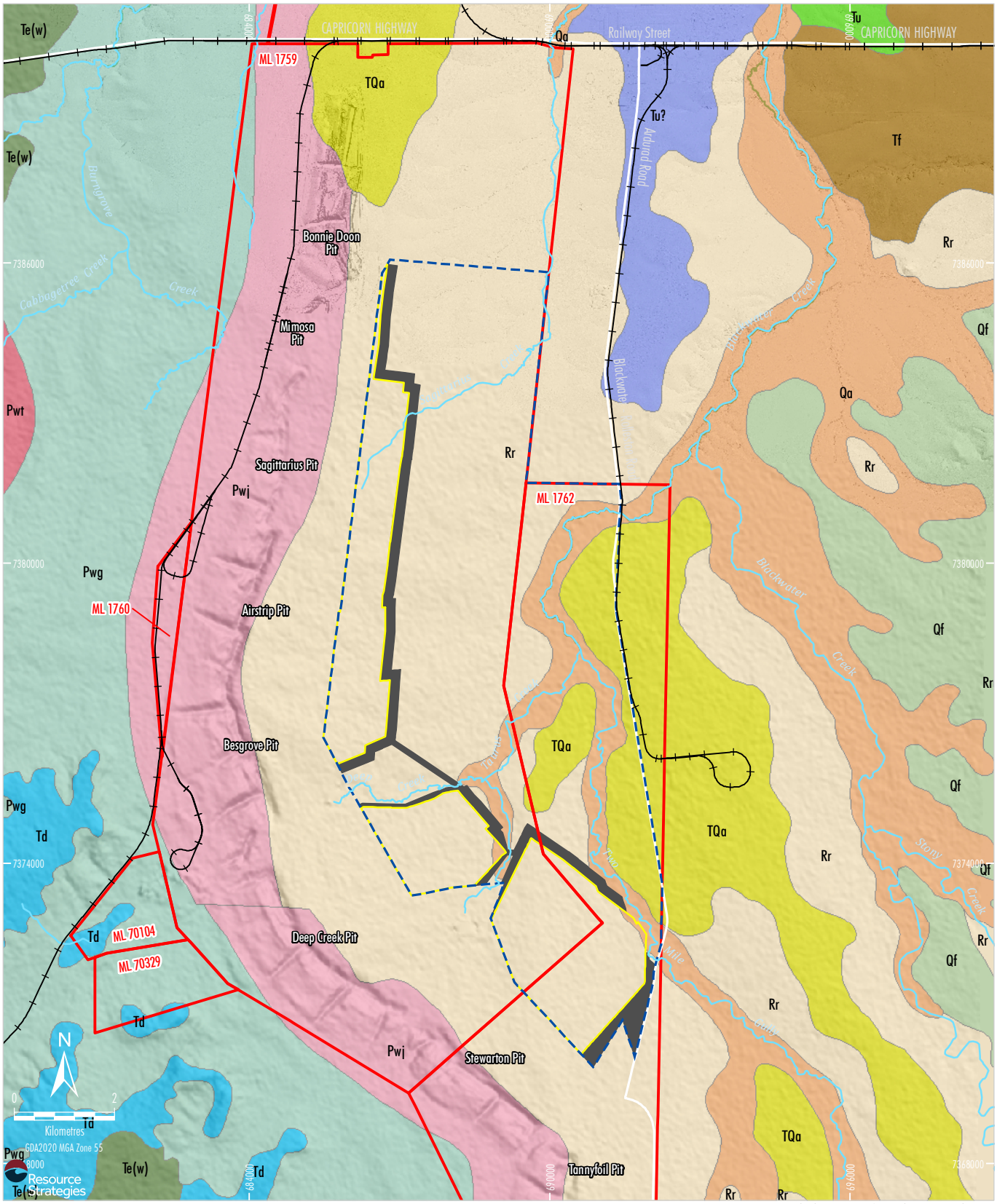
Hydrogeological Systems

The Project is located within the Bowen Basin, a major foreland sedimentary basin and the largest productive coal basin in Australia. The north-south oriented Bowen Basin stretches from Townsville in the north to the Queensland-New South Wales border in the south.

The stratigraphic units within the Project area and immediate surrounds, from youngest to oldest, and corresponding hydrogeological systems include (Figure 4-10):

- Quaternary (Alluvium).
- Tertiary (Sediments and Basalt).
- Triassic (Clematis Sandstone and Rewan Group).
- Permian (Rangal Coal Measures and Burngrove Formation).

The physical and chemical properties of each of the above hydrogeological units are described in the following sub-sections. Further details are provided in the Groundwater Assessment (Appendix C).



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Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Surface Geology

- Burngrove Formation (Pwg)
- Duaringa Formation (Tu)
- Duaringa Formation? (Tu?)
- Emerald Formation(w) (Te(w))
- Fair Hill Formation (Pwt)
- Qa-QLD (Qa)
- Qf-QLD (Qf)
- Rangal Coal Measures (Pwj)
- Rewan Group (Rr)
- TQa-QLD (TQa)
- Td-QLD (Td)
- Tf-SF55-16 (Tf)

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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BLACKWATER NORTH EXTENSION PROJECT

Surface Geology

Figure 4-10

Quaternary Sediments

The Quaternary alluvial sediments unconformably overlie the Triassic age Rewan Group and Permian coal measures. The unit consists of a thin surficial cover of generally unconsolidated clays, silts, sands and gravels associated with floodplains of the major drainage channels, primarily Blackwater Creek. The alluvial sequence varies in thickness from 0.5 to 16 m according to drilling data from within the Groundwater Assessment Study Area.

Due to the limited number of saturated alluvial monitoring bores and the short duration of available data, correlations with rainfall (and associated recharge) is not possible (Appendix C).

The BWM groundwater monitoring network comprises a total of six bores within the alluvium, installed at depths ranging from 7 to 16 metres below ground level (mbgl). All except for one are observed to be dry (Appendix C).

Tertiary Sediments and Basalt

Tertiary sediments and basalts unconformably overlay the Triassic and Permian units. The unit consists primarily of unconsolidated/weathered Tertiary sediments and weathered claystone, siltstone and sandstones which may provide a preferential flow pathway for groundwater if levels exceed the base of weathering. The unit varies in thickness, ranging from 5 to 50 m with a maximum thickness of 115 m, and is generally thicker to the south.

To the south and southwest of the BWM, basalt flows are present. The basalts have been described as having varying degrees of weathering and thickness. The basalt flows vary in thickness ranging from 10 to 42 m (AGE, 2003). The basalt occurs in the Groundwater Assessment Study Area, but not in the Project area.

Recharge from rainfall infiltration to this unit is expected to be low due to the presence of surficial clays (Appendix C).

The BWM groundwater monitoring network comprises a total of 47 bores within the Tertiary Sediments and Basalt, installed at depths from 4.5 to 56 mbgl (Appendix C).

Triassic Clematis Group

The Clematis Group unconformably overlies the Rewan Group and outcrops on the eastern margins of the Groundwater Assessment Study Area, where it forms an elevated plateau and escarpment.

The unit is comprised of weathering resistant medium to coarse grained quartzose to sublabile and micaceous sandstone, siltstone, mudstone and conglomerate. In the vicinity of the BWM, the Clematis Group is made up of the Glenidal Formation and Expedition Sandstone members which are estimated to form an average thickness of 100 to 800 m (Geoscience Australia, 2021).

There are no registered bores within the Clematis Group sandstone, as the sandstone outcrops in elevated rugged areas in Arthur's Bluff State Forest, Shotover State Forest and Blackdown Tableland National Park (Appendix C).

Triassic Rewan Group

The Rewan Group overlies the Permian Coal Measures and occurs as in-fill material, thickening to the east with the dip of the coal measures and occurring thinner to the west where the coal measures occur as outcrop. Where present, the Rewan Group has a distinct greenish tint (non-marine deposits containing glauconite) in colour and is composed of siltstone and mudstone, with interbeds of lithic and volcanic sandstones.

Based on exploration drill holes and groundwater bore holes in the Groundwater Assessment Study Area, the Rewan Group is comprised of siltstone and mudstone, with interbeds of lithic and volcanic sandstones and is of variable thickness ranging from 50 to 300 m. This formation is considered a regional scale aquitard.

Recharge to the Triassic Rewan Group is expected to occur via leakage from the overlying Quaternary and Tertiary units (Appendix C).

The BWM groundwater monitoring network comprises a total of six monitoring bores within the Triassic Rewan Group, installed at depths ranging from 15 to 95 mbgl. One of these bores is observed to be dry (Appendix C).

Permian Rangal Coal Measures

The Rangal Coal Measures underlie the Rewan Group and outcrop to the west of BWM. This unit consists of interbedded sandstone, siltstone, mudstone and coal with tuff (towards the base) and has a thickness of up to 100 m in the vicinity of the BWM.

Previous investigations (EMM, 2021) have identified this formation as a regional aquifer. Groundwater flow is primarily within the coal seams (via interconnected cleats and fractures), which are confined by low permeability overburden and interburden that essentially form aquitards. The coal measures are highly faulted resulting in "compartmentalisation" with coal seams juxtaposed against lower permeability interburden.

Recharge to this unit occurs via direct infiltration where the unit outcrops or sub-crops.

The BWM groundwater monitoring network comprises a total of 62 monitoring bores which target the Rangal Coal Measures, installed at depths ranging from 17 to 231.5 mbgl. Six of these bores are observed to be dry.

Burngrove Formation

The Rangal Coal Measures conformably overlie the coal bearing Burngrove Formation. The Burngrove Formation is generally regarded an aquitard comprising interbedded siltstone, carbonaceous and tuffaceous shales, mudstone and thin coal seams.

Recharge to the Burngrove Formation would occur primarily where the formation outcrops along the west of the Project area (Appendix C).

The BWM groundwater monitoring network comprises a total of 20 monitoring bores within the Burngrove Formation, installed at depths ranging from 8 to 72.9 mbgl. Five of these bores are observed to be dry.

Groundwater Users

A search of the Queensland Government's Registered Groundwater Bore Database (GWDB) (Department of Local Government, Water and Volunteers, 2026) and the Bureau of Meteorology's (BoMs) National Groundwater Information System (BoM, 2026) was carried out for registered bores within the Groundwater Assessment Study Area. The search returned 313 bores with registered uses as mine monitoring (190 bores), petroleum exploration (3 bores), sub-artesian monitoring (23 bores), water resources investigation (3 bores), water supply (28 bores), unknown (32 bores) and decommissioned (34 bores).

A landholder bore census was conducted at BWM by EMM (2019). A total of 32 bores were visited during the census, including 20 registered bores and 12 unregistered bores.

The census identified eight of the registered bores and 10 of the unregistered bores were in use, with the remaining bores not in use.

Overall, the bore census identified that 18 bores were in use (including both the unregistered and registered bores) and were equipped with pumping infrastructure. The survey results showed that these bores were used for stock and farm supply purposes and were screened across either Tertiary basalt or Permian.

There are two potential private water supply bores within approximately 5 km of the Project area, one of which is identified via the GWDB as unknown use, and the other an unregistered bore identified by EMM (2019) and indicated to not be in use.

4.3.2 POTENTIAL IMPACTS

Calibrated Numerical Groundwater Model

A contemporary numerical groundwater model has been developed for the BWM, based on the most recently available site data, to predict impacts of the Project on the local groundwater regime. This model was used as the basis for the Groundwater Assessment (Appendix C).

The 2026 groundwater model used for the Project was peer reviewed by Dr Noel Merrick of HydroAlgorithmics Pty Ltd. Dr Merrick concluded that the Groundwater Assessment addressed the objectives satisfactorily, the model underpinning the groundwater assessment is "fit for purpose", and the proposed mitigation and monitoring measures are satisfactory (Attachment 4).

The model has been constructed to consider all available data, including the current site mine plan and site geological model for the Project area, and accounts for potential cumulative impacts from nearby operational mines such as BWM, BWM South (Kenmare and Laleham), Minyango and Curragh Mines.

The model represents the key geological units within the model domain as 17 layers, each layer comprising a cell count of up to 64,880. At its widest extents, the model is approximately 57 km from west to east and 93 km from north to south.

Calibration

The model was calibrated and verified to existing groundwater levels, using reliable measurements from representative bores within the model domain. A detailed description of the calibration method is provided in Appendix C.

Calibration of the groundwater model was undertaken in accordance with the *Australian Groundwater Modelling Guidelines* (Barnett et al., 2012) and was designed to replicate observed groundwater levels. The transient calibration achieved a scaled root mean square (SRMS) error of 6.6%, which is less than the 10% maximum SRMS error recommended by the *Australian Groundwater Modelling Guidelines* (Barnett et al., 2012).

Highlands Groundwater Management Area

The Project does not directly intercept groundwater from Highlands Groundwater Unit 1 (Quaternary alluvium) under the *Water Plan (Fitzroy Basin) 2011*, meaning, all direct groundwater taken by the open cut pits for the Project is from Highlands Groundwater Unit 2 (sub-artesian aquifers).

Groundwater Levels (Predicted Drawdown/ Depressurisation)

The predicted incremental drawdown associated with the Project is < 1 m in the shallow alluvium layer.

The maximum predicted incremental drawdown associated with the Project within the weathered zone is presented in Appendix C. The incremental drawdown extent of the weathered zone is largely confined to near pit and is influenced by the distribution of predicted saturated zones in this zone.

The Permian coal seams (i.e. the target seams) would experience drawdown as a direct result of mining associated with the Project. Groundwater level drawdown within the mine coal seams is influenced by unit structure and is confined to unit extents. To the west, the maximum predicted incremental drawdown of the Permian coal measures is limited in its extent, maintaining proximity to the pit due to the structural geology (i.e. coal seams subcrop).

The extent of maximum predicted incremental drawdown to the east extends laterally to Blackwater Creek, however, at depth, not vertically into the shallow formations, such as alluvium or tertiary.

Maximum predicted incremental drawdown for the Burngrove Formation is similar to the drawdown in the Permian coal seams and is limited to the coal seam outcrop.

Drawdown contours for each of the groundwater model layers are presented in the Groundwater Assessment (Appendix C).

Groundwater Inflow Predictions

The total volumes of groundwater predicted to be intercepted as part of the Project are presented in Appendix C. Adjustments to account for water lost by evaporation and entrained water in ROM coal were made by Hydrobalance (2026) prior to using these inflows for water balance purposes (Appendix B).

Post mining, final voids would accumulate water due to groundwater inflows and rainfall runoff. These inflows were incorporated into the final void balance modelling to determine predicted long-term water levels (Section 4.2.2).

Sensitivity Analysis

Following peer review, it was noted that the modelled inflows exceeded the observed pit inflows (Appendix C).

To investigate this, the peer reviewer (Dr Noel Merrick) requested additional sensitivity simulations to assess the influence of the timing of time varying materials, which controls when model parameters transition from host material properties to post-mining properties (i.e. spoil or void) (Appendix C).

The sensitivity analysis concluded that predicted mine inflows are sensitive to the timing of hydraulic conductivity property changes. The results indicated that delaying the transition to post-mining hydraulic properties until after mining is completed reduced predicted pit inflows, with the resulting inflows being closer to the observed values (Appendix C).

Dr Merrick's peer review (Attachment 4) states that, in his opinion, the modelling process has resulted in ultra-conservative estimates of pit inflows and their probabilistic ranges, leading to an overestimation of predicted drawdown magnitudes and extents. Dr Merrick further notes that these impacts remain immaterial for third-party water supply bores and ecosystems (Attachment 4).

Groundwater Quality

The Project would involve progressively backfilling of the open cut pit creating in-pit waste rock emplacement areas, as space becomes available. Over time, with groundwater recovery in the post-mining environment, these in-pit waste rock emplacement areas would assimilate with native rock groundwater levels.

There are five proposed final voids in the vicinity of the Project to remain post-closure. Three are predicted to become long-term sinks and the other two are predicted to be flow through systems reporting to those long-term sinks (Appendix C).

Water within the final voids would evaporate from the final void lake surface and draw in groundwater from the surrounding strata, the two flow-through voids and runoff from the final void catchment areas. As the final voids would act as a sink, evaporation from the final void lake surfaces would slowly concentrate salts in the pit lake over time. The gradual increase in salinity would not pose a risk to the surrounding groundwater regime, as the residual voids would remain a permanent sink (or a flow-through where groundwater would report to a nearby permanent sink) (Appendix C).

There is limited potential for groundwater contamination expected to occur as a result of hydrocarbon and chemical contamination with provision for immediate clean-up of spills. All chemicals would be transported, handled and stored in accordance with the relevant AS. These controls represent standard practice and are a legislated requirement at mining operations for preventing contamination of the groundwater regime (Appendix C).

Groundwater Users

The groundwater impact assessment evaluated the drawdown at the two landholder bores identified within a 5 km radius of the Project area. The predicted incremental and cumulative drawdowns at these landholders bores were within the Water Act bore drawdown threshold triggers of 2 m for unconsolidated aquifers and 5 m for consolidated aquifers.

Incremental drawdown from the Project is not predicted at either bore (Appendix C).

A maximum cumulative drawdown of 1 m is predicted at bore RN207592, while none is predicted at the other bore (Appendix C).

Groundwater Dependent Ecosystems

GDEs within the Project area are described in Section 4.4.

Stygofauna

Stygofauna within the Project area are described in Section 4.4.

Semi-permanent Tailings Cells

The semi-permanent tailings cells would be located within the original pit development and used for the disposal of fine rejects during operations. As active pit dewatering would occur during operations, any seepage from the tailings cells would report to the excavated pits and be managed through the existing site WMS. Following closure, the final voids would continue to act as hydraulic sinks, capturing any seepage from the tailings cells. Particle tracking confirmed that there would be no flux out from the voids. Accordingly, no sustained off-site contaminant transport pathway has been identified (Appendix C).

Post-mining Recovery

Post mining conditions were simulated from cessation of mining and extended for 1,947 years until the model reached equilibrium to assess long-term impacts.

Based on the modelled predictions, the final voids would gradually fill over time from direct rainfall occurring across each void and groundwater seepage before achieving an equilibrated final void water level (Appendix C).

The modelling demonstrates that three voids are predicted to become long-term sinks, with the other two predicted to be flow through systems reporting to those long-term sinks. Therefore, the final voids would not pose a risk to the surrounding groundwater regime (Appendix C).

4.3.3 MANAGEMENT PRACTICES AND MITIGATION STRATEGIES

Groundwater Monitoring Network

A groundwater monitoring network has been established at BWM, which includes groundwater level and water quality monitoring stations within and surrounding the mine site, in accordance with EA EPML00717813. The locations of EA groundwater monitoring bores are shown on Figure 4-11.

The Groundwater Assessment (Appendix C) proposed five new monitoring bores and two existing bores for inclusion in the EA monitoring network to support monitoring associated with the Project, as outlined in Table 4-7.

Table 4-7
Proposed Additional EA Monitoring Bores at BWM

Monitoring Points	Target Aquifer	Reasons for Inclusion into the Network
Drilling location 3	Aries Seam	Located approximately 1.5 km east of the Bonnie Doon TSF.
Drilling location 4	Aries Seam	Located to the east of future mining.
Drilling location 5	Burngrove Formation	Located between the mining footprint and third-party water supply bores screened in the Burngrove Formation.
Drilling location 7	First water[1]	Provides spatial coverage of the shallow aquifer for EA compliance purposes, including confirmation of depth to groundwater in areas identified as potentially hosting terrestrial GDEs.
Drilling location 8	First water[1]	Spatial coverage of shallow aquifer for EA purposes. Confirm depth to water table.
MB19BWM06P[2]	Aries Seam	Located east of planned mining. Provides spatial coverage.

Table 4-7 (Continued)
Proposed Additional EA Monitoring Bores at BWM

Monitoring Points	Target Aquifer	Reasons for Inclusion into the Network
MB19BWM07A[2]	Alluvium	Located on an area identified as a potential terrestrial GDE.

Source: Appendix C.
[1] Bore to be installed at the depth where first groundwater is encountered during drilling.
[2] Existing bore.

Collectively, the inclusion of the five new bores and the two existing bores strengthen the existing EA monitoring network by improving spatial and hydrostratigraphic coverage, enhancing the ability to detect and track potential drawdown and water quality changes, providing additional data to validate groundwater model predictions, and supporting ongoing EA compliance monitoring requirements (Appendix C).

Groundwater Levels

Groundwater level monitoring would continue to be undertaken at an appropriate frequency (e.g. monthly to quarterly) to establish baseline datasets for groundwater levels in each monitoring bore.

Groundwater Quality

Groundwater quality sampling of existing monitoring bores would continue in accordance with Condition I5 of the EA, to provide a long-term baseline groundwater quality dataset, and to detect any changes in groundwater quality during and post-mining.

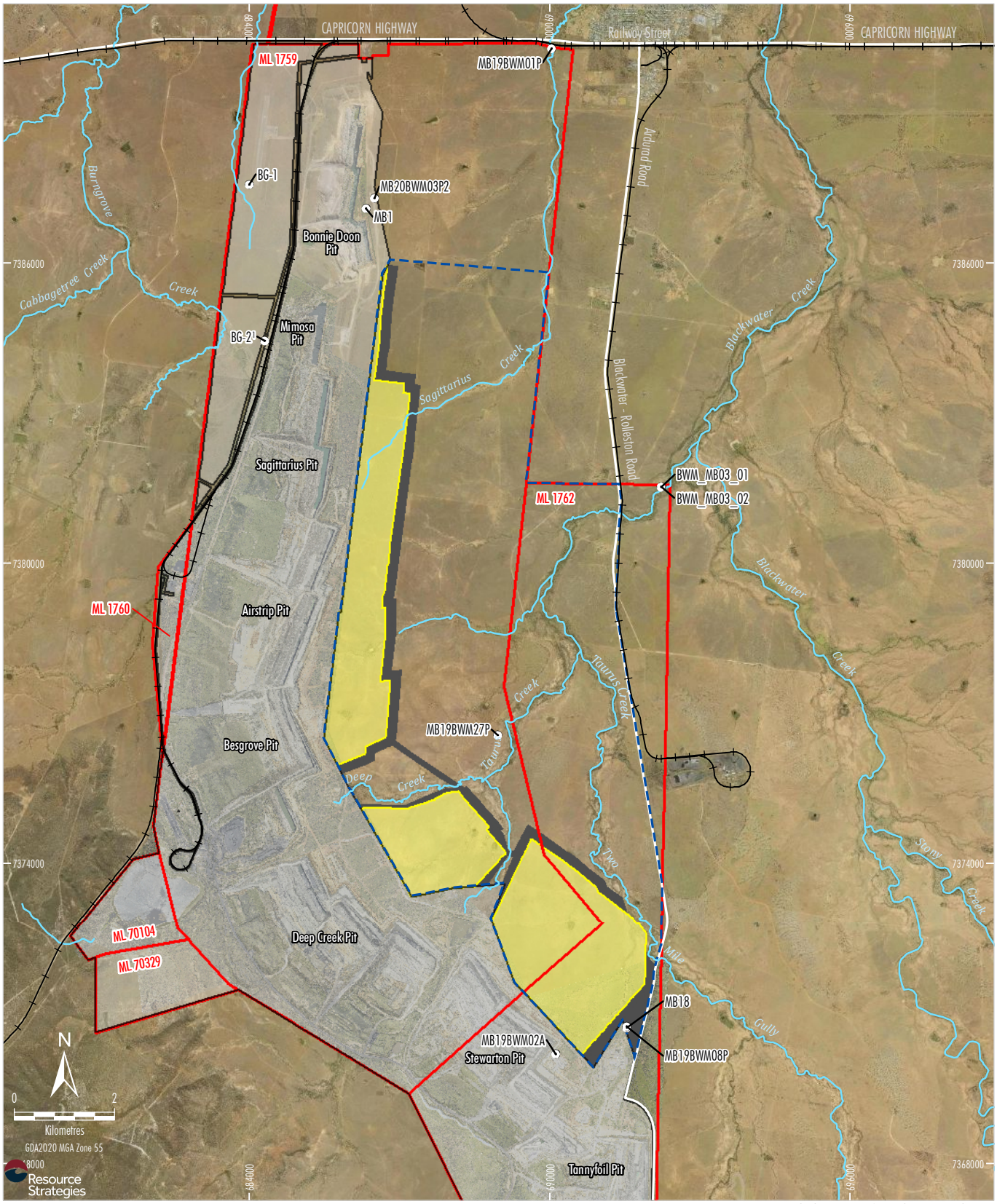
Mine Groundwater Inflows

Estimation of groundwater pit inflows would be undertaken routinely in consultation with a suitably qualified person.

Annual Reporting

Annual reporting would include:

- records of groundwater levels and quality in the monitoring bores of the approved groundwater monitoring network; and
- details of any review undertaken of the groundwater model since the previous annual monitoring report.



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Groundwater Monitoring Bore
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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BWM EA Groundwater Monitoring Bore Network

Figure 4-11

Associated Water Take Reporting

Whitehaven Blackwater would continue to report the annual water take of associated water take from ML 1759 and ML 1762 as required for the Project.

4.4 Biodiversity

The *Blackwater North Extension Project – Terrestrial Ecological Assessment* for the Project was undertaken by E2M (2026) and is presented in Appendix D. A *Blackwater North Extension Project – Aquatic Ecology and Groundwater-Dependent Ecosystems Assessment* was also prepared for the Project by DPM Enviros ciences Pty Ltd (DPM) (2026) and is presented in Appendix E.

This section summarises the findings of E2M (2026) and DPM (2026).

The Terrestrial and Aquatic Ecology Assessments surveyed a larger Study Area encompassing the Project area (disturbance footprint) and surrounds (approximately 6,907.49 ha) (Figure 1-7).

The Terrestrial Ecology Assessment and Aquatic Ecology and GDE Assessment were prepared in accordance with the following guidelines (Appendix D):

- *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (DES, 2022a) and associated Terrestrial Vertebrate Fauna Survey Field Data Sheets (DES, 2022b);
- *Flora Survey Guidelines – Protected Plants – Nature Conservation Act 1992* (DETSI, 2025b);
- *Methodology for survey and mapping regional ecosystems and vegetation communities in Queensland, Version 7.0* (Neldner et al., 2024);
- *Guide to determining terrestrial habitat quality – Methods for assessing habitat quality under the Queensland Environmental Offsets Policy* (DES, 2020b);
- *Queensland Australian River Assessment System (AusRivAS) Sampling and Processing Manual* (DNRM, 2001);
- *Queensland Wetland Definition Guideline – Version 2.0* (DES, 2023a) and *Queensland Wetland Delineation and Mapping Guideline – Version 2.0* (DES, 2023b);
- *Monitoring and Sampling Manual – Environmental Protection (Water) Policy 2009* (DES, 2018);
- *Guideline for the Environmental Assessment of Subterranean Aquatic Fauna* (DSITI, 2015);
- *Queensland Environmental Offsets Policy* (DETSI, 2025c);
- *Queensland Environmental Offsets Policy Significant Residual Impact Guideline* (DEHP, 2014); and
- Other various species-specific targeted survey guidelines and conservation and listing advice for Threatened Ecological Communities (TECs).

Background information relevant to biodiversity is provided in Section 4.4.1. Section 4.4.2 describes the potential impacts of the Project on biodiversity, while Section 4.4.3 outlines relevant management practices and mitigation strategies.

4.4.1 ENVIRONMENTAL VALUES

Regional and Local Setting

The Project area is located in the Isaac-Comet Downs subregion of the Brigalow Belt bioregion. This bioregion extends from Townsville, Queensland in the north to Narrabri, New South Wales in the south.

The nearest protected area is Blackdown Tableland National Park which is located 11.5 km to the southeast of the Project area. Amaroo State Forest and Arthurs Bluff State Forest are located approximately 4.5 km to the west and 8.5 km to the east of the Project area, respectively (Appendix D).

Locally, the Project is situated within the Mackenzie River Sub-basin of the broader Fitzroy Basin. Extensive broad scale clearing has occurred in the region, predominantly for agriculture. The Project area comprises of a mix of non-remnant pasture primarily used for cattle grazing (Appendix D).

Terrestrial Ecology Surveys

The terrestrial flora and fauna in the Project area and surrounds were initially surveyed by EMM (EMM, 2023a, 2023b) between 2018 and 2020 (Appendix D).

A comprehensive terrestrial ecological assessment was undertaken by E2M (2026) across the Study Area (Appendix D).

Flora and fauna survey sites were selected within the Study Area based in the outcomes of a desktop review completed by E2M (2026). The desktop review utilised various sources including aerial imagery, regional ecosystem (RE) mapping, and geological data to stratify the Study Area. Sites which represented the Study Area were selected (Appendix D).

Flora surveys were undertaken across multiple seasons and conducted in accordance with relevant Commonwealth and State guidelines, including the *Methodology for surveying and mapping of regional ecosystems and vegetation communities in Queensland – Version 7.0* (Neldner et al., 2024), *Flora Survey Guidelines – Protected Plants – Nature Conservation Act 1992* (DETSI, 2025b), *Guide to Determining Terrestrial Habitat Quality – Methods for assessing habitat quality under the Queensland Environmental Offsets Policy* (DES, 2020b) and Commonwealth conservation and listing advice for potential TECs (Appendix D).

Survey techniques included a combination of tertiary and quaternary surveys, ground-truthing of REs, identification of TECs under the EPBC Act, targeted searches for conservation significant species listed under the NC Act and EPBC Act and random meanders. A total of nine tertiary and 136 quaternary vegetation assessments were undertaken across the Study Area (Appendix D).

E2M (2026) undertook fauna surveys across multiple seasons. Fauna survey sites were conducted in consideration of the relevant State and Commonwealth survey guidelines (Appendix D):

- *Survey guidelines for Australia's threatened birds – Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, Water, Heritage and the Arts [DEWHA], 2010a).
- *Survey guidelines for Australia's threatened bats – Guidelines for detecting bats listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999* (DEWHA, 2010b).
- *Survey guidelines for Australia's threatened reptiles* (Department of Sustainability, Environment, Water, Population and Communities [DSEWPaC], 2011a).
- *Survey guidelines for Ornamental snake*, released in November 2025 following the completion of field surveys (Commonwealth DCCEEW, 2025a).
- *Survey guidelines for Australia's threatened mammals* (DSEWPaC, 2011b).
- *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (DES, 2022a).

Survey methods included nocturnal spotlighting, harp trapping, microbat call recording and analysis, bioacoustic recorders, herpetofauna surveys, passive infrared camera stations, diurnal water source watches and bird surveys, Koala spot assessment technique and scratch surveys (Appendix D).

Fauna surveys involved a combination of targeted surveys and habitat suitability assessments to determine likely presence/absence of target species (Appendix D).

The results of the Project Terrestrial Ecology Assessment are described in Section 4.4.2.

Aquatic Ecology Surveys

DPM (2026) prepared an Aquatic Ecology and GDEs Assessment which included assessment of aquatic habitat. Flora and fauna was assessed at sites both upstream and downstream of the Project area (Appendix E).

DPM (2026) undertook additional assessments of the aquatic ecology and GDE values of the Study Area. The aquatic ecology surveys (DPM, 2026) included (Appendix E):

- GDE Assessments;
- Australian River Assessment System (AusRivAS) habitat assessment protocol described in the Sampling and Processing Manual (DNRM, 2001);
- water quality sampling including sediment quality;
- surveys of aquatic vertebrates and macroinvertebrates; and
- aquatic flora assessments.

A seasonal pilot stygofauna survey was undertaken in July and October 2025, in accordance with the *Guideline for the Environmental Assessment of Subterranean Aquatic Fauna* (DSITI, 2015). Ten groundwater bores within the alluvial aquifer were sampled (twice/seasonally) in the pilot survey (Appendix E).

Based on desktop assessments and seasonal considerations, a post-wet season survey was conducted in June to July 2025, and a follow-up pre-wet season survey was conducted in October 2025. Survey timing aligned with the AusRivAS late wet or early post-wet and early wet or pre-wet sampling windows (Appendix E).

The results of the Project Aquatic Ecology and GDE Assessment are described in Section 4.4.2.

Regional Ecosystem

A total of seven REs and areas of non-remnant vegetation were ground-truthed across the Study Area (Figure 4-12). This included 203.11 ha of remnant vegetation and 83.77 ha of high value regrowth vegetation. A further 6,597.09 ha of the Study Area was mapped as non-remnant, consisting of cleared pasture, young regrowth and scattered mature trees. These non-remnant areas had been subject to modification, historical clearing processes and introduction of exotic species (Appendix D).

REs in the Project area are comprised of small areas of remnant RE 11.3.6 and 11.3.1 and high value regrowth RE 11.3.1, 11.4.9 and 11.9.5 are located in the central and southern extents of the Project area (Appendix D).

Examples of each RE identified within the Project area are shown on Plates 4-1 to 4-4.

A detailed description of each vegetation community is provided in Appendix D.

Endangered and Of Concern Regional Ecosystems

Of the seven REs within the Study Area, three have a conservation status of 'Endangered', two have a conservation status of 'Of Concern' and two 'Least Concern' under the *Vegetation Management Act 1999* (VM Act) (Table 4-8) (Appendix D).



Plate 4-1 Example of RE 11.3.1 within the Project Area (Appendix D)



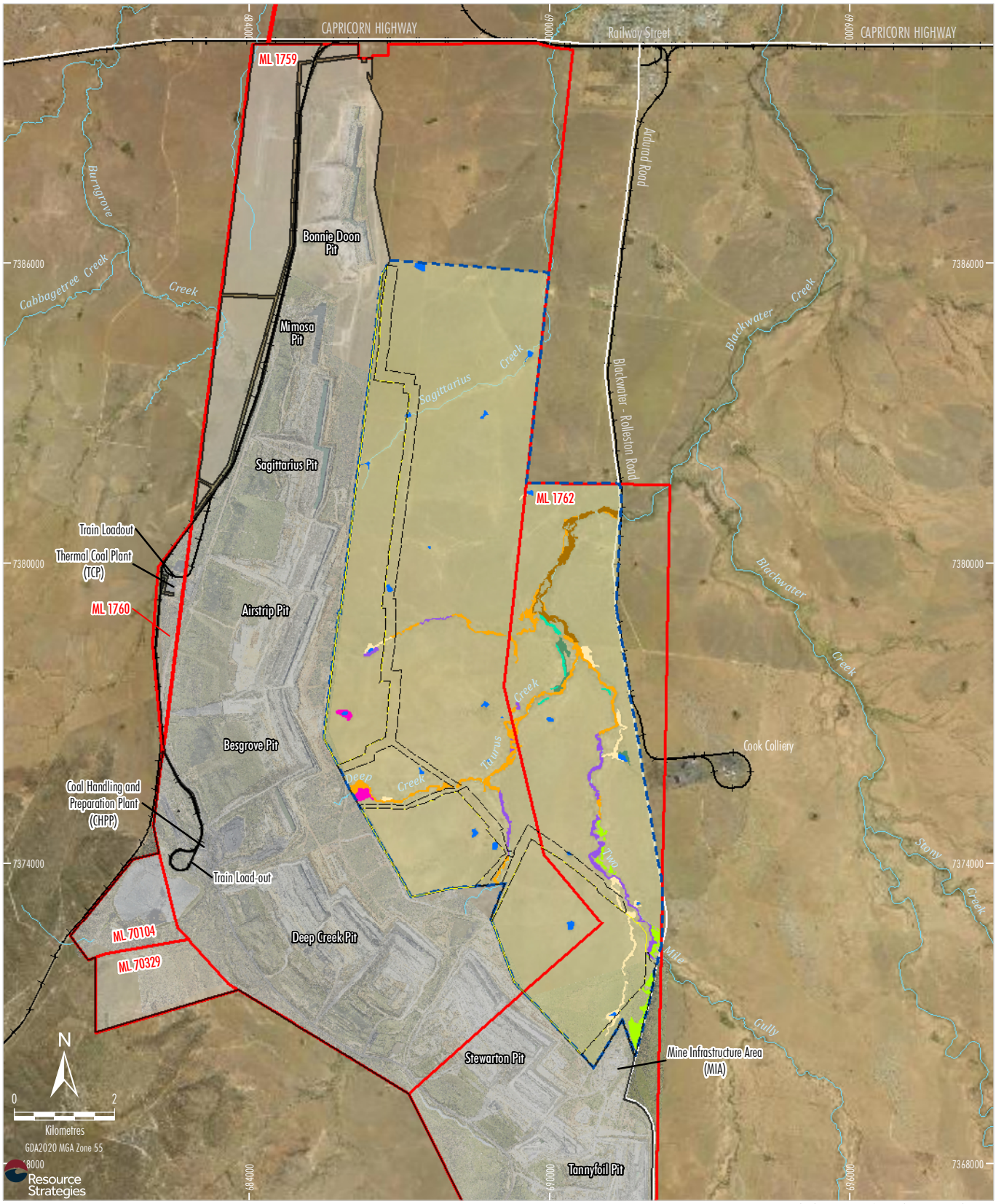
Plate 4-2 Example of RE 11.3.6 within the Project Area (Appendix D)



Plate 4-3 Example of RE 11.4.9 within the Project Area (Appendix D)



Plate 4-4 Example of RE 11.9.5 within the Project Area (Appendix D)



Source: E2M (2026); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Ground-truthed Regional Ecosystems

- 11.3.1 - High Value Regrowth
- 11.3.1 - Remnant
- 11.3.2 - Remnant
- 11.3.27 - Remnant
- 11.3.3 - Remnant
- 11.3.6 - Remnant
- 11.4.9 - High Value Regrowth
- 11.9.5 - High Value Regrowth
- Wetland/Dam
- Non-remnant

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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Ground-truthed Regional Ecosystems

Figure 4-12

Table 4-8
Ground-truthed Regional Ecosystems Within the Study Area

Regional Ecosystem	Short Description	BVG	VM Act Status
RE 11.3.1	Open forest to woodland dominated by *Acacia harpophylla* on Cainozoic alluvial clays forming plains and low undulating plains.	25a	Endangered
RE 11.3.2	*Eucalyptus populena* dominated low open woodland on alluvial plains.	17a	Of Concern
RE 11.3.3	*Eucalyptus coolabah* open forest woodland on alluvial plains.	16c	Of Concern
RE 11.3.6	*Eucalyptus melanophloia* dominant woodland on an alluvial plain.	17b	Least Concern
RE 11.3.27	*Eucalyptus camaldulensis* open forest fringing watercourses.	34d	Least Concern
RE 11.4.9	*Acacia harpophylla* open low woodland.	25a	Endangered
RE 11.9.5	*Acacia harpophylla* open woodland on gently undulating plains.	25a	Endangered

Source: Appendix E.
BVG = broad vegetation group.

Groundwater Dependent Ecosystems

Desktop GDE mapping (*Queensland Groundwater Dependent Ecosystems and Potential GDE Aquifer Mapping* [DETSI, 2025d]) for the Study Area (Appendix E) indicates:

- Riparian vegetation associated with sections of Taurus Creek is mapped as a moderate to high potential Terrestrial GDE, reflecting its position over shallow alluvium that may intermittently access perched groundwater during wetter periods.
- Small, isolated woodland patches adjacent to minor drainage lines are mapped as low to moderate potential terrestrial GDEs, consistent with limited rooting depth and intermittent access to moisture.
- No areas are mapped as high potential surface expression GDEs, such as springs, perennial baseflow waterways or groundwater maintained wetlands. This aligns with the ephemeral nature of waterways and absence of persistent flow or spring discharge within the Study Area.

The accuracy of the desktop GDE mapping around Taurus Creek was reviewed based on field assessments conducted by qualified ecologists during the June to July 2025 (post-wet) and October 2025 (pre-wet) surveys (Appendix E).

The results from the subterranean GDEs sampling (stygofauna sampling) show that although the alluvial aquifers of the Study Area are intercepted by several existing monitoring bores with similar characteristics to other bores in Queensland (4T Consultants Pty Ltd [2012], DPM [2022] and Queensland Herbarium [2025]) in which stygofauna have been previously detected, no stygofauna were detected (Appendix E).

Field observations of waterways within the Study Area (i.e. excluding Blackwater Creek) found no obvious evidence of on-ground indicators of surface expression GDEs (Appendix E).

Taurus Creek is subject to continuous natural wetting and drying cycles, and the riparian vegetation would access available moisture in the soil/sediment following rainfall, runoff and flow, and likely accesses shallow groundwater in the alluvial aquifer in drier times. This terrestrial GDE would likely be opportunistic, utilising small inputs of groundwater on occasion, but likely persisting without this input (Appendix E).

Thus, the field data corroborate the desktop mapping, confirming the presence of moderate potential terrestrial GDEs, but show that groundwater reliance is not continuous (Appendix E).

A summary of the sampling results is detailed below (Appendix E):

- Field sampling of five groundwater bores and five micropiezometers detected no stygofauna during either seasonal survey. The alluvial aquifers were shallow, discontinuous, and perched. These conditions are not conducive to sustaining stygofaunal communities confirming that subterranean GDEs are absent.

- No springs, baseflow maintained pools or groundwater-fed wetlands were identified during surveys. All waterways identified within the Study Area were fully ephemeral with no flow observed in either survey period. It was determined that isolated pools were sustained by rainfall and runoff only (not groundwater discharge) and lacustrine waterbodies (farm dams, mine water dams) are artificial and not groundwater-fed.
- Field inspections and water chemistry data revealed that (Appendix E):
    - Shallow alluvial aquifers along Taurus Creek are ephemeral, perched, and discontinuous, recharging only during significant rainfall and flow events.
    - These aquifers provide short-term access to moisture for riparian vegetation during wetter periods.
    - Riparian communities are not fully dependent on groundwater and maintain viability under dry-season conditions.

These findings confirm that terrestrial GDEs where present are opportunistic rather than obligate, consistent with Category 1 and 2 ecological value but with Low magnitude of risk from the Project (Appendix E).

Terrestrial Fauna Habitat

Native fauna habitats within the Study Area were categorised and mapped into 10 broad habitat types. The fauna habitat types present in the Study Area are (Appendix D):

- *Eucalyptus coolabah* +/ - brigalow open-forest;
- Brigalow +/- *Eucalyptus spp*. Woodland;
- mature brigalow regrowth/disturbed brigalow +/- *Eucalyptus* spp. woodland;
- vegetated non-remnant areas (brigalow regrowth < 3 m tall);
- Eucalyptus spp. Woodland;
- high value regrowth/disturbed *Eucalyptus* spp. woodland;
- freshwater wetland with fringing *Eucalyptus* spp.;
- pasture land without gilgai;
- pasture land with gilgai; and
- dams.

A detailed description of each fauna habitat type is provided in Appendix D, along with a description of habitat values and photos.

Aquatic Ecology

No aquatic flora or fauna species listed under the EPBC Act and/or NC Act were recorded during the aquatic ecology surveys (Appendix E).

Aquatic habitat assessments were undertaken at 16 sites across Taurus Creek, Two Mile Gully and associated wetlands and drainage features. Overall aquatic value scores ranged from Low to Moderate (Appendix E):

- Sites along Taurus Creek and Two Mile Gully were rated as Moderate aquatic value due to relatively higher habitat complexity, connectivity and macroinvertebrate diversity.
- Riverine ephemeral drainage lines were generally rated Low aquatic value due to limited habitat complexity and short flow duration.
- Lacustrine wetlands and farm dams were rated as Low to Moderate depending on hydroperiod and vegetation structure.

The waterways of the Study Area are ephemeral to intermittent, flowing for relatively short durations following rainfall and likely ceasing to flow within days to weeks. Aquatic biota present are therefore adapted to highly variable hydrological regimes including rapid colonisation, drought tolerance and use of refuge habitats (Appendix E).

Annual aquatic monitoring undertaken as part of the existing site water management and environmental program indicates that BWM are not adversely impacting aquatic habitat condition, macroinvertebrate community composition or water quality within receiving waters including Taurus Creek (Appendix E).

Conservation Significant Species Listed Under the NC Act

A total of seven conservation significant fauna species listed under the NC Act are known to occur within the Study Area (Appendix D):

- Koala (*Phascolarctos cinereus*) – listed as endangered NC Act;
- Australian Painted Snipe (*Rostratula australis*) – listed as endangered under the NC Act;
- Squatter Pigeon (southern) (*Geophaps scripta scripta*) – listed as vulnerable under the NC Act;
- Ornamental Snake (*Denisonia maculata*) - listed as vulnerable under the NC Act;

- Latham's Snipe (*Gallinago hardwickii*) - listed as vulnerable under the NC Act;
- White-throated Needletail *(Hirundapus caudacutus)* - listed as vulnerable under the NC Act; and
- Short-beaked Echidna (*Tachyglossus aculeatus*) - listed as special least concern under the NC Act.

One conservation significant flora species listed under the NC Act is known to occur within the Study Area (Appendix D):

- *Solanum elachophyllum* – listed as endangered under the NC Act

The above species are Matters of State Environmental Significance (MSES) and are further discussed below.

Matters of State Environmental Significance

MSES prescribed under the *Environmental Offsets Regulation 2014* are listed in Table 4-9 along with an assessment of the relevance to the Project area. MSES, specifically regulated vegetation and connectivity areas, and protected wildlife habitat areas, are shown on Figure 4-13.

Matters of National Environmental Significance

One TEC and five threatened fauna species that are known or likely to occur listed under the EPBC Act have been identified (Appendix D):

- Brigalow TEC;
- Squatter Pigeon;
- Australian Painted Snipe;
- Latham's Snipe;
- Koala; and
- White-throated Needletail.

In addition to the above, two fauna species noted as Migratory (only) species listed under the EPBC Act were identified by the desktop assessments as likely to occur. *Apus pacificus* (Fork-tailed swift) and *Plegadis falcinellus* (Glossy ibis) (Appendix D).

Environmentally Sensitive Areas

The Environmentally Sensitive Areas (ESAs) mapping tool (DNRMMRRD, 2026b) does not identify any Category A ESAs within or in proximity to the Study Area, however, it shows Category B ESA within the Project area (Appendix D).

Recent ground-truthing of the RE's within the Study Area by E2M (2026) confirmed the presence of three Endangered RE (classed as Category B ESA) in the Project area (REs 11.3.1, 11.4.9, and 11.9.5) (Figure 4-12) (Appendix D).

The Project would result in the clearing of approximately 1.21 ha of remnant Brigalow woodland (RE 11.3.1), based on ground-truthed mapping. The magnitude of impacts on remnant Brigalow Woodland from the Project is 0.0055% of the regional occurrence of RE 11.3.1.

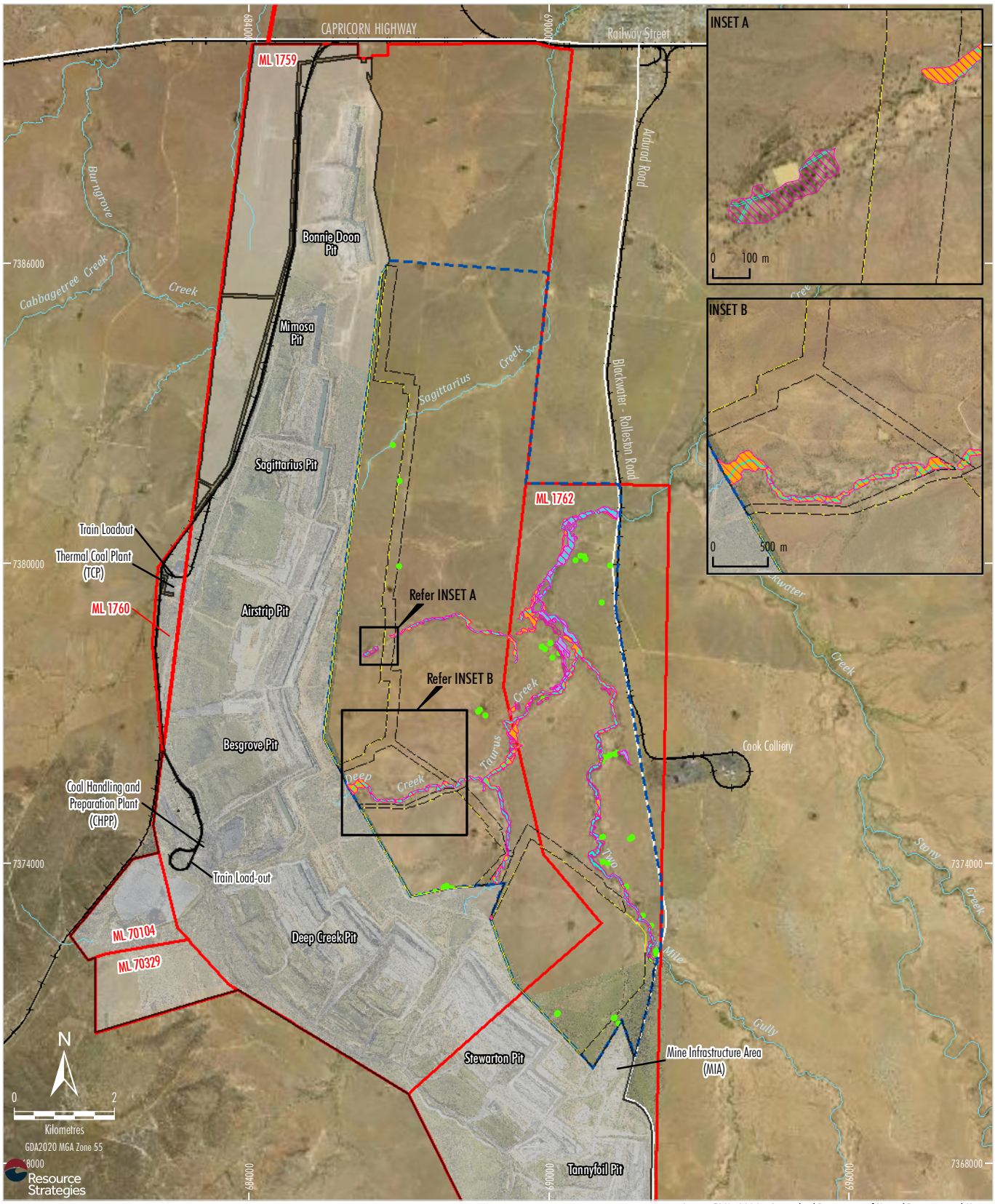
An offset would be provided for the Brigalow Woodland under the *Queensland Environmental Offsets Policy* (DETSI, 2025c) resulting in a greater area of Brigalow conserved (Appendix D).

Table 4-9
Relevance of MSES to the Project

MSES			Relevance to the Project area
Regulated Vegetation	Endangered or Of Concern REs	RE 11.3.1 Endangered	1.21 ha of remnant RE 11.3.1 occurs in the Project area.
		RE 11.4.9 Endangered	No remnant RE 11.4.9 occurs in the Project area.
		RE 11.9.5 Endangered	No remnant RE 11.9.5 occurs in the Project area.
		RE 11.3.2 Of Concern	No RE 11.3.2 occurs in the Project area.
		RE 11.3.3 Of Concern	No RE 11.3.3 occurs in the Project area.
	REs within the defined distance of a Vegetation Management watercourse	RE 11.3.1 Endangered	0.06 ha of RE 11.3.1 occurs in the Project area within the defined distance of a Vegetation Management watercourse.
		RE 11.3.2 and RE 11.3.3 Of Concern	No RE 11.3.2 or RE 11.3.3 occurs in the Project area within the defined distance of a Vegetation Management watercourse.

Table 4-9 (Continued)
Relevance of MSES to the Project

MSES			Relevance to the Project area
Regulated Vegetation (Continued)	REs within the defined distance of a Vegetation Management watercourse (Continued)	RE 11.3.6 and RE 11.3.27 Least Concern	0.18 ha of RE 11.3.6 and no RE 11.3.27 occurs in the Project area within the defined distance of a Vegetation Management watercourse.
Connectivity Areas			The Project area contains 3.93 ha of remnant vegetation/ connectivity areas (Figure 4-13).
Wetlands and Watercourses			The Project area does not contain any High Ecological Significance wetlands or High Ecological Value waters or watercourses.
Designated Precinct in a Strategic Environmental Area			The Project area is not a designated precinct in a strategic environmental area.
Protected Wildlife Habitat	Flora	*Solanum elachophyllum*	6.00 ha of known habitat and 2,299.78 ha of potential habitat is within the Project area. Potential habitat is shown on Figure 4-14. Threatened flora meanders within the Project area identified approximately 123 stems.
	Fauna	Australian Painted Snipe	6.41 ha of permanent foraging habitat and 14.45 ha of intermittent foraging habitat is within the Project area shown on Figure 4-15. The species has been detected once within the Project area (EMM, 2023a, 2023b).
		Koala	2.72 ha of breeding and foraging habitat and 48.29 ha of potential dispersal habitat is within the Project area as shown on Figure 4-16. No evidence of Koala's has been recorded within the Project area but has been recorded in the broader Study Area by EMM.
		Latham's Snipe	6.41 ha of permanent foraging habitat and 14.45 ha of intermittent foraging habitat is within the Project area shown on Figure 4-17. The species has not been recorded within the Project area but has been recorded in the broader Study Area by EMM.
		Ornamental Snake	No breeding or foraging habitat was identified within the Project area. The species has not been recorded within the Project area but has been recorded in the broader Study Area by EMM.
		Squatter Pigeon (southern)	26.05 ha of breeding and foraging habitat, 6.41 ha of foraging habitat and 262.34 ha of dispersal habitat is within the Project area as shown on Figure 4-18. The species has not been recorded within the Project area.
		White-throated Needletail	2,316.58 ha of aerial foraging habitat is within the Project area. No breeding or roosting habitat occurs within the Project area. Habitat is limited to transient aerial foraging.
		Short-beaked Echidna	122.10 ha of breeding and foraging habitat occurs within the Project area.
Protected Areas			No Protected Areas occur within or adjoining the Project area.
Fish Habitat Areas and Highly Protected Zones of State Marine Parks			The Project area is not located in a State Marine Park.
Waterways Providing for Fish Passage			Waterways within the Project area provide for fish passage (Figure 4-19).
Marine Plants			The Project area is not located in a marine environment.
Legally Secured Offset Area			There are no legally secured offset areas located within the Project area.



Source: E2M (2026); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Matters of State Environmental Significance

Regulated Vegetation

- Endangered Regional Ecosystem
- Of Concern Regional Ecosystem
- Regional Ecosystem within the Defined Distance of a Vegetation Management Watercourse

Connectivity

- Remnant Vegetation

Protected Wildlife Habitat

- *Solanum elachophyllum* Habitat

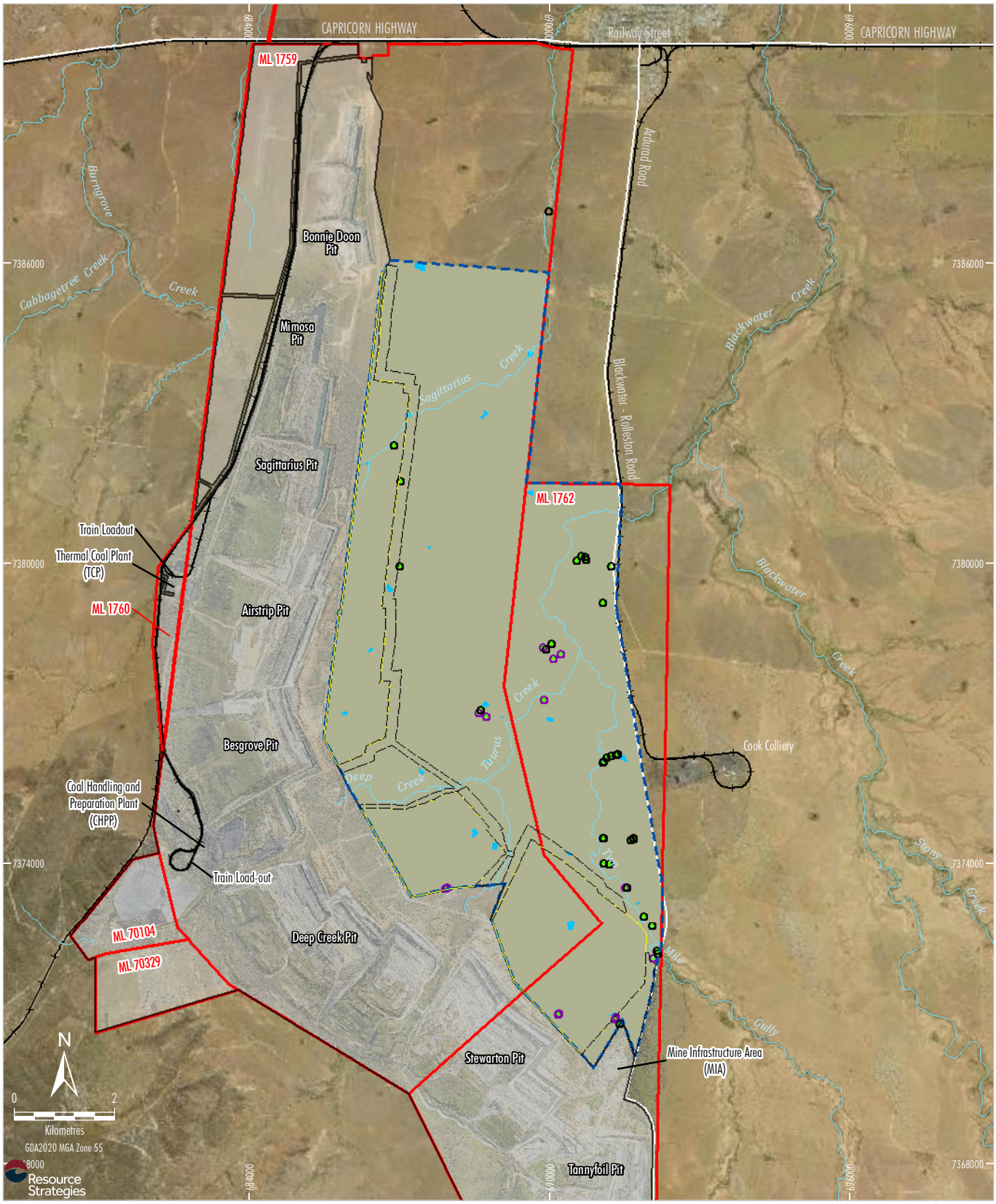
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Matters of State Environmental Significance

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Figure 4-13



Source: E2M (2025, 2026); EMM (2023); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint
- Project Components[1]
- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area
- *Solanum elachophyllum* Record (EMM, 2023)
- *Solanum elachophyllum* Record (E2M, 2025)
- *Solanum elachophyllum* Habitat
- Known Habitat
- Potential Habitat
- Unsuitable (Wetlands and Dams)

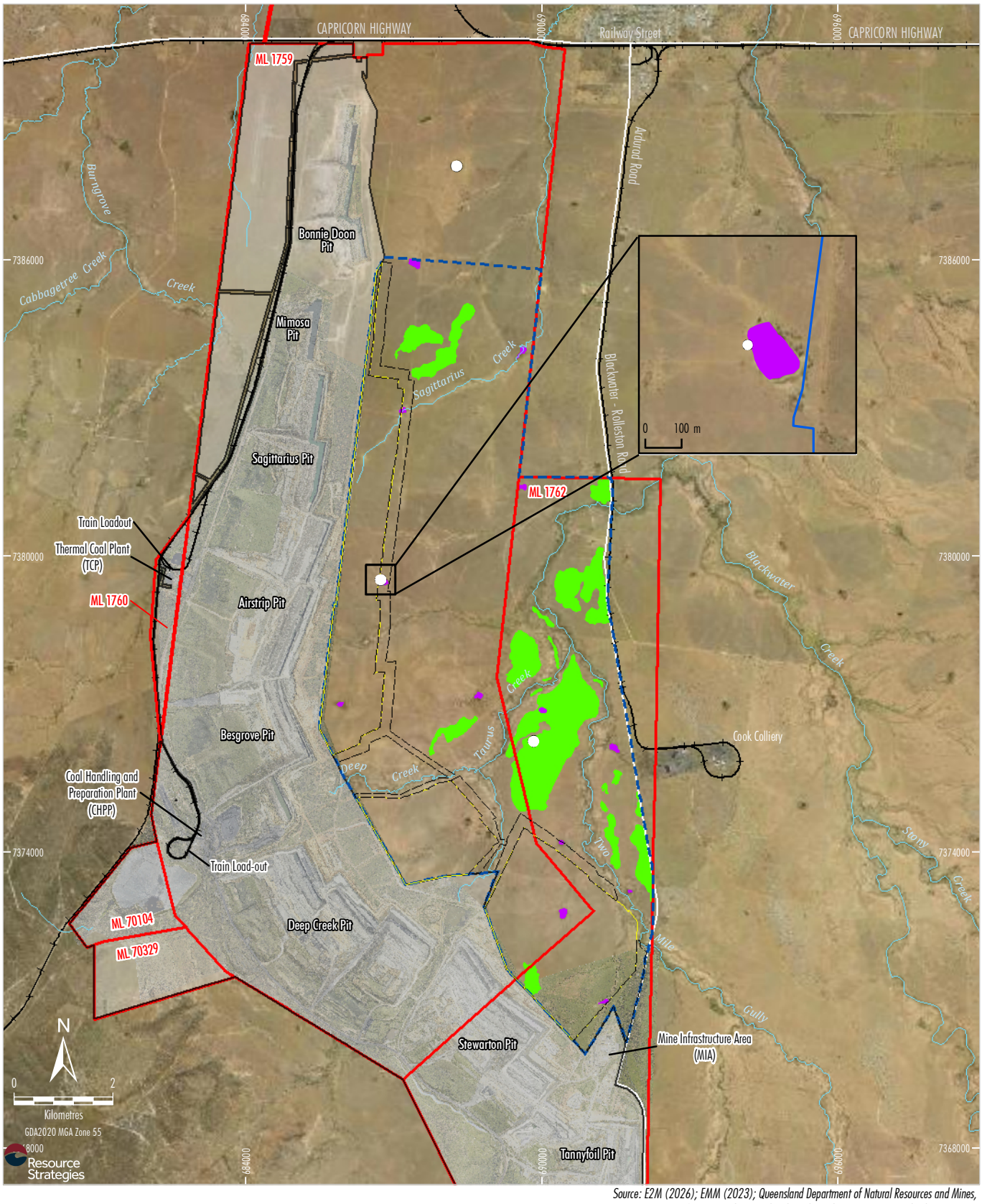
Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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***Solanum elachophyllum* Habitat and Records within the Project Area**

Figure 4-14



Source: E2M (2026); EMM (2023); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

- Australian Painted Snipe Record (EMM, 2023)

Australian Painted Snipe Habitat

- Intermittent Foraging
- Permanent Foraging

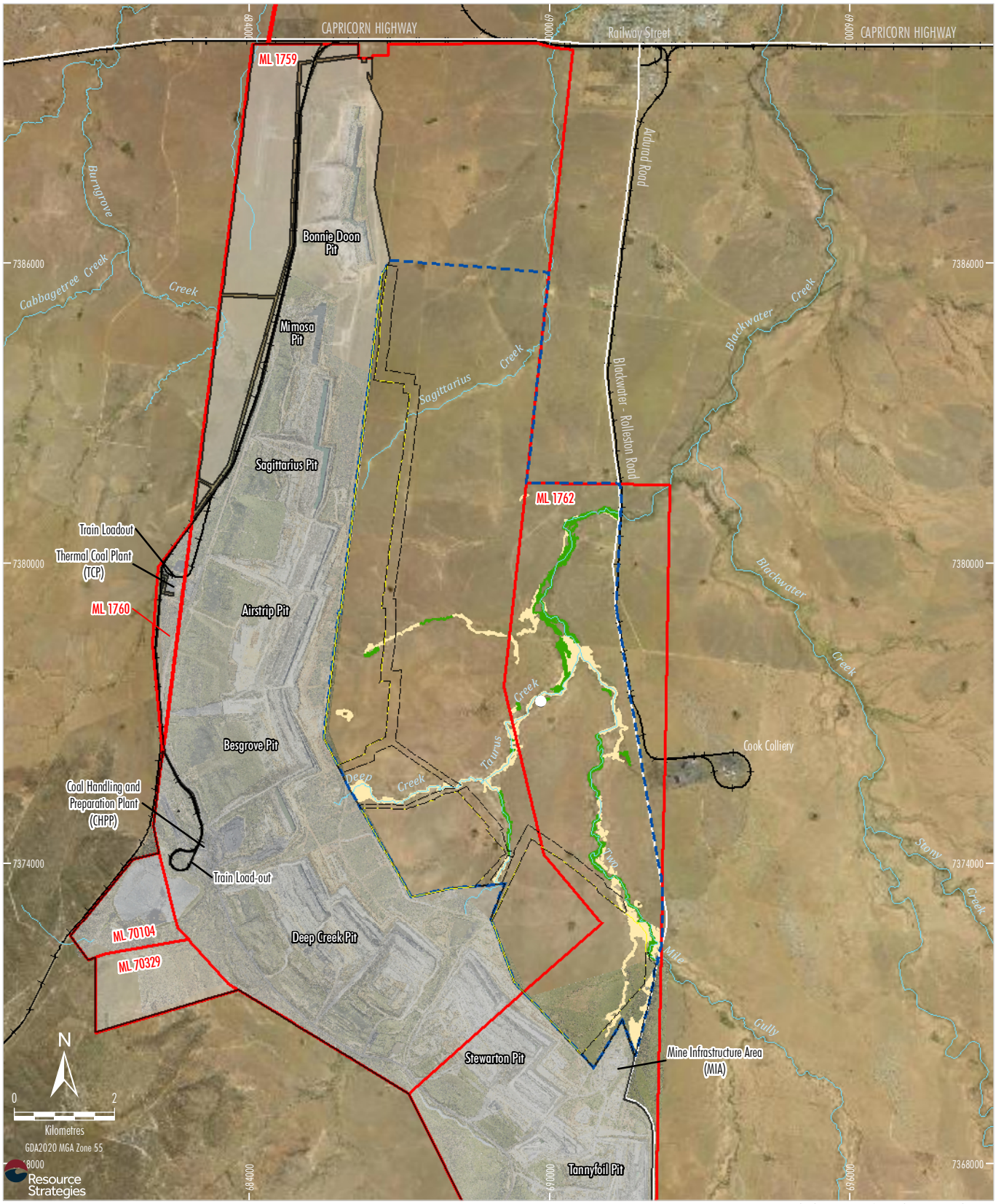
Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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BLACKWATER NORTH EXTENSION PROJECT

Australian Painted Snipe Habitat and Records within the Project Area

Figure 4-15



Source: E2M (2026); EMM (2023); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area
- Koala Record (indirect sign) (EMM, 2023)

Koala Habitat

- Breeding and Foraging
- Dispersal

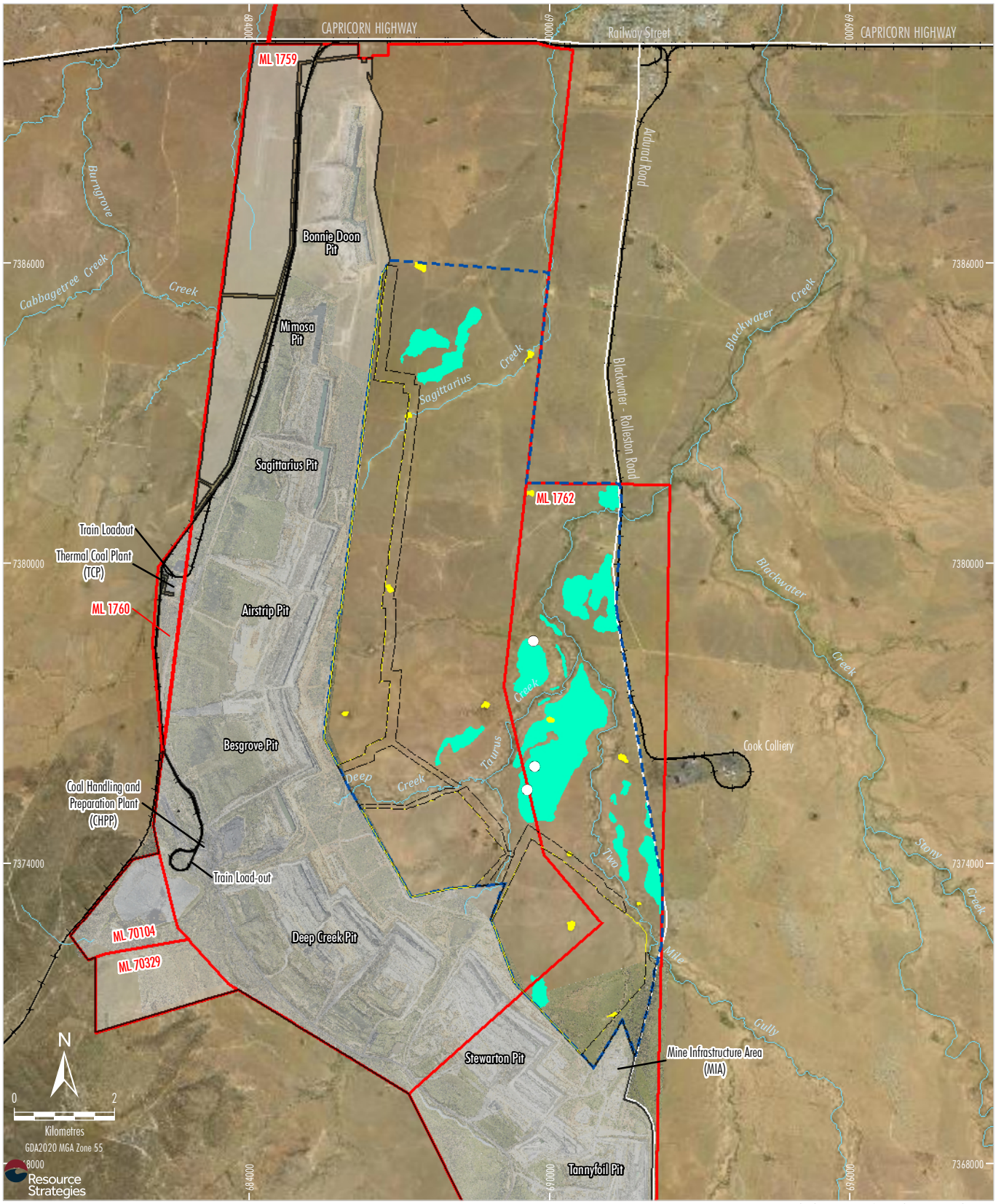
Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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Koala Habitat and Records within the Project Area

Figure 4-16



WHC-24-101_EA Amendment Sect4_215A

Source: E2M (2026); EMM (2023); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

- Latham's Snipe Record (EMM, 2023)

Latham's Snipe Habitat

- Intermittent Foraging
- Permanent Foraging

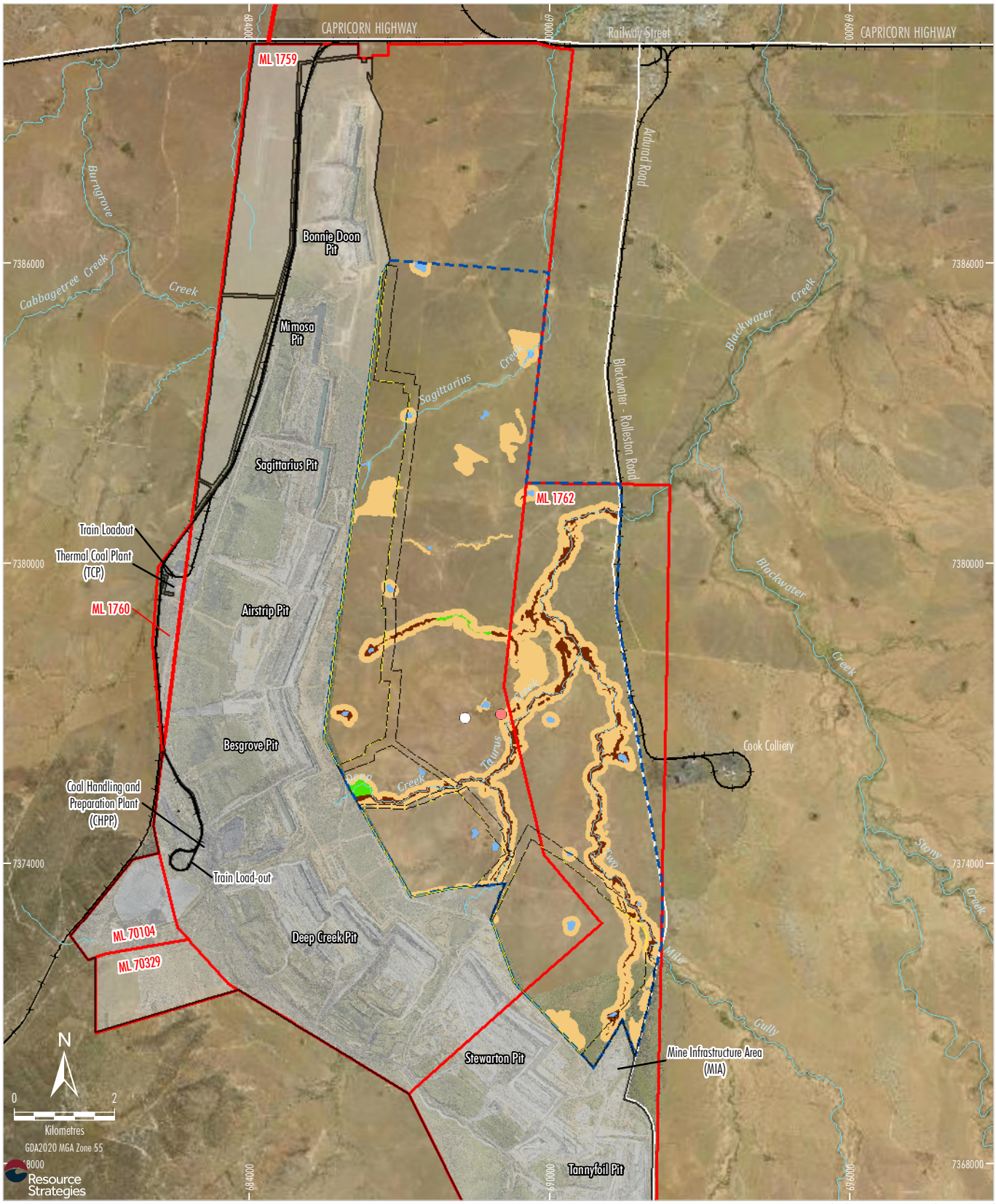
Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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BLACKWATER NORTH EXTENSION PROJECT

Latham's Snipe Habitat and Records within the Project Area

Figure 4-17



Source: E2M (2023, 2026); EMM (2023); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint
- Project Components[1]
- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area
- Squatter Pigeon Record (EMM, 2023)
- Squatter Pigeon Record (E2M, 2023)
- Squatter Pigeon (Southern) Habitat
- Breeding and Foraging
- Dispersal
- Foraging
- Wetland and Dam

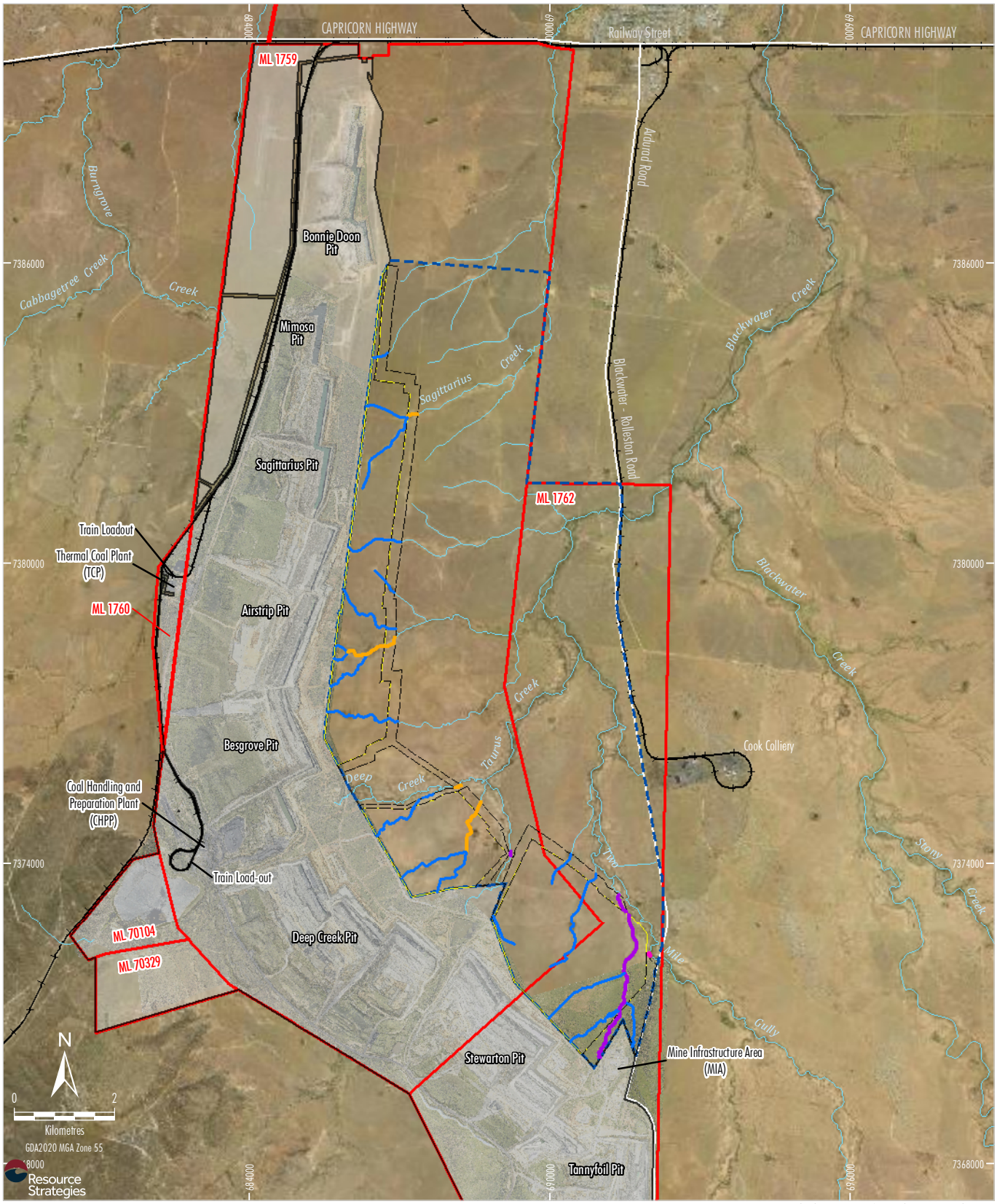
Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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Squatter Pigeon (Southern) Habitat and Records within the Project Area

Figure 4-18



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Waterways for Waterway Barrier Works (Fisheries Act, 1994)

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major

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BLACKWATER NORTH EXTENSION PROJECT

Waterways within the Project Area

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Figure 4-19

4.4.2 POTENTIAL IMPACTS

The Terrestrial Ecology Assessment (Appendix D) and Aquatic Ecology Assessment (Appendix E) provide an assessment of the potential impacts on biodiversity associated with the Project. Both assessments were conducted in accordance with the relevant Commonwealth and State Government survey guidelines.

Potential impacts on biodiversity were considered in terms of land clearance, aquatic ecology, GDEs, surface water impacts, weeds and pest animals, noise, dust and artificial lighting, vehicular traffic, interaction with the residual void, impacts to ESAs and MSES, and cumulative impacts, as described below (Appendix D and E).

Land Clearance

Whitehaven Blackwater has minimised potential Project impacts associated with land clearance through the refinement of the mine design and the strategic use of existing BWM infrastructure wherever practicable. As a brownfield extension, the Project utilises the established CHPP TCP, rail, road, power and water networks, substantially reducing the need for new disturbance compared to a greenfield development.

During the design process, alternative mining methods, layouts and infrastructure options were evaluated, and significant design constraints were incorporated to avoid sensitive environmental values. In particular, the Project layout was refined to avoid Taurus Creek and its riparian corridor.

After the application of avoidance and minimisation measures, surface disturbance associated with the Project consists predominantly of non-remnant and previously cleared areas (approximately 97.65%; 2,262.07 ha), with only 3.93 ha of remnant vegetation and 39.78 ha of high value regrowth (Table 4-10; Figure 4-12; Appendix D).

The Project would result in unavoidable impacts on native vegetation, as such a range of vegetation clearing measures would be implemented during both the construction and operation phases of the Project. The Project area does not contain large tracts of forested habitat; instead, remnant vegetation is highly fragmented and patchily distributed.

Aquatic Habitat Removal

The Project would remove several first and second order waterways (based on Strahler [1952]) (Figure 4-20), comprising approximately:

- 23.6 km of first order waterways;
- 5.2 km of second order waterways; and
- These drainage features are predominantly ephemeral and generally assessed as having a low aquatic value.

Taurus Creek is the primary receiving waterway and is classified as moderate aquatic value, functioning as a regional conduit for fish passage during flow events (Appendix E).

Table 4-10
Clearance of Regional Ecosystems within the Project Area

Regional Ecosystem	Short Description	VM Act Status	Remnant* (ha)	High Value Regrowth (ha)
RE 11.3.1	Open forest to woodland dominated by *Acacia harpophylla* on Cainozoic alluvial clays forming plains and low undulating plains	Endangered	1.21	18.35
RE 11.3.6	*Eucalyptus melanophloia* dominant woodland on alluvial plains.	Least Concern	2.72	0.00
RE 11.4.9	*Acacia harpophylla* open low woodland.	Endangered	0.00	17.66
RE 11.9.5	*Acacia harpophylla* open woodland on gently undulating plains.	Endangered	0.00	3.77
		Total	**3.93**	**39.78**

Source: Appendix E.
* Includes disturbed remnant.

The Project would remove or modify aquatic habitats in the Project area; however, these habitats are unlikely to support aquatic species of conservation significance listed under the NC Act or EPBC Act, due to the absence of suitable habitat features and the highly variable, ephemeral flow regime (Appendix E).

Groundwater Dependent Ecosystems

The detailed field assessments substantiate the desktop GDE mapping, with moderate to high potential terrestrial GDEs verified along parts of Taurus Creek and low to moderate potential in adjacent woodland patches. No subterranean or surface expression GDEs are present. The Project is assessed to pose a Low risk to the confirmed terrestrial GDEs, with groundwater recharge processes expected to remain largely unaffected (Appendix C).

Portions of the riparian vegetation of Taurus Creek forms part of a terrestrial GDE of High Ecological Value, mapped as a Category 1 sensitive environmental area (Appendix E).

No direct impacts (i.e. clearing) of terrestrial GDEs is proposed and the Project is unlikely to impact the perched alluvial aquifers of Taurus Creek. Consequently, indirect impacts on terrestrial GDEs associated with this aquifer are unlikely (Appendix E).

The Aquatic Ecology and GDE Assessment found (Appendix E):

- no evidence of subterranean GDEs, and
- no surface expression GDEs occurring within the Study Area.

Accordingly, the Project is unlikely to significantly impact subterranean or surface-expression GDEs (Appendix E).

The potential for stygofauna habitat is low due to geological and hydrological conditions of the BWM area, including limited void space connectivity and the absence of suitable groundwater quality and hydraulic conditions (Appendix E)

Changes to Hydrology

Changes to surface water flows and quality can influence aquatic habitat condition. If unmanaged, runoff from mining areas can mobilise sediment or contaminants into downstream waterways.

The Project is expected to result in only minor changes to peak flows, and the ephemeral, variable flow regimes of the waterways within the Project area would be maintained. The Project's WMS would operate within and build upon the existing approved water management framework, with progressive refinements over the life of the Project.

Section 4.2.2 describes the potential impacts on hydrology as a result of the Project.

Taurus Creek would continue to function as a flow-through system during in-channel events, maintaining connectivity with downstream reaches and preserving its role in regional aquatic habitat and fish passage (Appendix E).

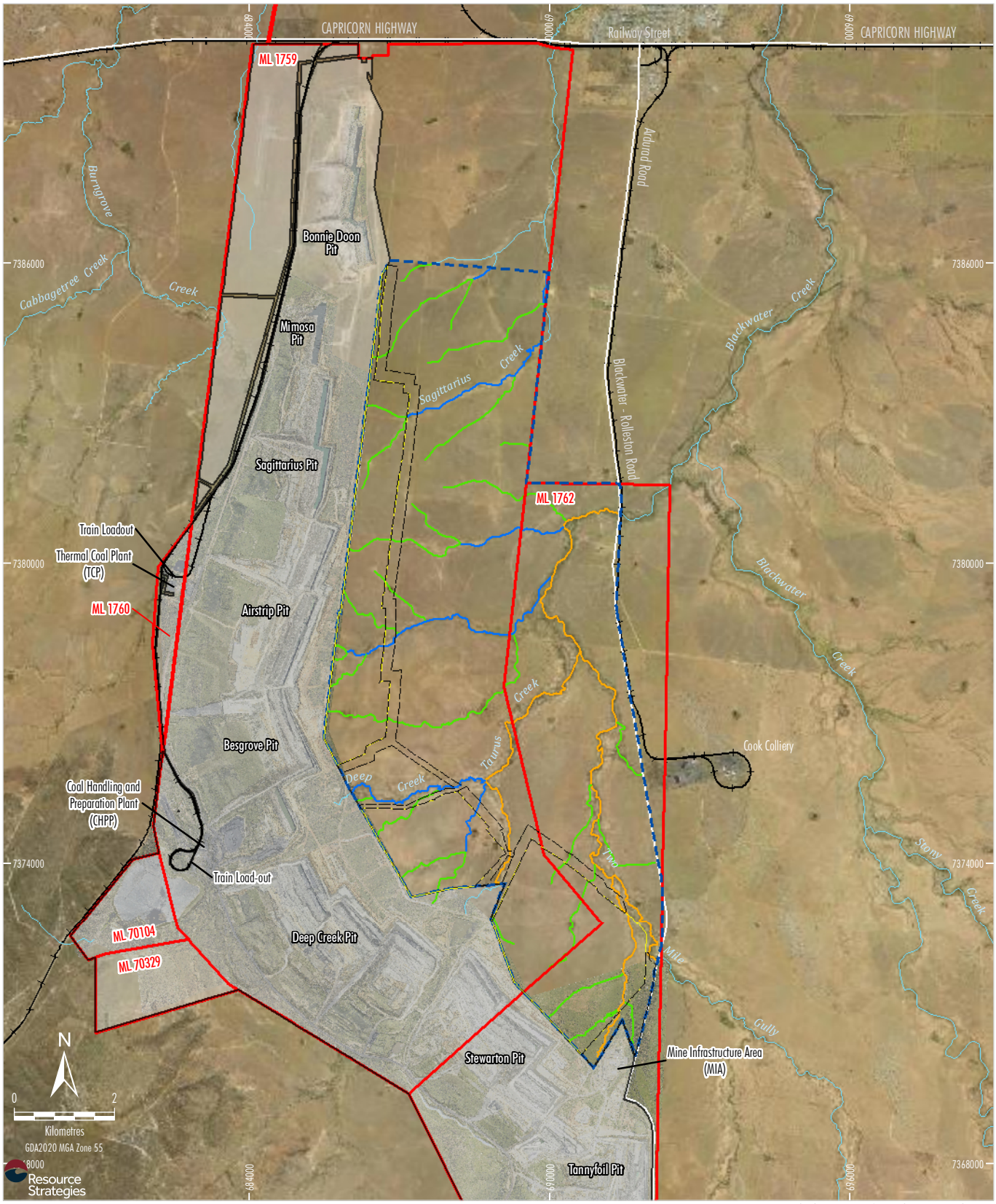
Approximately 3.9 km of an unnamed tributary of Two Mile Gully would be replaced by an approximate 2.4 km constructed clean water drain within the Project area. This unnamed tributary of Two Mile Gully is State mapped (Department of Primary Industries, 2025) as being at High risk (third order) of adverse impact from waterway barrier works on fish movement, although would be considered only Moderate risk (second order) if considering the Emu Creek diversion already in place upstream. Fish passage is not a key consideration for the proposed clean water drain, as it does not connect to fish habitat upstream of the Project area. Notwithstanding, the clean water drain would incorporate a number of deeper pools to provide refuge to fish attempting to inhabit or pass through it (Appendix E).

The Project is unlikely to result in significant hydrological regime changes that would adversely affect aquatic habitat, riparian vegetation or downstream ecological values (Appendix E).

Waterway Crossings

Waterway crossings would be constructed on a Moderate risk reach of Deep Creek and on a High risk reach of Taurus Creek. These crossing locations are indicative and may be changed during the design process (Appendix E).

The Project is unlikely to have a significant impact on waterways providing for fish passage given waterway crossings would be constructed in accordance with the Accepted development requirements for operational work that is constructing or raising waterway barrier works (Appendix E).



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Watercourse within Project Area

- 1st Order Waterway
- 2nd Order Waterway
- Other Waterway

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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BLACKWATER NORTH EXTENSION PROJECT

First and Second Order Waterways within the Project Area

Figure 4-20

Habitat Degradation and Edge Effects

Construction activities and vegetation clearing may indirectly degrade adjacent fauna habitat through edge effects, including changes to microclimate, vegetation structure, resource availability, and increased exposure to weeds, dust, noise and light. These changes can reduce habitat quality and alter local species assemblages.

Habitat surrounding the Project area is already highly fragmented due to historical grazing and mining, and non-remnant or regrowth areas are already degraded; therefore, additional edge effects in these areas are expected to be minimal. Edge effects may occur within remnant vegetation, although the remnant patches adjacent to the Project area, particularly along Taurus Creek are narrow and already constrained by existing disturbance, meaning any increase in edge effects would be localised and not significant at the broader landscape scale.

Habitat Connectivity and Fragmentation

Habitat connectivity within the Study Area is already limited due to historical and ongoing agricultural activities and previous mining disturbance, resulting in a fragmented mosaic of remnant and regrowth vegetation. The Project has largely avoided areas of higher connectivity value, with only 3.93 ha of remnant connectivity habitat located within the Project area. Key linear features, including the riparian corridors of Taurus Creek and Two Mile Gully, have been retained and avoided to the extent practicable.

Some clearing of connectivity areas is unavoidable, given the fixed location of the coal resource and the need to position mining pits and associated infrastructure in operationally safe and functional locations. Impacts to connectivity are expected to be localised, occurring within an already fragmented landscape.

Fauna Mortality and Injury

Construction and operational activities may result in fauna injury or mortality, particularly during vegetation clearing and active earthworks. Fauna may be struck by vehicles or machinery, unable to disperse ahead of clearing, or become trapped in open excavations or trenches. Species recorded or expected in the area such as Koala, Ornamental snake and Short-beaked echidna may be vulnerable where individuals occur within the Project area. Following construction, fauna remaining near active mining areas may also face an elevated risk of vehicle strike. These risks would be reduced through the implementation of fauna-spotter protocols, clearing procedures, and daily inspection of open excavations during both construction and operational phases.

Weeds and Animal Pests

E2M (2026) describes that seven weed species listed as Weeds of National Significance or restricted matter under the *Biosecurity Act 2014* (Biosecurity Act) were recorded within the Study Area: *Bryophyllum delagoense* (Mother of Millions), *Harrisia martinii* (Harrisia cactus), *Cryptostegia grandiflora* (Rubber Vine), *Parthenium hysterophorus* (Parthenium), *Parkinsonia aculeata* (Parkinsona) and three *Opuntia sp.* (*strica, tomentosa* and *streptacantha*) (Appendix D).

Whitehaven Blackwater would aim to restrict or reduce existing infestations and avoid introducing new weeds to the Project area.

There is a low likelihood of weeds spreading into adjoining native woodland/forest vegetation as the existing *WHC QLD PRO Weed and Feral Management Plan* would be implemented to monitor the distribution and density of listed invasive flora and fauna, and implementation of appropriate on ground actions to mitigate further impacts. Other management methods would also be required during the construction and operational phases of the Project (Appendix D).

Pest animals recorded in the Study Area during field surveys were *Felis catus* (Feral cat), *Oryctolagus cuniculus* (Rabbit), *Canis lupis familiaris* (Wild dog), *Sus scrofa* (Feral pig), *Rhinella marina* (Cane toad), and *Acridotheres tristis* (Common myna) (Appendix D). Each of these are listed as restricted matters under the Biosecurity Act (Appendix D).

Feral pests that are already present in the Project area are likely to displace into adjoining areas during construction; however, the number of feral pests that would be displaced would be reduced by controlling feral pests. The control of feral pests is an existing measure that would be continued for the Project.

Matters of State Environmental Significance

E2M (2026) conducted an assessment of residual impacts to MSES and determined that the Project has the potential to result in a significant impact on the endangered RE 11.3.1 and *Solanum elachophyllum* (Table 4-11). As such, potential impacts on these MSES would be mitigated and offset (Appendix D).

While the Project would result in the removal of foraging habitat for the Australian Painted Snipe, given the extent of similar habitat available throughout the Study Area and wider region, these impacts are not considered important, notable, or of consequence, having regard to their context and intensity (Appendix D).

While The Project would result in the removal of foraging habitat for the Latham's Snipe, given the extent of similar habitat available throughout the Study Area and wider region, these impacts are not considered important, notable, or of consequence, having regard to its context and intensity (Appendix D).

There is a very low chance or possibility that the Project would result in a significant impact on the Koala. Given the limited extent of proposed clearing, the species being considered unlikely to occupy habitat within the Project area, the absence of habitat critical to the Koala's survival, and the Project not fragmenting or isolating populations (Appendix D).

The Project is unlikely to have a significant impact on the Ornamental Snake, as no habitat would be directly removed and potential indirect impacts on retained habitat is considered negligible based on implementation of proposed mitigation measures (Appendix D).

The Project is unlikely to have a significant impact on the Squatter Pigeon (southern) (southern) as habitat within the Project area is degraded and unlikely to contain important habitat for the species (Appendix D).

The Project is unlikely to have an impact on White-throated Needletail given this species is almost exclusively aerial (Appendix D).

The Project is unlikely to result in a significant impact on Short-beaked Echidna as the species is likely to occupy the surrounding landscape and the Project is unlikely to fragment or isolate populations of the species (Appendix D).

Environmentally Sensitive Areas

As outlined in Section 4.4.1, RE 11.3.1, RE 11.4.9 and RE 11.9.5 are mapped as Category B ESAs (Figure 4-21). The three REs have been confirmed to constitute Brigalow TEC under the EPBC Act (Appendix D). As a listed MNES, any clearing of this 'Endangered' RE would be addressed through the Project's EPBC Act Referral and associated offset requirements.

Noise, Dust and Artificial Lighting

Indirect influences associated with the degradation of adjacent habitats may include increased exposure to noise, dust, and artificial lighting arising from vegetation clearing and construction activities. Potential noise impacts associated with the Project are discussed in more detail in Section 4.7.

To minimise potential impacts associated with dust, noise and artificial lighting, the Project would implement a range of management measures, including targeted dust suppression, directional lighting focused on work areas and regular maintenance of machinery and plant to reduce unnecessary noise.

Potential dust impacts associated with mining operations including haulage, blasting, excavation and material handling would be managed through targeted suppression, controlled operational practices and progressive rehabilitation. This is covered in more detail in Section 4.5.

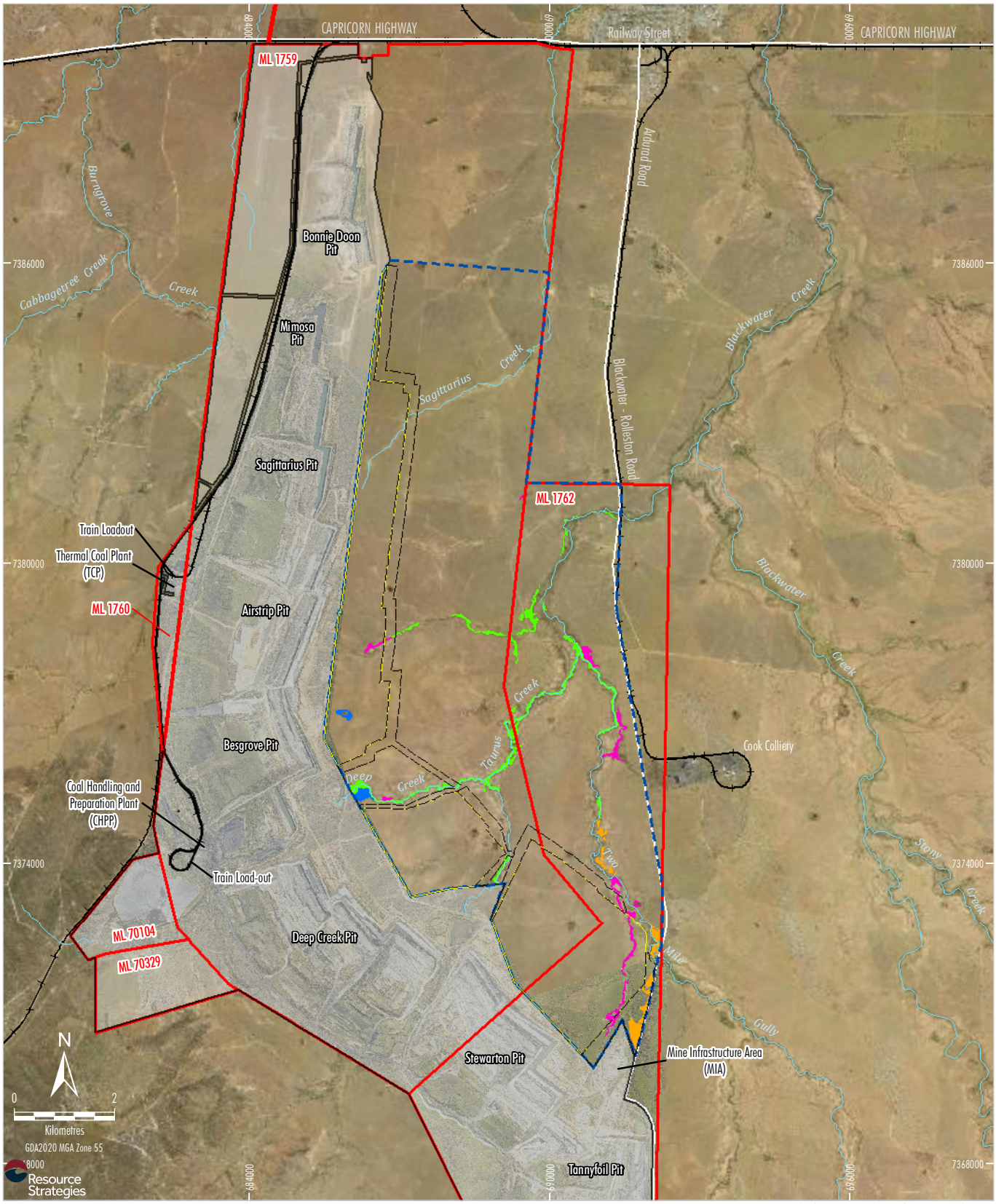
Potential light impacts associated with mining operations would be managed through directional lighting, adherence to relevant standards and the avoidance of unnecessary light spill into surrounding habitats. Key measures include:

- Use directional lighting focused on active work areas.
- Minimise or avoid light spill into remnant vegetation.
- Install and operate lighting in accordance with the AS's and the *National Light Pollution Guidelines for Wildlife* (Commonwealth DCCEEW, 2023b).

Table 4-11
MSES – Significant Residual Impacts

MSES			Area of Clearance (ha)	Residual Significant Impact Test	Significant Residual Impact
Regulated Vegetation	Endangered or Of Concern REs	RE.11.3.1 Endangered	1.21 (remnant)	The clearing is greater than the clearing threshold of 0.5 ha.	Yes
		RE 11.4.9 Endangered	0.00	The clearing threshold is not exceeded.	No
		RE 11.9.5 Endangered	0.00	The clearing threshold is not exceeded.	No
		RE.11.3.2 and RE.11.3.3 Of Concern	0.00	The clearing threshold is not exceeded.	No
	REs within the defined distance of a Vegetation Management watercourse	RE.11.3.1 Endangered	0.06 (remnant)	The clearing threshold is not exceeded.	No
		RE.11.3.2 and RE.11.3.3 Of Concern	0.00	The clearing threshold is not exceeded.	No
		RE 11.3.6 and RE.11.3.27 Least Concern	0.18 (remnant) RE 11.3.6 0.0 RE 11.3.27	The clearing threshold is not exceeded.	No
Connectivity Areas			3.93	The change of core remnant areas post impact are low (0.0%).	No
Protected Wildlife Habitat	Flora	*Solanum elachophyllum*	6.0 (known habitat)	The likelihood to result in a significant residual impact has been assessed against the MSES Significant Residual Impact Guidelines (DEHP, 2014).	Yes
	Fauna	Ornamental Snake	0.0		No
		Australian Painted Snipe	6.41 (permanent foraging) 14.45 (intermittent foraging)		No
		Latham's Snipe	6.41 (permanent foraging) 14.45 (intermittent foraging)		No
		Squatter Pigeon (southern)	26.05 (breeding and foraging) 6.41 (foraging) 262.34 (dispersal)		No
		White-throated Needletail	2,316.58 (aerial foraging)		No
		Koala	2.72 (breeding and foraging) 48.29 (dispersal)		No
		Short-beaked Echidna	122.10 (breeding and foraging)		No

Source: Appendix D.



Source: E2M (2026); Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Ground-truthed Environmentally Sensitive Areas

- 11.3.1 - High Value Regrowth
- 11.3.1 - Remnant
- 11.4.9 - High Value Regrowth
- 11.9.5 - High Value Regrowth

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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BLACKWATER NORTH EXTENSION PROJECT

Environmentally Sensitive Areas within the Project Area

Figure 4-21

Potential noise impacts associated with mining operations would be managed through equipment maintenance, operational controls and optimised blasting practices. More detail is provided in Section 4.7.

Cumulative Impacts

Cumulative impacts are considered to be the total impact (direct and indirect) on the environment that would result from the incremental impacts of the Project added to other existing impacts.

Terrestrial Ecology

Land use within the Isaac–Comet Downs sub-bioregion is already highly modified through mining, grazing and agriculture. The Project's impact would therefore be additive to existing disturbance in the region.

The Project would clear 2,316.58 (rounded to 2,317 ha), including 3.93 ha of remnant RE, which represents a small proportion (0.17%) of the Project area. The Project represents only a modest incremental increase in total vegetation loss (Appendix D).

Consistent with the Terrestrial Ecological Assessment (Appendix D), the cumulative assessment considers both MSES and MNES habitat to describe the broader ecological context; Commonwealth significance is addressed separately under the EPBC Act Referral. When compared to the substantial amount of suitable habitat in the surrounding subregion, the Project's proportional impact across species and communities is very low (generally < 1%), and cumulative habitat loss remains minor relative to regional availability.

Progressive rehabilitation throughout the life of the Project would further mitigate cumulative effects by re-establishing vegetation cover and reinstating habitat features within final landforms (Section 5).

Overall, the Project is expected to result in only a minor increase in cumulative vegetation and habitat loss and is not anticipated to significantly contribute to cumulative impacts on terrestrial ecology within the region.

Aquatic Ecology

DPM (2026) concluded that the Project is unlikely to result in a conservation-significant cumulative impact to the aquatic flora and fauna of Taurus Creek, Two Mile Gully and downstream receiving environments (Appendix E). This conclusion is based on:

- the absence of listed aquatic species;
- the predominantly Low to Moderate aquatic values recorded;
- the ephemeral and disturbance-tolerant nature of local aquatic communities;
- retention of main channel connectivity in Taurus Creek; and
- continuation of established water management and monitoring programs.

4.4.3 MANAGEMENT PRACTICES AND MITIGATION STRATEGIES

Avoidance Measures

Field surveys were undertaken early in the design process such that ecological constraints could be considered as part of design and direct impacts to native vegetation could be minimised. The Project area has been designed to avoid impacting areas of vegetation where possible, including avoiding Taurus Creek and the ecological values along its riparian corridor.

Considering that impacts to terrestrial GDEs comprising riparian (and floodplain) vegetation of Taurus Creek are unlikely, key measures would instead comprise the avoidance of both direct and indirect impacts on terrestrial GDEs (Appendix E).

Native Vegetation Clearing

While the Project would result in unavoidable impacts on native vegetation, a range of land clearance procedures would be implemented during both the construction and operation phases of the Project. These include the following:

- Vegetation clearing extents would be kept to the minimum area necessary for construction to minimise the removal of *S. elachophyllum* habitat and Brigalow TEC.

- Areas that must not be cleared or damaged outside of the Project area would be clearly identified on construction plans. Where necessary, signage, flagging and/or barricade fencing would be used to demarcate areas not to be cleared and this information clearly communicated to all necessary construction personnel.
- Continued implementation of weed hygiene protocols (e.g. wash-down, weed hygiene certification) for all vehicles, equipment and materials to be used in areas of native vegetation. This would help reduce the indirect impacts on the remaining Brigalow TEC in the Study Area by minimising further increases in weed density.
- Re-spread cleared vegetation and vegetation mulch on rehabilitated land to suppress weeds and assist in regrowth of *S. elachophyllum* and Brigalow community species.

Management of Conservation Significant Species

The Project would potentially disturb animal breeding places and therefore the following management plans would be developed detailing the mitigation measures for the Project.

The existing *BWM Plan – Land and Biodiversity Management Plan* (Whitehaven, 2020) would be updated to include mitigation and species-specific management measures for relevant MNES and MSES species, including:

- Australian Painted Snipe;
- Koala;
- Latham's Snipe;
- Squatter Pigeon (southern);
- White-throated Needletail; and
- Short-beaked Echidna.

Invasive Plant and Animal Management

Whitehaven Blackwater currently conducts invasive plant and animal management in line with *WHC QLD PRO Weed and Feral Management*. The occurrence of pest animals is monitored by the Health, Safety and Environment department and control programs are implemented on an as needs basis. Pest management is conducted in consultation with neighbouring landholders and relevant land management authorities.

Bushfire Prevention and Management

Whitehaven Blackwater would aim to maintain vegetation structure and composition, protect mine assets and safeguard human life through the implementation of bushfire management techniques, including:

- Implement a Bushfire Management Plan, which includes strategies for fuel load management. The Bushfire Management Plan should include an assessment of appropriate fire strategies to maintain the ecological values of surrounding vegetation communities, some of which are sensitive to uncontrolled burns (i.e. brigalow communities).
- Any chemicals used in the Project area would be handled and disposed of in accordance with the relevant Safety Data Sheet.
- Access tracks would be constructed and maintained for ready use by Queensland Fire and Rescue Service in emergency situations. These tracks could also be used as fire breaks if appropriately maintained. The designation of fire breaks is to be specified within the Bushfire Management Plan.
- An Emergency Response Procedure would be prepared in consultation with emergency services and implemented.

Biodiversity Offset Strategy

While the Project was designed such that ecological constraints could be considered as part of design and direct impacts to native vegetation have been be minimised, a significant residual impact on two MSES and one MNES was identified as a result of the Project. Therefore, suitable environmental offsets are required to address the significant residual impacts that are likely as a result of the Project (Appendix D).

The preferred offset approach for the Project is via land-based offsets for the significant residual impact on Brigalow TEC (MNES). Whitehaven Blackwater owns the Ganadero and Memooloo properties, both located approximately 50 km from the town of Blackwater to the south of the BWM, which provide an ecologically appropriate offset for the significant residual impacts on MNES as a result of the Project.

The significant residual impacts to MSES, including *Solanum elachophyllum* and RE 11.3.1, would be offset in accordance with the *Queensland Environmental Offset Policy*. The offset for MSES may be delivered through either a land-based offset or financial settlement.

4.5 Air Quality

An Air Quality Assessment for the Project was undertaken by RWDI Australia Pty Ltd (RWDI) (2026a) and is presented as Appendix F.

Section 4.5.1 provides a description of the environmental values relevant to air quality, including the air quality assessment criteria. Section 4.5.2 provides a description of the modelling results and the potential air quality impacts of the Project. Section 4.5.3 outlines the proposed management practices and mitigation strategies for the Project.

4.5.1 ENVIRONMENTAL VALUES

Air Quality Objectives

The following legislation, policies, guidelines and standards identified by RWDI are relevant to assessing potential air quality impacts of the Project, including (Appendix F):

- EP Act;
- EP Regulation;
- Environmental Protection (Air) Policy 2019 (EPP Air);
- Environmental Protection (Air) Amendment Policy 2024;
- *EIS Information Guideline – Air* (DETSI, 2026c);
- Guideline – Application requirements for activities with impacts to air (DETSI, 2025e); and
- National Environment Protection (Ambient Air Quality) Measure (National Environmental Protection Council, 2021).

The objective of the EPP Air is to identify the environmental values of the air environment to be enhanced or protected and to achieve the objective of the EP Act (i.e. ecologically sustainable development).

Concentrations of Suspended Particulate Matter

Mining activities during the life of the Project have the potential to generate particulate matter (PM) (i.e. dust) emissions in the form of:

- total suspended particle (TSP);
- PM with an equivalent aerodynamic diameter of 10 micrometres (µm) or less (PM_{10}) (a subset of TSP); and
- PM with an equivalent aerodynamic diameter of 2.5 µm or less ($PM_{2.5}$) (a subset of TSP and PM_{10}).

Mining activities generate particles in all the above size categories, with the majority generally larger than 2.5 µm. Fine particles (< 2.5 µm) are typically generated through combustion processes (Appendix F).

Dust Deposition

The *Guideline – Application requirements for activities with impacts to air* states that a dust deposition parameter is dust that settles out of the air onto the surface of buildings or onto the ground (DETSI, 2025e).

The EP Act aims to protect environmental values of the atmosphere that are conducive to the health and well-being of humans and biological integrity. Division 1, Part 3 of Schedule 8 of the EP Regulation refers specifically to air, stating the Environmental Objective of activities being to "*operate in a way that protects the environmental values of air*".

Adopted Air Quality Limits

The air quality limits developed from the relevant policies and guidelines, and adopted for the assessment are summarised as Table 4-12.

Table 4-12
Adopted Air Quality Limits

Parameter	Averaging Time	Criteria
PM_{10}	24-hour	50 µg/m^3
	Annual	25 µg/m^3
$PM_{2.5}$	24-hour	20 µg/m^3
	Annual	7 µg/m^3
TSP	Annual	90 µg/m^3
Deposited dust	Monthly	120 mg/m^2/day

Source: Appendix F.
µg/m^3 = micrograms per cubic metre; mg/m^2/day = milligrams per square metres per day.

Existing Air Quality Environment

As part of the air quality assessment, RWDI (2026a) reviewed the ambient air quality environment in the vicinity of the Project using monitoring data from DETSI Blackwater air quality monitoring station (AQMS), and four Whitehaven Blackwater Osiris AQMS within the boundaries of the ML (for diagnostic purposes only, not for compliance monitoring).

Local ambient air quality are summarised in Appendix F. The air quality monitoring locations are shown in Figure 4-22.

The DETSI Blackwater AQMS is within the Blackwater town, which is representative of air quality in the township and thus used to determine background ambient air quality. It is affected by dust emissions from (Appendix F):

- the BWM, under south-westerly winds (which are not very frequent);
- mines north of Blackwater under northerly winds;
- soil erosion during strong wind episodes; and
- closer anthropogenic and mobile dust emissions in the town.

During very windy days, dust levels have occasionally exceeded the 24 hour PM10 and PM2.5 ambient air quality criteria. Extensive bushfires have also contributed to elevated PM10 and PM2.5 levels at times (Appendix F).

A summary of the PM_{10} and $PM_{2.5}$ monitoring results collected at the DETSI Blackwater AQMS is presented in Table 4-13.

Table 4-13
Summary of Particulate Matter Monitoring Results at DETSI Blackwater AQMS (µg/m³)

Year	Annual average		24-hour Maximum		24-hour 70th percentile	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
2020	16.17	5.07	60.95	17.54	17.42	5.47
2021	15.54	4.73	54.57	24.92	17.45	5.18
2022	13.91	4.50	32.33	8.30	15.66	5.17
2023	19.28	6.83	91.95	62.60	21.58	6.54
2024	16.73	5.32	45.89	19.18	18.53	5.85

Source: Appendix F.

Dust deposition is monitored at the BWM with Whitehaven Blackwater dust deposition gauges. A summary of the dust deposition monitoring results is provided in Appendix F.

Background Air Quality Levels for Assessment Purposes

Adopted background air quality levels for the assessment are summarised in Table 4-14.

Table 4-14
Background Air Quality Levels Adopted for Assessment

Parameter	Averaging Time	Concentration
$PM_{2.5}$	24-hour	5.6 µg/m³
	Annual	5.3 µg/m³
PM_{10}	24-hour	18.1 µg/m³
	Annual	16.3 µg/m³
TSP	Annual	36.3 µg/m³
Dust Deposition	30-days	42 mg/m²/day

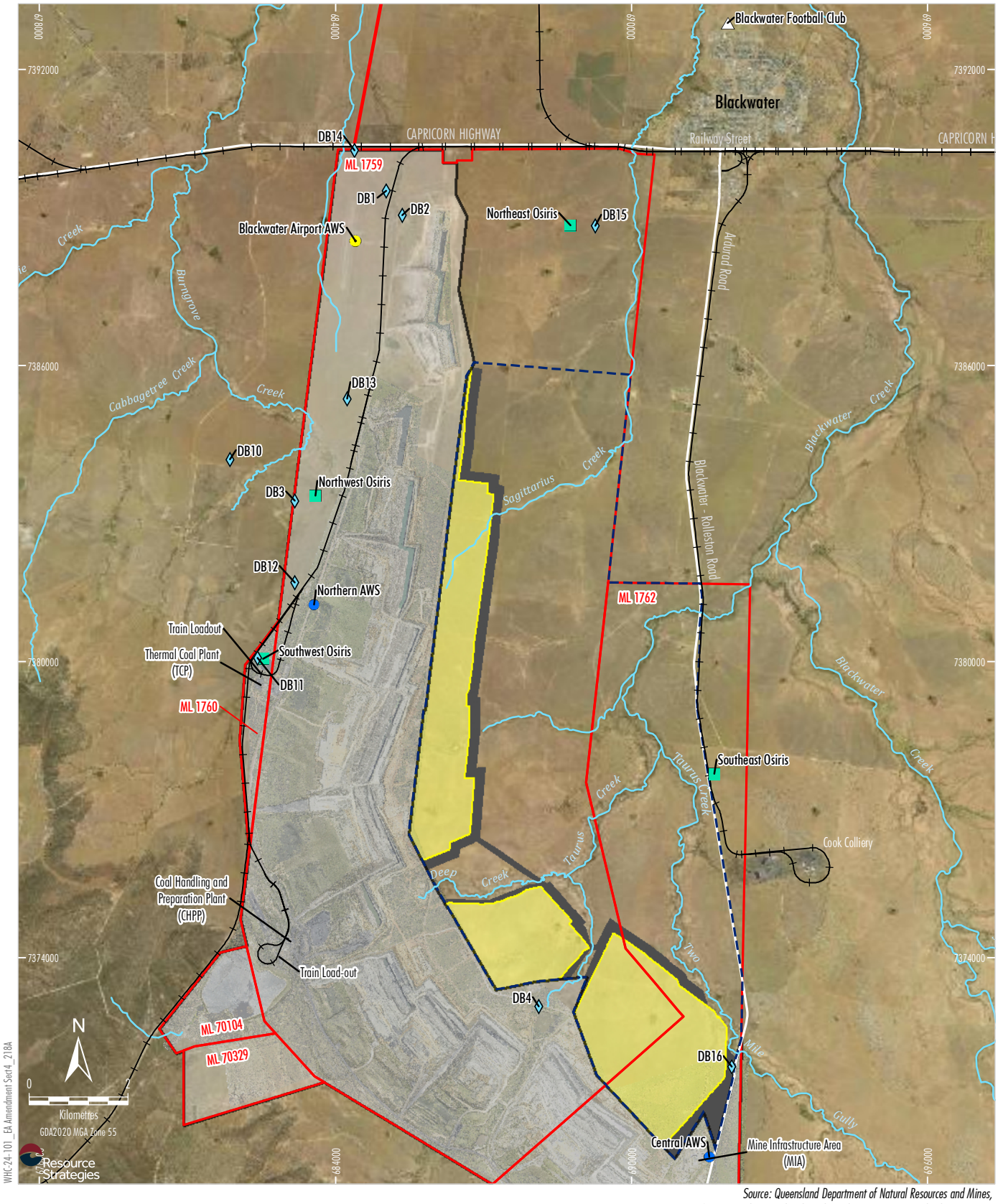
Source: Appendix F.

Receivers

Figure 1-8 shows the sensitive receivers in the vicinity of the Project that were considered in the assessment.

In total, 59 receivers were considered and are summarised as follows (Appendix F):

- 39 privately-owned sensitive receivers, comprising 34 rural properties and five dwellings representative of Blackwater;
- eight other sensitive receivers, comprising three schools, a childcare centre, a hospital, a medical centre, a camp accommodation and a cemetery (all located in Blackwater except for the cemetery); and
- 12 non-sensitive receivers (including five mine-owned residential dwellings, two privately-owned residential dwellings currently under agreements, and five commercial/industrial receivers in the surrounding rural areas).



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LEGEND

- Mining Lease
- Railway
- Road
- Watercourse

Meteorological Stations

- BoM Blackwater Airport AWS
- Whitehaven AWS

Air Quality Monitoring Stations

- DETSI Blackwater AQMS
- Whitehaven Osiris AQMS
- Whitehaven Deposited Dust Gauge
- Existing Blackwater Mine

Project Components[1]

- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Note: [1] Excludes some incidental Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Air Quality Monitoring Locations

Figure 4-22

4.5.2 POTENTIAL IMPACTS

Assessment Methodology

Modelling Scenarios

Four representative years were selected throughout the lifetime of the Project. FY 2032, FY 2046 and FY 2055 represent early, mid and end of the Project lifetime, with high ROM and/or overburden production rates, as the BWM overall expands to the east. An additional early scenario was selected (FY 2030) when the northernmost activities (i.e. closest to Blackwater township residential areas) are planned (Appendix F).

Further details regarding the four representative assessment years are outlined as (Appendix F):

- FY 2030: representing when the Project production is planned in the northernmost pit (i.e. closest to Blackwater township residential areas);
- FY 2032: representing the first year with the peak ROM coal amount of approximately 19 Mtpa;
- FY 2046: representing the year with the peak overburden amount, and similar ROM coal amount to the peak; and
- FY 2055: representing the end of the Project and mining near eastern sensitive receivers.

Given the impacts assessed include the worst-case scenarios, it is considered that any impacts associated with the Project would be lower than those considered as part of the assessment.

Emission Inventory

Key activities that would generate emissions include waste rock removal, ROM coal extraction, truck haulage emissions, wind erosion from exposed areas and material handling (Appendix F).

Air quality emission inventories were prepared for the selected years in consideration of the anticipated mining activities for each year.

Emissions of TSP, PM_{10} and $PM_{2.5}$ from mining activities were estimated using recognised and accepted methods. Detailed calculations and emission parameterisations are provided in Appendix F.

Table 4-15 summarises the indicative TSP emissions across all the assessed scenarios.

Table 4-15
Indicative TSP Emissions

Scenario	Estimated Emission (t/year)
FY 2030	27,184
FY 2032	30,474
FY 2046	31,170
FY 2055	30,803

Source: Appendix F.
t/year = tonnes per year.

Full emission inventories for all the assessed scenarios are presented in Appendix F.

Meteorological Conditions

Local meteorological conditions in the vicinity of the Project were assessed in order to determine the metalogical conditions that applied in the dispersion modelling.

Long-term climate statistics for BoM Blackwater Airport Automatic Weather Station (AWS) showed that January is typically the hottest and wettest month of the year, and July is the coolest month. Annual statistics of rainfall depict rather large interannual variability, and the region experiences both periods of drought and floods (Appendix F).

Based on wind data recorded at the BoM Blackwater Airport AWS between 2013 and 2024, winds in the Project area most frequently blow from the northeast towards the southwestern quadrants (Appendix F).

RWDI analysed the climatology, local meteorological conditions (e.g. annual windroses, rainfall), and based on data availability, 2021 was selected as generally representative of the conditions over the Project area and adopted for modelling purposes (Appendix F).

Local meteorological data was generated by the coupled The Air Pollution Model/CALMET meteorological models at the location of the Project and used in the dispersion model assessment (Appendix F).

Dispersion Modelling

Dispersion modelling was conducted using the CALPUFF air dispersion model. The CALPUFF dispersion model is an advanced non-steady-state dispersion modelling system. A full description of the dispersion model, meteorology, emission inventories and modelling outputs is provided in Appendix F.

Potential Impacts

Assessment of the Project's potential impacts of TSP, PM_{10} and $PM_{2.5}$ emissions, including model predictions, are provided in Appendix F. A summary is provided below.

Predicted 24-hour average and annual average PM_{10} isopleth diagrams for all the assessed scenarios are shown on Figures 4-23 and 4-24. All other isopleth diagrams are provided in Appendix F.

PM_{10}

Predicted cumulative maximum 24-hour average ground-level PM_{10} concentrations were predicted to exceed the criteria at six privately-owned sensitive receivers (R5, R6, R7, R17, R20 and R21). These exceedances could be prevented with proactive dust management approaches, including real-time monitoring and mine activity adjustment when warning levels are reached. Details of the indicative proactive dust management measures are provided in Section 4.5.3 (Appendix F).

Predicted cumulative annual average ground-level PM_{10} concentrations were predicted to exceed the criteria at one privately owned sensitive receiver (R5) (Appendix F).

There were no other predicted exceedances of PM_{10} at the sensitive receivers (Appendix F).

$PM_{2.5}$

There are no predicted exceedances of the 24-hour $PM_{2.5}$ criteria at any of the sensitive receivers for any of the assessed scenarios. Predicted cumulative annual average ground-level $PM_{2.5}$ concentrations were also predicted to not exceed the criteria at any public or private sensitive receivers (Appendix F).

TSP

There are no predicted exceedances of the annual average TSP criteria at any of the receivers for any of the assessed scenarios (Appendix F).

Deposited Dust

There are no predicted exceedances of the dust deposition criteria at any of the sensitive receivers for any of the assessed scenarios (Appendix F).

4.5.3 MANAGEMENT PRACTICES AND MITIGATION STRATEGIES

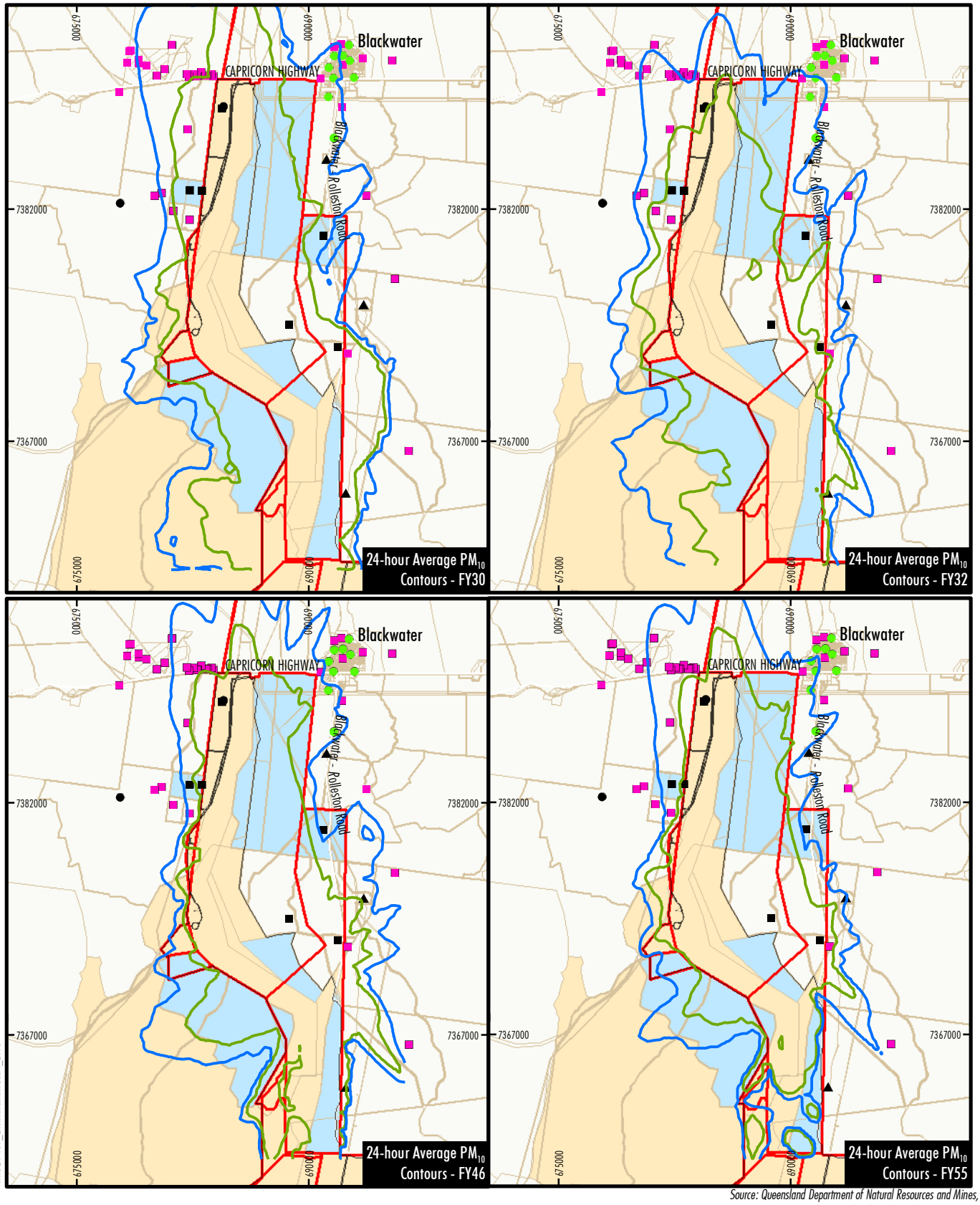
Identification of air quality mitigation measures required to meet the air quality limits at the nearest sensitive receivers was undertaken as part of the Air Quality Assessment.

Ongoing dust mitigation measures are implemented at the BWM and have been taken into account in the modelling. These include (Appendix F):

- Watering of main haul roads (75% control with watering at a rate of approximately > 2 litres per square meter per hour [$L/m^2/hr$]).
- Watering of pit haul roads (50% control with watering at a rate of approximately 2 $L/m^2/hr$).
- Water spraying at the CHPP and TCP hoppers (90% efficiency).
- Dragline drop height of approximately 6 m.
- Ongoing revegetation of exposed areas (50% efficiency for partially rehabilitated areas and 100% for fully rehabilitated areas).

Control measures that are currently implemented at the BWM are outlined below. These controls would be continued upon commencement of the Project (Appendix F).

- Planning Controls:
  - construction of bunds (if required) in operational areas;
  - utilising of dust forecasting and assessing meteorological conditions to allow for forward planning;
  - minimising exposed surface areas by only clearing vegetation/disturbing areas required for mining activities;
  - progressive rehabilitations to reduce exposed areas and reduce dust;
  - sufficient provision of sheltered dumping during adverse wind conditions;
  - optimising of base construction materials during road design to reduce the silt content of surface and increase the retention of coarser aggregates; and
  - sufficient water within BWM's site water balance model to undertake dust suppression activities.



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LEGEND

- Mining Lease
- Road
- Property Boundary
- Approved Disturbance Footprint
- Whitehaven Freehold Land
- Whitehaven Leasehold Land

Sensitive Receiver
- Community
- Private

Non-sensitive Receiver
- Mine-owned or Privately-owned
- Under Agreement
- Commercial
- Community

24-hour Average PM_{10}
- 40 $\mu g/m^3$
- Exceedance Cumulative (50 $\mu g/m^3$)

Criteria: 50 $\mu g/m^3$

N

0 5

Kilometres

GDA2020 MGA Zone 55

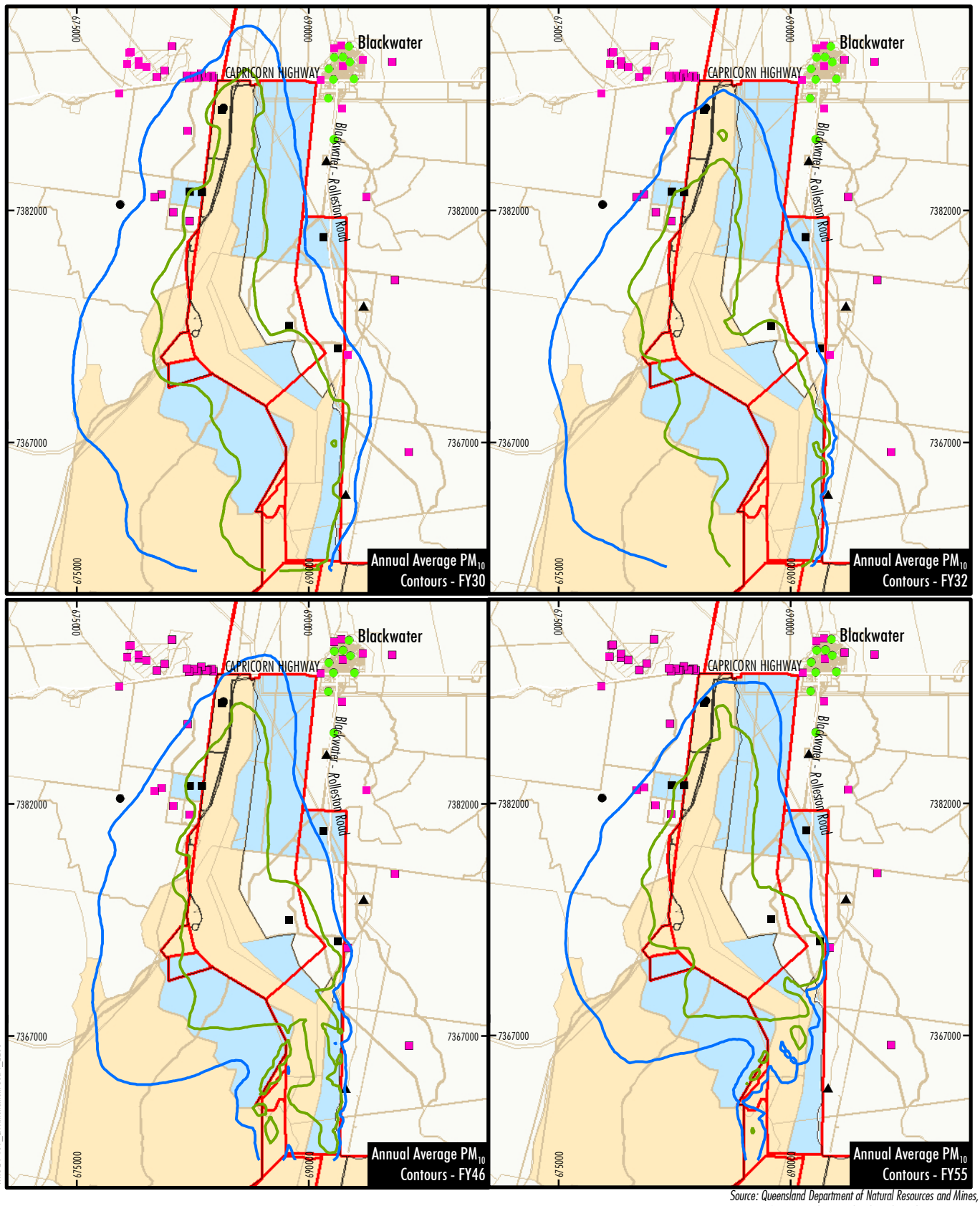
Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); RWDI (2026); Whitehaven (2025)

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Predicted Maximum 24-hour Average Ground-level PM_{10} Concentrations ($\mu g/m^3$)

Figure 4-23



WHC-24-101_EA Amendment Sept4_220C

LEGEND

- Mining Lease
- Road
- Property Boundary
- Approved Disturbance Footprint
- Whitehaven Freehold Land
- Whitehaven Leasehold Land

Sensitive Receiver
- Community
- Private

Non-sensitive Receiver
- Mine-owned or Privately-owned
- Under Agreement
- Commercial
- Community

Annual Average PM_{10}
- 20 $\mu g/m^3$
- Exceedance Cumulative (25 $\mu g/m^3$)

Criteria: 25 $\mu g/m^3$

N

0 5

Kilometres

GDA2020 MGA Zone 55

Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Predicted Annual Average Ground-level PM_{10} Concentrations ($\mu g/m^3$)

Figure 4-24

- Operational Controls:
  - use of a real-time dust monitoring system to clarify and understand where and what operations need to be modified to reduce dust emissions;
  - implementation of the BWM Dust TARP in conjunction with the real-time monitoring system;
  - limited speed of heavy machinery and vehicle traffic on haul roads;
  - machinery to operate in less exposed/sensitive areas during adverse meteorological conditions;
  - utilisation of available water trucks to provide dust suppression in required locations including haul roads, light vehicle roads and hardstands;
  - progressive backfilling and rehabilitation of overburden dumps;
  - dust suppression sprays installed on the stacker reclaimer units located at both the CHPP and TCP;
  - dust suppression sprays installed on the ROM hoppers located at both the CHPP and TCP; and
  - trains are sprayed with veneer once loaded and prior to departure at the train loadout.

Indicative proactive dust management approach, including real-time monitoring and weather forecasting, and mine activity adjustment are provided in Appendix F, including:

- Weather forecasting and real-time weather and dust monitoring can allow that sustained strong wind episodes trigger a reduced and/or more sheltered overburden handling and dumping activity in the pits upwind of those sensitive receivers, along with enhanced watering of the overburden areas.
- For R5, R6 and R7, sustained strong winds from the south-southeasterly and clear stable nights with weak south-southeasterly winds would be monitored closely during the early Project years when the mining activities have not yet materially progressed eastward.
- For R20 and R21, mitigation of overburden handling and dumping activities in Ramp 8 would occur when sustained strong southerly winds are picking up and during quiet clear nights when weak south-easterly winds are blowing directly from the northernmost pit to these residences (potentially during early stage of the Project [e.g. FY 2030]). The implementation of adaptative management measures when winds are blowing from the east-southeast (90 degrees to 150 degrees) during night-time is anticipated to achieve compliance with the air quality objectives at these sensitive receptors.
- For R17, potentially during late stage of the Project (e.g. FY 2046, FY 2055), a forecast of westerly winds around sunrise would trigger adaptative management measures in the Stewarton and Deep Creek ramps, especially during clear calm (very stable) nights to achieve compliance with the air quality objectives

Notwithstanding, Whitehaven Blackwater would continue implementing the air quality management controls, as currently detailed in the *BWM Plan – Air Quality Management Plan* (Whitehaven, 2026c).

For those receptors where it is proposed that potential exceedances would be managed using real-time controls, should monitoring show that these controls are not effective, Whitehaven Blackwater intends to enter commercial agreements (i.e. “Alternative Arrangements” under EA EPML00717813) with these landowners (R20 and R21) (Appendix F).

Whitehaven Blackwater intends to enter commercial agreements (i.e. “Alternative Arrangements” under EA EPML00717813) with landowners that may be subject to potential air quality impacts from the Project (R5, R6, R7 and R17) (Appendix F).

4.6 Greenhouse Gas

A Greenhouse Gas Management and Abatement Plan (GMAP) has been developed for the Project and is presented in Appendix G. The GMAP (Appendix G), the supporting *Blackwater North Extension Project – Greenhouse Gas Calculations Report* (RWDI, 2026b) (Appendix B of Appendix G), the greenhouse gas (GHG) Abatement Evaluation and the Project Three-Year Plan were produced with consideration of the Queensland *Greenhouse Gas Emissions Guideline – Version 1.02 ESR/2024/6819* (Queensland GHG Guideline) (DETSI, 2026d).

The GMAP was peer reviewed by Steph Byrom (Loop Decarbonisation Services Pty Ltd [Loop], 2026). The peer review report is presented in Appendix C of Appendix G.

Key Policy Context

International

The international framework addressing GHG emissions, and the global response to climate change, commenced with adoption of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992. Two of the most important progressions of the UNFCCC were adopted at the third Conference of the Parties (in 1997) and 21st Conference of the Parties (in 2015), with the adoption of the *Kyoto Protocol* and the *Paris Agreement*, respectively.

The *Kyoto Protocol* entered into force in 2005 and imposed limits on the GHG emissions of developed countries listed in Annex 1 to the UNFCCC, with an initial commitment period of 2008 to 2012 (UNFCCC, 2024).

The *Paris Agreement* is a legally binding international treaty on climate change, which was adopted by 196 Parties in 2015 (UNFCCC, 2015). The Paris Agreement's central aim is to strengthen the global response to the threat of climate change by holding the increase in global average temperatures to well below 2 degrees Celsius (°C) above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels (UNFCCC, 2015).

Under the *Paris Agreement*, each Party is required to prepare, communicate and maintain Nationally Determined Contributions (NDCs) that would contribute to the long-term goals of the *Paris Agreement* (UNFCCC, 2015). Australia is a Party to the *Paris Agreement*. Australia's first NDC under the *Paris Agreement* was amended to commit to national GHG target of 43% below 2005 levels by 2030 and reaffirmed the target to achieve net zero emissions by 2050 (Commonwealth Department of Industry, Science, Energy and Resources, 2022).

Australia's second NDC under the *Paris Agreement* has communicated a GHG emissions reduction target of 62 to 70% below 2005 levels by 2035 (Commonwealth DCCEEW, 2025b).

National

The *National Greenhouse and Energy Reporting Act 2007* (NGER Act) is a national framework for reporting GHG emissions, energy production and energy consumption by corporations. The GHG emissions and energy data reported under the NGER Act is used by the Commonwealth Government in compiling Australia's national GHG emission inventory to meet its reporting obligations under the UNFCCC.

The Safeguard Mechanism (underpinned by the Commonwealth National Greenhouse and Energy Reporting [Safeguard Mechanism] Rule 2015) was established through the NGER Act and provides baseline emissions and offset requirements for applicable facilities that emit over 100,000 t carbon dioxide equivalent (CO_2-e) per year of covered Scope 1 emissions, such as BWM.

The Safeguard Mechanism sets a baseline level of emissions for facilities. If a facility exceeds its baseline level, it is generally required to surrender Australian Carbon Credit Units equivalent to the exceedance to the Clean Energy Regulator (CER).

The Safeguard Mechanism Reforms (Commonwealth DCCEEW, 2024) introduced an amendment to the NGER Act and other legislation to establish the framework to give effect to key elements of the reforms, such as introducing a requirement for facilities to achieve greenhouse abatement via annual downward adjustment of baseline GHG emission levels.

Safeguard facility standard baselines are determined based on the amount of product each facility produces in a FY.

The reforms apply a decline rate to a facility's baseline so that baselines are reduced predictably and progressively over time (initially 4.9% per annum) on a proportionate trajectory consistent with achieving Australia's emission reduction targets of 43% below 2005 levels by 2030, and net zero by 2050 (Commonwealth DCCEEW, 2024) in combination with other GHG reduction measures in the economy.

It is noted that the target of 43% reduction by 2030 has been calculated with sufficient headroom allowance for higher-than-expected growth at new and existing Safeguard facilities (Commonwealth DCCEEW, 2024).

Large facilities under the NGER Act therefore have declining emissions baselines to 2050, reflective of proportionately reducing net GHG emissions below 2005 levels of 43% by 2030 and potentially adjusted to reflect 62 to 70% by 2035 and net zero by 2050.

Queensland

The Queensland Government previously released the *Pathways to a clean growth economy - Queensland Climate Transition Strategy* (Queensland Climate Transition Strategy) (DEHP, 2017a), which outlined how Queensland would transition to a clean growth economy and achieve its target of net-zero emissions by 2050.

Since the release of the Queensland Climate Transition Strategy (DEHP, 2017a), the former Labor Queensland Government also legislated a stronger intermediate emissions reduction target of 75% by 2035 (referred to as '75% by 2035') through the passing of the *Clean Economy Jobs Act 2024*. The timeframe of sector-specific emissions reduction plans to meet the 2035 targets legislated in the *Clean Economy Jobs Act 2024* has been delayed by the current Queensland Government for the foreseeable future. However, Queensland's emissions are currently 35% below 2005 levels, which exceeds the first interim emissions reduction target of 30% by 2030 (Queensland Treasury, 2026).

The Queensland Government also announced that the *Net Zero Roadmap* is in development (Queensland Treasury, 2026), which would provide a revised pathway for Queensland to meet the revised emissions reduction targets legislated in the *Clean Economy Jobs Act 2024* (Queensland). This roadmap would include new industry specific emissions reduction plans, including a plan for the resources sector.

The *Pathways to a climate resilient Queensland – Queensland Climate Adaptation Strategy 2017 – 2030* (DEHP, 2017b) is also under review by the current Queensland Government (Queensland Treasury, 2025).

The GMAP (Appendix G) has been produced with consideration of the Queensland GHG Guideline which outlines existing application requirements under the EP Act for new and existing EAs, and details how to meet these requirements in relation to GHG emissions (DETSI, 2026d).

Future versions of the Queensland GHG Guideline would be considered in future revisions of the GMAP. Whitehaven Blackwater understands this guideline is currently in the process of being updated, however, the GMAP has been developed in accordance with Version 1.02 of the guideline (Appendix G). It is noted that, with reference to the Queensland GHG Guideline and predicted emissions in Section 3 of the GMAP, the Project is a medium to high emitter.

The GMAP was peer reviewed by Steph Byrom (Loop, 2026). The peer review report is presented in Appendix C of Appendix G.

4.6.1 ENVIRONMENTAL VALUES

Greenhouse Gas Emissions Scope

The BWM has triggered the reporting requirements for the NGER Act, and Whitehaven Blackwater reports on its greenhouse emissions each FY under Whitehaven.

In the context of BWM, the most relevant GHGs are carbon dioxide (CO_2), methane, nitrous oxide and sulphur hexafluoride (SF_6). Emissions for these GHGs are typically standardised by expression as CO_2-e based on their Global Warming Potential.

The Greenhouse Gas Protocol (GHG Protocol) (World Business Council for Sustainable Development and World Resources Institute, 2024) contains methodologies for calculating and assessing GHG emissions.

Under the GHG Protocol, an entity's operational boundaries are established by identifying emissions associated with its operations, categorising them as direct or indirect emissions, and identifying the 'scope' of accounting and reporting for indirect emissions. Three 'Scopes' of emissions have been defined (Scopes 1, 2 and 3), with direct emissions of a controlling entity referred to as Scope 1 emissions, and indirect emissions referred to as Scope 2 and Scope 3 emissions.
The major sources of GHG emissions associated with the BWM and the Project include:

- fugitive gaseous emissions that are liberated during mining from exposed coal seams;
- vehicle transportation and off-road mobile equipment diesel consumption associated with mining operations;
- emissions associated with progressive vegetation clearing (open woodlands) in advance of mining;

- associated Scope 1 emissions of liquefied petroleum gas - stationary equipment, petroleum-based oils and petroleum-based greases;
- explosives associated with land clearing in advance of mining; and
- fugitive SF_6 associated with mining practices.

RWDI (2026b) has also identified some key upstream and downstream Scope 3 emissions associated with rail to the Port of Gladstone and international shipping (Appendix B of Appendix G).

Greenhouse Gas Estimated Methodology

BWM's direct and indirect GHG emissions have been estimated by RWDI (Appendix B of Appendix G) using published emission factors from the National Greenhouse Account (NGA) Factors (Commonwealth DCCEEW, 2025b).

Where NGA Factors were not available (e.g. for rail and ship transport), GHG emissions have been estimated using emission factors published by the United Kingdom Department for Environment, Food and Rural Affairs in *Greenhouse Gas Reporting – Conversion Factors 2024* and supplemented by relevant guidance for land clearing and explosives (Transport Authorities Greenhouse Group, 2013; Commonwealth Department of Climate Change, 2008).

Greenhouse Gas Scenario

In order to quantify the incremental GHG emissions of the Project, the following scenarios have been assessed:

- **Baseline Scenario:** Approved LOM as approved by EA EPML00717813 excluding the Project. This scenario assumes continued operations of the BWM at a maximum mining rate of 19.0 Mtpa of ROM coal until 2090 (at an average ROM coal mining rate of approximately 12.8 Mtpa).
- **Project Scenario:** Proposed LOM with the Project, incorporating the proposed extension of open cut mining on SA 7 on ML 1762 and SA 10 on ML 1759. This scenario would extract an additional 200 Mt of ROM coal when compared to the Baseline Scenario, extending operations to approximately 2093 with continued maximum annual ROM coal extraction rate of 19.0 Mtpa (at an average ROM coal extraction rate of approximately 15.0 Mtpa).
- **Project Only Scenario:** This scenario evaluates the net change in emissions resulting from the Project extension by comparing the emissions from Project Scenario against those from Baseline Scenario, thereby quantifying the incremental impact of the proposed amendment.

Emission factors for electricity usage were obtained from Australia's emissions projections 2025 (Commonwealth DCCEEW, 2025b). These emission factors are based on projections for the decarbonisation of the electricity grid overtime.

For the purposes of the following discussion, the Project Scenario and Project Only Scenario are explored below.

4.6.2 POTENTIAL IMPACTS

Project Greenhouse Gas Emissions

Project Scenario

The Project Scenario GHG emissions estimated by RWDI (2026b) are summarised in Table 4-16.

Table 4-16
Summary of GHG Emissions Estimates for the Project Scenario

Period	Scope 1 (Mt CO_2-e)	Scope 2 (Mt CO_2-e)	Scope 3 (Mt CO_2-e)
Annual Average	0.99	0.051	34.21
Total	66.18	3.41	2,292.09

Source: RWDI (2026b) (Appendix B of Appendix G).
Mt CO_2-e = million tonnes of carbon dioxide equivalent.

Project Only Scenario

The Project Only Scenario GHG emissions estimated by RWDI (2026b) are summarised in Table 4-17.

Table 4-17
Summary of GHG Emissions Estimates for the Project Only Scenario

Period	Scope 1 (Mt CO_2-e)	Scope 2 (Mt CO_2-e)	Scope 3 (Mt CO_2-e)
Annual Average	0.27	0.004	7.91
Total	18.30	0.27	530.16

Source: RWDI (2026b) (Appendix B of Appendix G).

Greenhouse Gas Emissions

The Project's contribution to global, national, regional and local climate change effects including the associated environmental impacts, would be in proportion with its contribution to global GHG emissions. Emissions from the Project would be similar to existing open cut operations at the BWM.

International

The estimated GHG emissions of the Project can be considered in the context of global GHG emissions associated with anthropogenic sources. Emissions from power generation (including the combustion of coal and gas), transport (e.g. automobiles, aeroplanes and ships), agriculture for food production and industrial processes (e.g. steel production) all contribute to global emissions.

Comparison of Project Scenario annual average Scope 1 and Scope 2 emissions during mining (approximately 1.04 Mt CO_2-e per annum on average) to the total anthropogenic GHG emissions globally in 2024 (approximately 57,700 Mt CO_2-e) indicates that it would constitute approximately 0.002% of global emissions per annum over the life of the Project (Appendix B of Appendix G).

National

The existing Emission Intensity Determination (EID) for ROM coal is 0.0527 tonnes of carbon dioxide equivalent per tonne of run of mine coal (t CO_2-e/t ROM) (CER, 2025). This ranks the BWM as having the 29th lowest emissions intensity among approximately 68 Australian coal mining facilities with published EIDs (Chart 4-1).

The emissions intensity at BWM is lower than the industry default value of 0.0653 t CO_2-e/t ROM, as specified under the Safeguard Rule.

Under the Project Scenario, the BWM average emissions intensity would increase as mining progresses further and deeper into the 0.066 t CO_2-e/t ROM, and relative to other current Australian ROM coal EIDs, would rank approximately 44th lowest (excluding the existing BWM) out of approximately 68 facilities (based on historical data determinations) (Chart 4-1).

The BWM emissions intensity determinations are currently based on fugitive emissions estimated using NGER Method 1. Whitehaven Blackwater is currently progressing toward a site-specific Method 2 determination for fugitive emissions at BWM. Once a Method 2 determination is finalised, the fugitive emissions estimates and corresponding emissions intensity determinations are expected to change and may differ from the Method 1 based values.

When comparing the required decline rate for the Safeguard emissions intensity and the calculated Scope 1 emissions intensity of the BWM incorporating the Project, Whitehaven Blackwater could comply with the current Safeguard intensity decline rates to 2032 (Appendix B of Appendix G).

The proportion of Scope 1 emissions from the Project Only Scenario compared to projected National emissions is presented in Table 4-18. In 2030, the Project Only Scenario would account for approximately 0.03% of total projected National Scope 1 emissions. In 2035, the Project Only Scenario would account for approximately 0.11% of total projected National Scope 1 emissions.

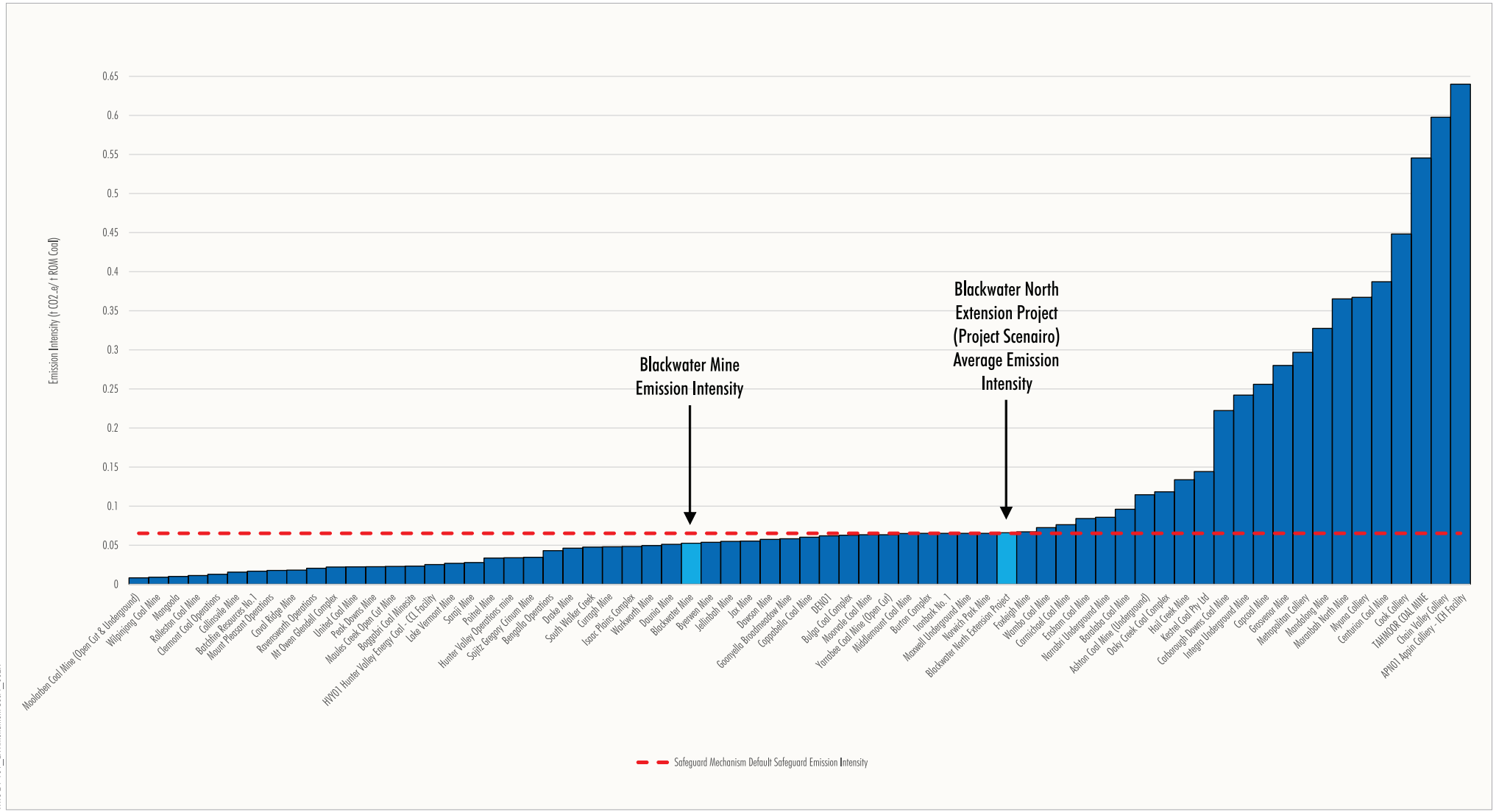
Table 4-18
Comparison of Estimated Project and Project Only Emissions with National and Queensland Emissions and Reduction Targets

Emission/Year	2030	2035
Scope 1 and 2 Project Only (Mt of CO_2-e)	0.12	0.19
Australia Target (Mt of CO_2-e)	349	184
Queensland Target (Mt of CO_2-e)	133	48
Project Only % contribution to Australia Target	0.03	0.11
Project Only % contribution to Queensland Target	0.09	0.41

Source: RWDI (2026b) (Appendix B of Appendix G).

Queensland

In 2030, the Project Only Scenario would account for approximately 0.09% of total projected Queensland's Scope 1 emissions. In 2035, the Project Only Scenario would account for approximately 0.41% of total projected Queensland Scope 1 (Table 4-18).



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Source: CER (2026); RWDI (2026b)

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Australian ROM Coal Emissions Intensity Determinations and Estimated Project Average ROM Coal Emissions Intensity

Chart 4-1

Potential Impacts of Climate Change

Consideration of the potential implications of climate change involves complex interactions between climatic, biophysical, social, economic, institutional and technological processes.

Although scientific understanding of climate change has improved, projections are still subject to a wide range of uncertainties such as (Commonwealth Scientific and Industrial Research Organisation [CSIRO] and BoM, 2015):

> *…scenario uncertainty, due to the uncertain future emissions and concentrations of greenhouse gases and aerosols; response uncertainty, resulting from limitations in our understanding of the climate system and its representation in climate models; and natural variability, the uncertainty stemming from unperturbed variability in the climate system.*

If the Project is approved and proceeds, the Project's contribution to global climate change would be proportional to its contribution to global GHG emissions. GHGs directly generated at the Project Only Scenario (i.e. Scope 1 emissions) and indirect emissions associated with the on-site use of electricity (i.e. Scope 2 emissions) have together been estimated at approximately 0.28 Mt CO_2-e per year during operations. These emissions would be small in the context of global GHG emissions.

International Projections

The Intergovernmental Panel on Climate Change (IPCC) has completed a number of comprehensive assessments of potential climate change, which include projections for both the 'near-term' (for the period 2021 to 2040), and 'long-term' (for the period 2081 to 2100).

Summaries of relevant climate projections from the *AR6 Climate Change 2021 – The Physical Science Basis* (IPCC, 2021) are provided below:

- 'Near-term' climate projections – projections indicated global mean surface temperatures are likely to increase by 0.4 to 1.1°C based on the range of all climate scenarios and relative to the reference period of 1995 to 2014.
- 'Long-term' climatic projections – global mean surface temperatures are projected to increase by 1.3 to 2.7°C under the Shared Socio-economic Pathway (SSP) 2-4.5 climate scenario and 2.5 to 4.9°C under the SSP5-8.5 climate scenario relative to the reference period of 1995 to 2014.

Climate projections suggest that many changes in the climate system are likely to become larger in direct relation to increasing incremental global warming, with a warmer climate likely to intensify very wet and very dry weather and climatic events and seasons, noting the frequency is dependent on location (IPCC, 2021).

National Projections

In Australia, the climate is generally projected to become warmer and drier. Climate change may result in changes to rainfall patterns, runoff patterns and river flow.

Table 4-19 presents two global GHG emission scenario projections for annual average rainfall in the East Coast South sub-cluster of 'Eastern Australia' for 2030 and 2090 (relative to 1995), based on the Climate Change in Australia impact (CSIRO and BoM, 2015).

It is noted that the Representative Concentration Pathway (RCP) 8.5 scenario (worst-case) illustrated in Table 4-19 is a scenario where minimal GHG emissions controls are introduced and therefore does not reflect the measures currently being pursued by Parties to the *Paris Agreement* or the Queensland Government.

Table 4-19
Climate Change Projections for the East Coast South Sub-cluster, Eastern Australia – Percentage Change in Rainfall (relative to 1995)

Period	2030	2090	
	RCP4.5	RCP4.5	RCP8.5
Summer	+1	0	+10
Autumn	-5	-4	-4
Winter	-3	-10	-17
Spring	-2	-8	-14
Annual	-2	-4	-6

Source : CSIRO and BoM (2015).
Note: RCP4.5 – Emissions scenario assuming a slow reduction in emissions that stabilises CO_2 concentration at about 540 parts per million (ppm) by 2100.
RCP8.5 – Emissions scenario assuming an increase in emission leading to a CO_2 concentration of about 940 ppm by 2100.

Regional Projections

Changes to annual rainfall are predicted to vary across the Central Highlands Region, with average rainfall projected to decrease annually (Trancoso et al., 2024) (Table 4-20). Table 4-21 summarises anticipated variability of in temperature for the Central Highlands Region. These projections indicate that the region is expected to experience an increase in average temperatures.

Potential Impacts of the Project

The Project Only Scenario contribution to Australian emissions would be relatively small, as estimated annual average Scope 1 and 2 emissions would represent approximately 0.09% and 0.41% in 2030 and 2035 respectively of the estimated total GHG emissions in Queensland (133 and 48 Mt CO_2-e in 2030 and 2035 respectively) and approximately 0.03% and 0.11% of Australia's projected GHG emissions in 2030 and 2035 respectively (349 and 184 Mt CO_2-e in 2030 and 2035 respectively) (Appendix B of Appendix G).

Based on a conservative approach that assumes that the Project Only Scenario emissions are wholly additive, the Project's total emissions equate to an incremental global temperature influence measured at the scale of millionths (Scope 1 and 2) or ten-thousandths of a °C (Scope 1, 2 and 3), as follows:

- total Scope 1 and 2 Emissions - Global Surface Temperature Change 0.000008356°C (8.4 millionths of a degree); and
- total Scope 1, 2 and 3 Emissions - Global Surface Temperature Change 0.0002469°C (0.25 thousandths of a degree).

Given the above, the Project's incremental contribution to temperature change would be sufficiently minor that no additional impacts on the environmental values would arise.

4.6.3 MANAGEMENT PRACTICES AND MANAGEMENT STRATEGIES

Three-Year Action Plan

Should the Project be approved, Whitehaven Blackwater would implement adaptive management of GHG emissions over the life of the BWM, consistent with Australia's emissions reduction requirements as set out under the Safeguard Mechanism, and to meet any applicable EA conditions imposed by the Queensland Government.

The Three-Year Action Plan has been developed to align with the current stage of the Project (i.e. environmental approvals) and the information that is presently available for the BWM. The Three-Year Action Plan would be revisited during the course of the Project as the regulatory, operational, technological and commercial context evolves.

The Three-Year Action Plan focuses on activities that increase site-specific information, including targeted trials and feasibility assessments that enable Whitehaven Blackwater to identify measures that are reasonable and feasible.

Scope 1 – Gas Capture and Drainage Options

Table 4-22 sets out the three-year work program for fugitive emissions management for the Project. Fugitive emissions are a material Scope 1 source at the BWM, but site-specific characterisation and feasibility work for BWM remains at an early stage and would be progressively refined in future GMAP revisions.

Accordingly, the actions in Table 4-22 prioritise establishing a baseline and assessment of whether gas drainage, capture and abatement options (for example surface-to-inseam drilling and flaring or utilisation pathways) are reasonable and feasible for the Project's operational context.

Technology adoption timing and engineering solutions are subject to further feasibility assessment, technology maturation and operational planning considerations.

Table 4-20
Climate Change Projections for the Central Highlands Region, Queensland – Change in Rainfall (mm/d)

Period	2050			2090		
Scenario	SSP1-2.6 (mm/d)	SSP2-4.5 (mm/d)	SSP3-7.0 (mm/d)	SSP1-2.6 (mm/d)	SSP2-4.5 (mm/d)	SSP3-7.0 (mm/d)
Summer	-0.1 (-0.8 – 0.6)	-0.3 (-0.9 – 0.5)	-0.1 (-1.3 – 0.6)	-0.3 (-0.7 – 0.3)	-0.3 (-1.1 – 0.5)	-0.1 (-1.1 – 0.4)
Autumn	-0.3 (-0.7 – 0)	-0.2 (-0.5 – 0.2)	-0.2 (-0.7 – 0.3)	-0.2 (-0.8 – 0.1)	-0.4 (-0.8 - -0.2)	-0.5 (-0.8 - -0.1)
Winter	-0.1 (-0.5 – 0.2)	0 (-0.3 – 0.3)	0 (-0.3 – 0.2)	-0.1 (-0.4 – 0.2)	-0.1 (-0.5 – 0.1)	0 (-0.4 – 0.1)
Spring	-0.1 (-0.8 – 0.4)	-0.1 (-0.4 – 0.2)	0 (0.6 – 0.2)	-0.1 (-0.5 – 0.3)	0 (-0.5 – 0.4)	-0.1 (-0.4 – 0.3)
Annual	-0.1 (-0.3 – 0)	-0.1 (-0.3 – 0.2)	-0.1 (-0.5 – 0.3)	-0.2 (-0.3 – 0)	-0.2 (-0.4 – 0.1)	-0.2 (-0.4 – 0)

mm/d = millimetres per day
Note: SSP refers to Shared Socio-economic Pathway which describes the socio-economic trends underlying the scenario (SSP1 – Low Emissions scenario; SSP2 – Medium Emissions scenario; SSP3 – High Emissions scenario).
Values in brackets represent range of predictions.

Table 4-21
Climate Change Projections for the Central Highlands Region, Queensland – Change in Mean Temperature (°C)

Period	2050			2090		
Scenario	SSP1-2.6 (°C)	SSP2-4.5 (°C)	SSP3-7.0 (°C)	SSP1-2.6 (°C)	SSP2-4.5 (°C)	SSP3-7.0 (°C)
Summer	1 (0.1 – 1.5)	1.4 (0.9 – 2.3)	1.5 (0.8 – 2.6)	1.2 (0.4 – 2)	2.3 (1.3 – 3.3)	3.4 (2.1 – 4.3)
Autumn	1.2 (0.7 – 1.8)	1.5 (0.9 – 2)	1.7 (1.3 – 2.5)	1.4 (0.6 – 2.1)	2.6 (1.8 – 3.5)	3.8 (2.6 – 4.7)
Winter	1.1 (0.6 – 1.8)	1.4 (0.8 – 2)	1.6 (1.2 – 2.4)	1.3 (0.6 – 2.1)	2.5 (1.7 – 3.2)	3.6 (2.7 – 4.3)
Spring	1 (0.3 – 1.7)	1.3 (0.6 – 1.8)	1.4 (0.8 – 2.1)	1.2 (0.2 – 1.8)	2.2 (1.1 – 3.1)	3.4 (2.4 – 4.1)
Annual	1.1 (0.5 – 1.6)	1.4 (0.9 – 1.9)	1.6 (1.1 – 2.4)	1.3 (0.5 – 1.9)	2.4 (1.5 – 3.2)	3.5 (2.7 – 4.2)

Note: SSP refers to the Shared Socio-economic Pathway which describing the socio-economic trends underlying the scenario (SSP1 - Low Emissions scenario; SSP2 – Medium Emissions scenario; SSP3 – High Emissions scenario).
Values in brackets represent range of predictions.

Table 4-22
Three-Year Action Plan – Fugitive Emissions

Measure	Year 1*	Year 2	Year 3	Rationale
Transition to NGER Method 2 Fugitive Emissions Basis	Transition of the BWM fugitive emissions estimates to a NGER Method 2 basis (as updated modelling inputs and supporting documentation become available).	Incorporate fugitive emissions forecasting outputs into the Project fugitive emissions methodology and assumptions.	N/A	Transitioning the Project's fugitive emissions estimates to an NGER Method 2 basis would enhance the accuracy of fugitive emissions estimation. This higher resolution would support more detailed feasibility assessments. In addition, Method 2 will provide a basis to account for gas capture and abatement.
Methane Pre-Drainage Capture and Abatement	Undertake a concept assessment of methane pre-drainage capture and abatement opportunities within the 5-year mine plan, informed by available gas reservoir data and development of the Method 2 gas model. Develop forward work plan for methane gas capture, including field validation if appropriate.	Progress shortlisted concepts through technical and economic feasibility assessment informed by updated gas reservoir information and Method 2 fugitive emissions estimates as appropriate.	Where feasibility assessment supports and recommends progression, arrange a pilot trial program (subject to regulatory requirements) to validate feasibility assumptions or fill data gaps for methane capture and abatement options.	Methane capture and abatement opportunities at BWM are highly site specific and dependent on gas reservoir characteristics, mine sequencing, and operational factors. Subject to outcomes of the concept assessment, feasibility assessment and pilot trial, integrate preferred methane pre-drainage into the next Three-Year Action Plan, considering the mine plan progress and appropriate regulatory approval pathways for development. The staged assessment approach provides a progression from gas modelling to concept development and feasibility screening with emerging industry practice in the Bowen Basin.

Source: Appendix G.
* Year 1 is indicatively FY 2027.

Scope 1 – Diesel Combustion

Table 4-23 sets out the three-year work program in relation to the Project's diesel emissions, recognising diesel combustion is a major contributor to the Project's Scope 1 emissions profile and is strongly influenced by haulage requirements and operational practices (e.g. use of draglines instead of diesel haul trucks). The actions in Table 4-23 aim to build operational understanding, including evaluation of near-term fuel substitution options where practicable and assessment of market available hybrid and battery electric alternatives as part of replacement decisions within the equipment procurement cycle.

Scope 2 – Electricity from Main Grid

Table 4-24 sets out the three-year work program for Scope 2 emissions management. The actions in Table 4-24 prioritise improved understanding of electricity demand and efficiency opportunities, alongside a staged review of practicable renewable electricity contracts consistent with broader corporate considerations.

Table 4-23
Three-Year Action Plan – Diesel Consumption Emissions

Measure	Year 1*	Year 2	Year 3	Rationale
Biodiesel/Renewable Diesel	Conduct cost and efficiency review of potential diesel fuel alternatives and review transferability of Maules Creek Coal Mine trial outcomes to the BWM.	Undertake site specific applicability assessment for biodiesel and renewable diesel at the BWM, including fleet compatibility, fuel quality requirements, storage and handling constraints.	Review potential feasibility including the marginal abatement cost of partial implementation.	Moderate trial opportunity, low-risk implementation and potential to modestly reduce diesel fuel emissions.
Hybrid Diesel Equipment	Consult with original equipment manufacturers (OEMs) on the availability and practicability of hybrid diesel equipment alternatives for haul trucks, dozers and loaders, including capital, operating and fuel consumption data	Conduct a procurement evaluation of currently available hybrid diesel equipment vs conventional diesel equipment based on life-of-plant financial and productivity analysis.	Determine potential feasibility of adoption of hybrid equipment in consideration of the BWM replacement schedule. Undertake a review of the readiness of large mining battery electric vehicles and associated infrastructure, to inform future emission reduction plans.	Hybrid diesel/electric equipment has potential to materially reduce diesel combustion emissions.
Tethered Equipment Study	Consult with OEMs on the availability and practicability of electrical tethered equipment as a replacement for existing diesel powered equipment, including capital, operating and electricity consumption data.	Considering the previous consultation, identify the tethered equipment that may be suitable for use at the Project and evaluate the applicable site electrical supply and distribution requirements and any key constraints to adoption.	Determine potential feasibility of adoption of previously identified tethered equipment in consideration of any site constraints and procurement requirements.	The use of electrical equipment would reduce Scope 1 emissions through the displacement of diesel and other direct fuel combustion sources.

Source: Appendix G.
* Year 1 is indicatively FY 2027.
Note: NSW = New South Wales.

Table 4-24
Three-Year Action Plan – Scope 2 Emissions

Measure	Year 1*	Year 2	Year 3	Rationale
Site Electricity Supply – offset Scope 2 emissions	Assess available options and consult with existing suppliers (e.g. GreenPower is currently used for Whitehaven's NSW operations) or alternative renewable electricity providers regarding opportunities to offset Scope 2 emissions at the BWM.	Determine whether it would be reasonable and feasible to offset Scope 2 emissions associated with the site electricity supply (agreement extension or alternative supplier).	Implement extended or new site electricity supply agreement (if applicable).	As the electricity grid is progressively decarbonised, Scope 2 emissions would correspondingly fall.

Source: Appendix G.
* Year 1 is indicatively FY 2027.

4.7 Noise and Blasting

A Noise and Blasting Assessment for the Project was undertaken by RWDI (2026c) and is presented as Appendix H.

Section 4.7.1 provides a description of the environmental values relevant to noise and vibration, including the noise and vibration assessment criteria. Section 4.7.2 provides a description of the modelling results and the potential noise and blasting impacts of the Project. Section 4.7.3 outlines the proposed management practices and mitigation strategies for the Project.

4.7.1 ENVIRONMENTAL VALUES

Noise Measurement

The noise levels presented in Appendix H and summarised in this section are typically expressed in A-weighted decibels (dBA). The logarithmic dBA scale simulates the response of the human ear, which is more sensitive to mid to high frequency sounds and relatively less sensitive to low frequency sounds. Figure 4-25 provides information on common noise sources in dBA for comparative reference.

Measured or predicted noise levels are expressed as statistical noise exceedance levels (L_{AN}), which are the levels exceeded for a specified percentage of the interval period. For example, L_{A10} is the noise level that is exceeded for 10% of the sampling period and is also considered to be the average maximum noise level. The equivalent continuous noise level (L_{Aeq}) refers to the steady sound level, which is equal in energy to the fluctuating levels recorded over the sampling period.

Noise and Vibration Objectives

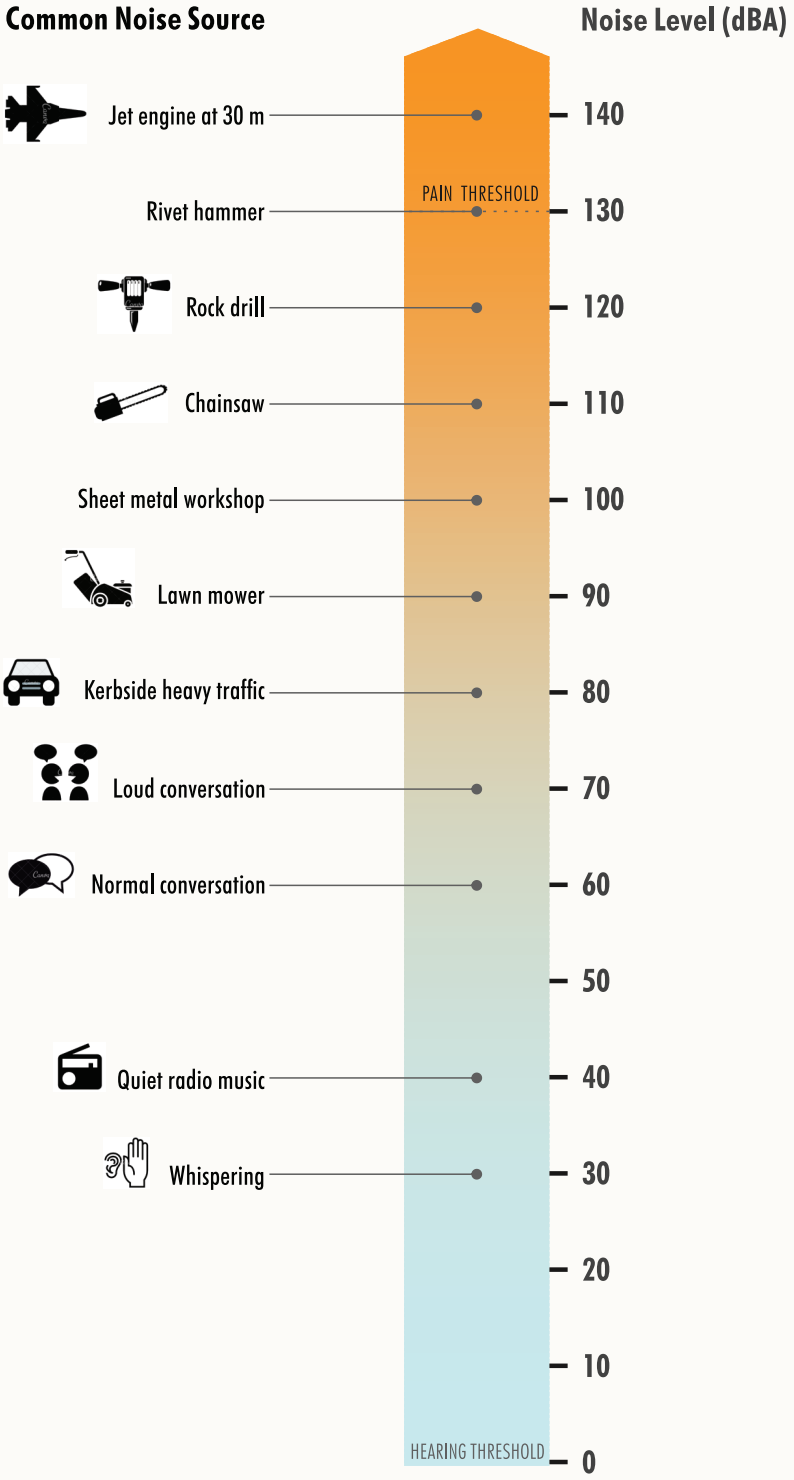
The following legislation, policies, guidelines and standards identified by RWDI are relevant to assessing potential noise and vibration impacts of the Project, including (Appendix H):

- EP Act;
- EP Regulation;
- *Environmental Protection (Noise) Policy 2019* (EPP [Noise]);
- *Ecoaccess Guideline – Planning for Noise Control Guideline* (DEHP, 2016);
- *Guideline – Application requirements for activities with noise impacts* (DETSI, 2025f);
- *Guideline – Streamlined model conditions for petroleum activities* (Department of Environment, Science and Innovation, 2024);
- Noise Measurement Manual (DES, 2020c).

The EP Act and subordinate legislation (EP Regulation and EPP [Noise]) set acoustic quality objectives to prevent and minimise adverse effects on environmental values of the acoustic environment, including health, wellbeing and amenity.

Adopted Noise and Vibration Limits

The noise and vibration limits included in the existing EA EPML00717813 and adopted for the assessment are summarised as Tables 4-25 and 4-26.



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Source: After Safe Work Australia (2020)

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Common Noise Level Sources

Figure 4-25

Table 4-25
EA EPML00717813 Noise Criteria for Sensitive and Commercial Places

Noise Limits (dBA)			
Day	Evening	Night	Night
$L_{Aeq,15min}$	$L_{Aeq,15min}$	$L_{Aeq,15min}$	$L_{A1,15min}$
40	40	40	45

Source: Appendix H.
Notes: Day = 7.00 am to 6.00 pm; Evening = 6.00 pm to10.00 pm; Night = 10.00 pm to 7.00 am.

Table 4-26
EA EPML00717813 Blasting Criteria for Sensitive and Commercial Places

Parameter	Blasting Criteria
Ground vibration	5 millimetres per second (mm/s) peak particle velocity (PPV) for nine out of ten consecutive blasts and not > 10 mm/s PPV at any time
Airblast overpressure	115 decibels Linear peak (dBL Peak) for nine out of ten consecutive blasts and not > 120 dBL Peak at any time

Source: Appendix H.
Notes: PPV corresponds with vector peak particle velocity as per the *Guideline – Noise and Vibration from Blasting* (DES, 2022c).

To assess building damage for nearby receivers, RWDI (2026c) adopted the airblast overpressure limit of 133 dBL Peak, and ground vibration limit of 10 mm/s peak component particle velocity for all identified receivers except for mine-owned receivers (Appendix H).

Receivers

Figure 1-8 shows the sensitive receivers in the vicinity of the Project that were considered in the assessment.

Section 4.5.1 provides descriptions of the receivers considered in the Noise and Blasting Assessment.

Existing Noise Environment

EMM conducted a baseline noise survey in 2020 and 2021, to quantify and characterise the existing noise environment at the BWM and determine the site's noise contribution (Appendix H).

Details of the attended and unattended background noise survey, including the noise measurement results, are provided in Appendix H.

From the background noise survey, EMM noted that at most long-term noise measurement locations, attended measurements showed that BWM was generally inaudible, and where mine noise was audible, other nearby environmental sources were noted as the dominant feature (Appendix H).

4.7.2 POTENTIAL IMPACTS

Noise

Noise Modelling Methodology

Operational noise levels at nearby receivers were predicted using the Environmental Noise Model, based on noise characteristics and locations of major equipment/plant, intervening terrain to nearby noise-sensitive receivers, and local meteorology (Appendix H).

Noise modelling was undertaken for FY 2030, FY 2032, FY 2050 and FY 2055 assessment scenarios. These scenarios were selected to represent operations with the greatest potential for noise impacts on surrounding noise-sensitive receivers (Appendix H).

Further details regarding the four representative assessment year are outlined as (Appendix H):

- FY 2030: representing when the Project production is planned in the northernmost pit (i.e. closest to Blackwater township residential areas), and considerable increase in total mobile fleet relative to prior years;
- FY 2032: representing the first year with the peak ROM coal amount of approximately 19 Mtpa, with high level of activities that are relatively close to nearby rural properties, and considerable increase in total mobile fleet relative to prior years;
- FY 2050: representing the year with the peak waste amount, with high level of activities that are relatively close to nearby rural properties; and
- FY 2055: representing the end of Project, with high level of activities that are relatively close to nearby rural properties.

The indicative list of mobile equipment and fixed plant considered in the noise assessment is provided in Appendix H. Appendix H also includes the indicative sound power levels assumed for the noise modelling.

Assessment Meteorological Parameters

The analysis was based on data from the BoM Blackwater Airport AWS located at directly west of the site for the period of January 2021 to December 2024. The BoM data is considered representative of the general surroundings (Appendix H).

Analysis of gradient winds indicated that winds up to 3 m/s are not deemed significant during the day, evening or night periods, and therefore do not warrant assessment. As such, the noise emissions were modelled under calm conditions (represented as 0.5 m/s winds) (Appendix H).

Given the site's location in a non-arid region, the *Ecoaccess Guideline - Planning for Noise Control Guideline* recommends assessing moderate temperature inversions (stability category F) with a vertical temperature gradient of +3 °C per 100 m (Appendix H).

The meteorological conditions assumed for the assessment are summarised in Table 4-27.

Table 4-27
Assessment Meteorological Conditions

Assessment Period	Meteorological Parameters
Day	0.5 m/s source-to-receiver wind combined with stability category D
Evening	0.5 m/s source-to-receiver wind combined with stability category D
Night	0.5 m/s source-to-receiver wind combined with stability category F

Source: Appendix H.
Notes:
1. Day: 7.00 am to 6.00 pm; Evening: 6.00 pm to 10.00 pm; Night: 10.00 pm to 7.00 am.
2. Source-to-receiver wind direction was modelled using the closest direction in a 16-direction compass to the source-to-receiver direction.
3. Stability category D modelled using vertical temperature gradient of -0.5°C/100 m in accordance with the New South Wales (NSW) *Noise Policy for Industry* (NPfI) (NSW Environment Protection Authority, 2017).
4. Stability category F modelled using vertical temperature gradient of 3°C/100 m in accordance with the NPfI.

Noise Modelling Predictions

Operational Noise

Appendix H includes operational $L_{Aeq,15min}$ noise predictions for all four noise assessment scenarios.

The operational noise assessment indicated that the majority of surrounding privately-owned noise-sensitive receivers would comply with the applicable criteria under all assessed scenarios, with residual exceedances identified at eight privately-owned receivers and three industrial receivers (Appendix H).

Table 4-28 provides a summary of the residual noise exceedance levels for the eight privately-owned receivers that were predicted to experience operational noise exceedances (Appendix H).

Table 4-28
Residual Noise Exceedance Levels at Privately-owned Receivers

Exceedance Category	Number of Receivers	Receiver ID
Negligible (1-2 dB)	1	R07
Marginal (3-5 dB)	4	R03, R04, R13, R19
Significant (> 5 dB)	3	R05, R06, R17

Source: Appendix H.

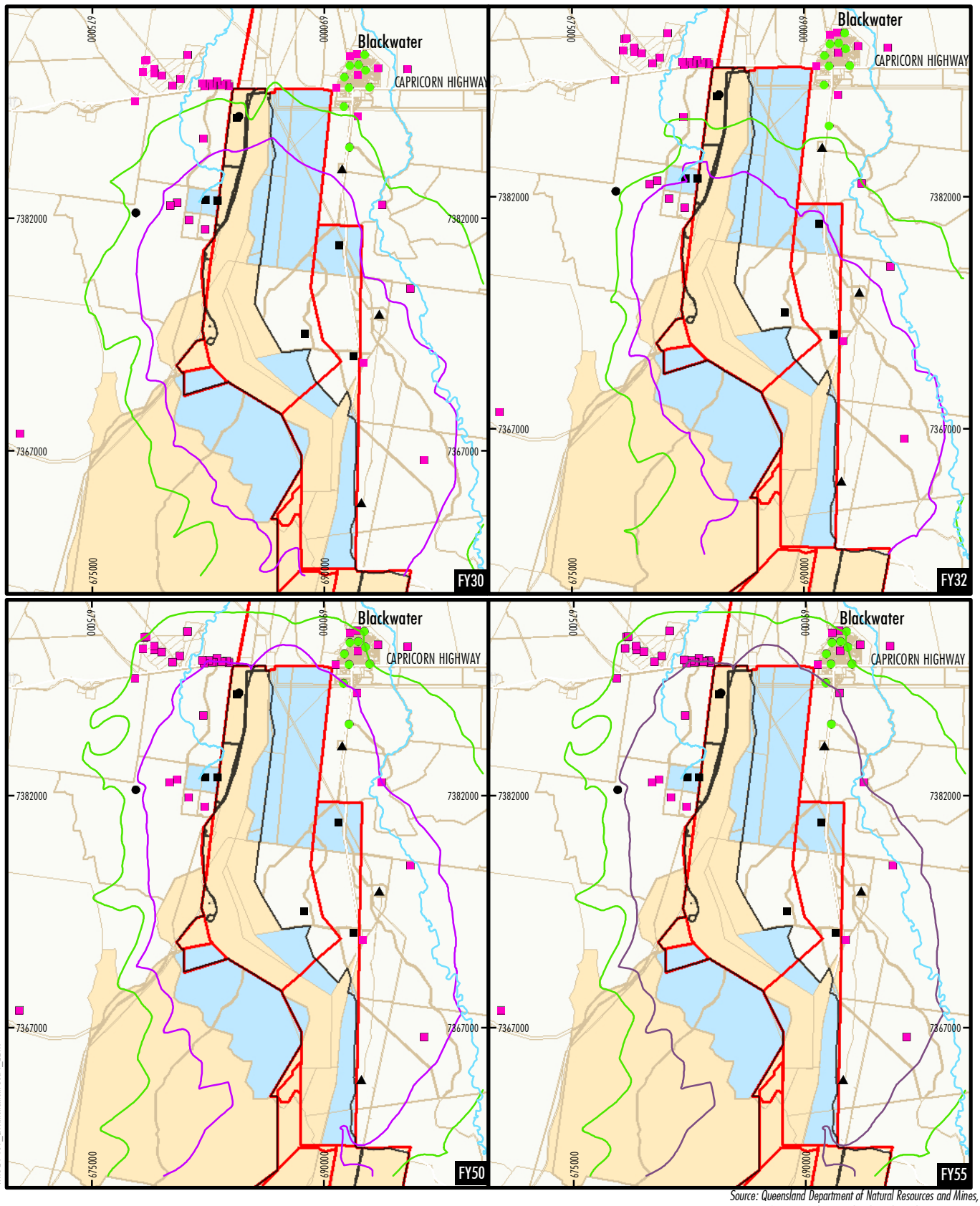
Indicative night-time noise contours of the EA EPML00717813 noise criteria (i.e. 40 dBA) are presented in Figure 4-26.

Whitehaven Blackwater would enter commercial noise agreements (i.e. "Alternative Arrangements" under EA EPML00717813) with landowners that may be subject to potential noise and blasting impacts from the Project (R03, R04, R05, R06, R07, R13, R17 and R19) (Appendix H).

It should be noted that the assessment assumed a proactive noise management system, including predictive meteorological forecasting with real-time noise monitoring and a TARP would be implemented to maintain compliance at receivers R11, R20, R21, R22 and R23 (Appendix H).

Where commercial noise agreements can not be reached, Whitehaven Blackwater would also apply the proactive noise management system to the privately-owned receivers with residual noise exceedances (R03, R04, R05, R06, R07, R13, R17 and R19).

RWDI (2026c) also qualitatively assessed the potential noise impacts from the operation of quarries (Figure 2-12).



WHC-24-101_EA Amendment Sept4_221A

Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2026)

LEGEND

- Mining Lease
- Road
- Watercourse
- Property Boundary
- Approved Disturbance Footprint
- Whitehaven Freehold Land
- Whitehaven Leasehold Land

Sensitive Receiver
- Community
- Private

Non-sensitive Receiver
- Mine-owned or Privately-owned
- Under Agreement
- Commercial
- Community

Noise Contour (Night)
- 35 dBA
- 40 dBA

N

0 5

Kilometres

GDA2020 MGA Zone 55

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Operational $L_{Aeq,15min}$
Noise Contours - Night Time

Figure 4-26

The equipment proposed for use at the quarries, along with their associated sound power levels are summarised in Appendix H.

A sensitivity analysis was conducted by RWDI (2026c) and confirmed that the potential noise generated by the quarries would not contribute to overall noise levels from the BWM at any surrounding receivers under any of the assessed scenarios (Appendix H).

The quarries have therefore not been further considered quantitatively in the assessment.

Maximum Noise Level Events

Night-time maximum noise level events associated with the Project and with the potential to cause sleep disturbance were considered in the assessment.

The assessment of night-time maximum noise level events predicted compliance at all but five receivers, including three privately-owned receivers and two industrial receivers. It is noted that these receivers are already subject to $L_{Aeq,15min}$ operational noise exceedances (Appendix H).

Low-frequency Noise

An assessment was conducted to evaluate the likelihood that low-frequency noise (LFN) from the Project may potentially be perceived by the community and cause annoyance.

The assessment focused on the night-time period where potential LFN issues are expected to be most significant due to noise-enhancing meteorological conditions (Appendix H).

Assessment against the *Guideline – Streamlined model conditions for petroleum activities* LFN outdoor criteria showed compliance at all sensitive receivers. The LFN assessment results suggested that the Project is unlikely to generate LFN that could be perceived by the community and cause annoyance (Appendix H).

Cumulative Noise

Cumulative noise from the Project and nearby industries were considered in the assessment. The Curragh Mine Complex, including the Curragh Coal Mine and Mammoth Underground Mine, located approximately 20 km north of Blackwater, was identified as the only nearby industrial operation with the potential to contribute to cumulative noise levels in the areas surrounding the Project (Appendix H).

For the cumulative noise assessment, the Curragh Mine Complex noise levels (adjusted where necessary) were added to the Project noise levels, based on the maximum impacts observed across all assessment scenarios (Appendix H).

The noise prediction showed that cumulative noise levels in north Blackwater may exceed the EA EPML00717813 criteria during the day and evening periods, however exceedances would already occur due to noise from the Curragh Mine Complex. Since the noise contribution from the Project is significantly lower than that of the Curragh Mine Complex, the Project would have a negligible influence on overall cumulative levels (Appendix H).

In southwest Blackwater and along the Capricorn Highway (northwest of the BWM), cumulative noise levels are expected to comply with the EA EPML00717813 criteria, noting that this assumes the implementation of proactive noise mitigation for the Capricorn Highway receivers (Appendix H).

As the Project and nearby industries would generally comply with the site-specific EA criteria, it is possible to conclude that the Project would therefore not result in unreasonable background noise levels for the area (Appendix H).

Blasting

Blast design parameters and blast sizes would vary throughout the life of the Project. The assessment adopted maximum instantaneous charge (MIC) values that are consistent with the upper range of those typical used at the BWM (Appendix H):

- pre-split blast: MIC of 550 kilograms (kg);
- coal blast: MIC of 1,000 kg; and
- production blast: MIC of 4,500 kg.

RWDI (2026c) predicted the proposed blasting areas and the minimum compliance distances for large production blasts at the BWM based on the MIC of 4,500 kg, shown in Figure 4-27. Table 4-29 summarised the compliance distances, relative to the proposed blasting areas. For sensitive and commercial receivers, the minimum compliance distances are based on the controlling criteria, namely the human comfort airblast overpressure criterion (Appendix H).

The assessment showed that most receivers are located outside the minimum compliance distances, while MIC restrictions would be required to meet all relevant criteria and achieve compliance at privately-owned receiver R17 (Appendix H).

Notwithstanding, based on blast management practices currently implemented at the BWM, it is expected that airblast overpressure and ground vibration from the Project can be effectively controlled to meet all blasting criteria and minimise the risk of significant impacts at surrounding receivers and infrastructure (Appendix H).

4.7.3 MANAGEMENT PRACTICES AND MITIGATION STRATEGIES

Identification of mitigation measures required to meet the noise and blasting criteria at the nearest sensitive receivers was undertaken as part of the Noise and Blasting Assessment (Appendix H).

The implementation of a proactive noise management system that would integrate predictive forecasting and real-time noise monitoring to support day-to-day operational planning. This system would be designed to manage noise levels during periods when meteorological conditions are likely to amplify noise, therefore reduce the risk of noise-related non-compliance (Appendix H).

The noise management system would incorporate a TARP, enabling the operator to anticipate and adjust activities before potential exceedances occur. A tiered warning system issues would alert when noise levels from mining operations increase and approach the EA EPML00717813 noise criteria. If warning trigger thresholds are exceeded, automatic alerts monitored by the Remote Operating Centre would prompt Whitehaven Blackwater to activate the TARP. Once activated, the plan would guide the modification of mining activities to reduce intrusive noise and prevent noise exceedances (Appendix H).

As stated in Appendix H, a risk of negligible (1 dB) night-time exceedances was identified in FY 2050 under noise-enhancing meteorological conditions at receivers R20, R21, R22 and R23, and a similar negligible 1 dB night-time exceedance risk was identified at receiver R11 in FY 2050 and FY 2055. For these receivers, the proactive mitigation measures would be applied.

Details of the indicative proactive noise mitigation measures and the indicative implementation frequencies are provided in Appendix H. Analysis of implementation frequencies has confirmed that these proactive measures are feasible and can be integrated into operational planning without affecting the Project schedule.

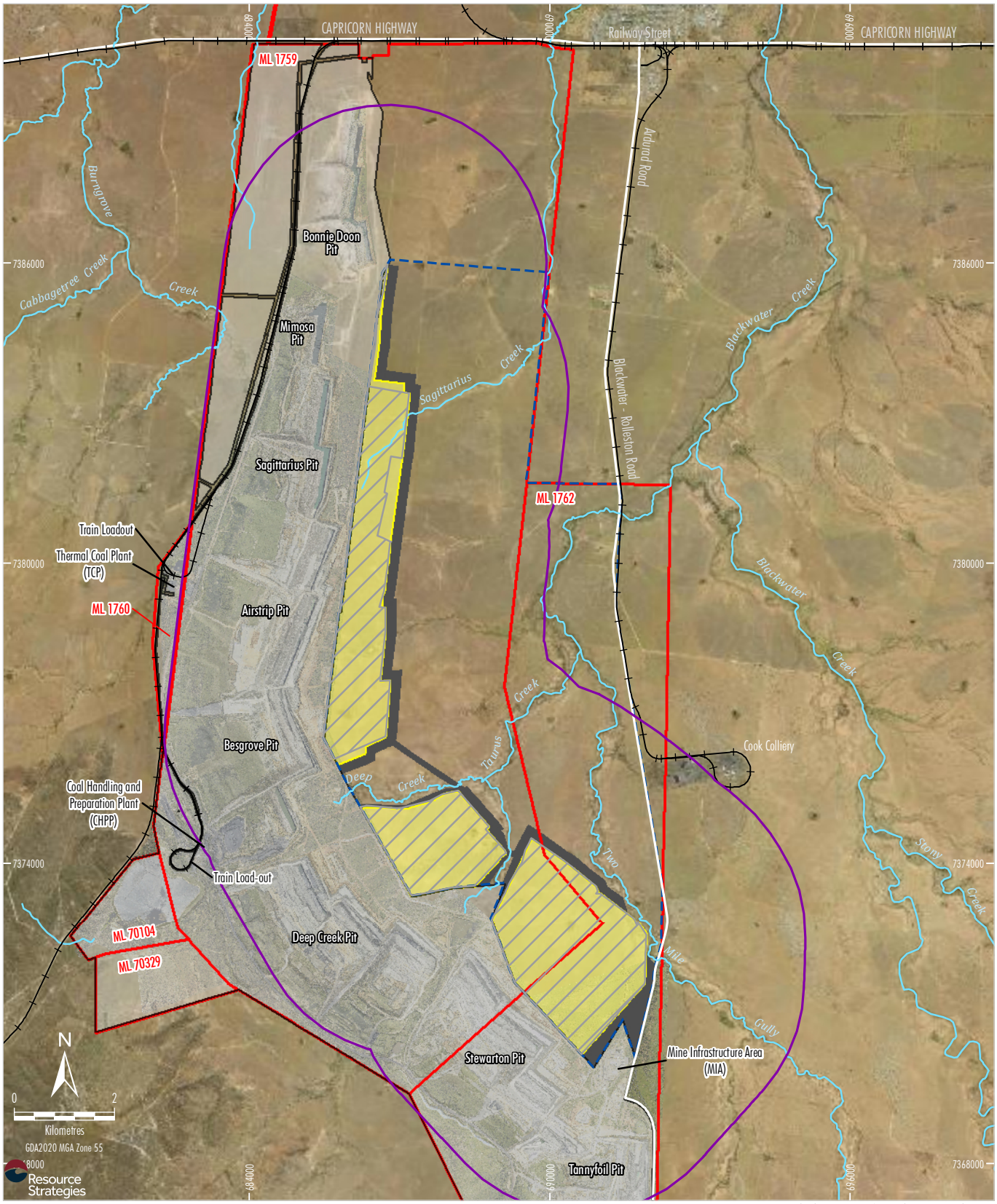
In addition, Whitehaven Blackwater intends to enter commercial noise agreements (i.e. “Alternative Arrangements” under EA EPML00717813) with other privately-owned receivers that may be subject to potential noise and blasting impacts (R03, R04, R05, R06, R07, R13, R17 and R19) (Appendix H).

Where commercial noise agreements can not be reached, Whitehaven Blackwater would also apply the proactive noise management system to the privately-owned receivers with residual noise exceedances (R03, R04, R05, R06, R07, R13, R17 and R19).

Table 4-29
Blasting Minimum Compliance Distances

Receivers / Public Infrastructure	Parameter	Required Distance to Comply (m)		
		MIC 550 kg	MIC 1,000 kg	MIC 4,500 kg
Human Comfort				
All receivers (except non-sensitive receivers)	Ground vibration	962	1,297	2,752
	Airblast overpressure	1,580	1,929	3,184

Source: Appendix H.



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND
- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint
- Proposed Blasting Areas
- Minimum Compliance Distances (MIC 4500kg)
- Receptors

Project Components[1]
- Study Area
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

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Blasting Minimum Compliance Distances

Figure 4-27

Notwithstanding, Whitehaven Blackwater would continue implementing the following noise and vibration management controls, as currently detailed in the *BWM Plan – Noise Management Plan* (Whitehaven, 2026e) and *BWM Plan – Blasting Environmental Management Plan* (Whitehaven, 2026f):

- construction of noise bunds in operational areas closely situated to sensitive receivers;
- upgrading silencing of mobile equipment;
- limiting speed of heavy vehicle traffic on haul roads;
- implement maintenance and operation procedures to minimise nuisance noise emissions from equipment, including servicing and maintenance of exhaust systems on mine equipment;
- investigation of complaints to identify sources;
- only carry out blasting during daylight hours, 8:00am to 5:00pm;
- restricting blasts to favourable weather conditions; and
- alteration of number of blast holes; stemming depth, spacing etc. of blasts.

4.8 Waste

This section summarises the outcomes of the environmental assessment undertaken for the Project to assess potential impacts to general and recyclable waste.

Mining waste expected to be generated by the Project is described in Section 2.10.

Section 4.8.1 provides a description of the relevant environmental values, including a description of the existing environment relating to waste.

Section 4.8.2 describes the potential impacts of the Project on waste and Section 4.8.3 outlines the proposed mitigation measures, management and monitoring.

4.8.1 ENVIRONMENTAL VALUES

The environmental values relevant to waste in the Project area have been identified with consideration of the DETSI Guideline *Application requirements for activities with waste impacts* (ESR/2015/1836) (DETSI, 2025g).

Description of Waste Material and Sources

The key waste streams generated by the Project would comprise waste rock and coal rejects, recyclable and non-recyclable general wastes, sewage and wastewater and other wastes from mining and workshop related activities (as described in Section 2.10).

Areas of potential contamination identified in the post-mining landform would be investigated and managed/remediated if required prior to relinquishment.

The waste streams expected to be produced during operation of the Project would be consistent with existing operations at the BWM.

The waste that is generated at the BWM can be separated into the following main groups (Whitehaven, 2021):

- general waste;
- recycled waste (paper, cardboard, cans, plastics carrying the recycle symbol);
- regulated waste;
- scrap metal; and
- used scrap tyres.

4.8.2 POTENTIAL IMPACTS

Key risks associated with waste management for the Project are consistent with existing operations and include storage or disposal of waste material, which may result in the following environment values being impacted:

- community and workforce health and wellbeing;
- water quality in the surrounding environment;
- soil classification (quality) in areas where waste is disposed, or incorrectly disposed;
- biological integrity and diversity of ecosystems and processes proximal to the Project; and
- suitability of land for the proposed PMLU.

Potential impacts of waste which may be generated by the Project include:

- groundwater and surface water contamination caused by release or spills of soils or liquid waste either directly to receiving waters or indirectly via runoff from waste contaminated areas;

- degradation of native flora and fauna habitat as a result of inappropriate storage and management of waste;
- land contamination caused by spills or inappropriate waste disposal;
- littering due to unsuitable storage and containment of general waste;
- hygiene issues (including odour) associated with the storage, treatment and disposal of putrescibles waste;
- increased vermin and potential spread of disease due to inappropriate storage and disposal of waste;
- reduced visual amenity due to improper storage of waste;
- decreased air quality due to odours and airborne contaminants;
- increased fire hazards due to poorly managed waste storage;
- increased pressure on existing waste management infrastructure; and
- risks to human health and safety through poor management of hazardous materials.

4.8.3 MANAGEMENT PRACTICES AND MITIGATION STRATEGIES

Whitehaven Blackwater would continue to manage the waste produced at the Project in accordance with the waste and resource management hierarchy in the WRR Act (i.e. “avoid, reduce, reuse, recycle, recover, treat and dispose”). If waste must be disposed of, Whitehaven Blackwater would do so in a way that prevents or minimises adverse effects on environmental values.

Whitehaven Blackwater would continue to use the existing *BWM Plan – Waste Management Plan* (Whitehaven, 2021) to manage waste generated by the Project.

Control strategies which are implemented for the existing BWM would continue for the Project in accordance with the *BWM Plan – Waste Management Plan* (Whitehaven, 2021) and would include but not be limited to:

- disposing waste in accordance with the waste as resource management hierarchy in the WRR Act;
- avoidance and reduction of wastes for the Project;
- re-use and recycling of waste, where available;
- all waste transported offsite would be transported by the waste management contractor in a safe manner; and
- all waste disposed on-site would be undertaken in accordance with the existing *BWM Plan – Landfill Management Plan*.

Monitoring of waste disposal at the existing BWM would continue for the Project and include monitoring the volume of general waste with specific area breakdown and the percentage of contamination in general and recyclable bins.

4.9 Cultural Heritage

4.9.1 OVERVIEW

Aboriginal Cultural Heritage

Currently, there is an undetermined native title claim which has been lodged over the Project area (QC2012/009).

An approved CHMA is in place with the Ghungalu People and Kangoulu People (representatives for the Gaangalu Nation People) for the Project and BWM is committed to ongoing engagement and consultation.

The Project area is located within the extent of the BWM and South BWMs ILUA (QI2001/035). This ILUA took effect on 31 May 2002 between the Ghungalu and Kangoulu People.

Non-Indigenous Cultural Heritage

The non-Indigenous history of the region was provided by Converge (2025):

- Ludwig Leichhardt travelled up the Comet River veering north west from the junction of the Mackenzie River on his first trip in January 1845 and again on his second trip in March 1847.
- Leichhardt reported an outcrop of coal on the banks of the Mackenzie River around 30 km northwest of where Blackwater is located today.
- One of the first pastoral stations in the Project area was Taurus Station, established in the 1850s by Mr Thompson of Roxborough. An early stock route was established through Taurus Station and was identified in early run plans as “Old Coach Road”. This route was later referred to as the Stewarton Run.

- There was a broad take up of land in the Leichhardt District around Blackwater by the 1880s, with the Project area located in the Blackwater and Stewarton Pastoral Runs by 1884.
- The Central Western Railway line, which was established to open up the region between Rockhampton and Winton, reached Blackwater in July 1877.
- The settlement of Blackwater was established in 1877 with the extension of the railway line from Rockhampton.
- Until the mid 1960s, Blackwater remained a small town with a population of just 77 in the 1961 census.
- The population boomed from 1967, following the development of open-cut coal mines and by 1971 the population had risen to 1,984, and ten years later it was 5,434.

The Queensland Heritage Register (accessed on 7 April 2026) did not identify any State heritage places within 50 km of the Project area. There are no local heritage places within 25 km of the Project area.

Eight places of potential non-Indigenous cultural heritage significance were located during a field survey of the Project area (Converge, 2025). These include a dam, foundation stumps and dump, the Taurus Homestead and a scatter of five artefacts along Old Coach Road (Converge, 2025).
There are no known grave sites or burials within the Project area (Converge, 2025).

The Old Coach Road Scatter archaeological site consists of a low-density scatter of bottle glass, ceramics, metalwork, and a potential stone open campfire. Artefacts recorded at these sites date to the mid to late 19th century (Converge, 2025).
Apart from the Old Coach Road Scatter, the Project area, in general, is considered to have minimal, to no archaeological potential and any that may exist would be in the form of rubbish pits/dumps associated with the pastoral use of the Project area, although no evidence of such was noted (Converge, 2025).
It is considered that there is low potential for further historic and archaeological places/items to exist within the Project area.

4.9.2 POTENTIAL IMPACTS

There is potential risk to Indigenous and non-Indigenous heritage values associated with direct disturbance within the Project area (including the eight places of potential non-Indigenous cultural heritage noted in Section 4.9.1). With effective due diligence and implementation of agreements with Traditional Owners and landholders the risk to heritage values is considered to be low.

4.9.3 MANAGEMENT PRACTICES AND MITIGATION STRATEGIES

The potential risk to Indigenous heritage would be managed through the continued implementation of the approved CHMA with the Ghungalu People and Kangoulu People (representatives for the Gaangalu Nation People) for the Project. BWM is committed to ongoing engagement and consultation.

It is considered that there is low potential for further historic and archaeological places/items to exist within the Project area.

Whitehaven Blackwater would demonstrate diligence whilst undertaking works within the Project area, particularly during any clearing or construction associated with the Project.

4.10 Social (Community) Values

4.10.1 LOCAL COMMUNITY

Key industries for the CHRC LGA include coal mining, agriculture, and horticulture (CHRC, 2024b). The CHRC LGA had a resource industry workforce of 10,070 persons as of June 2023, with a total of 12 coal mines in the region (Queensland Government, 2023).

The BWM currently relies on the towns of Blackwater, Bluff, Comet and Emerald for the majority of services. These towns would continue to be utilised for the Project.

Blackwater

Blackwater is the closest town to the Project, located 20 km to the north-east of the BWM. Blackwater, known as the Coal Capital of Queensland, is a key business and community centre for multiple coal mines including the BWM, Ensham Coal Mine, Yarrabee Coal Mine, Curragh Mine Complex and Jellinbah Mine.

As of the 2021 Census, Blackwater had a population of 4,702 people, with 39.5% employed in the coal mining industry (Australian Bureau of Statistics [ABS], 2021a).

Blackwater is a key facility provider location which supports the BWM and would support the Project. Medical facilities in Blackwater include two medical centres, a multipurpose health service (including a hospital offering accident and emergency services, acute in-patient services and visiting specialist services), and a dental surgery.

Blackwater also has two Queensland state primary schools and a Queensland state secondary school that provide schooling for local families. Other facilities in the town include a fire station, veterinary clinic, supermarket, multiple motels, mine workers accommodation villages, a golf and country club, a mine workers club and recreational facilities. The town is also home to the Blackwater International Coal Centre and the Australian Coal Mining Museum.

Bluff, Comet and Emerald

Bluff, Comet and Emerald currently provide services for the BWM. Bluff and Comet are rural towns with populations of 324 and 360 respectively (ABS, 2021b; ABS, 2021c). Bluff is a major interchange location for coal trains and Comet is the main support town for the local beef cattle grazing community.

Emerald is the largest business centre in the CHRC LGA. At the 2021 census, Emerald had a population of 14,089 people (ABS, 2021d), with 16.9% employed in the coal mining industry. Healthcare facilities in Emerald include a hospital, medical centres and dental facilities.

The town has four Queensland state schools (three primary and one secondary). Other public facilities in Emerald include an airport, libraries, sports facilities, cemeteries, community gardens and community centres.

4.10.2 STAKEHOLDERS AND COMMUNITY ENGAGEMENT

Whitehaven Blackwater is actively engaged with the local community, with principal engagement activities including:

- Project fact sheet (Attachment 3);
- face-to-face meetings;
- roadshows;
- information sessions;
- newsletters;
- electronic direct mail and e-mails;
- media releases;
- advertising;
- Project website;
- community information sessions;
- digital communications campaigns; and
- qualitative and quantitative research.

4.10.3 PROJECT WORKFORCE

The Project would provide continued employment to the existing BWM workforce as well as require an additional 500 FTE direct mine operational personnel by approximately 2032 due to increased mining equipment requirements. Direct mine operational FTE personnel numbers would then increase by a further 150 in the period from 2033 to 2055.

It is anticipated that the future workforce for BWM will continue as a mix of residential, Drive-in Drive-out and FIFO, similar to the existing conditions.

The workforce would continue to utilise existing local services and amenities as per the operations of the existing BWM.

4.10.4 POTENTIAL IMPACTS

The Project would continue to provide significant direct employment opportunities at the BWM. In addition, a significant number of indirect employment opportunities would be supported through suppliers, contractors, services providers and local businesses.

Increases in the mine workforce noted in Section 4.10.3 would be minor compared with the existing CHRC LGA resource industry workforce.

The potential social impacts associated with operation of the Project may include:

- competition for construction labour;
- increases in the number of non-residential workers in the CHRC LGA;
- increase in traffic on local and state roads in the CHRC LGA;
- increase in demand on local health services, Queensland Police, Ambulance, and Fire and Emergency Services;

- increase in demands on Council infrastructure such as water and wastewater systems and municipal services;
- population growth in the CHRC LGA;
- impacts on housing availability and cost;
- increases in employment rates, labour force participation and socio-economic wellbeing for communities in the Isaac LGA; and
- overall increase in patronage for retail, hospitality, fuel and food venues in Moranbah (which would be a positive impact for local businesses).

4.10.5 MANAGEMENT PRACTICES AND MITIGATION STRATEGIES

The Project would continue to operate under Whitehaven's existing *Queensland Site Transport and Accommodation Policy*. Where eligible, housing may be provided to employees in Blackwater or subsidies for employees who elect to reside within 50 km of Blackwater or in Emerald.

Whitehaven Blackwater would continue existing initiatives supporting the local community throughout the life of the BWM, including community sponsorship opportunities in line with the existing Queensland Sponsorship Guidelines.

5 Rehabilitation

5.1 Progressive Rehabilitation and Closure Plan

5.1.1 LEGISLATIVE REQUIREMENTS

Under the EP Act, the DETSI issued Transition Notices to all site-specific EA holders between 1 November 2019 and 1 November 2022. The Transition Notices identified the period within which the EA holder had to prepare and submit a PRCP (DETSI, 2026a).

A Transition Notice for the BWM was issued to BMA by the Administrating Authority on 13 December 2021 which required submission of a PRCP by 15 November 2024. On 2 April 2024, Whitehaven Blackwater acquired the BWM from BMA and inherited the responsibility of the PRCP submission (DETSI, 2026a). The status of the PRCP is outlined below, followed by a brief description of the PRCP framework.

Blackwater Mine Progressive Rehabilitation and Closure Plan

Whitehaven Blackwater submitted a PRCP to support the existing BWM on 11 November 2024 in accordance with their Transition Notice (herein referred to as 'PRCP Rev 1') (Whitehaven, 2024). PRCP Rev 1 was developed to be consistent with the BWM mine plan completed by BMA prior to Whitehaven Blackwater acquiring the asset.

On 25 November 2024, the DETSI issued Whitehaven Blackwater with a *Not Properly Made Application Notice*, outlining the reasons the application was considered Not Properly Made and specifying the actions required to address the identified issues. Subsequently, a revised PRCP Rev 1 was submitted to the DETSI on 16 May 2025 and declared Properly Made.

An Information Request on PRCP Rev 1 was issued on 13 June 2025 and a response to the Information Request was submitted on 19 December 2025.

As a result of detailed mine planning which occurred post obtaining the BWM from BMA, Whitehaven Blackwater submitted a Change Request to the DETSI on 19 December 2025 along with a revised PRCP to incorporate the Whitehaven Blackwater revised mine plan (herein referred to as 'PRCP Rev 2') (Whitehaven, 2025a).

On 30 January 2026, the DETSI provided notice that the Change Application was determined to be a minor change, and the application progressed to the decision stage. Subsequently, PRCP Rev 2 was approved by the DETSI.

A revised PRCP was submitted to the DETSI as part of a Change Request on 24 June 2026 (herein referred to as 'PRCP Rev 3'). PRCP Rev 3 incorporates the additional footprint associated with the Project in addition to the existing BWM as described in PRCP Rev 2 (Whitehaven, 2026d).

This section describes the rehabilitation strategy for the Project area. Once approved, Whitehaven Blackwater would ensure that progressive rehabilitation and closure planning at the BWM occurs in accordance with PRCP Rev 3.

Progressive Rehabilitation and Closure Plan Framework

A PRCP comprises the Rehabilitation Planning Part (RPP) and Schedule, and must be submitted alongside spatial information, relevant appendices, and an application form (DETSI, 2026a). Each requirement of the PRCP as per *Statutory guideline – Progressive rehabilitation and closure plan (PRC plans)* (DETSI, 2026a) (the PRCP Guideline) is outlined below.

The RPP contains the following sections (DETSI, 2026a):

- *3.1. Project planning* which includes information such as:
  - baseline information relating to site specific- conditions including topography, climate, geological setting, hydrology, hydrogeology, soil, land stability, vegetation, fauna, pre-mining land uses and underlying landholders;
  - project description including mining tenements, primary infrastructure, type of mining operation and LOM schedule;
  - a design for closure for planned expansions including location, size, shape and mining methods; and
  - rehabilitation/improvement planning including the identification of all relevant activities, predicted duration of each relevant activity, size/extent of relevant activities and whether relevant activities can be progressively rehabilitated.
- *3.2. Post-mining land use* which contains information relating to nominated PMLUs and how they align with State or Commonwealth legislation and community values.

- *3.3. Non-use management areas* which discusses nominated NUMAs, justification for why a PMLU could not be sustained, and how NUMAs align with State or Commonwealth legislation and community values.
- *3.4. Voids in floodplains* which contains information relating to flood modelling.
- 3.5. Community consultation which presents:
    - details of community consultation undertaken before and during preparation of the PRCP; and
    - a plan for ongoing community consultation.
- 3.6. Rehabilitation and management methodology which outlines:
    - general rehabilitation practices relating to hydrogeology, flooding, soil and capping material, waste characterisation, landform design, cover design, water management and revegetation; and
    - closure methodologies for TSFs, voids and built infrastructure including any relevant technical reports.
- 3.7. Risk assessment which contains:
    - a risk assessment and treatment matrix covering risks to rehabilitation success; and
    - information relating to historical, present, and future rehabilitation trials.
- 3.8. Monitoring and maintenance which presents:
    - a schedule for monitoring pertaining to each RM;
    - monitoring methodologies for surface water, groundwater and revegetation areas; and
    - adaptive management measures.

According to the PRCP Guideline, the PRCP Schedule is a legally binding schedule for progressive mine rehabilitation (DETSI, 2026a). In accordance with the PRCP Guideline, a Schedule for progressive mine rehabilitation is created by first allocating each mine feature into:

- a Rehabilitation Area (RA), which is generally a selection of mine features within a certain domain with similar function and the same designated PMLU; or
- into an Improvement Area (IA), which is generally a selection of mine features within a certain domain with similar function and the same designated NUMA (DETSI, 2026a).

Next, a series of RMs and Management Milestones are developed with the objective of completely rehabilitating or improving each RA or IA respectively (DETSI, 2026a).

Once RAs, IAs, RMs and Management Milestones have been determined, the Schedule template published by the DETSI needs to be populated (DETSI, 2026a). This involves scheduling completion of RMs and Management Milestones for all areas of each RA or IA, ensuring sufficient time is allocated for completion of mining and for each RM/Management Milestone (DETSI, 2026a).

According to the DETSI (2026e), spatial information needs to be submitted as part of the PRCP application and must contain:

- the location and maximum extent of the disturbance footprint;
- PMLUs and NUMAs for the area within the resource tenures;
- any sensitive receptors; and
- delineation of each RA and IA.

All technical reports relied upon for preparation of the PRCP must be included as appendices to the RPP and must be submitted to the Administering Authority alongside the PRCP application (DETSI, 2026a).

PRCPs for operations with a current EA such as the BWM are ‘transitional’ PRCPs (DETSI, 2026a). The PRCP Guideline has special provisions for transitional PRCPs, including (but not limited to) being able to transition land outcomes directly from land outcome documents (LODs) without further assessment (DETSI, 2026a). The highest order LOD for the BWM is the EA, and the *Residual Void Investigation* report (BMA, 2020) is a secondary LOD.

5.2 Existing Rehabilitation

5.2.1 REHABILITATION STATUS

When open-cut operations commenced at BWM, most overburden was removed by electric draglines (Whitehaven, 2026d). Initially (i.e. prior to the introduction of pre-stripping with truck-and-shovel), areas of rehabilitation were generally constructed by regrading dragline waste rock rows to undulating plains and rises which were seeded to improved pastures, trees and shrubs (Whitehaven, 2026d).

Methods used since the commencement of more formal rehabilitation in about 1980 have included waste rock regrading with scrapers and draglines in addition to more common techniques using large dozers (Whitehaven, 2026d). Subsequently, extensive areas have since been rehabilitated by regrading waste rock with dozers to long uniform slopes (Whitehaven, 2026d).

BWM EA conditions initially required that lands disturbed by mining should be 'reinstated to no less than its former value for grazing'; hence, rehabilitation efforts focused predominantly on the establishment of pasture-based grazing systems (Whitehaven, 2026d). There are however several areas, particularly in South Blackwater (Figure 5-1), that have been historically rehabilitated to a woodland habitat largely focused on the establishment of native *Eucalyptus* and *Acacia* species (Whitehaven, 2026d).

BWM is progressing towards the achievement of 2,854 ha of existing rehabilitation (Whitehaven, 2026d). Of this area, 1,910 ha is existing cattle grazing rehabilitation and 944 ha is existing woodland habitat rehabilitation (Whitehaven, 2026d). A total of 45.33 ha of woodland habitat rehabilitation and 63.5 ha of cattle grazing rehabilitation has received progressive certification for resource activities under EP Act (Whitehaven, 2026d).

The PRCP Rev 3 schedule lists the associated RM criteria that existing RAs are progressing towards (Whitehaven, 2026d). Routine rehabilitation monitoring would continue to be implemented in accordance with PRCP Rev 3 to identify any maintenance/corrective actions required to enable the rehabilitated areas to achieve the milestone criteria (Whitehaven, 2026d).

Applications would continue to be made to the administrating authority for areas identified as being suitable for progressive rehabilitation certification under the EP Act as a result of ongoing monitoring (Whitehaven, 2026d).

5.2.2 REHABILITATION SUCCESS EXAMPLES

Examples of successful rehabilitation at the BWM are presented in Plates 5-1 to 5-3.

2024



2026



Plate 5-1 Rehabilitation of Ramp 62

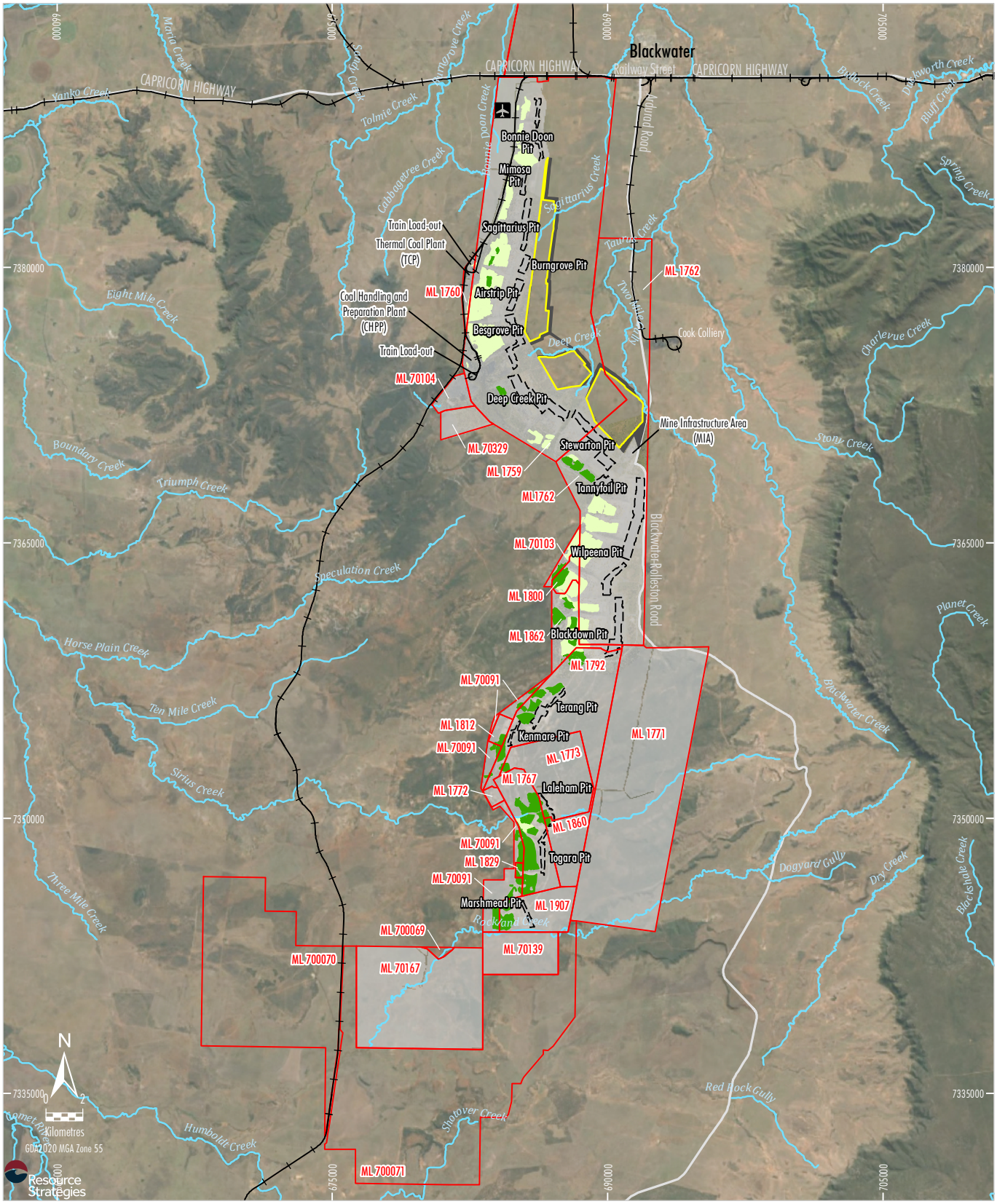
2022



2023



Plate 5-2 Rehabilitation of Ramp 56



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Esri (2025); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Airport
- Proposed Open Cut Extension
- Proposed Infrastructure Area
- Approved Disturbance Footprint
- Pit
- Existing Rehabilitation - Woodland Habitat
- Existing Rehabilitation - Cattle Grazing

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

Existing Rehabilitation

Figure 5-1



Plate 5-3 Rehabilitation of Ramp 76

5.3 Rehabilitation and Closure Objectives

Whitehaven Blackwater has reviewed the current rehabilitation strategy to incorporate the Project. The review has made use of Whitehaven Blackwater's rehabilitation experience to date at the BWM and considered leading guidelines and standards including:

- *Statutory Guideline – Progressive rehabilitation and closure plans* (PRC plans) (DETSI, 2026a);
- *Integrated Mine Closure – Good Practice Guide* (International Council on Mining and Metals, 2025);
- *Strategic Framework for Mine Closure* (Australian and New Zealand Minerals and Energy Council and Minerals Council of Australia, 2000); and
- *Leading Practice Sustainable Development Program for the Mining Industry – Mine Closure* (Department of Industry, Innovation and Science, 2016).

Section 111A of the EP Act states that land with a nominated PMLU is in a stable condition if:

- the land 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 PMLU.

Similarly, Schedule 8A, Part 3 of the EP Regulation states that the following objectives must be achieved for land designated as a NUMA:

- the risk of the area collapsing, eroding or subsiding has been minimised;
- there is minimal need to actively manage the area; and
- access to the area by an animal or person is sufficiently impeded by means such as fencing, safety bunds and/or signage.

5.4 Rehabilitation Activities

There are many considerations when prescribing rehabilitation activities to occur post-mining (DETSI, 2026a). This section presents the overarching landform design for the Project, considering the conceptual final landform presented in Figure 2-19, before discussing detailed closure methodologies for each major operational feature.

General land rehabilitation activities are then outlined including cover design, contaminated land assessment, earthworks, soil and capping material placement, surface preparation, revegetation, and monitoring.

All information within this section is consistent with information in PRCP Rev 3.

5.4.1 LANDFORM DESIGN

Mine Features

The Project comprises a number of mine domains and features which generally align with domains and features of the existing BWM as described in PRCP Rev 3 (Whitehaven, 2026d). Mine domains and features associated with the Project are outlined in Table 5-1 and shown in Figures 2-1 to 2-5.

Final Landform Design

The final landform design is based on fulfilling rehabilitation and closure objects for PMLUs and NUMAs (Sections 5.2 and 5.4), and are presented in PRCP Rev 3. This design ensures the rehabilitated landform would be geotechnically stable, would have a high flood tolerance and would maintain appropriate angles for erosional stability as required by the PRCP Guideline (DETSI, 2026a). The final landform design of the existing BWM is detailed in PRCP Rev 3.

Table 5-1
Mine Domains and Features

Mine Domain	Proposed, Relocated and/or Upgraded Mine Features Within the Project area
Pits and waste rock dumps	– Extension of existing open cut pits. – Mined-out sections of pits used as waste rock dumps.
Stockpiles	– ROM coal stockpiles. – Coal stockpiles. – Topsoil stockpiles.
Dams	– MAW dams. – Sediment dams. – Process water dams.
Creek diversions	– Minor diversion of a tributary of Two Mile Gully.
General infrastructure	– Powerlines. – Switchyards and substations. – Communication and lighting towers. – Fences.
General disturbance	– Laydown areas. – Access roads. – Haul roads. – Drains. – Exploration areas.

Source: Whitehaven (2025a).

Landform Design Considerations

Landform design considers the landform development and reshaping of all relevant activity areas after the removal of infrastructure, and prior to placement of growth media and seeding (Whitehaven, 2026d). All landform designs have been guided by the objectives to achieve long-term erosional stability and be non-polluting whilst supporting the target PMLU (Whitehaven, 2026d). Additionally, landform design must consider the required land outcomes of RAs and how these outcomes can be achieved through the use of appropriate growth media, seed application and monitoring and maintenance (Whitehaven, 2026d).

Materials available for use in rehabilitation are another important consideration of the landform design, with materials that have the required characteristics and that are available on site being used preferentially (Whitehaven, 2026d). For example, rock sourced from the mined overburden would be utilised on the steeper final landform slopes to improve the erosion resistance (Whitehaven, 2026d). Similarly, inert waste rock and high-quality soil that is available on site would be preferentially used to encapsulate any waste rock and/or to provide a suitable growth medium for revegetation where required (Whitehaven, 2026d).

With the exception of the residual void catchments, the final landform of the existing BWM has been designed to be water shedding (Whitehaven, 2026d). Hydrological and hydrogeological assessments were completed for the existing BWM to ensure the final landform design has a low flooding risk, and the final voids would continue to act as groundwater sinks (or would facilitate systems that flow to other nearby voids) to prevent environmental contamination (Whitehaven, 2026d). These assessments are discussed and provided in PRCP Rev 3.

Long-term landform stability modelling has been done for the existing BWM to ensure the final landform design is appropriate (Whitehaven, 2026d). Erosion modelling and landform evolution modelling of the waste rock dumps indicated that the proposed waste rock dumps and slope profiles at the existing BWM can be expected to be stable over the long term, provided the target levels of vegetation cover are achieved (Landloch Pty Ltd 2025; 2026).

The limitations and assumptions of the existing BWM final closure landform design are discussed in PRCP Rev 3 (Whitehaven, 2026d) and include:

- The final closure landform is dependent on the mining schedule, which can change due to increased geological knowledge as mining progresses, and market factors. These changes may result in differences to the landform, such as varying heights or ramp locations, but the key considerations to ensure long-term stability, such as slope profiles and materials, would be maintained in the final closure landform design.
- The landform has been designed with maximum dump heights to ensure all modelling is conservative. It is not expected that all areas of the waste rock dumps would reach these heights.
- A swell factor of 25% has been assumed for the dump scheduling. This is a standard factor based on experience in the Bowen Basin.
- Angle of repose of the waste rock material is 37 degrees.
- Landform evolution modelling has been completed up to 300 years based on the best available inputs at this time.
- Erosion rate thresholds adopted in the landform evolution modelling represent indicative modelling benchmarks and are not, in isolation, intended to be interpreted as statutory rehabilitation completion or surrender criteria.
- Due to the size of the waste rock dumps and dumping in lifts, the majority of settlement of the ‘constructed’ landforms is expected to occur during placement with only minor settlement expected after rehabilitation.
- The landform would be monitored to ensure a free-draining landform is maintained where required.

The results of the aforementioned studies are presented in PRCP Rev 3.

The final landform design for the Project area is presented in Table 3-35 in PRCP Rev 3 (Whitehaven, 2026d).

5.4.2 BUILT INFRASTRUCTURE

Project Infrastructure

Infrastructure that may be built as part of the Project includes:

- additional dams, pumps, pipelines, diversions and drains, as required;
- upgrades and new onsite electricity infrastructure (e.g. additional powerlines) as required;
- upgrades and new roads as required;
- progressive upgrades to the existing communication systems as required; and
- other associated infrastructure and equipment.

Fixed infrastructure from the existing BWM that would be constructed or relocated within the Project area includes (but is not limited to):

- mobile equipment (e.g. excavators, shovels, haul trucks and draglines);
- waste rock dumps;
- sediment dams;
- clean water diversion drains and dams;
- surface water drains;
- MAW system;
- other ancillary water management infrastructure (including pumps, piping, and drains); and
- explosives magazines and reload facilities, noting that these would be relocated progressively to remain near active pits.

All infrastructure built as part of the Project would be removed unless an agreement is made to transfer ownership of and responsibility for specific infrastructure to a future or neighbouring landholder in accordance with the PRCP Guideline (DETSI, 2026a). However, due to the remaining long life of the operation, BWM does not currently have any agreements in place for mining related infrastructure that may have ownership transferred in the future (Whitehaven, 2026d).

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 Rev 3 Schedule (Whitehaven, 2026d).

The closure strategy for all built infrastructure associated with the Project that is not covered by a landholder agreement is described in PRCP Rev 3 (Whitehaven, 2026d), including:

- disconnecting services;
- removing surface built and service infrastructure through salvage or recycling activities, or demolishing and burying in the mining voids or waste rock dumps;
- removing below-ground built and service infrastructure to a depth of 0.5 m below the surface and recycling, or burying in the mine void or waste rock dumps, or covering to a minimum depth of 0.5 m to enable the establishment of the PMLUs;
- removing concrete to a depth of 0.5 m below the surface and recycling, or burying in the mine void or waste rock dumps, or covering to a minimum depth of 0.5 m to enable the establishment of the PMLUs;
- removing bitumen and recycling, or burying it in the mining voids or waste rock dumps; and
- disposing of demolition-related putrescible and hazardous wastes at an appropriately licensed facility.

5.4.3 WASTE MANAGEMENT INFRASTRUCTURE

Waste Management Areas

In accordance with PRCP Rev 3 (Whitehaven, 2026d), waste rock dump landforms associated with the Project would be comprised of mined overburden and interburden disposed behind the active mining face.

Characteristics of waste rock that would form the waste rock dump landforms are reported in Appendix I, which has been detailed in Section 4.8 and is outlined in the following sections.

Waste Rock Characterisation

Terrenus (2026) (Appendix I) provides an in-depth assessment of expected geochemical characteristics of mineral waste associated with the Project. Findings of this assessment are outlined in Section 2.7.4 and 2.7.5 and summarised below.

Terrenus (2026) found that non-carbonaceous waste rock represents approximately 92% of total mineral waste expected to be generated as a result of the Project.

The assessment found that non-carbonaceous waste rock would have negligible potential to generate AMD as AD, NMD or SD, and is expected to be non-saline and strongly sodic with potential for dispersion (Appendix I). The assessment concludes that this material can be considered inert, yet highlights that it should be used with caution near the rehabilitated surface due to its dispersion potential (Appendix I).

Terrenus (2026) found that carbonaceous waste rock represents approximately 2 to 3% of total mineral waste expected to be generated as a result of the Project. The assessment found that carbonaceous waste rock would generally have a low potential to generate AD, NMD or SD, noting that a very small proportion of carbonaceous waste rock would have some potential to generate low-level AD, NMD and/or SD (Appendix I).

Additionally, the assessment found that carbonaceous waste rock is expected to be non-saline and strongly sodic with potential for dispersion (Appendix I). Terrenus (2026) concludes that most of the carbonaceous waste rock is considered inert, yet recommends that it be used with caution near the rehabilitated surface due to its dispersion potential.

Closure Strategy

Waste rock landforms would be rehabilitated in accordance with PRCP Rev 3.

5.4.4 VOIDS

Void Minimisation

Void minimisation is an important consideration of open cut mine rehabilitation because it can result in a larger proportion of the land being returned to a PMLU, thereby delivering a beneficial environmental and/or economic outcome (DETSI, 2026a).

In order to minimise area and volume of the voids, voids would be progressively backfilled with waste rock as mining progresses during the Project as described in PRCP Rev 3 (Whitehaven, 2026d). Placement of waste rock would be determined with consideration of the waste characterisation which is detailed in Section 2.7.4 and 2.7.5. That is, waste rock and rejects that pose a medium or high risk in terms of AMD generation, salinity, and/or sodicity would be placed below low-risk waste wherever possible in accordance with the findings of Terrenus (2026) (Appendix I).

Groundwater, void and flood studies have been undertaken for the BWM to assess, refine, and optimise the NUMA locations and extents, and to minimise the potential for environmental harm (Whitehaven, 2026d). These studies are presented in PRCP Rev 3 (Whitehaven, 2026d).

Closure Strategy

Residual voids would become NUMAs in accordance with Condition E10 of the EA. In order to achieve safe, stable and non-polluting NUMAs, the following management strategies would be employed (Whitehaven, 2026d):

- achievement of structural stability including achievement of a Factor of Safety of ≥ 1.5 at the safety bund for the pit walls;
- installation of cover systems where required;
- achievement of surface requirements including restriction of access to high-walls by a bund, fencing, and signage where required; and
- achievement of sufficient improvement in that NUMAs do not present an unacceptable risk of environmental harm outside of the tenure boundary, and are safe for humans and livestock.

These management strategies are further described in the PRCP Rev 3 Schedule (Whitehaven, 2026d).

5.4.5 CONTAMINATED LAND ASSESSMENT

As per PRCP Rev 3 (Whitehaven, 2026d), at completion of mining operations and prior to landform development (re-profiling/reshaping), surface preparation and revegetation; a contaminated land assessment would be undertaken in accordance with the EP Act and the PRCP Schedule Criteria for RM2 (Whitehaven, 2026d). The contaminated land investigation would assess the site for the presence of contamination with the potential to adversely impact the nominated PMLUs and/or environmental values (Whitehaven, 2026d).

Contaminated land investigations (including investigation, remediation and validation) would 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 (Whitehaven, 2026d). Contaminated and hazardous materials would be remediated *in situ* or removed and disposed of at an approved landfill, with waste tracking information recorded and submitted (Whitehaven, 2026d). A Contaminated Land Auditor would certify that no contamination unsuitable for the nominated PMLUs remains or is occurring (Whitehaven, 2026d).

5.4.6 EARTHWORKS AND LANDFORM RESHAPING

As discussed in PRCP Rev 3, once closure strategies for infrastructure and mine features have been executed and the contaminated land assessment has found no areas containing residual contamination, earthworks and landform reshaping would be undertaken (Whitehaven, 2026d). The objectives of earthworks would be to ensure the surface of waste rock dumps are free draining and do not display surface ponding (Whitehaven, 2026d).

5.4.7 COVER DESIGN

A cover system is required where there is potential for materials to cause AD, NMD and/or SD to ensure contaminants are not released to the receiving environment (DETSI, 2026a).

At the existing BWM, waste rock is placed predominantly in waste rock dumps within the mined-out pits and would continue for the Project (Whitehaven, 2026d). As discussed in Section 5.3.3, Terrenus (2026) found that the vast majority of waste rock produced by the Project would be NAF and would not be enriched in metals or metalloids, meaning it can be considered inert (Appendix I).

Considering the waste materials within the waste rock landforms, the large quantities of inert waste rock and the methods of disposal, Terrenus (2026) concluded that the only specific AMD management measure required is for waste rock to be used with caution near the rehabilitated surface due to its dispersion potential (Appendix I).

Any potentially acid forming or dispersive waste rock would be placed appropriately in the waste rock dumps (i.e. not at the surface) and would not be used in the construction of embankments or cover systems at the BWM, in accordance with the findings of Terrenus (2026) (Appendix I).

As discussed in Section 2.7.4 and 2.7.5, Terrenus (2026) found that approximately half of the tailings generated by the Project are expected to have a moderate to high potential to generate AMD as AD, NMD and/or SD (Appendix I). Therefore, the semi-permanent tailings cells used for the Project would require a cover system designed by an Appropriately Qualified Person in accordance with the relevant milestone criteria in the approved PRCP Schedule.

If any additional cover systems were deemed to be required in the future, appropriate and detailed construction designs would be developed (Whitehaven, 2026d).

5.4.8 REVEGETATION

Revegetation Planning

Progressive rehabilitation would be undertaken throughout the mine life in conformance with planning requirements (Whitehaven, 2020a).

Rehabilitation design incorporates a number of different aspects that are to be included in planning of landforms, including (Whitehaven, 2020a):

- drainage designs to limit erosion from water flow on slopes;
- slope design to maintain stability;
- appropriate ground cover; and
- additional erosional controls, including rock armouring.

Pre-clearing Practices to Support Revegetation

Areas requiring fauna clearance would be inspected by a qualified spotter catcher in accordance with the *BWM Plan – Land and Biodiversity Management Plan* (Whitehaven, 2020b).

The revegetation seed provenance is considered important for all species (Whitehaven, 2025b). Seeds would be sourced as locally as possible from natural populations (Whitehaven, 2025b). Although the local provenance boundary locations may differ between species, seed should ideally be obtained from the Brigalow Belt bioregion (Whitehaven, 2025b).

Proof of provenance would be sought from the seed supplier(s) along with germination and viability certificates and Pure Live Seed results for all purchased seeds (Whitehaven, 2025b).

Soil Stockpiling

All stages of mine planning should incorporate soil stripping (Whitehaven, 2025b). Stripping schedules should incorporate any opportunities for direct return of topsoil onto RAs as this greatly increases rehabilitation success (Whitehaven, 2025b).

There are several soil stockpile management measures presented in *BWM Plan – Topsoil Management Plan* (Whitehaven, 2025b) that would apply to the Project, including:

- A plan should be developed for topsoil collection from different areas such as hillsides and steep slopes.
- Timing of stripping should avoid periods when the soil is either very moist or very dry.
- The topsoil stripping depth for an area should be determined by baseline soil survey.
- Almost all topsoil is valuable for rehabilitation. Where possible, a minimum 200 to 300 millimetres depth should be recovered. Efforts shall be made to recover the maximum depth of topsoil unless site-specific or safety restrictions are present.
- Topsoil should be transferred to suitable rehabilitation sites (directly laid) to avoid the requirement for stockpiling or shall be transported to appropriate topsoil stockpile locations.
- Contaminated topsoil (including weed infested) shall be stockpiled separately and managed appropriately.
- Topsoil stockpile locations should be prioritised in the below order:
    - direct placement onto RAs;
    - stockpiled in strategic locations at the crest of low wall dumps near RAs or slopes;
    - low wall close to toe of dump;
    - low wall in available location(s); then

  - high wall.
- Where direct placement is not possible, topsoil stockpiles should be located where rehandling is not required (e.g. the low wall). Additionally, stockpiles should be in areas that would minimise haulage during the rehabilitation execution.
- Topsoil stockpiles shall be located to avoid:
  - sloped areas (>10%);
  - natural drainage pathways; and
  - traffic routes.
- Topsoil should be stored as low mounds of paddock dumped material and not flat-topped or compacted. The maximum topsoil stockpile height shall be 3 m unless an alternate height is approved. Topsoil stockpiles more than 3 m in height may require additional Permit to Disturb controls, such as ESCs.
- Compaction of topsoil during stockpiling should be minimised. Scrapers should not be used to stockpile topsoil as they compact the soil.
- Consideration should be given to stockpiling subsoil and topsoil separately to avoid contamination, if over stripping is required or permitted. Soil types with significantly different properties should be stockpiled separately.
- The following are not permitted on topsoil stockpiles:
  - light vehicles (unless stockpiling, recovery, sampling or monitoring is occurring/required);
  - any medium or heavy vehicles (unless stockpiling, recovery, sampling or monitoring is occurring/required); or
  - polypipe, parts laydown or any other materials that can contribute to compaction, erosion, vegetation loss or reduce rainfall infiltration.
- If topsoil stockpiles need to be accessed for any reason, approval is required.
- Where necessary, a flow diversion bank or catch drain should be placed up-slope of a stockpile to direct surface water flows away. All stockpiles shall remain in a free-draining location to avoid long-term soil saturation. Stockpile surfaces should be left in a coarsely textured condition to promote infiltration and aeration and to minimise erosion until vegetation is established.
- For historical topsoil stockpiles or stockpiles that have been flat-topped, and compaction is noted, work should be planned for a grader to rip the surface of the topsoil stockpile with its tynes. This can help aerate the soil, promoting infiltration and vegetation growth. Caution must be taken to not concentrate water flow down the batter slopes of the topsoil stockpile from rip lines.
- Where necessary, silt fences or cleared vegetation should be installed around topsoil stockpiles or stripped areas as a form of ESC. Mulch or wood chip from cleared vegetation can also be applied as a veneer over topsoil stockpiles to slow erosion, increase organic matter content, reduce weed establishment and to maintain moisture content.
- Topsoil inventory shall be maintained and should include:
  - date of stockpile formation;
  - volumes and source of measurement (LIDAR/survey);
  - mapped stockpile locations, volume and soil type;
  - annual topsoil reconciliations in Geographic Information System (or relevant system);
  - extent of weed encroachment (if any); and
  - any additional information regarding soil type or testing.

Surface Preparation

Contour deep ripping and seeding would be the predominant method of surface preparation with the use of topsoil or substitute material in some instances (Whitehaven, 2020b). Contour ripping would occur immediately after topsoil application, seeding, and applying fertiliser (if applicable) (Whitehaven, 2020b).

Bushfire Management

Whitehaven Blackwater would aim to maintain vegetation structure and composition in such a way that limits bushfire likelihood and potential intensity, to protect assets and safeguard human life. In addition, the existing BWM includes the presence of four rescue personnel, one paramedic and two fire trucks at all times and this would continue for the Project.

Pest and Weed Management

Weed management is conducted in line with Whitehaven's *WHC QLD Procedure – Weed and Feral Animal Management Protocol* (Whitehaven, 2022b). The occurrence of pest animals is monitored by Whitehaven's Environment and Rehabilitation Department, and control programs are implemented on an as needs basis (Whitehaven, 2022b). Pest management is conducted in consultation with neighbouring landholders and relevant land management authorities (Whitehaven, 2022b).

It is the responsibility of all employees to report weed infestation areas and sighting of feral animals to the Environment and Rehabilitation Department (Whitehaven, 2022b).

Monitoring

In accordance with the PRCP Rev 3 (Whitehaven, 2026d), there are two phases of rehabilitation monitoring undertaken, this is conducted under the *Rehabilitation Monitoring Program – Initial and Major Monitoring Methodology* (Whitehaven, 2023a) which would be utilised for rehabilitation monitoring of the Project:

1. Initial monitoring, undertaken at newly established rehabilitation sites (Year 1 or within 12 months of rehabilitation being completed, and Year 2), to categorise the site, develop baseline data and identify any risks to rehabilitation success.
2. Major monitoring, conducted approximately two years after initial monitoring (Year 3 and Year 5) to provide a detailed assessment of the current state of rehabilitation, and then conducted every five years.

In accordance with Condition E8 of EA EPML00717813, monitoring is undertaken by an appointed qualified person/ecologist on an annual basis for the first three-years to primarily assess the trajectory of rehabilitation as it relates to stability, vegetation establishment and achieving initial surface requirements (Whitehaven, 2026d). 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 (Whitehaven, 2026d).

Additional rehabilitation parameters are included into the monitoring program in Years 3, 5, 10 and five-yearly thereafter, to assess and track the performance of rehabilitation in relation to achievement of surface requirements and achievement of the PMLU to a stable condition (Whitehaven, 2026d). The phased approach of the monitoring program enables regular analysis of rehabilitation monitoring data, including multi-year comparison of trends (Whitehaven, 2026d).

5.5 Post-mining Land Uses and Non-use Management Areas

In-pit waste rock dumps associated with the Project would be rehabilitated in accordance with PRCP Rev 3 (Whitehaven, 2026d).

A cattle grazing PMLU is predominantly planned for lower gradient areas disturbed by mining activities, areas that require shallow rooted species, and areas where significant clearing occurred prior to mining (Whitehaven, 2026d). A woodland habitat PMLU is planned for areas where cattle grazing is unsuitable (e.g. steeper slopes) and for disturbed areas near existing vegetation communities to improve longer term connectivity (Whitehaven, 2026d). A watercourse PMLU is planned for areas where existing watercourses run through the Project and any associated creek diversions (Whitehaven, 2026d).

Residual voids associated with the Project would be designated NUMAs in accordance with Condition E10 of the EA noting that adjacent flood protection landforms are not part of the NUMAs and would be part of the cattle-grazing PMLU.

Proposed RMs for areas of the Project with a PMLU of cattle grazing or woodland habitat are summarised below, and align with PRCP Rev 3 (Whitehaven, 2026d):

- infrastructure decommissioning and removal;
- identification, remediation and removal of contaminated land;
- landform development (re-profiling/reshaping);
- surface preparation;
- revegetation;
- achievement of surface requirements;
- achievement of PMLU to a stable condition; and
- achievement of PMLU water quality.

Proposed Management Milestones for NUMAs associated with the Project are summarised below, and align with PRCP Rev 3 (Whitehaven, 2026d):

- achievement of structural stability;
- installation of cover system;
- achievement of surface requirements; and
- achievement of sufficient improvement.

The proposed PMLUs and NUMAs are illustrated in PRCP Rev 3 (refer Figure 2-19).

5.5.1 JUSTIFICATION

The transitional provisions of the PRCP Guideline allow PMLUs and NUMAs to be transitioned directly from the EA to the PRCP (DETSI, 2026a).

Residual voids would be designated NUMAs in accordance with Condition E10 of the EA. For all other areas, the EA permits the following PMLUs:

- cattle grazing;
- dryland cropping;
- woodland habitat;
- water storage; and
- watercourse.

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

- cattle grazing;
- woodland habitat; and
- watercourse.

The EP Regulation requires that each PMLU:

- is viable, having regard to the use of land in the surrounding region; and
- satisfies at least one of the following:
  - consistency with how the land was used before a mining activity was carried out on the land;
  - consistency with a development approval relating to the land;
  - consistency 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; and/or
  - delivering, or aiming to deliver, a beneficial environmental outcome.

The land uses nominated in Section 5.4 are directly transitioned from the EA. Notwithstanding, they also align with the requirements of the EP Regulation for the following reasons:

- Cattle grazing:
  - this is a viable PMLU that has regard for use of land in the surrounding region, with a significant amount of cattle grazing land in the area; and
  - this PMLU is consistent with how the land was used pre-mining.
- Woodland habitat:
  - this is a viable PMLU that has regard for use of land in the surrounding region, with significant patches of remnant vegetation in the area;
  - this PMLU is consistent with how the land was used pre-mining (and pre-agriculture); and
  - this PMLU aims to deliver a beneficial environmental outcome.

5.6 Rehabilitation Milestones and Completion Criteria

RMs, Management Milestones and Completion Criteria for the Project match those in the BWM PRCP Rev 3 (Whitehaven, 2026d)

5.7 Rehabilitation Schedule

The proposed rehabilitation schedule is detailed in the PRCP Rev 3 Schedule (Whitehaven, 2026d).

The approved rehabilitation schedule would differ from the proposed schedule presented in PRCP Rev 3 as a result of consultation with the DETSI during the approvals process.

6 Summary of Environmental Management Commitments

6.1 General Environmental Protection Commitments

This section provides a summary of the proposed environmental protection commitments for the Project, including mitigation, monitoring, auditing and reporting.

A summary of management, monitoring and reporting commitments for the Project is provided in Table 6-1. In addition to this, a summary of commitments made by Whitehaven Blackwater throughout this EA Amendment Supporting Document is provided in Table 6-1.

The existing environmental management systems at the BWM include environmental management plans and programs that have been developed and implemented since operations commenced. Existing management plans relevant to the Project include but are not limited to[2]:

- *BWM Plan – Air Quality Management Plan* (Whitehaven, 2026c).
- *BWM Plan – Blasting Environmental Management Plan* (Whitehaven, 2026f).
- *BWM Plan – Erosion and Sediment Control Management Plan* (Whitehaven, 2026a).
- *BWM Plan – Firearm Management Plan* (Whitehaven, 2020c).
- *BWM Plan – Land and Biodiversity Management Plan* (Whitehaven, 2020b).
- *BWM Plan – Landfill Management Plan* (Whitehaven, 2018).
- *BWM Plan – Noise Management Plan* (Whitehaven, 2026e).
- *BWM Plan – Rehabilitation Management Plan* (Whitehaven, 2020a).
- *BWM Plan – Waste Management Plan* (Whitehaven, 2021).
- *BWM Plan – Water Management Plan* (Whitehaven, 2026b).
- *BWM Plan – Topsoil Management Plan* (Whitehaven, 2025b).
- CHMA.

Whitehaven Blackwater would continue to implement the existing plans and where necessary, review, revise and build on them.

A summary of these measures and the associated reporting is provided in Table 6-1.

Table 6-1
Summary of Key Management, Monitoring and Reporting Commitments

Key Management, Mitigation or Monitoring Measures for the Project	EA Amendment Supporting Document Section Reference
Land	
– The Project area would be rehabilitated to land suitable for beef cattle grazing, or woodland habitat, consistent with the PMLUs described in the PRCP. – General soil resource management practices would include the stripping and stockpiling of soil resources for use in rehabilitation. – Soil stripping and handling measures would be undertaken in accordance with the *BWM Plan – Topsoil Management Plan* (Whitehaven, 2025b). A soil inventory, consistent with that described in the *BWM Plan – Topsoil Management Plan*, would be maintained for the life of the Project. – ESC works would be conducted in accordance with the current *BWM Plan – Erosion and Sediment Control Management Plan* (Whitehaven, 2026a). The current *BWM Plan – Erosion and Sediment Control Management Plan* would be updated to include the Project. – Progressive rehabilitation of the Project landforms would be undertaken to reduce the contrast between the Project landforms and surrounding environment. – Any potential contamination risks associated with the Notifiable Activities would be managed in accordance with the relevant legislation, guidelines and/or policies. – On-site consumable storage areas would be operated, where applicable, in compliance with the requirements of AS 1940-2017 *The Storage and Handling of Flammable and Combustible Liquids* and AS 2187.1 *Explosives – Storage, Transport and Use – Storage*.	Section 4.1.3

[2] Whitehaven Blackwater took ownership of BWM in 2024, however some of the existing management plans which were developed by BMA (previous owners of the mine) have been re-branded and continue to be used for the existing BWM.

Table 6-1 (Continued)
Summary of Key Management, Monitoring and Reporting Commitments

Key Management, Mitigation or Monitoring Measures for the Project	EA Amendment Supporting Document Section Reference
Surface Water	
– The controlled release of MAW would continue to be restricted by the existing EA release conditions for the duration of the Project. – No specific requirements for sediment basins have been identified. However, there is potential additional sediment dams may be required for the Project associated with disturbance in advance (to the east) of mining operations including infrastructure corridors, pre-stripping and soil stockpiles. – Operational flood levees would be established to provide flood immunity for events up to and including the 0.1% AEP event. Conceptual designs for the temporary operational levees have been prepared by TerraQ (2026). – A clean water drain along the south-eastern side of the future Stewarton Pit extent would be in place during the operational stage of the Project and would also form part of the final landform post-closure. – Whitehaven Blackwater is a participant in the Fitzroy Regional Receiving Environment Monitoring Program. – Surface water quality monitoring of receiving waters would continue to be undertaken in accordance with the requirements of EA EPML00717813. Current monitoring locations are sufficient to cover the any additional disturbance because of the Project. - Contaminant investigation levels in the EA (Table F3) would be amended to align with current DGV's in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018). – The existing *BWM Water Management Plan* (Whitehaven, 2026b) would be updated, as required as mine plans are refined, to reflect any changes to the site WMS and surface water monitoring locations resulting from the Project.	Section 4.2.3
Groundwater	
– A groundwater monitoring network has been established at BWM, which includes groundwater level and water quality monitoring stations within and surrounding the mine site, in accordance with EA EPML00717813. – The Groundwater Assessment recommended five additional monitoring bores are installed in the vicinity of the Project area. – The Groundwater Assessment also proposed that the five additional monitoring bores, in addition to two existing bores, are included in the EA monitoring network to support monitoring associated with the Project. – Groundwater level monitoring would continue to be undertaken at an appropriate frequency (e.g. monthly to quarterly) to establish baseline datasets for groundwater levels in each monitoring bore. – Estimation of groundwater pit inflows would be undertaken routinely in consultation with a suitably qualified person. – Whitehaven Blackwater would continue to report the annual water take of associated water take from ML 1759 and ML 1762 as required for the Project.	Section 4.3.3
Biodiversity	
- Continued implementation of land clearance measures to minimise impacts on fauna. - Implementation of weed hygiene protocols for all vehicles, equipment and materials to be used in areas of native vegetation. - The existing *BWM Plan – Land and Biodiversity Management Plan* (Whitehaven, 2020b) would be updated to include mitigation and species-specific management measures for relevant MNES and MSES species - Continued implementation of invasive plant and animal management in line with *WHC QLD PRO Weed and Feral Management*.	Section 4.4.3

Table 6-1 (Continued)
Summary of Key Management, Monitoring and Reporting Commitments

Key Management, Mitigation or Monitoring Measures for the Project	EA Amendment Supporting Document Section Reference
Biodiversity (Continued)	
- Implementation of bushfire management techniques to maintain vegetation structure and composition. - A Protected Plants Clearing Permit from the DETSI would be required prior to undertaking any clearing (e.g. removing or destroying) of *Solanum elachophyllum*. - Secure and implement biodiversity offsets for significant residual impacts on MNES (Brigalow TEC) (to be addressed through the Project's EPBC Act Referral) and MSES (RE 11.3.1 and *Solanum elachophyllum*).	Section 4.4.3
Air Quality	
- Ongoing implementation of proactive dust mitigation measures would continue to be implemented at the BWM. - Continued implementation of air quality management controls, as currently detailed in the existing *BWM Plan – Air Quality Management Plan* (Whitehaven, 2026c). - For those receptors where it is proposed that potential exceedances would be managed using real-time controls, should monitoring show that these controls are not effective, Whitehaven Blackwater intends to enter commercial agreements (i.e. "Alternative Arrangements" under EA EPML00717813) with these landowners (R20 and R21). - Whitehaven Blackwater intends to enter commercial agreements (i.e. "Alternative Arrangements" under EA EPML00717813) with landowners that may be subject to potential air quality impacts from the Project R5, R6, R7 and R17).	Section 4.5.3
Greenhouse Gas	
- A peer reviewed GMAP has been developed for the Project. - Should the Project be approved, Whitehaven Blackwater would implement abatement of GHG emissions progressively over the life of the BWM, consistent with Australia's emissions reduction requirements as set out under the Safeguard Mechanism and to meet any applicable EA conditions imposed by the Queensland Government. - A Three-Year Action Plan has been developed to align with the current stage of the Project (i.e. environmental approvals) and the information that is presently available for the BWM. The Three-Year Action Plan would be revisited during the course of the Project as the regulatory, operational, technological and commercial context evolves.	Section 4.6.3
Noise and Vibration	
- Implementation of a proactive noise management system that would integrate predictive meteorological forecasting with real time noise monitoring to support day to day operational planning, as well as a TARP. - Continued implementation of noise and vibration management controls, as currently detailed in the *BWM Plan – Noise Management Plan* (Whitehaven, 2026e) and *BWM Plan – Blasting Environmental Management Plan* (Whitehaven, 2026f). - Whitehaven Blackwater intends to enter commercial noise agreements (i.e. "Alternative Arrangements" under EA EPML00717813) with landowners that may be subject to potential noise and blasting impacts from the Project (R03, R04, R05, R06, R07, R13, R17 and R19).	Section 4.7.3
Waste	
- Whitehaven Blackwater would continue to manage the waste produced at the Project in accordance with the waste and resource management hierarchy in the WRR Act (i.e. "avoid, reduce, reuse, recycle, recover, treat and dispose"). - Whitehaven Blackwater would continue to use the existing *BWM Plan – Waste Management Plan* (Whitehaven, 2021) to manage waste generated by the Project.	Section 4.8.3

Table 6-1 (Continued)
Summary of Key Management, Monitoring and Reporting Commitments

Key Management, Mitigation or Monitoring Measures for the Project	EA Amendment Supporting Document Section Reference
Cultural Heritage	
- Continued implementation of existing CHMA with the Ghungalu People and Kangoulu People (representatives of the Gaangalu Nation People). This CHMA would continue to be utilised for the Project. - Whitehaven Blackwater would demonstrate diligence whilst undertaking works within the Project area, particularly during any clearing or construction associated with the Project. - Ground disturbance of new disturbance areas would adhere to the management measures prescribed in the approved CHMA.	Section 4.9.3
Community	
- The Project would continue to operate under Whitehaven's existing Queensland Site Transport and Accommodation Policy. Where eligible, housing may be provided to employees in Blackwater or subsidies for employees who elect to reside within 50 km of Blackwater or in Emerald.	Section 4.10.5

7 Proposed Environmental Authority Condition Amendments

This section provides a description of the proposed amendments to the conditions of EA EPML00717813 and a justification for each amendment proposed.

7.1 ERA 33

ERA 33 – *Crushing, milling, grinding or screening Crushing, grinding, milling or screening more than 5000t of material in a year* is currently permitted on ML 1759.

Additional quarry locations at BWM are proposed to allow for increased efficiency and to optimise mining operations (Section 2.5.5 and Figure 2-12).

An assessment of the potential impacts associated with extending ERA 33 over the additional MLs is described in Section 4.7.2. In summary, the activities are not expected to trigger material increases in air quality and noise impacts.

This EA Amendment application seeks to authorise ERA 33 to extend over six additional MLs, namely ML 1767, ML 1772, ML 1773, ML 1812, ML 1907 and ML 70091 in locations shown on Figure 2-12.

It is proposed that the locations of ERA 33 prescribed in EA EPML00717813 would be updated to allow ERA 33 on the following MLs: ML 1759, ML 1767, ML 1772, ML 1773, ML 1812, ML 1907 and ML 70091.

7.2 EA Condition E23

EA Condition E23 currently states:

> *Mining activities other than the following are prohibited within SA 10 on ML 1759 and SA 7 on ML 1762.*
>
> *(a) detailed resource drilling and infill seismic work;*
>
> *(b) watercourse diversion and associated works as per **Figure 1 (Deep Creek Diversion Staging)**;*
>
> *(c) access track as per **Figure 2 (Access Track on ML1759 [SA10])**; and*
>
> *(d) access roads, fences, above-ground pipelines, low-impact telecommunications facilities, transmission grid works and supply network works, laydown, environmental monitoring, soil testing, and other similar minor disturbance.*

This condition was originally drafted when SA rights were secured for SA 7 on ML 1762 and SA 10 on ML 1759 in 2014 under the MR Act for exploration activities only. A minor amendment to the condition was made subsequently to allow for other minor activities as conditioned in E23. Whitehaven Blackwater now seeks to commence mining in these areas.

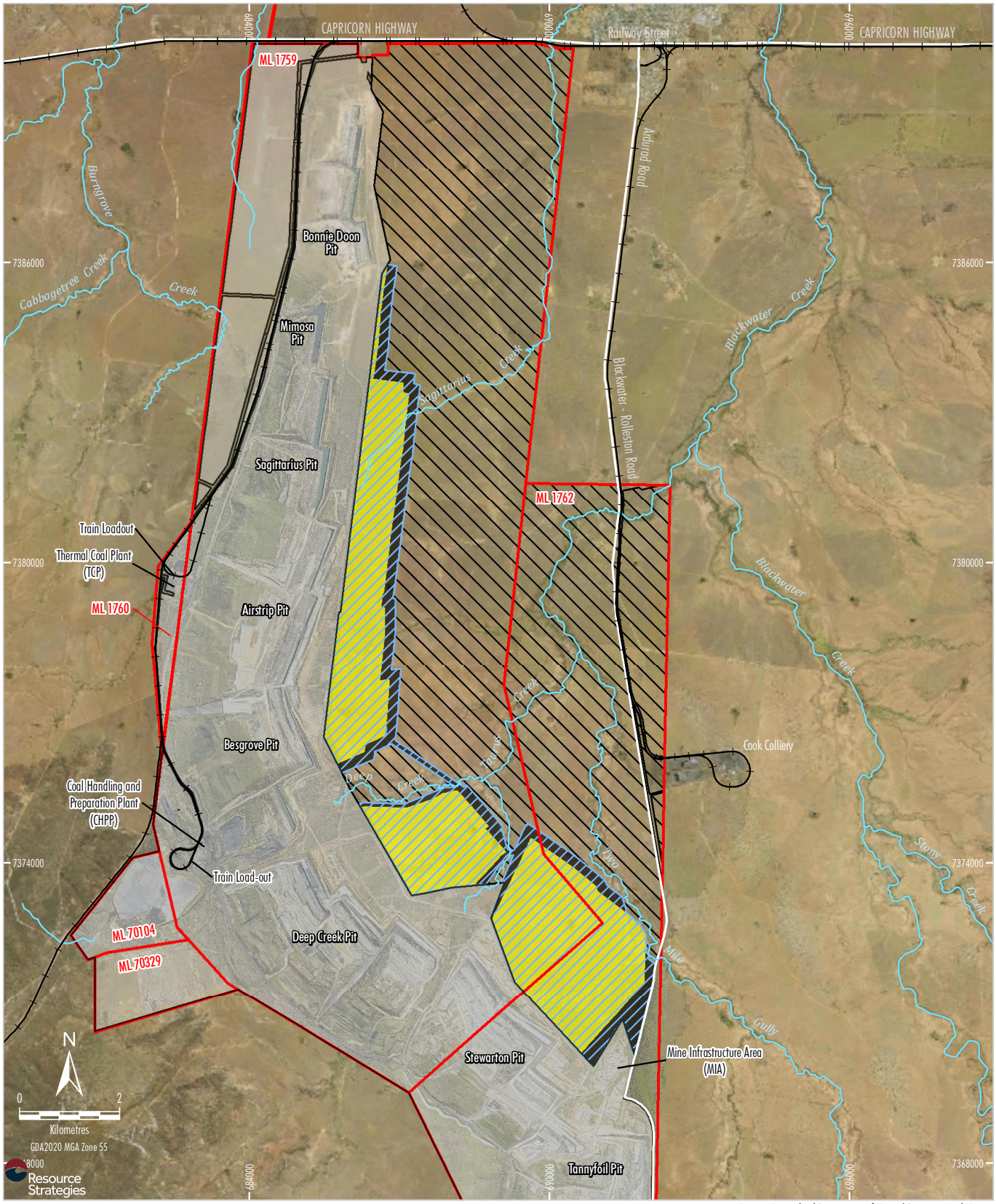
All environmental impacts associated with this proposed condition amendment have been addressed in Section 4 and Appendices A to I.

This EA Amendment application seeks to authorise the extension of open cut mining and related activities to within SA 7 (ML 1762) and SA 10 (ML 1759) under the EP Act.

It is proposed that Condition E23 be amended to be as follows:

> *In SA 7 on ML 1762 and SA 10 on ML 1759, open cut mining activities are authorised within **Area A** as per **Figure 4**. The following activities are authorised within both **Area A** and **Area B** as per **Figure 4**.*
>
> *(a) detailed resource drilling and infill seismic work;*
>
> *(b) watercourse diversion and associated works as per **Figure 1 (Deep Creek Diversion Staging)**;*
>
> *(c) access track as per **Figure 2 (Access Track on ML1759 (SA10)**); and*
>
> *(d) access roads, fences, above-ground pipelines, low-impact telecommunications facilities, transmission grid works and supply network works, laydown, environmental monitoring, soil testing, and other similar minor disturbance.*

A new Figure 4 is proposed to be included in the BWM EA which illustrates the approved Project area (refer Figure 7-1).



Source: Queensland Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (2024); Whitehaven (2025)
Orthophoto: Queensland Department of Resources (2017); Whitehaven (2025)

LEGEND

- Mining Lease
- Railway
- Road
- Watercourse
- Approved Disturbance Footprint

Area A and B
- Area A
- Area B

Project Components[1]
- Proposed Open Cut Extension
- Proposed Infrastructure Area

Note: [1] Excludes some ancillary Project components such as water management, access tracks, topsoil stockpiles, power supply, temporary offices, and other ancillary works and construction disturbance.

Whitehaven

BLACKWATER NORTH EXTENSION PROJECT

SA 7 and SA 10 General Arrangement

Figure 7-1

7.3 EA Condition F5

Whitehaven Blackwater proposes to amend the contaminant investigation levels in the EA (Table F3) to align with current DGVs in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018). The rationale for the adopted WQOs is included in Appendix B, with the revised parameters summarised below:

- Ammonia: reduced from 1,000 µg/L to 720 µg/L.
- Fluoride: reduced 2,000 µg/L to 1,700 µg/L.
- Cadmium: reduced from 5.6 µg/L to 0.2 µg/L.
- Iron: reduced from 1,200 µg/L to 280 µg/L.
- Zinc: reduced from 17 µg/L to 8 µg/L.
- Boron: increased from 370 µg/L to 940 µg/L.

The existing contaminant investigation levels for EC, nitrate, aluminium, selenium, uranium, molybdenum and vanadium are proposed to be retained.

It is proposed that Table F3 be amended to be consistent with Table 7-1.

7.4 EA Condition I5

A groundwater monitoring network has been established at BWM, which includes groundwater level and water quality monitoring stations within and surrounding the mine site, in accordance with EA EPML00717813. The locations of EA groundwater monitoring bores are shown on Figure 4-11.

Appendix C proposes five new monitoring bores and two existing bores for inclusion in the EA monitoring network to support monitoring associated with the Project, as outlined in Table 4-7.

It is proposed Table I1 of the EA be amended to include the additional monitoring bores shown on Table 7-2. Table I2 of the EA would also be updated to include the additional monitoring bores (it is proposed that these bores would be included in the right hand column of this table).

Table 7-1
Release Contaminant Trigger Investigation Levels

Quality Characteristic	Trigger Level (µg/L)	Comment of Trigger Level	Monitoring Frequency
Aluminium	1,014	For aquatic ecosystem protection, based on 80th percentile of background data.	Commencement of release and thereafter weekly during release when safe to do so and access permits.
Cadmium	0.2	For aquatic ecosystem protection, based on ANZG (2018).	
Iron	280	For aquatic ecosystem protection, based on ANZG (2018).	
Zinc	8	For aquatic ecosystem protection, based on ANZG (2018).	
Boron	940	For aquatic ecosystem protection, based on ANZG (2018).	
Molybdenum	34	For aquatic ecosystem protection, based on low reliability guideline.	
Selenium	10	For aquatic ecosystem protection, based on LOR for ICPMS.	
Uranium	1	For aquatic ecosystem protection, based on LOR for ICPMS.	
Vanadium	10	For aquatic ecosystem protection, based on LOR for ICPMS.	
Ammonia	720	For aquatic ecosystem protection, based on ANZG (2018).	
Nitrate	7,600	For aquatic ecosystem protection, based on ambient Qld WQ Guidelines (2006) for TN.	
Petroleum hydrocarbons (C6-C9)	20		
Petroleum hydrocarbons (C10-C36)	100		
Fluoride	1,700	For aquatic ecosystem protection, based on ANZG (2018).	

NOTES:
1. All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered). Trigger levels for metal/metalloids apply if dissolved results exceed trigger.
2. LOR - typical reporting for method stated. ICPMS/CV FIMS - analytical method required to achieve LOR.

Table 7-2
Groundwater Monitoring Locations and Frequency

Monitoring Points	Hydrogeological Unit	Easting (GDA2020)	Northing (GDA2020)	Ground level Surface RL (m)	Screened Interval RL (m)	Monitoring Frequency
Compliance Bores						
Drilling location 3	Aries Seam	687649	7387769	TBC	TBC	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter
Drilling location 4	Aries Seam	688199	7383619	TBC	TBC	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter
Drilling location 5	Burngrove Formation	683969	7390169	TBC	TBC	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter
Drilling location 7	First water	689329	7378809	TBC	TBC	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter
Drilling location 8	First water	690849	7374329	TBC	TBC	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter
MB19BWM06P	Aries Seam	687580	7379296	TBC	TBC	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter
MB19BWM07A	Alluvium	689156	7376707	TBC	TBC	Monthly until Final Contaminant Limits are reflected in EA, then Quarterly thereafter

Note: TBC = to be confirmed.

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TerraQ (2026) *Levee and Flood Protection Landform Concept Design: Blackwater North Extension Project*

Terrenus Earth Sciences (2026) *Geochemical Assessment of Potential Spoil and Coal Reject Materials – Blackwater North Extension Project*

Trancoso, R., McGloin, R., Putland, D., Syktus, J., Ahrens, D., Chapman, S., Owens, D., Toombs, N., Eccles, R. and Zhang, H. (2024) *Queensland Future Climate Services - downscaled CMIP6 climate projections for Queensland's regions and locations*

Transport Authorities Greenhouse Group (2013) *Greenhouse Gas Assessment Workbook for Road Project*

United Nations Framework Convention on Climate Change (2015) *Paris Agreement*

United Nations Framework Convention on Climate Change (2024) *United Nations Framework Convention on Climate Change*

Whitehaven Coal Limited (2018) *BWM Plan – Landfill Management Plan*

Whitehaven Coal Limited (2020a) *BWM Plan – Rehabilitation Management Plan*

Whitehaven Coal Limited (2020b) *BWM Plan – Land and Biodiversity Management Plan*

Whitehaven Coal Limited (2020c) *BWM Plan – Firearm Management Plan*

Whitehaven Coal Limited (2021) *BWM Plan – Waste Management Plan*

Whitehaven Coal Limited (2022b) *WHC QLD Procedure – Weed and Feral Animal Management Protocol*

Whitehaven Coal Limited (2023a) *Rehabilitation Monitoring Program – Initial and Major Monitoring Methodology*

Whitehaven Coal Limited (2024) *Whitehaven QLD Blackwater Mine – Progressive Rehabilitation and Closure Plan – Revision 1*

Whitehaven Coal Limited (2025a) *Whitehaven QLD Blackwater Mine – Progressive Rehabilitation and Closure Plan – Revision 2*

Whitehaven Coal Limited (2025b) *Whitehaven BWM Plan – Topsoil Management Plan*

Whitehaven Coal Limited (2026a) *BWM Plan – Erosion and Sediment Control Management Plan*

Whitehaven Coal Limited (2026b) *BWM Plan – Water Management Plan*

Whitehaven Coal Limited (2026c) *BWM Plan – Air Quality Management Plan*

Whitehaven Coal Limited (2026d) *Whitehaven QLD Blackwater Mine – Progressive Rehabilitation and Closure Plan – Revision 3*

Whitehaven Coal Limited (2026e) *BWM Plan – Noise Management Plan*

Whitehaven Coal Limited (2026f) *BWM Plan – Blasting Environmental Management Plan*

World Business Council for Sustainable Development and World Resources Institute (2024) *Greenhouse Gas Protocol*

WRM Water and Environment Pty Ltd (2026) *Blackwater North Extension Project – Surface Water Assessment*

Whitehaven

Blackwater North Extension Project

Attachment 1
Environmental Protection Act Requirements – Reconciliation Table



Table A-1
Environmental Protection Act – Section 226 Requirements

Section 226, Clause 1 Requirement	EA Amendment Supporting Document Section/Appendix Addressed
(a) be made to the administering authority; and	The Environmental Authority (EA) Amendment Application for the Project will be made to the Department of the Environment, Tourism, Science and Innovation (DETSI).
(b) be in the approved form; and	The EA Amendment Application for the Project will be made using the DETSI form *Application to amend an environmental authority—ESR/2015/1733* and will be supported by this EA Amendment Supporting Document.
(c) be accompanied by the fee prescribed by regulation; and	The EA Amendment Application will be accompanied by the appropriate fee as prescribed the *Environmental Protection Regulation 2019*.
(d) describe the proposed amendment; and	Section 2.
(e) describe the land that will be affected by the proposed amendment; and	Section 4.1.
(f) include any other document relating to the application prescribed by regulation.	This EA Amendment Supporting Document provides a detailed description of the Project, an assessment of the potential environmental impacts of the Project, as well as proposed management measures and mitigation measures.

Table A-2
Environmental Protection Act – Section 226A Requirements

Section 226A, Clause 1 Requirement	EA Amendment Supporting Document Section/Appendix Addressed
(a) describe any development permits in effect under the Planning Act for carrying out the relevant activity for the authority; and	N/A
(b) state whether each relevant activity will, if the amendment is made, comply with the eligibility criteria for the activity; and	N/A
(c) if the application states that each relevant activity will, if the amendment is made, comply with the eligibility criteria for the activity—include a declaration that the statement is correct; and	N/A
(d) state whether the application seeks to change a condition identified in the authority as a standard condition; and	Section 7.
(e) if the application relates to a new relevant resource tenure for the authority that is an exploration permit or GHG permit—state whether the applicant seeks an amended environmental authority that is subject to the standard conditions for the relevant activity or authority, to the extent it relates to the permit; and	N/A
(f) include an assessment of the likely impact of the proposed amendment on the environmental values, including—	Section 4. Appendices A to I. Attachment 4.
(i) a description of the environmental values likely to be affected by the proposed amendment; and	Section 4. Appendices A to I. Attachment 4.
(ii) details of emissions or releases likely to be generated by the proposed amendment; and	Section 4.6. Appendix G.

Table A-2 (Continued)
Environmental Protection Act – Section 226A Requirements

Section 226A, Clause 1 Requirement	EA Amendment Supporting Document Section/Appendix Addressed
(iii) a description of the risk and likely magnitude of impacts on the environmental values; and	Section 4. Appendices A to I. Attachment 4.
(iv) details of the management practices proposed to be implemented to prevent or minimise adverse impacts; and	Section 4 and 6.
(v) if a PRCP schedule does not apply for each relevant activity—details of how the land the subject of the application will be rehabilitated after each relevant activity ends; and	Section 5.
(g) include a description of the proposed measures for minimising and managing waste generated by amendments to the relevant activity; and	Section 2.10 and 4.8.
(h) include details of any site management plan or environmental enforcement order issued under section 362(1) that relates to the land the subject of the application.	Section 4.1.

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Blackwater North Extension Project

Attachment 2
Environmental Impact Statement Triggers



Table B-1
Environmental Impact Statement Triggers

Environmental Impact Statement Trigger	Triggered	Justification
For mines already removing 2–10 million tonnes per year ROM ore or coal, would the application increase the current annual removal rate by more than 100% or 5 million tonnes per year (whichever is the lesser)?	N/A	The run of mine (ROM) coal extraction rate is not increasing and remains unchanged at 19 million tonnes per annum (Mtpa).
For mines already removing over 10 million tonnes per year ROM ore or coal, would the application increase the current annual removal rate by more than 50% or 10 million tonnes per year (whichever is the lesser)?	No	The ROM coal extraction rate is not increasing and remains unchanged at 19 Mtpa.
For mines already removing more than 20 million tonnes per year ROM ore or coal, would the application increase the current annual removal rate by more than 25%?	N/A	The ROM coal extraction rate is not increasing and remains unchanged at 19 Mtpa.
Would the application involve an extension into and significant impact on a Category A or B environmentally sensitive area, which is not already authorised by the State?	No	The Environmentally Sensitive Areas (ESA) mapping tool (DNRMMRRD, 2026b) does not identify any Category A ESA within or in proximity to the broader Study Area, however, it shows Category B ESA within the Project area. Recent ground-truthing of the Regional Ecosystems (REs) within the Study Area by E2M (2026) confirmed the presence of three Endangered RE (classed as Category B ESA) in the Project area (REs 11.3.1, 11.4.9, and 11.9.5) (Figure 4-12 of the Environmental Authority Amendment Supporting Document) (Appendix D). The Project would result in the clearing of approximately 1.21 hectares of remnant Brigalow woodland (RE 11.3.1), based on ground-truthed mapping. The magnitude of impacts on remnant Brigalow Woodland from the Project is 0.0055% of the regional occurrence of RE 11.3.1. An offset would be provided for the Brigalow Woodland under the Queensland Environmental Offsets Policy (DETSI, 2025c) resulting in a greater area of Brigalow conserved.
Would the application involve a substantial change in mining operations—such as from underground to open cut, or (for underground mining) a change in operations from one causing little subsidence to one likely to cause substantial subsidence?	No	The Project does not propose a substantial change in mining operations. The mining method would remain unchanged with proposed extension of open cut mining within Mining Lease (ML) 1759 and ML 1762 consistent with existing operations.
Would the application introduce a novel or unproven resource removal process, technology or activity?	No	The Project would continue to apply drill and blast methods, draglines, dozers and truck and shovel fleet, consistent with existing operations.

Whitehaven

Blackwater North Extension Project

Attachment 3
Consultation – Project Fact Sheet



Whitehaven

FACTSHEET

Blackwater North Extension Project



Whitehaven Coal is currently preparing a Major Environmental Authority (EA) Amendment to extend open cut operations within the northern section of the Blackwater Mine (BWM).

The BWM is an existing, open cut metallurgical coal mine located approximately 20 kilometres south-west of Blackwater in the Bowen Basin, Queensland.

Whitehaven Coal proposes to develop the Blackwater North Extension Project (the Project), which would extend the current open cut mining development at BWM into Surface Area (SA) 7 on Mining Lease (ML) 1762 and SA 10 on ML 1759. The Project is expected to optimise mining operations at BWM and support ongoing employment and economic benefits from the BWM to the local area, region and State of Queensland.

The Project would include the following:

- Extension of open cut operations into SA 7 and SA 10 to allow mining of additional coal reserves to approximately 2055
- Extraction of an additional 200 Mt (approximately) of ROM coal
- Continued extraction of up to 19 Mtpa of ROM coal
- Continued use of existing BWM infrastructure (e.g. coal handling and preparation plant, thermal coal plant, ROM and product coal stockpiles, train load-out, water management, tailings management and other supporting infrastructure)
- Construction and operation of new water management and water storage infrastructure in support of extended mining operations
- Development of an integrated waste rock emplacement landform
- Continued co-disposal of coarse rejects with waste rock and disposal of tailings into an approved tailings storage facility or in-pit void
- Development of decarbonisation opportunities over the life of the Project (e.g. fugitive emissions reduction measures, alternative fuels for mobile fleet)
- Progressive rehabilitation activities of the Project
- Ongoing exploration activities in the Project area
- Other associated infrastructure, equipment and activities.

Community and Stakeholder Engagement

The Project will be considered under the Queensland Government's Major EA Amendment Application process.

Whitehaven Coal is committed to ongoing, comprehensive engagement with the community and stakeholders throughout the process. This includes neighbours, local community members and the Aboriginal community, the Central Highlands Regional Council and relevant government agencies as part of the Department of the Environment, Tourism, Science and Innovation's (DETSI) requirements.

The Project Major EA Amendment will be placed on public exhibition by the DETSI, which will provide further opportunities for questions and issues to be raised and addressed.

Approval Timeline

Lodgement of Application for Decision on Whether an EIS Would be Required

▼

Confirmation on approval process being a Major EA Amendment

▼

Major EA Amendment development

▼

Major EA Amendment submission

▼

Submission of a Progressive Rehabilitation and Closure Plan (PRCP) Change Application to support the Project

▼

DETSI reviews the Major EA Amendment and PRCP and prepares for public exhibition

▼

Major EA Amendment and PRCP placed on public exhibition for comment

▼

Whitehaven responds to submissions

▼

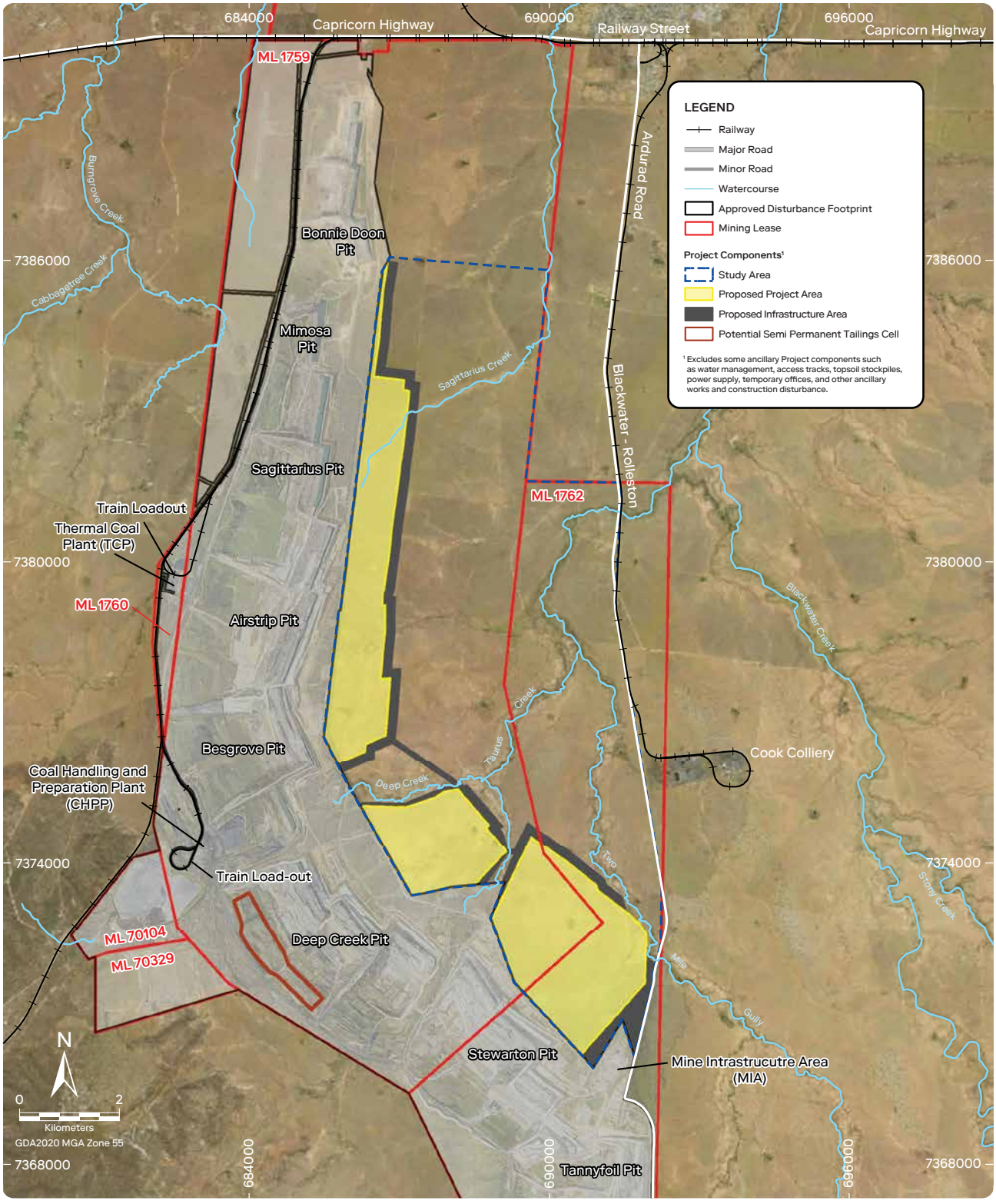
DETSI assesses the Major EA Amendment and PRCP, submissions and Whitehaven responses

▼

Project approval

For further information please visit **whitehavencoal.com**

FIGURE 1: PROPOSED SITE DESIGN



Whitehaven

Contact

If you would like to discuss the Blackwater North Extenstion Project, or any other matters relevant to Whitehaven or the Blackwater Mine, please reach out to us through the following channels:

Via email: community@whitehavencoal.com.au
Via phone: 1800 WHAVEN (1800 942 836)
Via post: Blackwater Mine, Private Mail Bag, Ardurad Road, Blackwater Qld 4717

Whitehaven

Blackwater North Extension Project

Attachment 4
Groundwater Assessment Peer Review



HydroAlgorithmics Pty Ltd ● ABN 25 163 284 991
PO Box 241, Gerringong NSW 2534. Phone: +61(0)424 183 495

noel.merrick@hydroalgorithmics.com

DATE: 17 April 2026

TO: Whitehaven Blackwater Pty Ltd
Level 31, 12 Creek Street
Brisbane QLD 4000

FROM: Dr Noel Merrick

RE: Blackwater North Extension Project – Groundwater Peer Review

YOUR REF: PO 00106607

OUR REF: HA2026/8

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1. Introduction

This report provides a peer review of the Groundwater Impact Assessment (GIA) and associated modelling for the Blackwater North Extension Project (the Project), extending mining into Surface Area (SA) 10 on ML1759 and SA7 on ML1762 (see **Figure 1**). The GIA has been prepared by SLR Consulting Australia Pty Ltd (SLR) for the client Whitehaven Blackwater Pty Ltd (Whitehaven Blackwater). The Blackwater Mine (BWM) has a number of open cut pits which produce metallurgical and thermal coal. The Project is located within the Bowen Basin, Queensland, about 25 kilometers (km) south of the township of Blackwater, and about 75 km east of Emerald.

The main elements of the Project that are relevant to groundwater assessment are:

- Life of Project approximately 30 years (to 2055).
- Mining of the Aries (Top), Castor (Middle) and Pollux (Lower) seams in the Rangal Coal Measures.
- Co-disposal of coarse rejects with waste rock and disposal of tailings into an approved tailings storage facility or in-pit void.
- Five resultant final voids in the vicinity of the Project (see **Figure 1**).
- Several surrounding open cut and underground coal mines to the north and south, including other pits at the BWM.

The Project is based on an extension of existing BWM mining downdip to the east. Mining is to run approximately parallel to Blackwater Creek, at distances of about 6 km, but no alluvium will be intercepted.

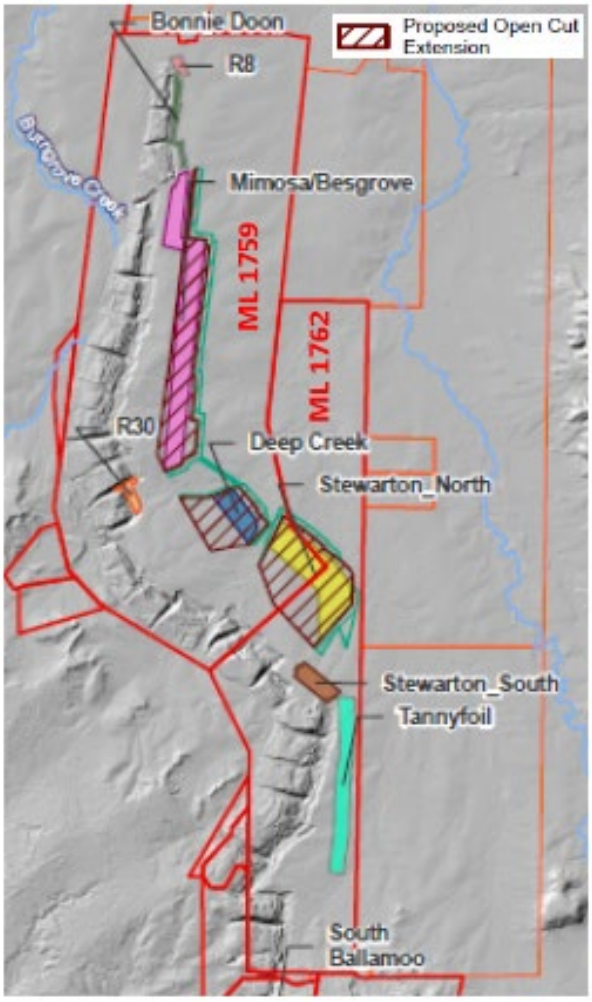


Figure 1. Final voids resulting from proposed open cut extension

2. Documentation

The review is based on the following report:

1. SLR, 2026, Blackwater North Extension Project – Groundwater Impact Assessment. Report 640.031809.00001-R01-V4.0_09042026 Revision V4.0 prepared for Whitehaven, 9 April 2026. 165p (main) + 2 Appendices.

Groundwater modelling details are in Appendix B of Document #1:

2. SLR, 2026, Blackwater North Extension Project – Groundwater Modelling Technical Report. Appendix B, 640.031809.00001-R02-V3.0_20260409 Revision V3.0 prepared for Whitehaven, 9 April 2026. 100 + 6 Appendices.

Document #1 has the following major sections:

1. Introduction
2. Legislative Requirements and Relevant Guidelines
3. Existing Conditions

4. Geology
5. Hydrogeology
6. Numerical Modelling
7. Potential Impacts on Groundwater Resources
8. Management and Mitigation Measures
9. References.

The Appendices are:

A. 80th Percentile Summary Statistics and Comparison to Guideline Values (BWM EA Bores)
B. Groundwater Modelling Technical Report.

Document #2 is structured as follows:

1. Introduction
2. Model Construction
3. Calibration
4. Predictive Modelling – Mining Period
5. Predictive Modelling – Post Mining
6. Sensitivity Analysis
7. Uncertainty Analysis
8. Model Confidence and Limitations
9. References.

The Appendices are:

A. Calibration Residuals
B. Calibration Hydrographs
C. Predictive Period Timing
D. Sensitivity Analysis Plots
E. Parameter Distribution Plots for Sampled Prior and Calibrated Ensemble
F. Uncertainty in 1 m Drawdown Contours.

3. Review Methodology

While there are no standard procedures for peer reviews of entire groundwater assessments, there are two accepted guides to the review of groundwater models: the Murray-Darling Basin Commission – *Groundwater Flow Modelling Guideline* (MDBC Guideline)[1], issued in 2001, and the *Australian groundwater modelling guidelines* issued by the National Water Commission (NWC Guidelines)[2] in June 2012. Both guides also offer techniques for reviewing the non-modelling components of a groundwater impact assessment.

The NWC Guidelines were built upon the original MDBC Guideline, with substantial consistency in the model conceptualisation, design, construction and calibration principles, and the performance and review criteria, although there are differences in details.

The NWC Guidelines promote the concept of "model confidence level", which is defined using a number of criteria that relate to data availability, calibration, and prediction scenarios. The NWC Guidelines are almost silent on coal mine modelling and offer no direction on best practice

[1] Middlemis, H., Merrick, N. and Ross, J. (2001). *Murray-Darling Basin Commission – Groundwater flow modelling guideline*.
[2] Barnett, B, Townley, L.R., Post, V., Evans, R.E., Hunt, R.J., Peeters, L., Richardson, S., Werner, A.D., Knapton, A. and Boronkay, A. (2012). *Australian Groundwater Modelling Guidelines*. Waterlines report 82, National Water Commission, Canberra.

methodology for such applications. There is, however, an expectation of more effort in uncertainty analysis, although the NWC Guidelines are not prescriptive as to which methodology should be adopted.

The guideline *Uncertainty Analysis—Guidance for groundwater modelling within a risk management framework* was issued by the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC Guidelines) in December 2018[3]. A revision was issued in July 2023 with less emphasis on checklists and more emphasis on *fitness for purpose* based on usability, reliability and feasibility. *The Information Guidelines Explanatory Note: Uncertainty analysis for groundwater modelling* (IESC Explanatory Note)[4] recommended against continued use of the NWC Guidelines confidence level as a measure of fitness for purpose and also expunged the previous "fatal flaws checklist" in the IESC Guidelines.

The groundwater guides include useful checklists for peer review. This groundwater assessment has been reviewed according to the 137-question Review Checklist in the NWC Guidelines. This checklist has questions on (1) Planning; (2) Conceptualisation; (3) Design and construction; (4) Calibration and sensitivity; (5) Prediction; (6) Uncertainty; (7) Solute transport[5]; and (8) Surface water-groundwater interaction.

This review has been conducted progressively through attendance at three video-conference workshops with SLR and Whitehaven Blackwater at key GIA project milestones, and review of slideshow presentations and progress reports. After each meeting/report, a log of issues was prepared and updated for consideration in the preparation of the final GIA report. All issues have been addressed satisfactorily. Video-conference meetings were held on the following dates: 10 July 2025, 28 January 2026 and 6 February 2026.

4. Checklist

A detailed checklist assessment based on the NWC Guidelines is provided in **Table 1**, excluding the inapplicable *Solute transport* set of questions.

Supplementary comments are offered in Sections 5, 6 and 7.

[3] Middlemis H and Peeters LJM (2018). *Uncertainty analysis—Guidance for groundwater modelling within a risk management framework*. A report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of the Environment and Energy, Commonwealth of Australia 2018.

[4] Peeters LJM and Middlemis H (2023). *Information Guidelines Explanatory Note: Uncertainty analysis for groundwater modelling*. A report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of Climate Change, Energy, the Environment and Water, Commonwealth of Australia 2023.

[5] Not relevant to this assessment (15 questions).

Table 1: Review checklist (NWC Guidelines)

		Main Report [Doc #1]
		Modelling Technical Report [Doc #2]
Review questions	*Yes/No*	*Comment*
1. Planning		
1.1 Are the project objectives stated?	Y	Section 1.3 (14 scope items).
1.2 Are the model objectives stated?	Y	Section 1.3 (5 tasks). .
1.3 Is it clear how the model will contribute to meeting the project objectives?	Y	Articulated in Appendix B of main report.
1.4 Is a groundwater model the best option to address the project and model objectives?	Y	No real alternative.
1.5 Is the target model confidence-level classification stated and justified?	N/A	The 2023 UA Guide recommends discontinuation of this feature.
1.6 Are the planned limitations and exclusions of the model stated?	Y	Table 8-1. Thorough analysis of shortcomings and suggestions for future improvements.
2. Conceptualisation		
2.1 Has a literature review been completed, including examination of prior investigations?	Y	Substantial reference list.
2.2 Is the aquifer system adequately described?	Y	Good coverage of solid geology and surface geology; one cross-section.
2.2.1 hydrostratigraphy including aquifer type (porous, fractured rock ...)	Y	One west-east cross-section (Figure 4-3). Each stratigraphic unit is described in terms of groundwater potential.
2.2.2 lateral extent, boundaries and significant internal features such as faults and regional folds	Y	The groundwater system is bounded regionally by basement outcrop (west) and a major fault (east). Many minor local faults suggest potential for compartmentalisation.
2.2.3 aquifer geometry including layer elevations and thicknesses	Y	Accommodated within the numerical model. Average thicknesses are tabulated. No structure contours or isopach maps.
2.2.4 confined or unconfined flow and the variation of these conditions in space and time?	Y	Some perching. Unconfined or confined conditions are self-evident. Potentiometric levels and vertical gradients are discussed.
2.3 Have data on groundwater stresses been collected and analysed?	Y	Rainfall, ET and creek stages.
2.3.1 recharge from rainfall, irrigation, floods, lakes	Y	Use of AWRA deep drainage. Use of CRD. No need for irrigation or floods or lakes (except dams and TSFs).
2.3.2 river or lake stage heights	Y	Ephemeral, with intermittent seepage but not perennial baseflow. All watercourses have zero stage.
2.3.3 groundwater usage (pumping, returns etc)	Y	Bore census (EMM, 2019) and database search.

Table 1: Review checklist (NWC Guidelines)

		Main Report [Doc #1]
		Modelling Technical Report [Doc #2]
Review questions	*Yes/No*	*Comment*
2.3.4 evapotranspiration	Y	SILO estimate (Table 3-1; Figure 3-2). Extinction depths subject to calibration; range 0.5-15 m.
2.3.5 other?	Y	Limited estimates of historical mine inflow rates; said to typically 2.25 ML/day (Engeny, 2025).
2.4 Have groundwater level observations been collected and analysed?	Y	Substantial monitoring network: 21 EA monitoring bores. Figure 5-1. Overall 144 bores + 4 VWPs.
2.4.1 selection of representative bore hydrographs	Y	All are discussed, per stratigraphic unit.
2.4.2 comparison of hydrographs	Y	Hydrographs are stacked and compared with CRD for assessment of rainfall influence. VWP hydrographs: Figs. 5-23 & 5-24. Stacked standpipe bores: Table 5-13, consistent upwards gradient from the coal seams into the Rewan Group.
2.4.3 effect of stresses on hydrographs	Y	Proximity of mining or storages is noted in text.
2.4.4 watertable maps/piezometric surfaces?	Y	Aries Seam only, including pit water levels (Figure 5-20). Alluvium is generally dry.
2.4.5 If relevant, are density and barometric effects taken into account in the interpretation of groundwater head and flow data?	N/A	
2.5 Have flow observations been collected and analysed?	Y	Historical mine inflow is used for *ad hoc* calibration control.
2.5.1 baseflow in rivers	N	No gauge data is supplied. No regular baseflow is expected in ephemeral streams.
2.5.2 discharge in springs	N/A	
2.5.3 location of diffuse discharge areas?	N/A	
2.6 Is the measurement error or data uncertainty reported?	OK	Table 8-1. Not quantitative.
2.6.1 measurement error for directly measured quantities (e.g. piezometric level, concentration, flows)	N (piezo level) Y (concentration, flow)	OK for water quality limits of resolution (that is, laboratory detectable limits).
2.6.2 spatial variability/heterogeneity of parameters	OK	Section 5.2 shows wide range in hydraulic properties collected by others, but not mapped spatially. Assumed depth dependence.
2.6.3 interpolation algorithm(s) and uncertainty of gridded data?	N	Assumed kriging (of minor importance).
2.7 Have consistent data units and geometric datum been used?	Y	
2.8 Is there a clear description of the conceptual model?	Y	Section 5.6

Table 1: Review checklist (NWC Guidelines)

		Main Report [Doc #1]
		Modelling Technical Report [Doc #2]
Review questions	*Yes/No*	*Comment*
2.8.1 Is there a graphical representation of the conceptual model?	Y	Figure 5-36: current and proposed mining extents. Ecohydrological model: Figure 5-37.
2.8.2 Is the conceptual model based on all available, relevant data?	Y	Includes water quality analysis to infer low recharge rates. Limited consideration of depth to water.
2.9 Is the conceptual model consistent with the model objectives and target model confidence level classification?	Y	Consistent with Class 2 target and model objectives. The 2023 UA Guide recommends discontinuation of confidence level classification.
2.9.1 Are the relevant processes identified?	Y	The conceptual model diagram (Fig.5-36) indicates major recharge/discharge processes and the direction(s) of creek/groundwater interaction.
2.9.2 Is justification provided for omission or simplification of processes?	Y	All described physical processes will carry across to the numerical model other than perching. CSG is excluded, given its relative unimportance due to distance of active operations.
2.10 Have alternative conceptual models been investigated?	N	Not warranted, as only one numerical model should be built.
3. Design and construction		
3.1 Is the design consistent with the conceptual model?	Y	Key processes are included.
3.2 Is the choice of numerical method and software appropriate?	Y	MODFLOW-USG + AlgoMesh + PESTPP-IES.
3.2.1 Are the numerical and discretisation methods appropriate?	Y	Voronoi grid for internal spatial detail. Temporal periods are appropriate – quarterly (to Dec.2024) for calibration; yearly for prediction.
3.2.2 Is the software reputable?	Y	State-of-art.
3.2.3 Is the software included in the archive or are references to the software provided?	OK	References are provided and are readily accessible. AlgoMesh is proprietary.
3.3 Are the spatial domain and discretisation appropriate?	Y	Total 0.82 million cells (moderate to large size).
3.3.1 1D/2D/3D	-	3D.
3.3.2 lateral extent	-	About 57 km (max) x 93 km.
3.3.3 layer geometry?	-	17 layers (with pinchouts).
3.3.4 Is the horizontal discretisation appropriate for the objectives, problem setting, conceptual model and target confidence level classification?	Y	Min 50 m cell size. Features detailed at 50, 100, 150 and 200 m.
3.3.5 Is the vertical discretisation appropriate? Are aquitards divided in multiple layers to model time lags of propagation of responses in the vertical direction?	Y N	17 layers. Separate layers for 4 coal seams in Rangal Coal Measures: Aries, Castor, Pollux, Orion. Aquitards are individual layers – a common pragmatic compromise with many layers.

Table 1: Review checklist (NWC Guidelines)

		Main Report [Doc #1]
		Modelling Technical Report [Doc #2]
Review questions	*Yes/No*	*Comment*
3.4 Are the temporal domain and discretisation appropriate?	Y	
3.4.1 steady state or transient		Both
3.4.2 stress periods	Y	1 SP for warm-up (4 yrs 1966-1969); 4 SP for historical (1970-2004); 80 SP for calibration (qtly Jan.2005-Dec.2024); 69 SP for prediction (annual Jan.2025-Dec.2093); 35 SP post-mining (to Dec.4040). Stress periods are suitable.
3.4.3 time steps?	Y	Model uses ATS (S2.4) – automatic time stepping – to set dynamic time steps.
3.5 Are the boundary conditions plausible and sufficiently unrestrictive?	Y	Extended openly to north and south. Limited to east and west due to basement outcrop (west) and barrier fault (east) – forces narrowing to north (~20 km wide). GHB on all edges. Rainfall recharge seasonality is included: quarterly averages of AWRA-L sequence – Australian Landscape Water Balance model.
3.5.1 Is the implementation of boundary conditions consistent with the conceptual model?	Y	Matches geology.
3.5.2 Are the boundary conditions chosen to have a minimal impact on key model outcomes? How is this ascertained?	Y	Sufficiently distant for incremental Project effects – other than natural narrowing to the north.
3.5.3 Is the calculation of diffuse recharge consistent with model objectives and confidence level?	Y	4 zones based on lithology.
3.5.4 Are lateral boundaries time-invariant?	Y	Time-invariant GHB on all edges.
3.6 Are the initial conditions appropriate?	Y	Based on steady-state 1969.
3.6.1 Are the initial heads based on interpolation or on groundwater modelling?	-	Model.
3.6.2 Is the effect of initial conditions on key model outcomes assessed?	N	But buffeted by intervening warm-up period.
3.6.3 How is the initial concentration of solutes obtained (when relevant)?	N/A	
3.7 Is the numerical solution of the model adequate?	Y	Zero mass balance errors.
3.7.1 Solution method/solver	-	USG solver and options are not stated.
3.7.2 Convergence criteria	-	Mass discrepancy 0.03% to 0.45% (max).
3.7.3 Numerical precision	-	Assumed single.
4. Calibration and sensitivity		**2005-2024**
4.1 Are all available types of observations used for calibration?	Y	Heads and drawdowns quantitatively.

Table 1: Review checklist (NWC Guidelines)

		Main Report [Doc #1]
		Modelling Technical Report [Doc #2]
Review questions	*Yes/No*	*Comment*
4.1.1 Groundwater head data	Y	108 initial target heads at 108 bores. 1,681 drawdown observations at 107 bores. Targets within 12 of 17 layers, indicating good depth coverage. None in local alluvium (dry where drilled).
4.1.2 Flux observations	Y	Minimal reliance on AWT reports (Engeny, 2025).
4.1.3 Other: environmental tracers, gradients, age, temperature, concentrations etc.	N	No explicit use of horizontal or vertical gradients for calibration. No statement on consistency of predicted vertical gradients but Appendix B shows good absolute levels at VWP hydrographs for 19BWM01 and 19BWM02, but poor at 19BWM04.
4.2 Does the calibration methodology conform to best practice?	Y	PEST++, PESTPP-IES and manual. Ensemble of 75 calibrated realisations (from pool of 500).
4.2.1 Parameterisation	-	Laterally heterogeneous in layers 1-3 (using extensive pilot points). Vertical depth functions in layers 4-17 result in some lateral variability.
4.2.2 Objective function	Y	PEST phi (sum of squares) ensemble 259,576 m^2 ± 10% approx. Best 242,581 $m^{2.}$.
4.2.3 Identifiability of parameters	Y	Type I-IV analysis in Section 6.3.3.
4.2.4 Which methodology is used for model calibration?		PEST++, PESTPP-IES and manual.
4.3 Is a sensitivity of key model outcomes assessed against?	Y	Section 6.0.
4.3.1 parameters	Y	Kx, Kz, Sy, riverbed Kz.
4.3.2 boundary conditions	N	*Not essential.*
4.3.3 initial conditions	N	*Not essential.*
4.3.4 stresses	Y	Recharge, ET rate, ET depth.
4.4 Have the calibration results been adequately reported?	Y	Section 3.3. Scatter plot Fig.3-1.
4.4.1 Are there graphs showing modelled and observed hydrographs at an appropriate scale?	Y	Section 3.3.2. Figures 3-4 (alluvium & regolith), 3-5 (interburden), 3-6 and 3-7 (coal seams) for 9 sites. All sites shown in Appendix B.
4.4.2 Is it clear whether observed or assumed vertical head gradients have been replicated by the model?	Y	Appendix B: Three sets of VWP plots – one good (19BWM01), one very good (19BWM02), one poor (19BWM04).
4.4.3 Are calibration statistics reported and illustrated in a reasonable manner?	Y	Table 3-3, key statistics best 6.6% SRMS (range 6.6-7.4%), best 11.6 mRMS (range 11.6-13.1 m).
4.5 Are multiple methods of plotting calibration results used to highlight goodness of fit robustly? Is the model sufficiently calibrated?	Y	Scattergram Figure 3-1 – tightly bound; linear over a wide range of elevations (~190 m). No apparent overall bias to underestimation or overestimation. Histogram (Figure 3-2) suggests tendency to underprediction except for regolith and basement.

Table 1: Review checklist (NWC Guidelines)

		Main Report [Doc #1]
		Modelling Technical Report [Doc #2]
Review questions	*Yes/No*	*Comment*
4.5.1 spatially	Y	Residuals by layer (Table 3-4). Average residual spatial map (Fig.3-3) and Appendix A table. The map has coincident blue & red dots, so impossible to match all data; underprediction and overprediction at the same spot in different bores.
4.5.2 temporally	Y	Figures 3-4 to 3-7; Appendix B.
4.6 Are the calibrated parameters plausible?	Y	Section 3.4.2. Tables 3-7 to 3-12 (ensemble results). Recharge rates are plausible (0.1-1% of rainfall) though higher for weathered Permian (4%); spoil 3%. Hydraulic conductivities cover expected ranges. Ss reasonable. Sy values are consistent with OGIA Surat model: 0.3-3% in Triassic; 2-3% Permian; 3-5% alluvium, weathered and Tertiary. ET depths 4-13 m (sensible).
4.7 Are the water volumes and fluxes in the water balance realistic?	N	Table 3-6: Magnitude 10 ML/day average mine inflow across calibration period. Not consistent with previous AWL reports (3.6-5.1 ML/day) for ML1759, ML1762, ML1862, ML1792, ML1767 and ML1907 over 4 years.
4.8 has the model been verified?	N	No data have been withheld from calibration – normal practice.
5. Prediction		**2025-2093**
5.1 Are the model predictions designed in a manner that meets the model objectives?	Y	• *"Assess the groundwater inflow to the mine workings as a function of mine position and timing.* • *Simulate the extent of maximum groundwater drawdown/depressurisation due to the Project and also with respect to cumulative impacts.* • *Simulate and predict the change in groundwater levels at identified groundwater users (i.e. registered bores, landholder bores and groundwater dependent ecosystems [GDEs]) due to the Project and also with respect to cumulative impacts.* • *Simulate the direct and indirect take of groundwater and surface water (baseflow) due to the Project.* • *Simulate the long-term impacts in the post-mining environment utilising the proposed final landform and void lakes."* All objectives are able to be assessed by the model design.
5.2 Is predictive uncertainty acknowledged and addressed?	Y	In Section 7.
5.3 Are the assumed climatic stresses appropriate?	OK	Normal practice is long-term average (no seasonality).
5.4 Is a null scenario defined?	Y	
5.5 Are the scenarios defined in accordance with the model objectives and confidence level classification?	Y	With and without Project including cumulative effects. Compared with null case.

Table 1: Review checklist (NWC Guidelines)

		Main Report [Doc #1]
		Modelling Technical Report [Doc #2]
Review questions	*Yes/No*	*Comment*
5.5.1 Are the pumping stresses similar in magnitude to those of the calibrated model? If not, is there reference to the associated reduction in model confidence?	Y	Continuation of mining.
5.5.2 Are well losses accounted for when estimating maximum pumping rates per well?	N/A	
5.5.3 Is the temporal scale of the predictions commensurate with the calibrated model? If not, is there reference to the associated reduction in model confidence?	Y	Calibration: quarterly. Prediction: annual to 2093. Recovery: 1, 5, 50, 50 + years (out to 1947 years).
5.5.4 Are the assumed stresses and timescale appropriate for the stated objectives?	Y	
5.6 Do the prediction results meet the stated objectives?	Y	The five stated objectives at Q5.1 are assessed.
5.7 Are the components of the predicted mass balance realistic?	Not all	In Section 4.2 for prediction period: Tables 4-1, 4-2, 4-3 for cumulative to approved to null. The approved and cumulative cases have different overall net storage behaviour: approved loses 2.6 ML/day; cumulative gains 0.5 ML/day, probably due to extra spoil recharge. Mine inflow increases from 11.8 to 14.5 ML/day; not reality checked against historical takes.
5.7.1 Are the pumping rates assigned in the input files equal to the modelled pumping rates?	N/A	
5.7.2 Does predicted seepage to or from a river exceed measured or expected river flow?	N	Negligible baseflow to Blackwater Creek for all scenarios: 0.02 ML/day.
5.7.3 Are there any anomalous boundary fluxes due to superposition of head dependent sinks (e.g. evapotranspiration) on head-dependent boundary cells (Type 1 or 3 boundary conditions)?	N	Not evident. Care has been taken to avoid coincident BCs.
5.7.4 Is diffuse recharge from rainfall smaller than rainfall?	Y	Percentage << 100%.
5.7.5 Are model storage changes dominated by anomalous head increases in isolated cells that receive recharge?	N	Not evident.
5.8 Has particle tracking been considered as an alternative to solute transport modelling?	Y	Section 5.3
6. Uncertainty		

Table 1: Review checklist (NWC Guidelines)

		Main Report [Doc #1]
		Modelling Technical Report [Doc #2]
Review questions	*Yes/No*	*Comment*
6.1 Is some qualitative or quantitative measure of uncertainty associated with the prediction reported together with the prediction?	Y	Qualitative in Table 8-1. Quantitative stochastic analysis in Section 7.
6.2 Is the model with minimum prediction-error variance chosen for each prediction?	Y	Termed "Best Calibrated Model"(BCM). Proof of convergence in Figures 7-1 (alluvium take) and 7-2 (pit inflow).
6.3 Are the sources of uncertainty discussed?	Y	Quantified by Type I – Type IV analysis.
6.3.1 measurement of uncertainty of observations and parameters	Y	Parameters, not observations – but QA performed.
6.3.2 structural or model uncertainty	Y	Discussed in Table 8-1. Normal practice is to implement a single model geometry
6.4 Is the approach to estimation of uncertainty described and appropriate?	Y	Robust and extensive. Prior/posterior comparison in Appendix E – good agreement.
6.5 Are there useful depictions of uncertainty?	Y	Compliant with IESC Guidelines. Figure 7-3: mine inflow (large range); Figure 7-4 and Figure 7.5: alluvium take; Figure 7-6: baseflow loss. Appendix F: 1 m drawdown extents.
7. Solute transport	N/A	
8. Surface water–groundwater interaction		
8.1 Is the conceptualisation of surface water–groundwater interaction in accordance with the model objectives?	Y	A model objective was to *"Simulate the direct and indirect take of groundwater and surface water (baseflow) due to the Project."* Potential for baseflow loss is assessed as negligible.
8.2 Is the implementation of surface water–groundwater interaction appropriate?	Y	RIV for Blackwater Creek and all other creeks with zero stage (=DRN). Ephemeral watercourses are difficult to represent in a groundwater model, especially in predictive mode.
8.3 Is the groundwater model coupled with a surface water model?	Loosely	Separate models coupled for final void recovery. Iterative exchange of model outputs until convergence of groundwater discharge to the voids.
8.3.1 Is the adopted approach appropriate?	Y	Groundwater discharge rates from groundwater model to surface water model. Final void water level(t) from surface water model (including climate change) to groundwater model. Implemented as CHD(t) across 5 final voids in MLs 1759 and 1762.
8.3.2 Have appropriate time steps and stress periods been adopted?	N/A	

Table 1: Review checklist (NWC Guidelines)

		Main Report [Doc #1]
		Modelling Technical Report [Doc #2]
Review questions	*Yes/No*	*Comment*
8.3.3 Are the interface fluxes consistent between the groundwater and surface water models?	Y	Iterated until matching.

5. Report Matters

The GIA report (Document #1) is a high-quality document of about 165 pages length, with additional material on groundwater quality in Appendix A. A separate numerical Groundwater Modelling Technical Report (Document #2) forms Appendix B and occupies another 100 pages plus six Appendices.

The main report is well-structured, well-written and the graphics are of high quality and designed to ease understanding by readers. The report serves well as a standalone document, with no undue dependence on earlier work. However, the report is missing an Executive Summary and a Conclusions section. Normally, there would be a summary of the findings of the groundwater impact assessment in terms of meeting the Project objectives. These objectives are expressed in Section 1.3 as a set of 14 tasks that aim to satisfy the scope of work. Although not addressed point by point, I consider the objectives to have been met satisfactorily.

The Groundwater Modelling Technical Report (Document #2) includes a Conclusions chapter which addresses satisfaction of the modelling objectives. Document #2 includes six Appendices that contain information on calibration residuals, hydrograph comparisons, simulation timing, prior and posterior distributions for the uncertainty analysis, and 1 m drawdown contour maps. This report is structured appropriately with sufficient detail and disclosure of methods and results. It is not intended as a standalone report because some key information (e.g. field investigations and cause-and-effect analysis) is reported only in Document #1.

Progressive review comments on factual and editorial matters, on both reports, were provided by the reviewer in a log of issues spreadsheet. These comments have been considered by SLR and have been accommodated satisfactorily in revisions of the reports.

The modelling objectives are itemised in Section 6.2 of the main report, and in Section 1.3 of the technical appendix, in the form of five dot points:

- “Assess the groundwater inflow to the mine workings as a function of mine position and timing.
- Simulate the extent of maximum groundwater drawdown/depressurisation due to the Project and also with respect of cumulative impacts.
- Simulate and predict the change in groundwater levels at identified groundwater users (i.e. registered bores, landholder bores and GDEs) due to the Project and also with respect of cumulative impacts.
- Simulate the direct and indirect take of groundwater and surface water (baseflow) due to the Project.
- Simulate the long-term impacts by running the post-mining scenario with the proposed final landform and void lakes.”

The model has been constructed and applied to address these objectives satisfactorily.

Overall, there are no significant matters of concern in the reports as to structure or depth of coverage, and there is a clear focus on regulatory requirements.

6. Data Matters

The target coal measures are confined within a narrow corridor of 25-40 km width, defined by basement outcrop on the western side and a major fault structure on the eastern side. The geology is well known at the Project site due to extensive exploration drilling associated with historical mining. Away from the site, the stratigraphy is well known but the geometry of the strata is available only through public domain documents where other mines have been approved. To the south of the site, the model developed for the Project has benefitted from overlap with the northern extremity of the Office of Groundwater Impact Assessment model for the Surat Cumulative Management Area.

The geology of the study area is illustrated by maps of outcropping geology, solid geology, structural faults and one cross-section (Figure 4-3). However, structure contours and thickness maps are not provided for any hydrostratigraphic units. The geometry of the three target coal seams is complicated by the coalescence of some seams and by seam splits (Figure 4-4). Many minor local faults suggest a potential for compartmentalisation in reality, but groundwater monitoring networks are rarely of a density where this expected behaviour can be observed. Given that the local fault structures have small throw, and they have no discernible effect on groundwater level patterns, a parsimonious approach has been followed in the modelling of them; this effectively assumes continuity of flow across the structures with neither barrier nor conduit behaviour.

The Project is supported by an existing network for the BWM and neighbouring mines of 144 groundwater monitoring sites including four multi-sensor vibrating wire piezometer (VWP) holes; 21 of these bores are Environmental Authority compliance bores for the BWM. The network was established in 2011 and expanded since then in multiple campaigns. The regional network includes additional data from Curragh Mine to the north and Blackwater South to the south. Calibration hydrographs are reported in Appendix B of Document #2 for a total set of 108 monitoring sites.

The Project has also benefitted from considerable effort conducted by others in earlier field investigations involving aquifer tests and downhole geophysics.

Cause-and-effect analysis of groundwater hydrographs has been presented separately for bores in Quaternary Alluvium, Tertiary sediments, Triassic Rewan Group, Permian Rangal Coal Measures (northern and southern areas), and the Burngrove Formation. In each case, comparison is made with the Cumulative Rainfall Departure curve to infer potential relationships with infiltrating rain water. Proximity of a bore to water storages or mining activity is given consideration in teasing out infrastructure or mining effects from a climatic signature. The earliest measurements in the region date from 2011. Limited grouped bores indicate the potential for upwards flow from the Permian to the Rewan Group (Table 5-13, Document #1).

Unlike previous groundwater assessments, water balance estimates of BWM inflow are not tabulated for consideration as constraints on model predictions of pit inflows. The only indication of historical inflows is at Section 6.4 in Document #2 where Engeny (2025) is cited for typical observed pit inflows of 2.25 megalitres per day (ML/day).

Groundwater flow directions in the coal measures can be inferred from groundwater head contours for the Aries Seam (Figure 5-20, Document #1). The ambient flow directions are controlled strongly by historical mining.

A thorough analysis is presented for groundwater quality signatures, primarily using Durov Diagrams. Water quality analysis suggests low rainfall recharge.

A clear and defensible description of hydrogeological conceptualisation is promoted in Section 5.6 of Document #1, illustrated by schematics for current-mining and future-mining conditions in cross-section (Figure 5-36, Document #1), supported by a conceptual ecohydrogeological model (Figure 5-37, Document #1).

Discussion on natural depth to water is minimal. As there are too few sites to allow contouring, a simulated depth to water table map is provided at Figure 5-25 (Document #1) without commentary. This map shows 5 m and 10 m contours that could be used as first-pass indicators of where transpiration from vegetation could occur if any groundwater-dependent species are evident in those areas. Independent groundwater dependent ecosystems (GDE) studies are reported in Section 5.5.1 (Document #1).

7. Model Matters

The current numerical groundwater model has evolved from an earlier model for which I had been engaged as a peer reviewer since 2021. While the current model has not changed significantly in extent or geometry, I am aware that the calibration dataset has undergone thorough review and field audit. Accordingly, some differences in predictions could result from model re-calibration.

The reviewer regards the modelling methodology described in Document #2 as being consistent with best practice.

Key features of the modelling approach are:

- MODFLOW-USG plus AlgoMesh software platform for better mass balance and better spatial resolution;
- application of dynamic rainfall recharge based on a scaled representation of the Australian Landscape Water Balance Deep Drainage model;
- conventional PEST calibration for steady-state and transient conditions;
- combined Spearman and standardised regression coefficients for identifying those model parameters that are sensitive to the calibration process, and those that are not. The considered parameters are horizontal hydraulic conductivity, vertical hydraulic conductivity, riverbed permeability, specific yield, evapotranspiration (ET) rate, ET extinction depth, diffuse recharge and spoil properties;
- assessment of the sensitivity of the magnitude of key model predicted outputs by a Type I to IV analysis. The considered outputs are drawdown, pit inflows, alluvial take and take from watercourses. The aim is to identify which model parameters (if any) might cause large changes in predictions for small changes from their adopted values; and
- an ensemble of model realisations for uncertainty analysis using PESTPP-IES software.

Being naturally constrained by geological boundaries, the model extent is not as large as most similar regional coal mining models, being about 15-50 km in an east-west direction and about 90 km in a north-south direction. With 17 layers and a minimum cell dimension of 50 m, a total cell count of 0.82 million cells gives the model a moderate size. Cell refinement is intense along mapped faults, Blackwater Creek and within mining leases, and grid design takes into account a large number of drainage lines. Separate layers are designated for four coal seams (Aries, Castor, Pollux and Orion) in the Rangal Coal Measures. Minor faults are not accommodated separately, other than through the control they exert on geometry. This means that coal seams are assumed to have continuity when in reality they might be truncated, and consequently Project drawdowns could prove to be more localised in reality than are predicted by the model.

Calibration performance is generally good in most areas of the model, based on 1,789 measurements of initial groundwater levels and subsequent variations from initial levels at 108 sensors. The key performance statistics are 6.6 percent (%) scaled root mean square (SRMS) and 11.6 metres root

mean square (m RMS) for the Best Calibrated Model (BCM), with ensemble ranges of 6.6-7.4% SRMS and 11.6-13.1 m RMS. The scattergram (Figure 3-1, Document #2) is generally linear with no significant bias towards overestimation or underestimation of heads at any elevation. In individual layers, there is a mild bias to overestimation of groundwater levels in Quaternary and Tertiary materials, and a bias to underestimation in the Rewan Formation and the Rangal Coal Measures. Spatially, the average calibration residual is distributed fairly evenly along the length of the study area. There remains, however, a paucity of calibration points in alluvium. Those in the calibration dataset are in the alluvium of Sirius Creek south-west of ML1762 and in the alluvium of Blackwater Creek north of ML1759. Consequently, the model has low reliability for predicted groundwater levels elsewhere along the watercourses.

For the VWP target bores, calibration is “good” to “very good” at two sites and “poor” at one other. The predicted VWP vertical gradients at VWP19BWM02 (Appendix B, Document #2) are very good. It should be noted that failure to match absolute magnitudes has little effect on the reliability of the predicted impacts of a model; as drawdown is the difference between two model runs, this procedure effectively cancels out any error in magnitude.

The primary predictive results (based on the BCM) are presented in Document #2 as maps of:

- groundwater level at end of mining in alluvium and Tertiary (Layer 1), regolith (Layer 2), Clematis Sandstone (Layer 3), and the Pollux Seam (Layer 12) with and without the Project;
- maximum incremental drawdown (due to the Project alone) for alluvium and Tertiary (Layer 1), regolith (Layer 2), Aries Seam (Layer 8), Pollux Seam (Layer 12) and the Burngrove Formation (Layer 14); and
- maximum cumulative drawdown (due to all mines) for alluvium and Tertiary (Layer 1), regolith (Layer 2), Aries Seam (Layer 8), Pollux Seam (Layer 12) and the Burngrove Formation (Layer 14).

Recovery in the presence of five final voids local to the Project, as well as others to the south of the Project, has been modelled in two steps using initially the “high-K” lake approach, and subsequently time-varying constant heads provided from the surface water model. The reviewer endorses deference to surface water modelling for a more robust analysis of final void behaviour than is readily achievable in a groundwater model. A post-closure map of particle tracks is presented at Figure 5-10 (Document #2) to show the permanent effect of the final voids, suggesting their status as groundwater sinks with low likelihood of escape of saline pit lake water. A similar finding is evident from the equilibrium water table map in Figure 6-19 (Document #1). More detail, however, is provided in Table 6-4 (Document #1) which examines final lateral hydraulic gradients within 250 m of each pit lake, including those south of the Project. Of the five local final voids, net lateral outflow is indicated from Bonnie Doon, but relative pit water levels suggest likely capture by the adjacent Mimosa/Besgrove final void. Section 6.7.5 (Document #1) states: “*of the five voids near the Project Area, three are predicted to become long-term sinks, and the other two are predicted to be flow through systems reporting to those long-term sinks*”.

A comprehensive IESC-compliant Type-3 uncertainty analysis has been undertaken by means of the Iterative Ensemble Smoother (IES) technique, using 75 alternative calibrated realisations out of a trial set of 500 randomly generated selections. A comprehensive set of parameters was subject to variation, as listed in Section 3.1 of Document #2. The IES method requires nomination of minimum and maximum values for exploration of each parameter’s space, from which a default standard deviation is calculated. The assumed ranges and standard deviations are not disclosed, though the former can be inferred (with difficulty) from the prior distributions in Appendix E (Document #2). The good agreement between prior and posterior distributions in Appendix E indicates that the prior distributions have been sampled adequately. Proof of convergence, as encouraged by the IESC Explanatory Note on Uncertainty Analysis, is offered for alluvial take and total pit inflow in Figures 7-1 and 7-2 (Document #2). There is little change in predicted alluvial take for more than approximately 50 realisations, but convergence is still improving after 75 iterations for pit inflow.

The spatial uncertainty results are presented in Figures F-1 to F-20 (Appendix F, Document #2) as 5th,

50th and 95th percentiles for exceeding 1 m maximum drawdown in Alluvium/Tertiary (Layer 1), weathered zone (Layer 2), Aries Seam (Layer 8), Pollux Seam (Layer 12) and the Burngrove Formation (Layer 16) at end of mining as well as end of recovery, both for incremental and cumulative effects.

A map of the maximum water table drawdown due to the Project, shown as 1 m and 2 m drawdown contours, is presented at Figure 7-1 (Document #1) as an aid for assessment of GDE effects by the ecological team.

Pit Inflows

The temporal uncertainty results for progressive total pit inflows, including pits to the south of the Project, are presented in Figure 7-3 (Document #2) as 5th, 33rd, 67th and 95th percentiles. The BCM prediction aligns well with the median case for the duration of the Project (prior to 2056).

At Section 6.4 (Document #2), it is stated that I requested some sensitivity simulations to test the timing setup of the TVM (time-varying materials) procedure in the model, in particular the TVM2 alternative to the TVM3 approach that the reported modelling has relied on. The approaches differ in how the "air" layers are handled in a model cell when it is excavated. Within a model, the material above the floor of a pit maintains artificial layering, and those artificial layers require assigned hydraulic and storage properties. General practice is for "drains" to be applied at the base of each artificial layer to prevent the artificial layers from holding water, without changing the assigned hydraulic and storage properties from their host (pre-mined) values. This is the TVM2 situation. The adopted TVM3 approach applies high permeability to the artificial layers to encourage rapid desaturation while the cell is being mined in the simulation. The TVM2 approach applies high permeability only after that cell has been mined and recovery is allowed to occur in the model.

Having examined a detailed layer-by-layer water balance for a newly mined cylinder of model cells, I have noticed that an unrealistic flow of water would occur from the upper five layers of the highwall to the corresponding artificial layers in the void, using the TVM3 approach. The reason for this is that lateral flow is governed by the average horizontal hydraulic conductivity across the void/highwall interface. With TVM2, this is low. With TVM3, this is very high.

I hold the view that pit inflows calculated using the TVM2 approach would be more reliable. The difference between the two approaches is seen in Figure 6-5 (Document #2) in ML/day units from 1980. During the prediction period for the Project (to 2055), the total pit inflows are roughly halved by adopting the TVM2 approach. As stated in Section 6.4 (Document #2): "*The reduction in inflows is closer to the observed values; however, it is noted that neither model result has been corrected for evaporation that would occur on the highwalls and pit floors, and as such would be expected to be greater than observed ingress and or values estimated from operational site water balance models*".

The cumulative and incremental Project pit inflows are shown in Figure 6-1 (Document #1) in megalitres per year (ML/year) units from 2024, but only for the TVM3 approach.

8. Conclusion

The reviewer is of the opinion that the documented groundwater assessment is best practice and has adequately addressed the stated project objectives in Document #1 and the modelling objectives in Document #2:

- Assess the groundwater inflow to the mine workings as a function of mine position and timing.
- Simulate the extent of maximum groundwater drawdown/depressurisation due to the Project and also with respect to cumulative impacts.
- Simulate and predict the change in groundwater levels at identified groundwater users (i.e. registered bores, landholder bores and groundwater dependent ecosystems [GDEs]) due to the Project and also with respect to cumulative impacts.

- Simulate the direct and indirect take of groundwater and surface water (baseflow) due to the Project.
- Simulate the long-term impacts in the post-mining environment utilising the proposed final landform and void lakes.

The groundwater modelling has been conducted to a high standard and a thorough uncertainty analysis has offset much of the uncertainty that is inherent in a groundwater model, as noted in the *Groundwater Model and Data Limitations* summarised in Table 8-1 of Document #2.

The reviewer supports adoption of the *Principle of Parsimony* for representation of local fault structures that have small throw, with no discernible effect on groundwater level patterns. This effectively assumes continuity of flow across the structures without the need to make an assumption of either barrier or conduit behaviour.

The primary output of the uncertainty analysis, with respect to potential off-site impacts, is presented in a modelling technical appendix as 5%, 50% and 95% probabilities of exceeding 1 m drawdown in five distinct hydrostratigraphic units, the upper two of relevance to potential ecosystem impacts. No third-party water supply bore in the study area is likely to be impacted by the Project, in terms of trigger thresholds, with a maximum predicted cumulative drawdown of about 1 m at one bore. This is considerably less than the Queensland *Water Act 2000* threshold of 5 m for bores in consolidated formations. No material impact on Blackwater Creek baseflow or seepage is anticipated.

In terms of ecosystem impacts, a groundwater model is limited to prediction of changes in depths to the *regional* water table, with deference to ecologists for an opinion on potential impacts. A regional groundwater model is not appropriate for assessing potential effects on shallow terrestrial and subterranean GDEs reliant on perched water tables, as the unsaturated soil zone cannot be represented in detail. Conceptually, however, as perched and regional water tables are independent of each other, mining could not have any appreciable effect on a perched system.

A groundwater model also has difficulty in representing ephemeral watercourses. Normal practice is to include them as drains so they will accept baseflow whenever groundwater levels rise above creek bed elevations. They are normally excluded as potential sources of water supply via vertical seepage to the groundwater system, as such seepage from an ephemeral creek is more likely to top up a perched water table. If they are included in a groundwater model, they will be given an assumed depth of open water (or stage) that applies for the full length of a model stress period, and that is usually a month or three months during calibration, and annual or longer for pre-calibration and predictive periods.

For the subject model, Blackwater Creek is ephemeral and flows only a few days each year. In the model, however, it is assumed not to flow. This assumption will not have any adverse effect on predicted regional water tables.

The latest IESC Explanatory Note on uncertainty analysis (Peeters and Middlemis, 2023) advocates the use of three criteria in deciding *fitness for purpose*: usability, reliability, and feasibility.

Usability: In my view, sufficient information has been conveyed to decision-makers about the uncertainty in conceptual processes and characterisation of the groundwater system based on model simulation. The model can be regarded as a usable tool for making decisions.

Reliability: In my view, the modelling process has resulted in ultra-conservative estimates for pit inflows, and their probabilistic ranges, with consequent overestimation of predicted drawdown magnitudes and extents, which remain immaterial for third-party water supply bores and ecosystems. This is due to adoption of the TVM3 approach to the active mining face, rather than the TVM2 approach whose results have been reported as a sensitivity analysis. The TVM2 results are more consistent with historical knowledge of groundwater inflows to BWM pits.

Feasibility: In my view, the developed model provides a sufficient and best practice approximation to reality subject to computational constraints and data limitations. No model will ever be perfect, but the current model is considered to have established the level of impact risk as well as can reasonably be

expected.

Overall, I regard the model as *fit for purpose*, where 'purpose' is defined by the modelling objectives listed at the start of this section of the peer review report

Dr Noel Merrick

