# Environmental Impact Statement Report under the *Environmental Protection Act 1994*

## Minyango Project

## Proposed by Blackwater Coal Pty Ltd

Prepared by: Statewide Environmental Assessments, Department of Environment and Heritage Protection



March 2014

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| | |
|---|---|
| ACH Act | *Aboriginal and Cultural Heritage Act 2003* |
| ARI | average reoccurrence interval |
| Aurizon | Aurizon Holdings Limited |
| BMA | BHP Billiton Mitsubishi Alliance's |
| ℃ | degrees celsius |
| CDA | codisposal area |
| CDMP | QR National Coal Dust Management Plan (2010) |
| CHMP | cultural heritage management plan |
| CHPP | coal handling and processing plant |
| CHRC | Central Highlands Regional Council |
| CMSH Act | *Coal Mining Safety and Health Act 1999* |
| DAFF | Department of Agriculture, Fisheries and Forestry |
| DATSIMA | Department of Aboriginal and Torres Strait Islander and Multicultural Affairs |
| dBA | decibel (A-weighted) |
| dBL | decibel (linear) |
| DCCSDS | Department of Communities, Child Safety and Disability Services |
| DCS | Department of Community Safety |
| DEEDI | Department of Employment, Economic Development and Innovation |
| DERM | Department of Environment and Resource Management |
| DETE | Department of Education, Training and Employment |
| DHPW | Department of Housing and Public Works |
| DIDO | drive-in-drive-out |
| DNRM | Department of Natural Resources and Mines |
| DOE | Commonwealth Department of Environment |
| DSDIP | Department of State Development, Infrastructure and Planning |
| EA | environmental authority |
| EC | electrical conductivity |
| EV | environmental values |
| EHP | Department of Environment and Heritage Protection |
| EIS | environmental impact statement |
| EM Plan | environmental management plan |
| EMR | Environmental Management Register |
| EP Act | *Environmental Protection Act 1994* |
| EPR | emergency preparedness and response planning |
| EP Regulation | Environmental Protection Regulation 2008 |
| EPBC Act | *Environment Protection and Biodiversity Conservation Act 1999* |
| EPC | exploratory permit (coal) |
| EPP (Air) | Environmental Protection (Air) Policy 2008 |
| EPP (Water) | Environmental Protection (Water) Policy 2009 |

| | |
|---|---|
| ERA | environmental relevant activity |
| FIFO | fly-in-fly-out |
| Fisheries Act | *Fisheries Act 1994* |
| Fitzroy WRP | Water Resource (Fitzroy Basin) Plan 2011 |
| Forestry Act | *Forestry Act 1959* |
| FTE | full time equivalent |
| Hz | hertz |
| ha | hectares |
| GHG | greenhouse gas |
| GLC | ground level concentration |
| GQAL | good quality agricultural land |
| GRAM | Guangdong Rising Assets Management |
| HSE | health safety and environment |
| HVR | high value regrowth |
| kL/year | kilolitre per year |
| km | kilometres |
| KPI | key performance indicators |
| kV | kilovolt |
| $LA_{eq}$ | equivalent or energy-averaged, continuous A-weighted sound pressure level |
| $LA_{max}$ | equivalent or energy-averaged, A-weighted maximum sound pressure level |
| L/s | litres per second |
| LGA | local government area |
| LOMS | limit of measurable subsidence |
| LP Act | *Land Protection (Pest and Stock Route Management) Act 2002* |
| MDLA | mineral development licence application |
| MIA | mine industrial area |
| m | metre |
| $m^3$/day | cubic metres per day |
| $m^3$/s | cubic metres per second |
| mg/L | milligrams per litre |
| ML | megalitre |
| MLA | mining lease application |
| $Mm^3$ | million cubic metres |
| mm | millimetres |
| MNES | Matters of National Environmental Significance |
| MR Act | *Mineral Resources Act 1989* |
| Mt | million tonnes |
| Mtpa | million tonnes per annum |
| MWh/year | megawatt hour per year |
| NAF | non-acid forming |
| NC Act | *Nature Conservation Act 1992* |

| | |
|---|---|
| NEPM | National Environmental Protection (Ambient Air Quality) Measures |
| NHMA | Natural Hazard Mapping Area |
| NSF | northern surface facilities |
| NSW | New South Wales |
| NTU | nephelometric turbidity unit |
| OHS | occupational health and safety |
| PAF | potential acid forming |
| PMAV | maps of assessable vegetation |
| PM | particulate matter |
| PMF | probable maximum flood |
| $PM_{10}$ | particulate matter 10 micrometres or less in diameter |
| $PM_{2.5}$ | particulate matter 2.5 micrometres or less in diameter |
| QAS | Queensland Ambulance Service |
| QH | Queensland Health |
| QPS | Queensland Police Service |
| QTT | Queensland Treasury and Trade |
| RE | regional ecosystems |
| REMP | receiving environment monitoring program |
| RIA | road impact assessment |
| RMP | road-use management plan |
| ROM | run-of-mine |
| SCL | strategic cropping land |
| SEWPaC | Commonwealth Department of Sustainability, Environment, Water, Population and Communities |
| SHMS | safety and health management system |
| SIA | social impact assessment |
| SIMP | social impact management plan |
| SP Act | *Sustainable Planning Act 2009* |
| SPP | state planning policy |
| SSBV | state significant biodiversity value |
| Sunwater | Sunwater Limited |
| $t/m^3$ | tonnes per cubic metre |
| t/year | tonnes per year |
| $tCO_2^{-e}$/year | tonnes carbon dioxide equivalent per year |
| TDS | total dissolved solids |
| TMP | traffic management plan |
| TMR | Department of Transport and Main Roads |
| TOR | terms of reference |
| TSP | total suspended particulate matter |
| µS/cm | microsemens per centimetre |
| VM Act | *Vegetation Management Act 1999* |
| VWP | vibrating wire piezometers |

| | |
|---|---|
| Water Act | *Water Act 2000* |
| WQO | water quality objective |

# 1 Introduction

Blackwater Coal Pty Ltd (Blackwater Coal), a wholly owned subsidiary of GRAM Caledon Resources Limited, is seeking approval to construct, operate and decommission the Minyango Project (referred to herein as the 'project'), located immediately south of Blackwater Township, approximately 170 kilometres (km) west of Rockhampton.

This report provides an evaluation of the environmental impact statement (EIS) process pursuant to Chapter 3 of the *Environmental Protection Act 1994* (EP Act) for the project proposed by Blackwater Coal. An application to prepare a voluntary EIS was granted by the former Department of Environment and Resource Management (DERM); now the Department of Environment and Heritage Protection (EHP), in December 2010 and the draft terms of reference (TOR) were advertised in June 2011. Following a period of public consultation, the TOR was finalised in September 2010.

EHP, as the administering authority of the EP Act, coordinated the EIS process. This EIS assessment report (herein referred to as the 'assessment report') has been prepared pursuant to sections 58 and 59 of the EP Act. Section 58 of the EP Act lists the matters that EHP must consider when preparing an assessment report, while section 59 of the EP Act states what the content must be.

The EP Act requires that an assessment report must:

- address the adequacy of the EIS in addressing the final TOR
- address the adequacy of the draft environmental management plan (EM Plan)
- make recommendations about the suitability of the project
- recommend any conditions on which any approval required for the project may be given
- contain other matters as prescribed under section 59(e) of the Environmental Protection Regulation 1998 (EP Regulation).

In meeting the requirements of the EP Act, this assessment report describes the project, the places and values likely to be affected by the project. It summarises the key issues associated with the potential adverse and beneficial environmental, economic and social impacts of the project. It also discusses avoidance, planning, management, monitoring and other measures proposed to minimise adverse environmental impacts. Finally, this assessment report identifies those issues of particular concern that were not resolved or that require specific conditions for the project to proceed.

Section 2 of this assessment report describes the project in order to provide context for the findings of the report. Section 3 outlines the EIS process that was followed for the project and the approvals that would be necessary for its commencement. Section 4 addresses the adequacy of the EIS documents in addressing the TOR, discusses the main issues with regard to the environmental management of the project and outlines the environmental protection commitments made in the EIS documents. Section 5 assesses the adequacy of the EM Plan for the project.
Section 6 makes recommendations and identifies outstanding matters required for the project to proceed. Section 7 makes recommendations for conditions to be included in the environmental authority (EA), which would set out the operational environmental monitoring, management and reporting requirements for the mine.

The giving of this assessment report to the proponent completes the EIS process under the EP Act.

# 2 Project description

This section provides a summary of the proposed project as described in Chapter 4 of the EIS and the amended EIS[1].

## 2.1 Location

The project site is defined by the boundary of mining lease application (MLA) 80173 and covers an area of approximately 3325 hectares (ha) (Figure 1). The project site is located immediately south of the industrial area of Blackwater Township in Central Queensland, approximately 170km west of Rockhampton. The site is located within the Central Highlands Regional Council (CHRC) area. There are a number of existing and proposed coal mines adjacent to and in relative proximity to the project site, including the Blackwater and South Blackwater Mine, Cook Colliery, Curragh and Curragh East Mine, Jellinbah South Mine and Washpool Project.

## 2.2 Mine infrastructure

The underground mine would extract up to approximately nine million tonnes per annum (Mtpa) of run-of-mine (ROM) coal, which would be processed to produce approximately 7Mtpa of product coal for export. The mine life would be approximately 20–40 years, depending on the mining schedule for the second coal seam.

The mine surface facilities would be primarily located in two areas: a mine industrial area (MIA) in the centre of the MLA which would include the coal handling and preparation plant (CHPP), rail loop and train loading facilities and; the northern surface facilities (NSF) in the north of the MLA which would include the remainder of the project's surface infrastructure as well as the construction accommodation village (Figure 1).

The MIA would be located approximately 4km from the southern boundary of the industrial area of Blackwater Township and approximately 5km to the southern boundary of the residential area of Blackwater Township. The final footprint of the MIA would be approximately 63.2ha. The MIA would be developed in two phases:

1. The first phase of MIA development would be developed to facilitate mining in the Aries Seam only and would include:
    - Phase 1 of the washplant which would have a footprint of approximately 0.5ha
    - one ROM coal stockpile with a footprint of approximately 2.4ha and a height of 20 metres (m) and two product coal stockpiles with a total footprint of approximately 2.4ha and a height of 20m
    - overland conveyors
    - a 5km long rail loop and train loading facilities with a footprint of approximately 0.1ha and a height of approximately 40m
    - the CHPP catch dam (approximately 6m high, with a footprint of approximately 2.8ha and a capacity of 120 megalitre (ML)), raw water dam 1 (approximately 4.5m high, with a footprint of approximately 1.2ha and a capacity of 10ML) and mine water dam (approximately 10.5m high, with a footprint of approximately 7.5ha and a capacity of 630ML)
    - a CHPP workshop (including a first aid station) with a footprint of approximately 1ha
    - topsoil stockpile (approximately 3m high and a footprint of approximately 9.4ha) and subsoil stockpile (approximately 6m high and a footprint of approximately 18.7ha)
    - access roads.
2. The second phase of the MIA would be developed to facilitate simultaneous mining in both the Aries and the Pollux Seams. The second phase of MIA development would include:
    - phase 2 of the washplant (a footprint of approximately 0.5ha which would make the final washplant footprint approximately 1ha)
    - the second ROM coal stockpile (approximately 20m high and a footprint of approximately 2.4ha which would make the final ROM stockpile footprint approximately 4.8ha) and the extension of the two product coal stockpiles (approximately 20m high and a footprint of approximately 2.4ha, which would make the final product coal stockpile footprint approximately 4.8ha).

[1] See section 3.5.2 of this assessment report for definition of the 'EIS' and 'amended EIS'.

The NSF area would be located approximately 1km from the southern boundary of the industrial area of Blackwater Township and approximately 2km from the southern boundary of the residential area of Blackwater Township. The NSF area would be approximately 12.7ha in area and would include:

- overland conveyors (approximately 2.2m wide and typically 5m high rising up to 15m high at transfer points)
- portals for the conveyor, personnel and materials drifts
- a sediment dam (approximately 2m high with a footprint of approximately 0.5ha) and raw water dam 2 (approximately 4.5m high, a footprint of approximately 1.2ha and a capacity of 10ML)
- muster/administration buildings and bathhouse (including a first aid station) having a maximum height of 10m and a footprint of approximately 1.3ha
- water and sewage treatment facilities with a footprint of approximately 0.8ha
- access roads and a 2.1ha car parking area
- workshop, warehouse and vehicle servicing facilities which would have a maximum height of 12m and a footprint of approximately 3.5ha.

Coarse and fine rejects would be deposited in a wet codisposal area (CDA). The CDA and associated CDA catch dam (Figure 1) would be located in the south of the project site, south of the MIA and to the east of Blackwater-Rolleston Road and the South Blackwater Mine Railway. The CDA catch dam would be approximately 8m in height, with a footprint of approximately 54.4ha and a capacity of 1380ML.

A temporary 500 person construction accommodation village would be located in the northern end of the project site, to the east of Blackwater-Rolleston Road and the South Blackwater Mine Railway. The construction accommodation village would have a footprint of approximately 9ha and the majority of the buildings would be approximately 3.5m high, although some may be up to 5m. Access to the village would be via an access road to be constructed from Blackwater-Rolleston Road. A new intersection on Blackwater-Rolleston Road would also be required. The construction accommodation village would consist of the following:

- 500 units
- car parking and bus station
- dining room and kitchens
- laundry facilities
- common rooms and recreational facilities
- water and sewage treatment facilities.

Access to the longwall and bord and pillar mining areas in both the Aries and Pollux Seams would be provided via portals to the inclined drifts (i.e. tunnels). The drifts would provide access from the surface to the underground roadways. One drift would be for the coal conveyor and the other for personnel and materials. The portals and drifts would be located in the NSF area. The drifts would each be approximately 1500m in length, at a grade of approximately 1 in 8 and would have the dimensions of approximately 6m high by 6m wide.

The proponent advised in the EIS that it was involved in discussions with Arrow Energy to determine whether the required pre-gas drainage can be undertaken as part of Arrow Energy's future commercial gas production activities on the project site. In the event that such activities are required to be undertaken by the proponent, a number of gas drainage plants would be required to drain coal seam gas prior to the commencement of underground mining.

The gas drainage plants would consist of a series of vacuum pumps in each plant, with an exhaust either going to a single stacked flare or being vented. A network of underground and surface pipes would direct the gas to the drainage plants. The gas drainage infrastructure would include up to 6 boreholes per longwall panel. Each borehole would have a maximum disturbance area of approximately 30m by 30m. Flares would typically be installed adjacent to the boreholes to flare the drained gas. Access tracks to the boreholes would be via existing tracks whenever possible. Temporary tracks would be installed, where necessary.

A number of minor surface facilities would be required above the longwall and bord and pillar mining areas. These would include ventilation shafts, underground communication cables, mine dewatering boreholes and associated pipelines, and other access and service boreholes. The largest footprint for these facilities would be the ventilation shafts (approximately 15m by 15m per shaft). It was stated in the EIS that there would be flexibility in the siting of the facilities and where practicable, such facilities would be sited to avoid disturbance of any significant surface features (such as regrowth vegetation or drainage lines) and to minimise impacts on residential amenity (e.g. dust, noise and visual). A formal process would be established for the selection of locations for this infrastructure.

A conceptual process flowsheet for the longwall and bord and pillar handling systems is shown in Figure 2.

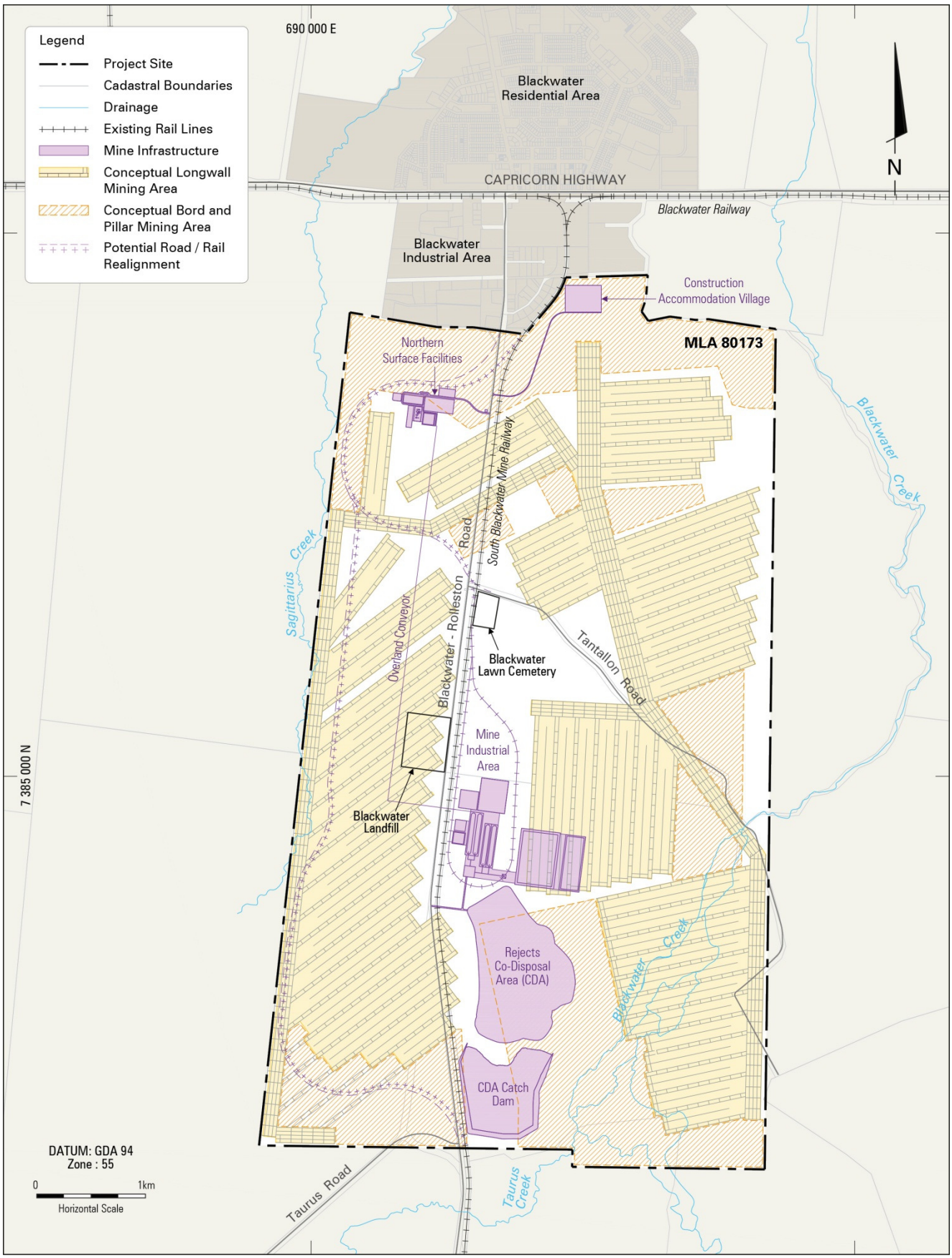


**Figure 1 Project layout (source: EIS Figure 4-1)**

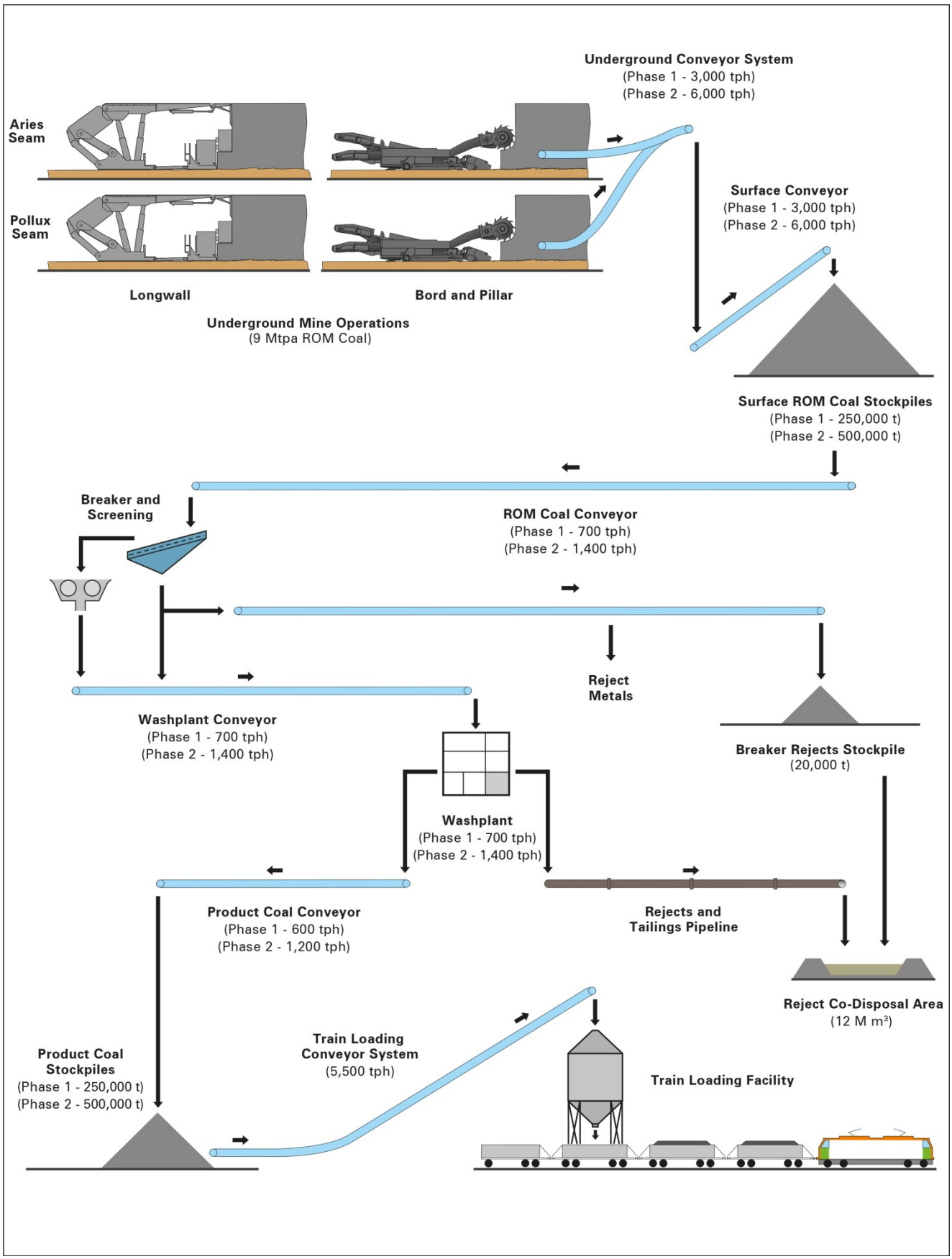


**Figure 2 Coal handling system conceptual process flowsheet (source: EIS Figure 4-18)**

## 2.3 Construction

The main construction activities associated with the project would include development of the underground mine and construction of the mine surface facilities, overland conveyor, CHPP, rail loop and train loading facilities, CDA and mine entries.

Construction of mine surface facilities, overland conveyors, CHPP, train loading facilities and the CDA would involve:

- clearing vegetation and conducting preparation earthworks using earthmoving equipment such as dozers, scrapers, excavators, trucks, graders, watercarts and compactors
- constructing the administration buildings, workshops, warehouses and small buildings associated with the underground support facilities such as air conditioners, compressors, dewatering pumps, water supply and fire suppression units
- erecting steel structures associated with the CHPP
- constructing the CDA
- constructing roads including culverts and drains using conventional road construction plant.

Construction of the longwall and bord and pillar mines would involve:

- constructing portals to access the mining areas in both coal seams. These portals would be constructed using heavy earthmoving equipment such as dozers, scrapers, excavators, trucks, graders, water-carts and compactors. Small scale blasting may be required. Spoil from the portal and drifts would be used as construction material, where suitable, or would be deposited in the CDA
- constructing the mine access drifts using a roadheader, which is a continuous miner designed to cut stone
- underground development involving the construction of the initial underground in-seam access roadways with continuous miners. It would also involve construction of associated facilities including ventilation, conveyors and other underground mine services.

Two construction phases for the project were proposed in the EIS. The first construction phase, associated with the development of the Aries Seam, was planned to commence in 2014 (project year 1) and would continue for approximately two years. The second construction phase, associated with the Pollux Seam, would commence in 2019 (project year 6) and continue for approximately two years.

## 2.4 Operations

### 2.4.1 Tenures and tenements

EIS section 4.4.2 included a detailed history of the tenures, drilling programs and exploration associated with the project site by current and previous tenure holders. The MLA is within the proponent's mineral development licence application (MDLA) 424 area and the proponent's exploration permit coal (EPC) 699 and 997. The EIS described the coal and petroleum tenements covering the project site (EIS Table 4-1) and adjoining tenements (EIS Table 4-2). There are no geothermal or greenhouse gas tenures or licences overlying or adjacent to the project site.

### 2.4.2 Resource base

A detailed description of the natural resources associated with the project site was provided in the EIS (section 4.4). In summary, the Aries and Pollux Seams are the principal target of the project site. Whilst a number of other coal seams exist in the Rangal Coal Measures and Fort Cooper Coal Measures, it was stated in the EIS that the Aries and Pollux Seams are the only coal seams capable of producing a washed coal product at high yields whilst maintaining a market acceptable product ash content. All other seams in the vicinity are variable in thickness, are too thin to work, contain significant partings or contain high inherent ash levels which make washing to a suitable ash content at sufficiently high yields impractical. Washplant simulations have revealed the coal from the project site can generate coking coal products with a low ash content and containing low to moderate levels of pollutants such as sulphur and phosphorous. The simulated product coal can be realised into two products: a primary product of coking coal with an ash content of between 7.5% and 8.0%; and secondary product, thermal export coal with an ash content of 15%.

### 2.4.3 Mining methods and equipment

Coal would be extracted using both longwall and bord and pillar underground mining methods. A detailed description of these methods was provided in the EIS (EIS section 4.5) and is summarised in the sections below.

#### 2.4.3.1 Longwall mining

Both the Aries and the Pollux Seams would be mined using the longwall mining methods (Figure 2). The longwall layout proposed in the EIS is shown in (Figure 1) and would cover an area of approximately 1630ha. This layout is proposed to be repeated in both the Aries Seam and the Pollux Seam with the layout 'stacked' one above the other. It was stated in the EIS that while modifications to the underground mine layout may be necessary following more detailed mine planning assessment, any revised mine plans would not have any significant additional impacts beyond those presented in the EIS.

Within the project site, the Aries Seam is at a depth between approximately 170m and 490m and the Pollux Seam is at a depth between approximately 200m and 550m. The Aries Seam would be mined first. It was assumed for the purpose of the EIS that approximately six years after the commencement of longwall mining in the Aries Seam, longwall mining would commence in the underlying Pollux Seam. However, depending on the price of coal and other economic factors, all mining in the Aries Seam may be completed prior to the commencement of mining in the Pollux Seam.

Longwall mining would involve extracting rectangular panels of coal approximately 150m wide and varying in length from approximately 300m to 1600m. The extraction height of the longwall panels would be the full seam thickness (typically 2.5m). The width of the proposed chain pillars (the coal left between the longwall panels) would be approximately 30m. The longwall panels would be defined by access roadways that are constructed around the perimeter of each longwall panel to provide access for the installation of the longwall mining equipment, mine workers and equipment and services.

Mine access roadways constructed around the perimeter of each longwall panel would be developed to provide access to the longwalls for mine workers, ventilation and equipment and would typically be 5m wide and 2.5m high. Coal would be transported to the surface via a series of connecting underground conveyors.

#### 2.4.3.2 Bord and pillar mining

Both the Aries and the Pollux Seams would also be mined using the bord and pillar method (Figure 2). The bord and pillar layout that was proposed in the EIS is shown in Figure 1 and would cover an area of approximately 920ha. The extraction height would be the full seam thickness—typically 2.5m for both the Aries and Pollux Seams.

The target coal seam in the bord and pillar mining area is at a depth of between approximately 170m and 490m for the Aries Seam and 200m and 550m for the Pollux Seam. It was stated in the EIS that the bord and pillar mine layout and the size of the roadways (bords) and the coal pillars would be specifically designed with sufficient roadway and pillar strength and stability to ensure that there would be no surface subsidence above the underground bord and pillar workings.

### 2.4.4 Mine sequencing

It was stated in the EIS that mine life would be approximately 20–40 years, depending on the mining schedule for the second coal seam. The EIS provided an indicative mining schedule for longwall mining in the Aries (EIS Figure 4-19) and Pollux Seams (EIS Figure 4-20). It was predicted in the EIS that the project would commence construction activities in 2014 (project year 1). Longwall mining would commence in 2016 (project year 3), following the construction of underground mine access and initial development works. Bord and pillar mining would commence in 2024 (project year 11). For the purpose of the EIS, it was assumed that the construction of the second longwall mine would commence six years after the construction of the first, and that the mine life would be approximately 25 years. The mine would continue operating through 2038 (project year 25), although longwall mining would cease in 2031 (project year 18) and the final years of the mine life would be restricted to bord and pillar mining. Mining would be followed by a year of decommissioning (project year 26) and a period of final rehabilitation.

## 2.5 Workforce and accommodation

An estimate of workforce requirements over the life of the project was provided in the EIS (sections 17.6 and Appendix M, Socio-economic impact assessment). Peak workforce associated with construction for the Aries Seam was estimated to be 500 full time equivalent (FTE) people. The peak FTE workforce associated with construction for the Pollux Seam was estimated in the EIS to be 410 people. Contractors would likely carry out the construction work for the project. It was stated in the EIS that the source of the construction workforce would largely depend on the construction companies selected to complete the work but it is likely that that they would be sourced from outside the Central Queensland Region as the size of the workforce, the short timeframe in which it is needed and the current unemployment rate in the Central Queensland Region means that it is unlikely to be able to be sourced from within the region. Construction workforce would be accommodated in an on-site construction accommodation village to be located in the north of the project site. The initial construction workforce would be accommodated in third party provided accommodation until the on-site construction accommodation village was completed.

Workforce requirements for the operations phase were estimated to be 502 FTE people, consisting of 100% employees and no permanent contractors. The workforce at full production would be sourced through a range of recruitment processes, including internal transfers from the proponent's existing Cook Colliery operation, local, state, national and international recruitment, apprentice, trainee and graduate programs and contract labour. For assessment purposes, the EIS estimated that approximately 15% of employees (~ 75 FTE) would be resident workers based in Emerald or Blackwater and 85% (~ 427 FTE) would be non-resident worker employees who would drive-in-drive-out (DIDO) or fly-in-fly-out (FIFO) to undertake work at the project site. Of the 427 non-resident workers, approximately 296 would reside permanently in the Central Queensland Region and approximately 131 in the rest of Queensland.

The following range of accommodation options would be made available to the operations phase workforce:

- Off-site accommodation village, run by a third party, for the non-resident workers in the local Blackwater area.
- Proponent-provided financial support for eligible employees who choose to rent their own property in Blackwater or Emerald.

For the decommissioning phase, workforce requirements were estimated to be approximately 50 FTE persons.

## 2.6 Waste management

Raw coal from the project site would be crushed, sized and washed at the CHPP (Figure 2). This process would generate coarse and fine reject materials combined together in a single waste stream. The reject materials would then be pumped to the CDA immediately south of the CHPP. It was stated in the EIS that mixing the coarse and fine rejects in this way would eliminate the need for a tailings dam, create a consolidated combined reject material and enable a stable CDA landform to be created, which would be rehabilitated progressively.

It was described in the EIS that the CDA had sufficient storage capacity for the life of mine rejects from the project which were estimated to be approximately 12 million cubic metres ($Mm^3$) (from both the Aries and Pollux Seams) at an average dry consolidated density of 1.5 tonnes per cubic metre ($t/m^3$) (with an annual average rate of approximately 0.8$Mm^3$). The final CDA would have a footprint of approximately 96ha and a maximum height of approximately 37m. The final side slopes of the CDA would be no more than 10% and the top surface of the CDA would have a 2% grade to promote run-off.

It was stated in the EIS that the CDA had been designed to ensure that decant water from active storage areas would be contained in the CDA catch dam and recirculated for use as CHPP water supply. Clean run-off water from rehabilitated areas of the CDA would be also be contained in the CDA catch dam and used as CHPP water supply.

## 2.7 Transport

Access to the project site would be via the Capricorn Highway and Blackwater-Rolleston Road. The Blackwater-Rolleston Road is a sealed road that bisects the centre of the project site from north to south. Three new access points from Blackwater-Rolleston Road would need to be constructed: two access points from Blackwater-Rolleston Road to the NSF and MIA for the life of the project and; and another from Blackwater-Rolleston to the construction accommodation village temporarily for the construction period.

The Blackwater Railway to the north of the project site is a dedicated coal transport system that delivers coal from the Bowen Basin east to coal terminals at the Port of Gladstone. The South Blackwater Mine Railway runs south from the Blackwater Railway traversing the project site. It currently only services Cook Colliery (owned by the proponent). The project would require the construction of a rail loop and spur connecting to the existing South Blackwater Mine Railway within the project site (Figure 1Figure 1). Product coal from the project would be loaded onto trains at the new, on-site train load-out facility and transported via South Blackwater Mine Railway and the Central Railway to the Wiggins Island Coal Export Terminal located in the Port of Gladstone. At its peak production capacity, the project would be serviced by approximately two coal trains per day.

The proponent proposes in the EIS to subside sections of Blackwater-Rolleston Road and South Blackwater Mine Railway as a result of longwall mining. It proposes to maintain the Blackwater-Rolleston Road and South Blackwater Mine Railway in their current location for the life of the project by managing impacts of subsidence in-situ. However, in the event that in-situ management was not feasible, realignment of the road and railway may be required. A potential realignment option along the western boundary of the project site was described in the EIS. The alignment would maintain access to the Blackwater Lawn Cemetery and the Blackwater Landfill from Blackwater-Rolleston Road (Figure 1).

The nearest airport to the project site is the Emerald Airport, approximately a one hour drive away. The Rockhampton Airport could also be used to access the project site, approximately two hour drive to Blackwater.

## 2.8 Energy

Electricity demands for the project would be approximately 254,000 megawatt hour per year (MWh/year). Electricity for the project would be obtained from a connection to the 22 kilovolt (kV) or 66kV powerlines that traverse the project site. An on-site substation would convert the voltage as necessary to power the underground mining operations (11kV) and the mine surface facilities (66kV).

The project would require the construction of on-site power transmission lines to connect to the existing power that traverse the project site. It was stated in the EIS that the proponent is in discussions with utility providers (e.g. Powerlink) in relation to this infrastructure and any such infrastructure would be likely constructed by a third party utility provider.

Natural gas is being considered for use at the on-site construction accommodation village for food preparation and domestic use. It would be supplied though on-site tanks rather than a mains supply.

The project would also require approximately 6450 kilolitre per year (kL/year) of diesel. Diesel would be supplied to the project by a contracted service provider and would be stored in designated areas within the NSF area.

## 2.9 Water supply and storage

Approximately 1200 megalitres per annum (ML/a) of raw water would be required from an external source to meet the maximum operational demands of the project. The proponent stated in the EIS that it was in discussions with Sunwater Limited (Sunwater) to supply raw water to the project.

The project would require the construction of raw water pipelines to connect to the existing water utilities that traverse the project site. The proponent advised that it was in discussions with Sunwater in relation to this infrastructure and that it was likely that it would be constructed by a third party utility provider.

## 2.10 Utilities

The following utility infrastructure would be required for the project:

- Sewerage (up to 330 kilolitre per day; kL/day): A package sewage treatment plant with a capacity of 145kL/day would be constructed within the mine surface facilities. A Class A+ sewage treatment membrane module would be constructed for the construction accommodation village with a capacity of 186kL/day.
- Telecommunications: Telephone, internet, facsimile and security alarms. Necessary telecommunications infrastructure would be installed by a suitably qualified service provider.
- Water treatment: An on-site package water treatment plants would be installed in the mine surface facilities area and at the construction accommodation village.

## 2.11 Off lease infrastructure

Infrastructure beyond the project site may also be required for the project including a water pipeline and power transmission lines. It was stated in the EIS that off lease infrastructure were not assessed as part of the EIS process. The proposed corridors for this infrastructure are to still to be finalised by the proponent and would be constructed and owned by third parties (e.g. Sunwater, Powerlink or Ergon). Service agreements with these service providers would require them to obtain any necessary approvals (local, state or federal government approvals) and to construct and maintain the infrastructure.

# 3 The EIS process

## 3.1 Legislative basis for the EIS

On 17 December 2010, the proponent applied for approval to prepare a voluntary EIS for the project under Chapter 3 of the EP Act and the former DERM (now EHP) granted approval on 24 December 2010. The proponent also lodged a mining lease application (MLA 80173) and an application for an EA with the former Department of Employment, Economic Development and Innovation (DEEDI) on 20 December 2010.

On 17 January 2011, the project was referred (EPBC 2011/5811) to the former Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) (now Commonwealth Department of Environment; DOE) for a determination as to whether the project would constitute a 'Controlled Action' with respect to potential impacts on Matters of National Environmental Significance (MNES) under sections 75 and 87 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). SEWPaC determined the project would not have a significant impact on any MNES and was therefore 'Not a Controlled Action', on 15 February 2011.

## 3.2 Timeline of the EIS process

Table 1 outlines the stages, timing and actions undertaken in the EIS assessment process for the project.

**Table 1 EIS process stages, timing and actions**

| Stage | Section of EP Act | Date and action |
|---|---|---|
| Application for voluntary EIS. | 70 and 71 | 17 December 2010. |
| EHP decision on application for voluntary EIS. | 72 | 24 December 2010. |
| Mining lease and Environmental Authority application | | The proponent also lodged a mining lease application (MLA 80173) and an application for an EA with the former DEEDI on 20 December 2010. |
| **Division 2 – TOR stage** | | |
| The proponent prepared and submitted draft TOR to DERM. | 41 | 12 May 2011. |
| DERM finalised TOR notice and provided it to the proponent. | 42 | 2 June 2011. |
| DERM published TOR Notice | 43(1) | 6 June 2011. |
| Proponent gave TOR notice to affected and interested persons. | 43(3) | Posted by the proponent on 7 June 2011 (registered post). |
| Comment period for the draft TOR. | 42(3) | 7 June–22 July 2011. A total of 15 submissions were received. |
| DERM provided comments to the proponent. | 44 | 5 August 2011. |
| The proponent responded to comments and made amendments to the draft TOR. | 45 | 2 September 2011. |
| DERM finalised and published final TOR. | 46 | 30 September 2011. |
| **Division 3–EIS preparation stage** | | |

| Stage | Section of EP Act | Date and action |
|---|---|---|
| Proponent prepared and submitted the EIS. | 47 | Proponent submitted the EIS to EHP on 15 April 2013. |
| **Division 3–Submission stage** | | |
| The proponent submitted the EIS. | 47 | 15 April 2013. |
| EHP decision on whether to allow the EIS to proceed. | 49(1)–(2) | 28 May 2013. |
| EHP decided on minimum period for making of the submissions about the EIS (at least 30 business days after EIS notice is published). | 49(3-4) | On 14 May 2013 EHP set the submission period for the EIS from 19 June–30 July 2013. |
| EHP prepared and gave notice of decision to proponent. | 49(5) | 28 May 2013. |
| **Division 4–Notification stage** | | |
| The proponent gave EIS notice to affected and interested persons. | 51(2) | Posted by the proponent on 7 June 2013 (registered post). |
| The proponent published the EIS notice and made submitted EIS available on a website. | 51(2)(b) | 14 June 2013. |
| The proponent provided statutory declaration of compliance with notice requirements. | 53 | 20 June 2013. |
| EHP provided all accepted submissions to the proponent. | 56(1) | 12 August 2013. |
| The proponent responded to submissions, provided any amendments of the EIS and submitted an EIS amendment notice to EHP. | 56(2) and (3)<br>66 | 12 December 2013. |
| EHP decided if EIS and response to submissions and submitted EIS were adequate for the EIS process to proceed. | 56A(2) and (3) | 24 January 2014. |
| EHP prepared and gave decision notice to the proponent. | 56A(4) | 10 February 2014. |
| **Division 5–EIS assessment report** | | |
| EHP prepared the EIS assessment report. | 57 | 24 March 2014. |
| **Division 6–Completion of process** | | |
| EHP gave EIS assessment report to proponent—completing EIS process. | 60(1) | 24 March 2014. |

## 3.3 Approvals

The following sections of this assessment report summarise the key approvals sought for the project under the state's legislation.

### 3.3.1 *Mineral Resources Act 1989*

The project requires leases to be approved for MLA 80173 under the *Mineral Resources Act 1989* (MR Act). A mining lease entitles the holder to mine coal resources and carry out activities associated with mining or promoting the activity of mining. An EA under the EP Act is required before a mining lease can be granted. Additionally, a mining lease will not be granted by the mining registrar (Department of Natural Resources and Mines; DNRM) until agreement and compensation is reached with owners of the land within the MLA area.

### 3.3.2 *Environmental Protection Act 1994*

The conduct of project activities within the MLA area requires an EA under Chapter 5 of the EP Act. This approval would cover mining and the activities listed as environmentally relevant activities (ERA) under Schedule 2 of the EP Regulation 2008 that are directly associated with, or facilitate or support, the mining activities, including those described in Table 2.

The following notifiable activities being undertaken for the project would also be authorised under the EA:

- Notifiable activity 1—Abrasive blasting: Carrying out abrasive blast cleaning (other than cleaning carried out in fully enclosed booths) or disposing of abrasive blasting material.
- Notifiable activity 7—Chemical storage: Storing more than 10 tonnes (t) of chemicals (other than compressed or liquefied gases) that are dangerous goods under the dangerous goods code.
- Notifiable activity 14—Engine reconditioning works: Carrying out engine reconditioning work at a place where more than 500 litres (L) of any of the following are stored:
    - Halogenated and non-halogenated hydrocarbon solvents
    - Dangerous goods in Class 6.1 under the dangerous goods code
    - Industrial degreasing solutions.
- Notifiable activity 29—Petroleum product or oil storage: storing petroleum products or oil:
    - In underground tanks with more than 200L capacity
    - In above ground tanks with for petroleum products:
        - or oil in class 3 in packaging groups 1 and 2 of the dangerous goods code—more than 2500L capacity
        - or oil in class 3 in packaging groups 3 of the dangerous goods code—more than 5000L capacity
        - that are combustible liquids in class C1 or C2 in AS 1940–2004—more than 25,000L capacity.

**Table 2 Project environmentally relevant activities (source: amended EIS and proponent's response to information request; see Appendix 2)**

| Environmentally relevant activities | Threshold | Applicable project activities |
|---|---|---|
| ERA 8–chemical storage | Storing a total of 50t or more of chemicals of dangerous goods class 1 or class 2, division 2.3 under subsection (1)(a) 8.3: Storing more than 500 $m^3$ of chemicals of class C1 or C2 combustible liquids under AS1940 or dangerous goods class 3 subsection (1)(c). | Bulk diesel storage – Fuel for underground equipment, mobile and surface equipment, used in Coal Preparation Plan. Storage of detonators and chemicals for blasting Storage of chemicals for water treatment. Storage of organic solvents. |
| ERA 10–gas producing | Manufacturing, processing or reforming 200t or more of hydrocarbon gas in a year. | Gas drainage activities. |
| ERA 13–tyre manufacturing or retreading | (2) Retreading tyres. | Required for the retreading of tyres on plant/vehicles where possible. |
| ERA 31–mineral processing | 2(b) - Processing more than 100,000t of mineral products (other than coke) in a year. | Required for the CHPP, which will process approximately 9Mtpa of coal. |
| ERA 56–regulated waste storage | Receiving and storing regulated waste. | Required for waste management activities on-site |
| ERA 63–sewage treatment | Operating sewage treatment works, other than no-release works, with a total daily peak design capacity of— (b) more than 100 but not more than 1500 equivalent persons | Required for the operation of sewage treatment plants for the mine surface facilities and the temporary construction accommodation village. |

In regards to any potential contaminated land on-site (e.g. landfill or existing railway lines), the proponent is required to address the following:

- Any disturbance or work associated with contaminated land (including hazardous contaminants and notifiable activities) should be undertaken in consultation with a suitably qualified person in accordance with section 564 of the EP Act and management should be in accordance with provisions under part 8 Contaminated Land of the EP Act.
- Should the proponent become aware of any contaminant present on-site (including any contamination associated with the existing rail lines), the applicant has an obligation under section 371 of the EP Act to notify EHP as the administering authority.
- The administrating authority should be advised of any notifiable activity occurring on the MLA.
- If it is confirmed that a land has been contaminated regardless of whether or not a notifiable activity is occurring, the EHP should be advised in accordance with section 371 of the EP Act.

### 3.3.3 *Water Act 2000*

The project is located within the Fitzroy River catchment and subject to the Water Resource (Fitzroy Basin) Plan 2011 (Fitzroy WRP) and its implementation tool, the Fitzroy Basin Resource Operations Plan (January 2004, amended October 2011). The Fitzroy WRP regulates the taking of overland flow water from the Fitzroy Basin. The proponent would have to apply for a water licence in accordance with section 32 of the Fitzroy WRP, to authorise the proposed groundwater dewatering activities associated with the project.

If the take and use of any water generated from gas drainage activities is not authorised under the *Petroleum and Gas Act (Production and Safety) Act 2004*, a water authorisation under the *Water Act 2000* (Water Act) would be required to authorise the extraction of this water.

The project would involve the subsidence of watercourses and the repair of subsidence cracks. Such activities carried out within a watercourse, lake or spring, are authorised by a riverine protection permit under the Water Act. A riverine protection permit would not be required if the proposed activity can be undertaken in accordance with the departmental guideline Activities in a Watercourse, Lake or Spring Associated with a Resource Activity or Mining Operations (DNRM, version 3). If it is determined that the proposed activity cannot be undertaken in accordance with this guideline, then a riverine protection permit would be required.

### *3.3.4 Aboriginal Cultural Heritage Act 2003*

A cultural heritage management plan would be required under the *Aboriginal Cultural Heritage Act 2003* (ACH Act) prior to the commencement of construction. The proponent stated in the EIS that the cultural heritage requirements under the ACH Act had been satisfied with a Cultural Heritage Investigation and Management Agreement which was accepted by the former DERM (now EHP) in 2012.

## 3.3.5 Other approvals

#### *3.3.5.1 Nature Conservation Act 1992*

The proponent would need to comply with the NC Act, particularly in regard to obtaining the following approvals for the project:

- Where there is a requirement for the clearing of plants protected under the NC Act, clearing of protected plants (including endangered, vulnerable, near threatened and least concern species) must only occur in accordance with an exemption under the NC Act. Further detail is provided in the Nature Conservation (Protected Plants) Conservation Plan 2000.
- Where the activities of the proponent may cause disturbance to animal breeding places, the proponent must prepare a species management program under section 332 of the Nature Conservation (Wildlife Management) Regulation 2006 and obtain approval from EHP.
- Any spotter catcher employed by the project must be in possession of a rehabilitation permit (spotter catcher endorsement) for managing fauna during clearing activities (section 207 of Nature Conservation (Wildlife Management) Regulation 2006).
- If it is necessary to remove animals posing a threat to human health or property, a damage mitigation permit under section 181 of the Nature Conservation (Wildlife Management) Regulation 2006 would be required.

#### 3.3.5.2 *Fisheries Act 1994*

In the event that the Blackwater-Rolleston Road/Blackwater and/or South Blackwater Mine Railway is re-aligned due to subsidence issues and the new alignment traverses a minor waterway, the proponent would require a waterway barrier works approval under the *Fisheries Act 1994* (Fisheries Act) from the Department of Agriculture, Fisheries and Forestry (DAFF). The approval can be actioned either by a development approval or a self assessable code notification.

#### *3.3.5.3 Queensland Heritage Act 1992*

In accordance with the *Queensland Heritage Act 1992*, the proponent would need to notify EHP if an archaeological artefact is discovered and provide information on the location and description of the discovery.

#### 3.3.5.4 Transport

To ensure compliance with the *Transport Infrastructure Act 1994* and *Transport Operations (Road Use Management) Act 1995* the proponent would need to consult with the Department of Transport and Main Roads (TMR) on all matters concerning:

- road impacts assessments
- road-use management plans
- investigation of potential road safety hot spots.

The proponent would need to apply for permits for over-dimension loads and road corridor permits. Section 4.17 of this assessment report provides further information on transport related approvals.

#### 3.3.5.5 Biosecurity management

In relation to biosecurity management, the proponent would need to comply with:

- The *Land Protection (Pest and Stock Route) Management Act 2002,* particularly if crossing and working around pest fences.
- The *Agricultural Chemicals Distribution Controls Act 1966* (licensing controls), particularly where chemical control is the proposed for mitigation of weeds.

- The *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act), particularly in relation to crossing and working around pest fences.
- *Plant Protection Act 1989,* particularly in relation to pest quarantine area for grape phylloxera. Machinery used for the project could traverse the Special Control Zone, which is designated as a phylloxera exclusion zone[2]. The movement of machinery, equipment, soil, grape plants and other phylloxera risk items that have been in contact with grape vines are restricted (refer section 73 of the Plant Protection Regulation 2002).

Where chemical control is the proposed mitigation measure for weeds, the project would need to comply with both the *Chemical Usage (Agricultural and Veterinary) Control Act 1988* (use controls) and *Agricultural Chemicals Distribution Controls Act 1966* (licensing controls) to ensure that use of agricultural chemicals or other industrial chemicals do not have an adverse impact on human health, trade or the environment through contamination of agricultural produce.

#### 3.3.5.6 Forestry product and quarry materials

No State forests or timber reserves were identified within the project site. However, to ensure compliance with the Forestry Act, the proponent should contact DAFF:

- To ensure that the location and positioning of the project's infrastructure and/or proposed offset areas, avoids sterilising and/or restricting the future utilisation and/or access to currently operational or known commercial deposits of State-owned quarry material, as administered under the *Forestry Act 1959* (Forestry Act).
- In the event that any State-owned forest products are to be cleared, interfered with or sterilised from utilisation as a result of the project, to salvage harvesting and any necessary authorisation (sales permit/s) to be arranged.

A sales permit administered under the Forestry Act, would be required for the moving of State-owned quarry material from one mining lease and transporting to, and using of this quarry material on another mining lease, including any adjoining mining leases.

### 3.3.6 Planning framework

The project is not subject to *Sustainable Planning Act 2009* (SP Act) and therefore is exempt from the requirements of State Planning Policies (SPP) and local planning schemes. However, it was stated in the EIS that principles in the state planning policies were used in considering the environmental impacts of the project. The SPP that were listed in the EIS have now been consolidated into a single state planning policy with some changes to policy.

The EIS refers to the Central Queensland Regional Plan (Central Queensland Regional Growth Management Framework) 2002. A new Central Queensland Regional Plan came into effect on 18 October 2013 which covers the project area. Part of the MLA lies within the Blackwater Priority Living Area in the Central Queensland Regional Plan.

The project is located within the CHRC (former Duaringa Shire Council). The Duaringa Shire Planning Scheme (2011) is referred to in the EIS.

## 3.4 Consultation program

### 3.4.1 Public consultation

In addition to the statutory requirements for advertising the TOR and EIS notices, and the mailing of the notices to interested and affected parties, the proponent undertook community consultation as part of the EIS process. Details of a series of five consultation phases with a range of stakeholders and focus groups were described in the EIS (EIS section 3).

The aim of the consultation program was to identify stakeholders' issues and to ensure that these issues were addressed as part of the EIS process. It included consultation with the neighbouring landowners, local and state government, community groups and other interested parties (listed in EIS Table 3-1). Consultation mechanisms included community information sheets, one-on-one meetings, small group meetings, and telephone interviews. The consultation program involved the five stages listed below.

[2] Refer to map at: http://www.daff.qld.gov.au/4790_20983.htm#Grape.

1. Stakeholder identification—The objective of this stage was to identify all relevant stakeholders in order to involve them early in the process. Over 65 stakeholders were identified during this phase.
2. Issue scoping—The objective of this stage was to provide information on the project and EIS process to stakeholders to enable them to identify issues in relation to the project.
3. Social impact assessment (SIA) consultation—This stage occurred in parallel with the issue scoping stage and was undertaken to validate the baseline profile of the study area, and assist in the identification and assessment of socio-economic impacts.
4. Issue response—The objective of this stage was to address and respond to all relevant stakeholder issues.
5. EIS feedback consultation—The objective of this stage was to provide feedback on the results of the EIS specialist studies to stakeholders. This stage was undertaken during the EIS submission period.

A summary of the key issues raised during the consultation program stakeholders was provided in Table 3-2 and Table 3-3 of the EIS. These issues were discussed in the relevant sections of the EIS.

### 3.4.2 Advisory bodies

EHP invited the following organisations to assist in the assessment of the TOR and the EIS by participating as members of the advisory body for the project. Due to the change in the structure of government, ('machinery-of-government'), the names and responsibilities of a number of Queensland departments were changed on 3 April 2012 (refer to Appendix 1).

1. Former DERM
2. Former Department of Communities
3. Former Department of Infrastructure and Planning
4. Former DEEDI now Department of State Development, Infrastructure and Planning (DSDIP)
5. Former Department of Education and Training now Department of Education, Training and Employment (DETE)
6. Former Queensland Treasury now Queensland Treasury and Trade (QTT)
7. Former Department of Communities, Child Safety and Disability Services (DCCSDS)
8. Department of Community Safety (DCS)
9. Department of Justice and Attorney-General
10. Department of Energy and Water Supply
11. Department of Housing and Public Works (DHPW)
12. Department of Local Government
13. DAFF
14. DNRM
15. Department of Science, Information Technology, Innovation and the Arts
16. Department of National Parks, Recreation, Sport and Racing
17. Department of Aboriginal and Torres Strait Islander and Multicultural Affairs (DATSIMA)
18. Department of Tourism, Major Events, Small Business and the Commonwealth Games
19. TMR
20. Queensland Police Service (QPS)
21. Queensland Health (QH)
22. CHRC
23. Gladstone Regional Council
24. Rockhampton Regional Council
25. Capricorn Conservation Council
26. QR National
27. Aurizon Holdings Limited (Aurizon)
28. Fitzroy Basin Association
29. Central Queensland Land Council
30. Gladstone Ports Corporation
31. Sunwater
32. Ergon Energy
33. Powerlink Queensland.
34. Road Accident Action Group Inc.

### 3.4.3 Public notification

In accordance with the statutory requirements, public notifications of the draft TOR and EIS were conducted through notices in *The Courier-Mail, Central Queensland News, Blackwater Herald,* and on the former DERM, EHP and Hansen Bailey Pty Ltd.'s (environmental consultancy representing the proponent; Hansen Bailey) websites.

The draft TOR and EIS were placed on public display at the locations listed in Table 3 during their respective public comment and submission periods. Copies of the amended EIS were made available upon request from Hansen Bailey.

**Table 3 Locations for the public display of documents**

| Display location | Public display document |
|---|---|
| DERM's web site: www.derm.qld.gov.au<br>EHP's web site: www.ehp.qld.gov.au | TOR |
| Hansen Bailey's website: www.hansenbailey.com.au | EIS |
| DERM and EHP's George Street Brisbane Business Centre | TOR and EIS |
| DERM, Emerald Office | TOR |
| EHP, Mackay Office | EIS |
| CHRC, Blackwater Library | TOR and EIS |
| CHRC, Emerald Library | TOR and EIS |

## 3.5 Matters considered in the EIS assessment report

As required under section 58 of the EP Act, the following matters were considered in this assessment report:

- the final TOR for the EIS
- the submitted EIS
- all properly made submissions and any other submissions accepted by the chief executive
- the Response to EIS submissions and amended EIS
- the standard criteria
- another matter prescribed under a regulation.

These matters are further described in the following subsections.

### 3.5.1 The final TOR

The final TOR was considered when preparing this assessment report. While the TOR was written to include all the major issues associated with the project that were required to be addressed in the EIS, they were not exhaustive, nor were they to be interpreted as excluding other matters from consideration. Where matters outside of those listed in the final TOR were addressed in the EIS, those matters have been considered when preparing this assessment report.

In deciding to allow the EIS to proceed to the preparation of an assessment report, EHP was required to consider the submitted EIS documents and determine if the information provided in this documentation adequately met the requirements of the TOR.

### 3.5.2 The submitted EIS

The submitted EIS was considered when preparing this report. The submitted EIS comprised:

- Minyango Project EIS (referred to as the 'EIS' in this assessment report) that was made available for public review
- Amendments to the EIS (referred to as the 'amended EIS' in this assessment report) which consists of:
  - the Minyango Project Response to Public Submissions for the Minyango Project EIS (referred to as the 'response to EIS submissions' in this assessment report) and
  - Minyango Project EIS addendum (referred to as the 'EIS addendum').
- Additional information provided by the proponent on 11 March 2014. This information was provided to EHP in response to a request on 5 February 2014 under section 62 of the EP Act for additional information to assist EHP in preparing the assessment report for the project. The proponent's response to the information request is provided in Appendix 2.

In this assessment report, the term 'EIS documents' refers to the combined submitted EIS documents consisting of the EIS, amended EIS and additional information provided by the proponent on 11 March 2014.

### 3.5.3 Properly made submissions

EHP accepted 21 properly made submissions on the EIS, 15 from local and state government agencies, 2 from private submitters, and 4 from non-government organisations. EHP also made a submission on the EIS.

All government agencies that made submissions stating outstanding issues arising from their review of the EIS were given the opportunity to review and provide comments on any amendments made to the EIS. This included comments on conditions that should apply to the project and on the adequacy or otherwise of the amended EIS chapters in addressing concerns raised in submissions. Letters were sent to all private submitters advising them on the submission of the amended EIS together with details for obtaining the proponent's response to their submission.

### 3.5.4 The standard criteria

Section 58 of the EP Act requires that, among other matters, the standard criteria listed in schedule 3 of the EP Act must be considered when preparing the EIS assessment report.

The standard criteria under the EP Act are:

a) the principles of ecologically sustainable development as set out in the National Strategy for Ecologically Sustainable Development
b) any applicable environmental protection policy
c) any applicable Commonwealth, state or local government plans, standards, agreements or requirements
d) any applicable environmental impact study, assessment or report
e) the character, resilience and values of the receiving environment
f) all submissions made by the applicant and submitters
g) the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows—
    i. an environmental authority
    ii. a transitional environmental program
    iii. an environmental protection order
    iv. a disposal permit
    v. a development approval
h) the financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument
i) the public interest
j) any applicable site management plan
k) any relevant integrated environmental management system or proposed integrated environmental management system
l) any other matter prescribed under a regulation.

EHP considered the standard criteria when assessing the project.

# 4 Adequacy of the EIS

This section of the assessment report discusses in more detail the adequacy of the EIS documents, taking into account key matters of concern identified in the EIS documents and particularly those of significant interest raised in submissions. The level of detail of the assessment is proportional to the significance of the potential impacts of the project, particularly on environmental values. Where possible, outstanding matters that need further assessment are identified, particularly those required by the proponent to meet State policy and legislative requirements.

Specifically, the following matters are addressed for each values section:

- a brief outline of the assessment methodology
- a brief outline of the environmental values identified
- statement of impacts as identified in the EIS documents
- adequacy of the avoidance, minimisation and management measures proposed
- assessment on how the proponent responded to the EIS submissions and if amendments addressed the comments adequately
- summary of the adequacy of the EIS section, including any outstanding issues identified during the EIS assessment process and any recommendations to address these issues. Recommendations are listed as either EM Plan requirements or as general recommendations that the proponent should address[3].

## 4.1 Introduction

Chapter 1 of the EIS adequately identified the proponent, provided an introduction to the project, and described its objectives and scope. The structure of the EIS documents including how to make submissions on the EIS was also described.

Key objectives of the project as described in the EIS would be to:

- develop a new high capacity underground mine
- develop the project in an environmentally responsible manner, through incorporating environmental considerations into the design and operation of the mine
- maximise the utilisation of the coal resource and provide a reliable high quality supply of metallurgical and thermal coal for the export market
- maximise the socio-economic benefits of the project for the local region and the state of Queensland.

## 4.2 Project need and alternatives

An adequate justification for the project and described key aspects of the project where alternatives were considered in the project planning was provided in section 4.14 of the EIS. A summary of this assessment is provided in the following sections.

### 4.2.1 Project justification

The project proposes to efficiently extract substantial undeveloped metallurgic and thermal coal resources within the project site. The project would provide substantial economic benefits to the local region, Queensland and Australia. The construction and operations phases would each directly employ approximately 500 FTE people. The total additional value to the Central Queensland Region annually from the project was estimated in the EIS to be $555 million.

[3] A summary of all recommendations made in the assessment report is provided in section 5 (adequacy of the EM plan) or section 6 (Recommendations about the suitability of the project).

The consequences of the project not proceeding as described in the EIS include: lost opportunity to produce approximately 74 million tonnes of metallurgical and thermal coal for the export market; lost royalty charges and other government taxes (approximately $647 million) and the projected contribution of the project to the state economy and; job opportunities would not eventuate.

### 4.2.2 Alternatives to the project

A number of aspects of the project where alternatives were considered in the project planning were described in the EIS. These are summarised below.

**Alternative resources**—The project would involve mining the Aries and Pollux Seams. It was justified in the EIS that mining of the coal seams in between and below the Aries and Pollux Seams would not be economically feasible.

**Alternative mining methods**—The target coal seams are not economically suitable for open cut mining as they are too deep (170m and 550m). Additionally, open cut mining methods would result in significantly increased environmental impacts, including noise, dust and visual impacts that are likely to be unacceptable given the close proximity to Blackwater.

Longwall mining methods are proposed for the majority of the areas. Bord and pillar mining is proposed for the faulted areas of the resource within the project site as prevalence of faults makes these areas unsuitable for longwall mining methods. While bord and pillar mining of the remaining area would result in reduced surface subsidence effects, the EIS stated that this method was not feasible for a high production capacity mining operation as it would result in significantly lower resource recovery.

**Alternative mine plans**—The EIS was based on the conservative assumption that a stacked longwall layout would be used (i.e. the same mine layout is repeated for both seams with the longwall layout in each seam "stacked" on above theother) as this would give rise to the highest level of potential subsidence effects. The alternative to this approach would be to offset the longwall layouts which would have the advantage of reducing stress interaction effects in the roadways. However, offset roadways can transfer additional stress onto the longwall face leading to a risk of cavity formation and ongoing roof control and productivity issues.

The EIS is also based on the assumption that two longwalls would be operating simultaneously in seperate coal seams. The possibility of mining using only one longwall in one seam at a time may be assessed in the future (depending on the results of detailed mine design and mine scheduling). If this approach were to be adopted, however the EIS indicated that it would have little impact on the nature of the impacts (e.g. the depth of subsidence) or result in any additional environmental impacts than those presented in the EIS but the timing and sequence of subsidence would differ from that described in the EIS documents.

**Alternatives with respect to mining beneath the Blackwater Lawn Cemetery**—In response to community concerns about the potential effects of subsidence on the cemetery, the proponent committed to adopting mining methods and a mine layout that would not result in any surface subsidence of the Blackwater Lawn Cemetery. However, detailed design of the mine plan may include mining or the development of access roadways beneath the cemetery, using methods that do not result in surface subsidence and therefore do not disturb the cemetery.

**Alternatives with respect to the location of the surface facilities**—In response to stakeholder concerns regarding the proximity of the project's surface infrastructure to Blackwater, particularly in relation to impacts on residential amenity, the proponent committed to locating the higher impact surface facilities (including the CHPP, rail loop and CDA), a minimum distance of 2km from the boundary of Blackwater.

**Alternatives with respect to rejects disposal**—Three options for the disposal of rejects material were described in the EIS: codisposal of rejects; dry rejects disposal; and disposal of coarse rejects in an emplacement area and pump tailings to a conventional tailings dam, with decanted water returned to the mine water management system.

Dry rejects disposal was identified in the EIS to be the preferred option as this would reduce water losses from the CHPP and therefore would have water conservation benefits. It would also result in an optimum final landform for the rejects disposal area in terms of geotechnical stability. Further sampling and testing of representative rejects material would be necessary to confirm the technical viability of dewatered fine rejects for the project. The EIS was therefore based on the assumption that

the proponent would use the wet CDA option for the disposal of rejects. Changing to a dry rejects disposal system would not give rise to any additional impacts beyond those assessed in the EIS documents. The EIS stated that both the wet CDA and dry rejects options were preferable to a conventional tailings dam as the final rehabilitation of tailings dams can be challenging due to the relatively high moisture content and low bearing capacity of wet, fine tailings. These options would also result in improved water conservation benefits compared to the use of conventional tailings dams.

## 4.3 Regulatory approvals

The methodology and objectives of the EIS process, key approvals required for the project and relevant policies, guidelines, planning policies and planning schemes to be considered in assessing the project were adequately described in section 2 of the EIS. These are summarised in section 3.3 of this assessment report.

## 4.4 Consultation

The consultation carried out as part of the EIS process, including its objectives, activities undertaken, stakeholders consulted, stakeholder issues and the way in which these issues were addressed in the EIS was adequately described in section 3 of the EIS. A summary of the key issues raised during the consultation program was provided in Table 3-2 and Table 3-3 of the EIS. A summary of the consultation process undertaken by the proponent as part of the EIS process is summarised in section 3.4.1 of this assessment report.

## 4.5 Description of the project

The location, scope and phases of the project including the proposed underground mining activities and coal handling, processing and transportation was described in section 4 of the EIS. A summary of the project is provided in section 2 of this assessment report.

The proposed location and footprint of raw water pipelines, power transmission lines and gas drainage infrastructure on the MLA was not provided in the EIS. EHP, Powerlink and Sunwater all raised this as an issue in their submissions on the EIS, with EHP's submission requesting the proponent clearly provide the location and footprint of this infrastructure in the amended EIS. In the response to EIS submissions, the proponent stated that the location of this infrastructure would be determined during the detailed design phases, but that this infrastructure would generally be located within the project disturbance area shown in EIS Figure 8-3. Further, section 4.6.8 of the EIS noted that the '*detailed design process will ensure these infrastructures are located in areas that avoid disturbance of any sensitive features and/or result in any significant adverse impacts*'. However, EHP notes that while section 4.6.8 of the EIS and amended EIS stated that there was flexibility in the siting of these facilities, no commitments were made in the EIS addendum to locate the infrastructure footprint to avoid 'sensitive features' as stated by the proponent in its response to EIS submissions document.

> **EM Plan requirement 1:** The proponent commit in an amended EM Plan to locate the raw water pipelines, power transmission lines and gas drainage infrastructure on the MLA to avoid 'sensitive features'. A definition of 'sensitive feature' should be provided and include as a minimum, remnant regrowth vegetation, creek lines including an appropriate buffer distance, gilgae areas and potential habitat for listed threatened species.

EHP, Powerlink and Sunwater's submissions on the EIS, raised a number of issues and requested clarification on a number of elements of the proposed project. The proponent adequately addressed a number of these matters in the amended EIS including the following:

1. **Electricity generation plant**—An electricity generation plant (i.e. ERA 14–Electricity generation) was proposed as part of the project in the EIS. EHP's submission on the EIS requested further information on the proposed location, footprint and output of the proposed electricity plant, consistent with the requirements of the TOR. In the amended EIS, the proponent clarified that an electricity generation plant was now not proposed as part of the project, removed reference to ERA 14–Electricity Generation in the EIS addendum and confirmed that electricity for the project would be obtained from a connection to the 22kV or 66 kV powerlines that traverse the project site.

2. **Water supply**—Sunwater's submission on the EIS, advised that the 'discussions' referred to by the proponent in the EIS were in the very initial phases and as yet no source of the required water allocations had been identified, nor the means by which the supplies could be transported to the site. It recommended that the proponent urgently negotiate a water supply and transport agreement with Sunwater to enable the proponent's timeframes in the EIS to be met (i.e. construction to commence in 2014). EHP's submission on the EIS also requested further information on the feasibility of the raw water supply option described in the EIS and any alternative options for sourcing raw water for the project, as required in the TOR. In response, the proponent clarified in the EIS addendum that it had consulted further with Sunwater and that Sunwater had confirmed in '*that the supply of water from the Sunwater pipeline that traverses the project site is a feasible option*'. The EIS addendum also described a number of alternative water supply options for the project, namely: water supply from BHP Billiton Mitsubishi Alliance's (BMA) Blackwater Mine; purchasing an available allocation from the open market; and the potential to use a percentage of its existing allocation of 1000ML/year from Sunwater for the operations at Cook Colliery.

3. **Access to electricity easements**—Powerlink's submission on the EIS, provided information and described requirements of the proponent when working on and around Powerlink easements. Powerlink advised that it would require ongoing and unfettered access to its easements during all phases of the project. It recommended that the proponent liaise with Powerlink as early as possible after the concept design stage to ensure such needs are considered during detailed planning and limit the impacts of the project on access to Powerlink's easements. In the response to EIS submissions, the proponent advised that it had consulted with Powerlink representatives regarding its submission on the project and that it expected to allow Powerlink unfettered access to its easement during all phases of the project. Further the proponent stated that any health and safety requirements relating to Powerlink accessing its easements would be fit for purpose and would not place unnecessary time constraints on Powerlink personnel.

**General recommendation 1:** The proponent continue to liaise with Powerlink after the concept design stage to ensure health and safety issues and Powerlink's access needs are considered during all stages of the project.

## 4.6 Subsidence impact assessment

Mine subsidence issues associated with the project were described in section 6 of the EIS. A detailed mine subsidence assessment was presented in EIS Appendix A, Subsidence report.

### 4.6.1 Methodology

The Incremental Profile Method was used to model and predict subsidence, tilt and strain profiles for the project mine plan. The method as described in the EIS used an empirical model based on a large database of observed subsidence monitoring data from various mines in the Bowen Basin and across New South Wales. It involved the following three steps:

1. Prediction of the incremental subsidence profiles over each longwall in each seam based on the local seam thicknesses, the incremental panel and pillar widths, the presence of adjacent previously mined panels and the local depths of cover.
2. The addition of all the incremental subsidence profiles in a single seam to form the total subsidence profiles over the series of longwalls. The prediction curves for each seam were calibrated using observed subsidence data from longwall mining at the nearby Cook Colliery.
3. The addition of the total subsidence profiles from the Aries Seam to the total subsidence profiles of the Pollux Seam in order to determine the total subsidence profile after mining in both seams.

### 4.6.2 Subsidence predictions

EIS section 4, Project description described the longwall mining methodology and EIS section 6.2.1 described typical subsidence associated with longwall mining.

Longwall wall mining, as described in the EIS, would typically result in subsidence that lead to progressive development of shallow, trough-like depressions on the surface above each extracted longwall panel. These depressions would have gentle grades and develop relative to the natural

surface topography. The subsidence effect would moves across the ground at approximately the same speed as the advance of the mining face—typically up to 100m per week.

Depressions on the surface would develop as the roof strata above the coal seam progressively collapsed to fill the void created by the extraction of coal in the area behind the longwall. As the roof collapsed into the mined area (referred to as the 'goaf'), the fracturing and settlement of rocks would progress upwards through the overlying strata and results in sagging and bending of the near surface layers.

Predicted subsidence associated with the project described in the EIS included:

1. No surface subsidence outside the project site boundary.
2. A total surface area affected by mine subsidence of approximately 1354ha (i.e. the area within the predicted limit of measurable subsidence (LOMS); Figure 3).
3. Vertical subsidence of up to 2.5m. The predicted maximum vertical subsidence after mining in the Aries Seam was 1.2m and 2.5m after mining both the Aries and Pollux Seams respectively (Figure 3). The maximum vertical subsidence was predicted to occur in the south-east of the mining area where the depth of cover is the deepest.
4. Localised changes in the ground surface slopes, up to a maximum of 4%, as a result of the formation of subsidence troughs at the surface. Post subsidence surface slopes would be steepened in localised areas around the edges of the subsidence troughs. The maximum post mining surface slopes after mining both seams, would be up to a maximum of 4% in the north of the project site where the depth of cover is the shallowest. This is due to the relatively high width:depth of cover ratio in the north of the project site where the incremental subsidence profile of the longwalls is relatively narrow and deep, thereby causing greater tilting than in the south of the project site where the depth of cover is greater.
5. Localised surface cracking and buckling due to tensile strain on the ground surface:
    - In the north of the project site (where the depth of cover would be the shallowest and the post subsidence surface slopes and the tensile strain are expected to be the highest), tension cracks are anticipated to occur in the area above the chain pillars and potentially around the edges of the chain pillars. These are anticipated to have an average width of up to 0.2m, with larger cracks that could extend to depths in the order of 5–10m occurring in isolated locations.
    - In the south of the project site, localised surface cracking would only be expected to occur in rare instances due to the relatively gentle post subsidence surface slopes and lower tensile strain expected.
    - Buckling of surface soil may occur near the centre of the longwall panels, in the zone of maximum compressive strain, due to compressive strain on the ground surface. Buckling would typically results in mounds of soil being produced in areas where transient tension cracks (formed temporarily above the retreating longwall) had over-closed.
6. Sub-surface cracking and fracturing in the strata overlying the longwall coal extraction area (i.e. the goaf). After mining in both the Aries and Pollux Seams, the caved zone would extend from the Rangal Coal Measures into the Rewan Formation and the fractured zone would be completely restricted to the Rewan Formation due to the depth of cover of the coal seams (Figure 3). Therefore, it was concluded in EIS Appendix A, Subsidence report that it is highly unlikely that there would be any connective cracking from the mining operations to the ground surface following longwall extraction and subsidence. This was stated as being consistent with operational experience during previous longwall mining at the nearby Cook Colliery.

The predicted post subsidence surface topography after the Aries and Pollux Seams are mined was shown in EIS Figure 6-4.

The reliability of the subsidence predictions were discussed in EIS section 6.2.4 and the limitations of the model were described in EIS Appendix A, Subsidence report . It was noted in the EIS that these limitations are considered unlikely to present a material difference to the outcomes or impacts predicted. In summary, the model is based on a large dataset of observed subsidence monitoring data from both Queensland and New South Wales, and was calibrated using the measured subsidence at previously extracted longwalls at the Cook Colliery, which has similar geology and topography. The predicted maximum vertical subsidence is approximately 50% of the total maximum extraction thickness. It was concluded in the EIS that in the unlikely event that the maximum vertical subsidence was 15% greater than predicted (i.e. maximum vertical subsidence of 2.9m), the impacts and mitigation would not be significantly different from those described in the EIS.

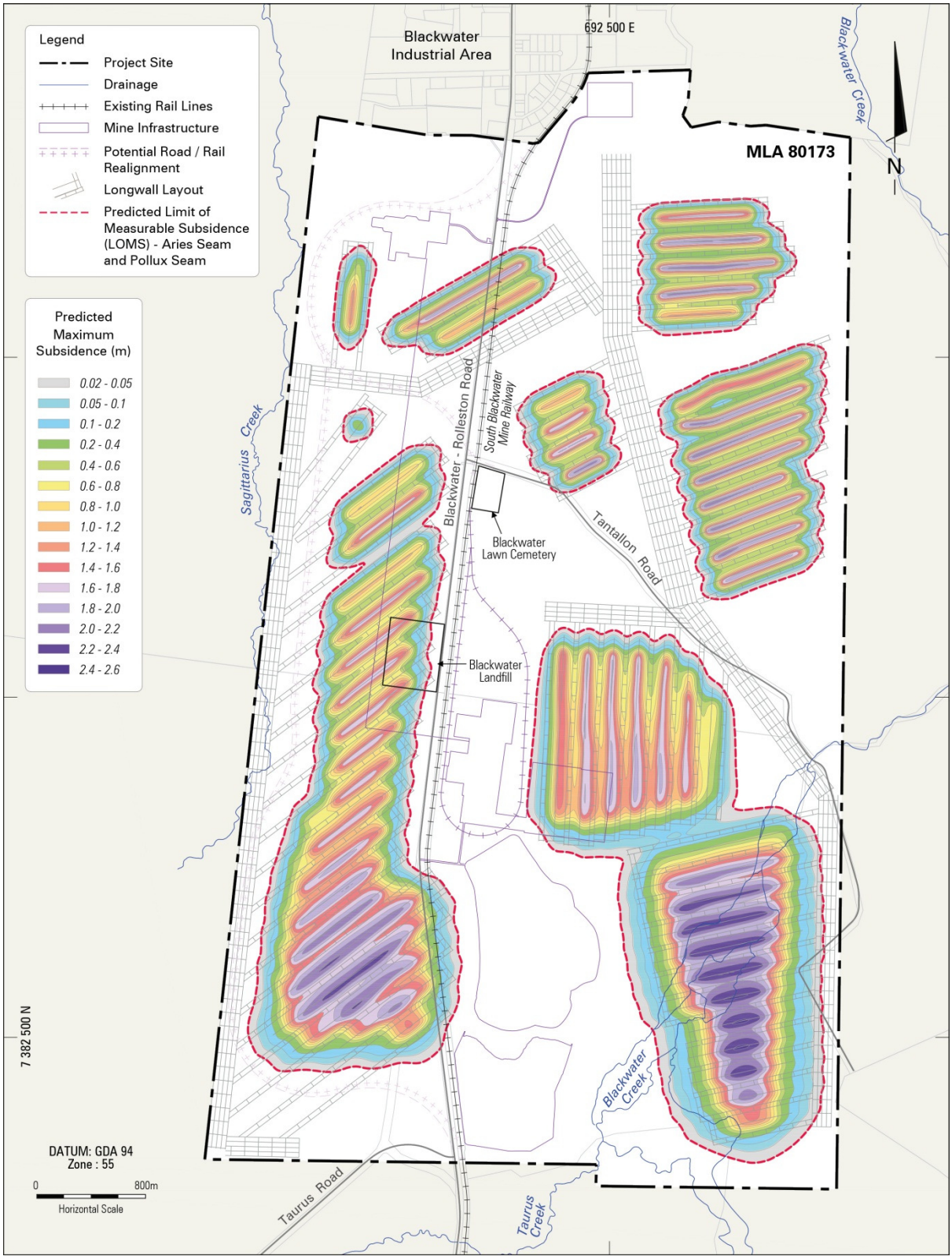


**Figure 3 Predicted maximum vertical subsidence (source: EIS Figure 6-2)**

### 4.6.3 Subsidence impacts

The impacts of subsidence on the proposed mine infrastructure, existing transport infrastructure, utilities, natural environment and cultural heritage within the project area were described in the EIS and are summarised in Table 4.

**Table 4 Summary of impacts of subsidence on proposed mine infrastructure, existing transport infrastructure, existing utilities, natural environment and cultural heritage within the project area (source: EIS documents)**

| Value/infrastructure [owner] | Predicted impacts* | Proposed mitigation and monitoring measures |
|---|---|---|
| **Mine infrastructure** | | |
| Proposed surface facilities and associated infrastructure | None— located so that they would not be impacted by subsidence. | No mitigation or monitoring measures proposed in the EIS.<br>Infrastructure would be located so it would not be impacted by subsidence. |
| Codisposal area (CDA) | None— designed so that there would be a minimum of 50m between the CDA and the predicted LOMS to ensure that the CDA would not be subsided. | |
| **Transport** | | |
| Blackwater-Rolleston Road [TMR] | ~0.6km of this road in the north of the MLA is within the predicted LOMS; subsidence of 0.02–2m is predicted.<br>~ 1.3km of this road in the south of the MLA is within the predicted LOMS; subsidence of 0.02–1m is predicted. | No mitigation or monitoring measures proposed in the EIS.<br>Proponent proposes to manage potential subsidence of Blackwater-Rolleston Road and the South Blackwater Mine Railway in-situ subject to approval by relevant owner(s), as required under the MR Act and *Coal Mining Safety and Health Act 1999* (CMSH Act).<br>It was stated in the EIS that should detailed investigations undertaken in consultation with owners identify that managing subsidence in-situ is not feasible then realignment of Blackwater-Rolleston Road and/or South Blackwater Mine Railway may be required. The EIS identified a conceptual realignment of Blackwater-Rolleston Road and the South Blackwater Mine Railway within the project site along the western boundary which is beyond the predicted LOMS. |
| Tantallon Road [CHRC] | A small section of this road (<200m) is within the predicted LOMS. EIS Figure 6-2 indicates it may be subsided by ~ 0.02–0.05m. | |
| South Blackwater Mine Railway [Aurizon] | ~ 0.55m of the railway in the north of the MLA is within the predicted LOMS, with subsidence of 02–2m predicted.<br>~ 1.2km of the railway in the south of the MLA is within the predicted LOMS, with subsidence of 0.02–0.06m predicted. | |
| Stockroute [DNRM and CHRC] | ~ 2km of the stockroute in the north and south of the MLA is within the predicted LOMS. Subsidence of up to 2.2m is predicted. | Proponent proposes to manage the impacts of subsidence on the operation of the stockroute through agreements between the owners of the stockroute (i.e. DNRM and the CHRC).<br>See section 4.10, Land of this assessment report for further information. |

| **Utilities** | | |
|---|---|---|
| Derelict residence [Proponent] | To be subsided. | No mitigation or monitoring measures proposed in the EIS as the residence is owned by the proponent.<br>See section 4.10, Land of this assessment report for further information. |
| Blackwater Landfill [CHRC] | ~75% of the landfill area is within the LOMS with up to 1.8m of subsidence predicted. | No mitigation or monitoring measures proposed in the EIS.<br>Subsidence impacts on utilities and the Blackwater Landfill is proposed to be managed through agreements required under the MR Act which would detail any proposed mitigation and monitoring measures.<br>See section 4.10, Land of this assessment report for further information. |
| Power transmission lines [Ergon Energy] | ~5km of the transmission lines would be within the LOMS with up to 2.6m of subsidence predicted in sections. | |
| Water pipeline [Sunwater Limited]<br>Telecommunications cable [Telstra]<br>Fibre optics cable [Nextgen Networks] | ~1.75km of each of these linier infrastructures in the north and south of the MLA is within the predicted LOMS, with subsidence of up to 2m predicted in sections. | |
| Natural environment | See relevant section of this assessment report for further information:<br>• Landuse and land suitability—section 4.10<br>• Terrestrial ecology—section 4.16<br>• Aquatic ecology— section 4.16<br>• Surface water/Blackwater Creek—section 4.14<br>• Groundwater— section 4.15<br>• Stygofauna— section 4.16. | |
| Cultural heritage | See relevant section of this assessment report for details:<br>• Indigenous cultural heritage—section 4.21<br>• Non-Indigenous cultural heritage— section 4.22. | |

* Base on data provided in the EIS or estimated by EHP using EIS Figure 6-2 and Figure 6-5.

### 4.6.4 Mitigation measures

Proposed monitoring and mitigation measures described in the EIS to address the potential impacts of subsidence on the proposed mine infrastructure, existing transport infrastructure, existing utilities, natural environment and cultural heritage within the project area are summarised in Table 4 and discussed further in the relevant section of this assessment report. In summary:

- Mine surface infrastructure would be located so that it would not be impacted by subsidence.
- No monitoring and mitigation measures were proposed to address impacts of subsidence on the Blackwater Landfill and existing utilities. The EIS proposed that such subsidence impacts would be managed through agreements with the relevant infrastructure owners, prior to commencing any mining that would cause subsidence of the infrastructure in accordance with the MR Act and the CMSH Act.

The proponent proposed in the EIS to manage potential subsidence of Blackwater-Rolleston Road and the South Blackwater Mine Railway in-situ subject to approval by TMR and Aurizon (formerly Queensland Rail National). However, the EIS states that, should detailed investigations undertaken in consultation with TMR and Aurizon identify that managing subsidence in-situ is not feasible, then realignment of Blackwater-Rolleston Road and/or South Blackwater Mine Railway may be required. To support the current project planning, a conceptual realignment of Blackwater-Rolleston Road and the South Blackwater Mine Railway was identified within the project site along the western boundary (Figure 1). This alignment is beyond the predicted LOMS.

### 4.6.5 Conclusion and recommendations

Quantitative estimates of predicted subsidence on the project area (based on the mine plan outlined in the EIS) were provided in the EIS as required in the TOR. The model used to estimate subsidence predictions was calibrated using observed subsidence data from longwall mining at the nearby Cook Colliery (which mine the same seams). It was stated in the EIS documents that subsidence as a result of longwall mining would impact on transport infrastructure, utilities, landuse, the natural environment and cultural heritage within the project area.

An assessment of the adequacy of the EIS documents in addressing the impacts of subsidence on infrastructure and natural and cultural values and the proposed mitigation measures is provided in relevant sections of this EIS assessment report. Specifically:

- South Blackwater Mine Railway—section 4.17, Transport
- Roads—section 4.17, Transport
- Landuse including the Blackwater landfill—section 4.10, Land
- Utilities—section 4.10, Land
- Terrestrial ecology—section 4.16, Ecology
- Aquatic ecology—section 4.16, Ecology
- Surface water—section 4.14, Surface water
- Groundwater—section 4.15, Groundwater
- Stygofauna—section 4.16, Ecology
- Indigenous cultural heritage—section 4.21, Indigenous cultural heritage
- Non-Indigenous cultural heritage—section 4.22, Non-Indigenous cultural heritage.

## 4.7 Climate

The local and regional climatic conditions in the vicinity of the project area and climatic extremes in relation to natural and other hazards were described and identified in section 13 of the EIS. Climate information was used in subsequent sections of the EIS (particularly air and noise) to assist in making predictions about impacts of the project. The impacts of natural hazards (bushfire and flooding) on surrounding landuses during operations and employee welfare was considered in a preliminary hazard assessment in section 22—Hazard and risk of the EIS (discussed in section 4.24 of this assessment report).

### 4.7.1 Existing environment

The local climate, from the perspective of how the climate could affect the potential for environmental impacts and the management of operations at the site, was adequately described in the EIS. It was noted that Central Queensland has a sub-tropical continental climate characterised by high variability in rainfall, temperature and evaporation and can experience droughts, floods, heatwaves and frosts. In summary:

- Temperatures are typical of the sub-tropical Queensland climate, with: warmer summer months during December, January and February when days are generally hot and nights are warm; and cooler winter months in June, July and August when days are warm and nights are cool.
- Rainfall is seasonal and summer dominant with almost half of the annual average amount falling between December and February due to storms and tropical lows associated with cyclones. Average monthly rainfall ranges from 16.8mm in August to 97.1mm in January with an annual average rainfall of 578.1mm.
- On average, relative humidity is approximately 65% higher during mornings in comparison to afternoon values.
- The most prevalent winds over the year are south-easterly. During summer and autumn winds typically originate from the east, and during spring, winds are predominantly from the north-east. South-south-westerly winds dominate during winter.
- The project is located approximately 170km inland and the terrain of the local area is relatively flat, although there are large bluffs in the Arthur's Bluff State Forest and the Blackdown Tableland National Park approximately 6.5km east and 11km south-east of the project site, respectively. Temperature inversions generally occur more than 30% of the time during winter, spring and autumn.

### 4.7.2 Impacts

Natural hazards identified in the EIS that may impact the project were: droughts, floods, dust storms and bushfire. These impacts are summarised below. The impacts of these natural hazards on surrounding landuses during operations and employee welfare were considered in the preliminary hazard assessment (discussed in section 4.24 of this assessment report).

DCS's submission on the EIS contended that insufficient mapping had been provided in the EIS to identify natural hazards subject to the SPP 1/03 (flooding, bushfire and landslide) and associated risks and mitigation measures. It requested that the proponent outline the applicability of natural hazards for the project area and provide justification of the projects compliance with the outcomes sought from the SPP 1/03 for flooding, bushfire and landslide. In the response to EIS submissions, the proponent stated that there was no statutory requirement to include an assessment of the project against the requirements of SPP 1/03 and advised that it considered that the EIS had adequately discussed natural hazards relevant to the project site including bushfire, flooding and landslides.

#### 4.7.2.1 Bushfire

It was identified in the EIS that the greatest bushfire danger usually occurs after the dry winter/spring period and before the onset of rains in the summer months, when low relative humidity, high winds and lack of rain are common. The Queensland Fire and Rescue Service Central Highlands Regional Council Bushfire Risk Analysis (QFRS, 2008*)* mapping classifies the majority of the project site as 'low' risk with some isolated areas of 'medium' risk. The proponent committed in the EIS to adopt a precautionary approach to managing these risks by assuming the development area falls within a medium risk Natural Hazard Mapping Area (NHMA) for bushfires. Key strategies to minimise the risk of bushfire were described in EIS section 22, Hazard and risk and are summarised in section 4.24 of this assessment report.

#### 4.7.2.2 Landslide

It was stated in the EIS that NHMA mapping for landslides has not been prepared by the CHRC for the development area. SPP 1/03 states that in the absence of NHMA mapping, NHMA areas are considered to include areas with slopes greater than 15%. On this basis, it was concluded in the EIS that geological and geomorphological conditions indicate very low risk of landslides occurring on the project site.

#### 4.7.2.3 Drought

Central Queensland, including the Blackwater area, is prone to periodic droughts with the region expected to get drier due to global climatic changes. The impacts of variable rainfall, in particular drought, on the project's water supply and balance were assessed in EIS section 12, Mine water management and EIS Appendix J, Water balance report and are discussed in sections 4.13 and 4.14 of this assessment report.

#### 4.7.2.4 Rain

Rain and flooding associated with cyclones and storms have affected the region. Floods hazards were described in EIS section 11, Surface water and EIS Appendix J, Water balance report and are discussed in sections 4.13 and 4.14 of this assessment report. The project site does not lie within the NHMA flooding area of the Duaringa Shire Planning Scheme (2011). The proponent committed to locate mine infrastructure beyond the 50 year average recurrence interval (ARI) flood line. It was concluded in the EIS that the project would not significantly alter the extent of flooding either on or beyond the project site.

In response to queries raised in DCS's submission on the EIS, the proponent clarified in the response to EIS submissions that the project development area, including essential services except the CDA catch dam, would be located outside the modelled probable maximum flood (PMF) extent. The CDA catch dam which was modelled to be subjected to a maximum flood depth of 3–4m, is proposed to have a dam wall approximately 6m high and hence should not present any risk of detrimental environmental impacts.

DCS's submission on the EIS also requested the proponent: amend the emergency response management plan to include: commitments to time works to avoid the wet season and respond to flood warnings; and confirm that the safety of workers on the development site would be maintained by the proposed flood mitigation measures from all floods up to and including the defined flood event, in accordance with SPP 1/03 Annex 4.2. The proponent argued in the response to EIS submissions that given the surface facilities (including essential services infrastructure) are to be located outside the defined flood event, it did not consider that specification of additional measures in the emergency response management plan was warranted. It committed that the safety of workers would be maintained during a defined flood event in accordance with SPP 1/03 Annex 4.2.

#### 4.7.2.5 Climate change

Projected climate change impacts upon flooding hazards were considered in the EIS with reference to the Queensland government's Increasing Queensland's Resilience to Inland Flooding in a Changing Climate: Final Report. It was noted in the EIS that the proposed climate change factors within this document are under review and are unlikely to be finalised before the end of 2014. In the interim, it is expected that local governments would apply the recommended factor to better identify flood risks. Queensland government floodplain mapping and the local planning scheme have yet to be been updated to address these climate change factors. The Inland Flooding Report proposes a climate change factor of 5% increase in rainfall intensity for each degree of global warming, to a design horizon of 4 degrees celsius (℃) at 2100. It is therefore proposed that development constraints are increased from the 100 year ARI flood event to the current 500 year ARI flood event to account for the climate change factor, on the basis that the current 500 year ARI flood event approximates to the 100 year ARI at the 2100 design horizon. It was concluded in the EIS that the PMF event presented in the EIS, would exceed the requirements of the Inland Flood Report and climate change factors. Further, by locating and designing the project consistent with flood events, the impacts of climate change upon flood risks would be mitigated.

### 4.7.3 Mitigation measures

The proponent committed in the EIS to implement a safety and health management system (SHMS) to address hazards (including bushfire and flooding) and risks associated with the project. This is discussed in section 4.24, Hazard and risk of this assessment report.

DCS' submission on the EIS raised concerns that the EIS had not described or committed to a monitoring program to ensure the project adequately addressed outcome 2 of the SPP 1/03—to minimise impacts as a result of natural hazards and avoiding unacceptable risk to people or property. In the response to EIS submissions, the proponent stated that it did not intend to conduct an ongoing monitoring program in relation to project flooding, as flooding impacts are predicted to be minor in

nature. The proponent argued that the flooding assessment described in section 11 of the EIS demonstrates that the project would not significantly alter the extent of flooding on or beyond the project site and all project infrastructure is located beyond the 50 year ARI floodline. It is therefore unlikely that the project would result in an unacceptable risk to people or property.

### 4.7.4 Conclusion and recommendations

The EIS documents addressed the TOR in terms of describing the climate patterns relevant to the project and identified climatic extremes in relation to natural and other hazards. An assessment of the adequacy of the EIS documents in mitigating the impacts of natural hazards on the project are discussed in the relevant sections 4.24 Hazard and risk of this assessment report.

## 4.8 Air

A summary of the air quality values within the project area and an assessment of the potential for these values to be affected by the project were provided in section 14—Air quality of the EIS. The detailed results of the air quality assessment were provided in EIS Appendix K, Air quality report.

### 4.8.1 Methodology

Legislation, policies and guidelines relevant for identifying values, mitigating and managing adverse air quality impacts on environmental values were adequately described in the EIS.

To estimate background concentrations of dust in the Blackwater Residential Area (EIS Figure 14-1) $PM_{10}$, (particulate matter 10 micrometres or less in diameter), temperature, wind speed and direction and relative humidity were monitored from 20 March 2012 to 10 July 2012.

Key project activities identified in the EIS that could contribute to dust generation were: wind erosion of stockpiles; dozer reclaiming ROM coal; transfer of material between conveyors; and screening of coal in the processing plant. Dust emission rates for project activities were calculated using emission factors published in relevant literature including the National Pollutant Inventory Handbooks and the USEPA AP-42 Emission Estimation Manuals.

The CALPUFF dispersion model was used to estimate the potential impacts of project activities on ambient dust levels in the vicinity of the project site. Modelled dust levels were compared with the applicable air quality objectives to confirm whether any potential adverse impacts on health or amenity may occur. EIS Table 14-2 described the relevant air quality objectives (dust and odour levels) and guidelines relevant to the project at each sensitive receptor from Environmental Protection (Air) Policy 2008 (EPP Air) and Odour Impact Assessment from Developments (2004).

The odour assessment considered the nearest ventilation shaft to sensitive receptors which is located within the NSF. The Ausplume v.6 Gaussian plume dispersion model (EPA Victoria, 1999) was used to model odour emissions from the ventilation shafts and to predict ground level concentrations of odour. The odour emissions used in the model were based on the results of odour sampling at the Moranbah North Mine.

It was concluded in the EIS that any realignment of the Blackwater-Rolleston Road and the South Blackwater Mine Railway is unlikely to significantly change the outcomes of the air quality assessment as the current alignment of Blackwater-Rolleston Road and the South Blackwater Mine Railway was considered to be a worst-case scenario of air quality impacts from the project.

### 4.8.2 Existing environment

A detailed description of the site meteorology was provided in the EIS. Potential sources of dust in the region included: natural features of the environment such as pollens, grass seeds and smoke from bushfires; grazing activities; use of unsealed roads; existing mines; and urban activities.

Background concentrations of dust used in the air quality assessment were summarised in EIS Table 14-3 and were based on the proponent's monitoring of the Blackwater residential area, supplemented with monitoring data collected by BMA within Moranbah Township and by Ensham Resources at the Ensham Mine.

Five representative sensitive receptors (R1–R5) were identified in the EIS in proximity to the project site. These receptors were deemed to be representative of the nearest private residences (R1),

caretaker's residences (R2), rural residence (R3) and also included the Blackwater Landfill (R4) and the Blackwater Lawn Cemetery (R5). The cemetery is the closest recreational sensitive receptor to project operations. While the cemetery is open to the public 24-hours a day, the EIS stated that it is unlikely that visitors or staff would be on-site from more than a few hours during the day and it is not anticipated that anyone would be present at night-time. The Blackwater Landfill is the closest industrial sensitive receptor to project operations. The Blackwater Landfill operates from 8am to 5pm and it is not likely that anyone would be present at the landfill for a complete 24-hour period.

Three additional rural residences are located in the vicinity of the project site, but were not considered sensitive receptors in the EIS documents. These were:

- A derelict residence located within the south-east of the project site. The residence is owned by the proponent and would remain unoccupied as it is currently unsuitable for use as a dwelling.
- One residence is located within the north-east of the project site. This residence is owned by the mining company BMA and any impacts from the project to this residence would be managed via a land access agreement between the proponent and BMA as required under the MR Act.
- The third residence, known as Mountain View, is located south of the project site and is owned by BMA. Any impacts from the project to this residence would be managed via an agreement between BMA and the proponent.

## 4.8.3 Impacts

Key air emissions identified in the EIS that would be generated by activities on the project site were odour and particulate matter (i.e. total suspended particulate matter (TSP), $PM_{10}$, $PM_{2.5}$ (particulate matter of 2.5 micrometres or less in diameter) and dust deposition). These are discussed further below.

### 4.8.3.1 Particulate matter

The predicted concentrations for 24-hour average $PM_{2.5}$ and the annual average $PM_{2.5}$ levels (including background levels) were reported in the EIS to be within the air quality objectives for all sensitive receptors (Table 5).

In regards to the predicted concentrations for 24-hour average $PM_{10}$, EHP's submission on the EIS stated that the $PM_{10}$ ground level concentration (GLC) reported in the EIS were not consistent with EPP (Air) $PM_{10}$ GLC air quality objective of 50 micrograms per cubic metre (µg/m$^3$); i.e. the 6$^{th}$ highest $PM_{10}$ GLC was reported in the EIS not the maximum GLC as required in the EPP (Air). The objective in the EPP (Air) was adopted from National Environmental Protection (Ambient Air Quality) Measures (NEPM) with the 5 days exceedances per year (as allowed in NEPM) being to allow for the occurrence of natural events such as bushfires and dust storms. EHP submission on the EIS requested the proponent: report the maximum $PM_{10}$ GLC (incorporating the background concentration) and compare the estimated maximum 24-hour average $PM_{10}$ GLC against the NEPM standard.

The requested information (maximum 24-hour average $PM_{10}$ GLC) was provided in the response to EIS submissions (Appendix B) for sensitive receptors R1–R3. The EIS addendum was updated to clarify that modelling for the EIS had shown that the maximum 24-hour average $PM_{10}$ GLC met with the EPP (Air) objective of 50µg/m$^3$ at R1 (representative of closest residence in the residential area) and R3 (representative of the closest rural residence). At R2 (representative of the closest caretaker residence within the industrial area), the maximum 24-hour average $PM_{10}$ GLC exceeded the EPP (Air) objective of 50µg/m$^3$ on one day, with the 6$^{th}$ highest 24-hour average $PM_{10}$ GLC less than the objective.

For R4 (Landfill) and R5 (Lawn Cemetery), the proponent did not provide the maximum 24-hour average $PM_{10}$ GLC as requested in EHP's submission on the EIS. EHP advised that this is not likely an issue for R5 (Lawn Cemetery), where the 6$^{th}$ highest 24-hour average $PM_{10}$ GLC (30.1 µg/m$^3$) reported in the EIS was well below the air quality objective of 50 µg/m$^3$. However, for R4 (Landfill) the 6$^{th}$ highest 24-hour average $PM_{10}$ GLC, exceeded the air quality objective of 50 µg/m$^3$. EHP requires the proponent to provide and consider this information in the amended EM Plan (see EM Plan requirement 2 in section 4.8.4 of this assessment report).

**Table 5 Predicted concentration of $PM_{2.5}$ and $PM_{10}$ including background levels at sensitive receptors (source: EIS and response to EIS submissions)**

| ID | Receptor | Maximum 24-hour average (µg/m³) including background levels | | Annual average (µg/m³) including background levels |
|---|---|---|---|---|
| | | $PM_{2.5}$ | $PM_{10}$ | $PM_{2.5}$ |
| R1 | Private residence in the Blackwater residential area, Mahogany Street (representative of closest residence in the residential area) | 5.2 | 47.1 | 2.7 |
| R2 | Caretaker residence in the Blackwater industrial area, Blackwater-Rolleston Road (representative of closest caretaker residence within the industrial area) | 5.3 | 53.3 | 2.8 |
| R3 | Rural private residence, Turpentine Street | 4.8 | 44.4 | 2.7 |
| R4 | Blackwater Landfill | 20.7 | Not provided (6th highest 69.0) | 6.2 |
| R5 | Blackwater Lawn Cemetery | 16.5 | Not provided (6th highest 30.1) | 5.5 |
| **Air quality objective (EPP Air)** | | **25** | **50** | **8** |

BMA's submission on the EIS raised concerns about the project's air quality impacts on Blackwater Township and the absence of the Primary School as a sensitive receptor. In its response to EIS submissions, the proponent clarified that the Blackwater State School on Way Street is in proximity to R1 on Mahogany Street and north of R2 on Jarrah Street. As modelling indicated that all air quality objectives would be met at these two sensitive receptors, the proponent concluded that air quality objectives would therefore also be met at the primary school.

BMA's submission on the EIS also raised concerns about the project's air quality impacts on an accommodation village to the west of the site, which was approved in June 2013. The proponent clarified in the response to EIS submissions that the development approval for the BMA accommodation village had not been granted at the time the EIS had been submitted. The results of modelling showing potential noise and dust impacts on the proposed BMA accommodation village were presented in Appendix E of the response to EIS submissions. The proponent concluded that dust levels were predicted to be within all relevant criteria at the proposed accommodation village location. EHP assessed the additional information provided in Appendix E of the response to EIS submissions and was satisfied that modelled air quality impacts on the accommodation village are predicted to be within the relevant EPP (Air) criteria.

#### 4.8.3.2 Nuisance dust

The TSP (including background levels) reported in the EIS were within the air quality objectives for all sensitive receptors (Table 6).

EHP's submission on the EIS stated that nuisance dust impacts from the project had not been adequately assessed in the EIS. It requested the proponent reassess nuisance dust deposition on a monthly basis in accordance with the EHP's guideline on assessing and conditioning nuisance dust fall (as opposed to the annual average adopted in the EIS). The proponent provided the predicted maximum monthly dust deposition rates as requested for sensitive receptors R1–R3 in the response to EIS submissions (Appendix B). The results indicated that monthly maximum dust deposition rates predicted at the sensitive receptors would comply with the guideline value of 120 milligrams per metre squared per day (mg/m²/day) (monthly maximum). EHP was satisfied that the required information had been provided in the amended EIS and that the information confirms modelled monthly dust fall deposition rates are unlikely to result in nuisance impacts at the sensitive receptors.

**Table 6 Predicted TSP and dust deposition rate for sensitive receptors including background (Source: EIS and amended EIS)**

| ID | Sensitive receptor | Annual average (µg/m³) including background levels TSP (µg/m³) | Monthly maximum dust deposition rate (mg/m²/day) * |
|---|---|---|---|
| R1 | Private residence in the Blackwater residential area, Mahogany Street (representative of closest residence in the residential area) | 21.7 | 54.6 |
| R2 | Caretaker residence in the Blackwater Industrial Area, Blackwater-Rolleston Road (representative of closest caretaker residence within the industrial area) | 22.8 | 62.1 |
| R3 | Rural private residence, Turpentine Street | 21.5 | 55.6 |
| R4 | Blackwater Landfill | 56.1 | Not provided |
| R5 | Blackwater Lawn Cemetery | 37.1 | Not provided |
| **Air quality objective (EPP Air)** | | **90** | **120** |

* Sourced from Appendix B, Response to EIS submissions

#### 4.8.3.3 Odour

Modelling presented in the EIS predicted that odour emissions from ventilation shafts would not result in ground-level odour concentrations exceeding EHP's odour guideline of 2.5 odour units at sensitive receptor locations. As the modelled ventilation shaft location is the closest to sensitive receptors, it was concluded in the EIS that other possible ventilation shaft locations would also comply with the EHP odour guideline.

#### 4.8.3.4 Cumulative impacts

It was stated in the EIS that the background dust levels used in the air quality modelling included natural sources of dust, as well as dust emissions from existing anthropogenic sources in the area, including existing mines (i.e. Blackwater Mine, Cook Colliery, Curragh Mine and Jellinbah Mine). The Washpool Project, an approved coal mine to the north of the project has not yet been constructed and was not captured in the measured background dust levels reported in the EIS. Given that the Washpool Project is located north of the project, the proponent argued in the EIS that any sensitive receptors in Blackwater Township would only be affected by the Washpool Project during a northerly wind and sensitive receptors in Blackwater Township would only be affected by the project during southerly winds. Therefore, it was concluded that the Washpool Project would not contribute to cumulative short term dust levels in Blackwater Township with the project and no significant cumulative dust impacts were anticipated to occur.

### 4.8.4 Mitigation measures

In regards to odour, the proponent committed to investigate any future complaints of odour nuisance on a case-by-case basis.

In relation to air quality, measures described in the EIS to reduce the impacts of the project on sensitive receptors included:

- Avoidance measures by locating surface facilities with potentially elevated dust emissions (including the CHPP, stockpiles, rail loop and train loading facilities and the CDA) approximately 4km south of the Blackwater industrial area and approximately 5km south of the Blackwater residential area. This was in response to concerns raised by stakeholders in the initial consultation phase on the potential impacts of the project on residential amenity.

- Designing the CDA to be progressively rehabilitated during the life of the project to minimise dust mobilisation.
- The use of dust suppression watering and sprays on dust generating activities, where necessary.
- Investigating any complaints in relation to dust in accordance with the project's complaints handling procedure which would include monitoring, where necessary.

The proponent contended in the EIS that further dust mitigation measures would not be necessary as the air quality impact assessment predicted compliance with the air quality objectives at all representative residential receptors and that the Blackwater Lawn Cemetery (R4) and Landfill (R5) are unlikely to be significantly impacted from the project.

No mitigation measures were described in the EIS for the landfill, despite modelling presented in the EIS predicting that 24-hour average $PM_{10}$ GLC would exceed the air quality objective of 50µg/$m^3$ (approximately seven days a year). The maximum 24-hour average $PM_{10}$ GLC was not reported in the amended EIS as requested in EHP's submission on the EIS (see section 4.8.3.1 of this assessment report). The proponent asserted in the EIS that the contribution of dust from the landfill while operating is predicted to be far greater than the additional contribution of dust from the project and as exceedances are only predicted for seven days a year, no mitigation measures are considered necessary. The proponent stated in the EIS that any potential project impacts associated with the landfill would be managed in accordance with an agreement between the proponent and with CHRC, the owner of the landfill.

EHP advises that while the above argument may have merit, no evidence had been provided in the EIS documents to demonstrate existing high dust contributions from the landfill operations. Without such data, apportioning the impacts of the landfill versus the mine in the future would be difficult. Given that the EIS documents predict $PM_{10}$ exceedances above the objectives in the EPP (Air) at the landfill as a result of mining activities, EHP requires this issue to be addressed further in an amended EM Plan (see EM Plan requirement 2 in section 4.8.5 of this assessment report).

EHP's submission on the EIS stated that the EIS and EM Plan did not include:

- measureable performance criteria for achieving air quality objectives
- a monitoring program to measure how control strategies perform against the performance criteria.

EHP advises that the requested information on performance criteria and monitoring were not addressed in the amended EIS. EHP requires that the EM Plan be amended to address these inadequacies (see EM Plan requirement 2 in section 4.8.5 of this assessment report).

TMR's submission on the EIS raised concerns that the EIS had not described measures to mitigate dust generation during rail-haul of coal to the export port. TMR stated that it is a requirement for all mines transporting coal on the Aurizon coal network to implement measures contained in the QR National Coal Dust Management Plan (CDMP, 2010). It noted that this issue is a key requirement for TMR to support approval of this project. The EIS addendum included a commitment by the proponent to comply 'with the requirements of the CDMP at the rail load-out facility including the use of coal wagon veneering systems and associated support systems'. TMR provided not additional comments on this issue in its response to the amended EIS.

### 4.8.5 Conclusion and recommendations

The existing air quality values, predicted the impacts of the project on air quality and outlined environmental protection commitments consistent with the requirements of the TOR were adequately addressed in the EIS. However, EHP identified a number of matters that remain outstanding. Specifically:

- no mitigation measures were described in the EIS for the landfill, despite modelling presented in the EIS predicting that 24-hour average $PM_{10}$ GLC would exceed the air quality objective of 50µg/$m^3$ (approximately seven days a year).
- measureable performance criteria for achieving air quality objectives and a monitoring program to measure how control strategies perform against the performance criteria were not provided in the EIS.

The proponent is required to provide this information in an amended EM Plan.

**EM Plan requirement 2:** The proponent is required to address the following matters in an amended EM Plan:

- Report the maximum 24-hour average $PM_{10}$ GLC for the Landfill (R4).
- Outline a monitoring program that could be used to measure how control strategies perform against the performance criteria should concerns be raised about the level of dust from the mine.

Based on the environmental protection commitments outlined in the EIS, appropriate conditions for air quality based on EHP's Model Mining Conditions Guidelines (EHP, 2012) has been included in the draft EA conditions in Appendix 3.

## 4.9 Greenhouse gas emissions

An inventory of estimated project greenhouse gas emissions (GHG) and proposed mitigation and management measures was provided in section 14.9—Greenhouse gas of the EIS. Detailed information on the project's GHG emissions and abatement measures were included in EIS Appendix F—Air quality report.

### 4.9.1 Methodology

Legislation, policies and guidelines relevant to quantifying and mitigating greenhouse gases were adequately described in the EIS. An assessment of greenhouse gas emissions was undertaken in accordance with the *National Greenhouse and Energy Reporting Act 2007*. Greenhouse gas emission rates were estimated using the National Greenhouse Accounts Factors Workbook (Department of Climate Change and Energy Efficiency, July 2012).

### 4.9.2 GHG emission estimates

An assessment of greenhouse gas emissions for the extraction of coal associated with the proposed project was detailed in EIS Appendix K, Air quality report for each year of the project. Table 14-6 of the EIS summarised the greenhouse gas emissions rates for the operational year with the highest emissions (Table 7). No emissions for the construction phase were provided in the EIS.

An estimate of greenhouse gas emissions from the use of the coal (once exported) was not quantified in the EIS. A private submitter raised concerns that the EIS had not adequately quantified GHG emissions; i.e. not considered the GHG emissions associated with the use of the coal that was to be extracted in the proposed project. The proponent asserted in the response to EIS submissions that there was no requirement for it to assess emissions from the use of coal once exported under the *National Greenhouse and Energy Reporting Act 2007* or in project's TOR.

**Table 7 Predicted annual GHG emission rates for the operational year with the highest emissions (source: EIS Table 14-6)**

| Source | Emissions ($tCO_2^{-e}$/year)* |
|---|---|
| Diesel | 37,631 |
| Electricity consumption | 241,034 |
| Coal seam gas (vented/flared and fugitive emissions) | 65,367 |
| **Total** | **344,032** |

* tonnes carbon dioxide equivalent per year.

### 4.9.3 Mitigation measures

The proponent proposed in the EIS to buy emissions permits under the Australian Government's carbon pricing mechanism (*Clean Energy Act 2011*) for the GHG emissions from the project. Should the proponent be required to participate in the *Energy Efficiency Opportunities Act 2006* it would report on the project, as necessary.

The proponent committed to address all mandatory energy efficiency performance standards, where applicable.

The EIS included a list of measures to reduce GHG emissions. While the proponent committed to 'consider' these measures, it did not commit to 'implement' any of them. Measures to be considered by the proponent were:

- consider energy efficient techniques and technologies, such as selecting equipment with high fuel efficiency
- monitor technological improvements and introduce new technologies when appropriate
- include greenhouse awareness training at induction
- segregate general waste into recycling materials and general waste
- adopt mining methods that use large equipment and economies of scale
- recycle refrigerants in equipment and air conditioning
- minimise clearing and burning of vegetation
- track and report relevant data to inform management decision making and mandatory reporting
- consider the use of pre-gas drainage as an energy source and/or flaring where feasible.

A private submitter raised concerns that the EIS had not adequately considered the impacts of the project's projected GHG emissions on global air quality. In the response to EIS submissions, the proponent asserted that it had met its statutory obligations in relation to the calculation of GHG emissions, energy efficiency and GHG reduction strategies and reiterated its commitment to buy emission permits under the Australian Government's carbon pricing mechanism.

### 4.9.4 Conclusions and recommendations

The EIS documents adequately addressed the TOR in relation to estimating potential GHG emissions associated with processes involved in the extraction of coal for the proposed project.

The proponent committed to buy emission permits under the Australian Government's carbon pricing mechanism and described a number of measures that the proponent would 'consider' implementing to reduce GHG emissions.

## 4.10 Land

The landuse and landownership of the project site was described in section 5—Landuse of the EIS and the soils and land suitability of the project and surrounding areas described in section 8—Rehabilitation of the EIS. Impacts of the project on landuse, landownership, soils and land suitability and mitigation measures proposed to avoid and minimise potential impacts of the project are summarised below.

### 4.10.1 Methodology

Legislation, policies and guidelines relevant to identifying values, mitigating and managing impacts on landuse, geology, landform and soils that applied at the time the EIS documents were drafted were described in the EIS.

A soils and land suitability assessment was undertaken. This included a desktop review of relevant regional data sources to prepare a site investigation plan for the project site (total area of approximately 3325ha). It was stated in the EIS that the investigation scale, density, layout and assessment methods were prepared with reference to relevant guidelines and best practice. The field investigation plan comprised 98 investigation sites of which 36 sites were detailed soil profile descriptions and 62 were surface observations (which satisfied the requirements for a soil mapping scale of 1:50,000). Soils in the vicinity of the mine surface facilities and CDA were mapped at 1:25,000.

Based upon field and laboratory data, soil mapping units were delineated and mapped according to their basic soil morphology, position in the landscape and parent material. The suitability of topsoil and subsoil for stripping and reuse in rehabilitation was also assessed.

Land suitability in Central Queensland was assessed according to the Queensland Government's Land Suitability Assessment Techniques in the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland (DME, 1995). Field and laboratory data was

used to assess the severity of any limitations and the land suitability class of each soil unit against Land Suitability Assessment Techniques. Factors assessed included soil moisture, nutrient content, salinity, wetness, rockiness, flooding and erosion potential.

A site history of the project site was compiled in accordance with the Queensland Government's Guidelines for Contaminated Land Professionals (EHP, 2012) to identify past and present potentially contaminating activities within the project site. This included: a review of the Contaminated Land Register and the Environmental Management Register (EMR); analysis of aerial photography to identify historic and existing landuses with the potential to cause land contamination; and discussions with the proponent to verify information concerning historical and existing landuses.

## 4.10.2 Existing values

The EIS documents adequately described the topography, landuse, geology and geomorphology, mineral resources, soils, land suitability, contaminated land, infrastructure and environmentally sensitive areas of the project site. Findings reported in the EIS documents are summarised below.

### 4.10.2.1 Topography

The project site comprises approximately 3325ha of gently undulating land, most of which has been cleared in the past for grazing activities. Significant natural features include Blackwater Creek, Sagittarius Creek and Taurus Creek. Field surveys determined that vegetation within the project site consists of cleared pastures, regrowth shrublands and regrowth sclerophyllous woodlands.

### 4.10.2.2 Landuse and ownership

Landuses surrounding the project site include coal mining, grazing, residential, recreation, commercial/industrial activities and railway lines (EIS Figure 5-2). Existing landuse within the project site is zoned 'rural' under the Duaringa Shire Planning Scheme (2011). It is predominantly cattle grazing, with some light industry (the Blackwater Landfill owned by the CHRC) and recreation (the Blackwater Lawn Cemetery managed by CHRC and recreational use of Blackwater Creek) (EIS Figure 5-2). There are four separate landowners across 12 parcels of land and four easement holders across the project site. The proponent has commenced discussions with all affected landowners in relation to obtaining access to the land for the project.

DSDIP's submission on the EIS stated that the EIS had not adequately considered the Blackwater East Priority Development Area in the landuse description. The proponent amended the EIS to address these concerns and included additional figures to illustrate the proximity of the mine to the Blackwater East Priority Development Area in the EIS addendum.

Infrastructure on the project site includes: Blackwater-Rolleston Road; Tantallon Road including a bridge across Blackwater Creek; Taurus Road; South Blackwater Mine Railway; a derelict residence in the south-east of the project site which is owned by the proponent; a residence in the north of the project site which is owned by BMA and is currently being rented; the Blackwater Lawn Cemetery; and the Blackwater Landfill (EIS Figure 5-6). Utilities and infrastructure such as power transmission lines, water pipelines and telecommunication lines owned by various entities are also located within or traverse the project site (EIS Figure 5-5).

### 4.10.2.3 Geology and geomorphology

A detailed description of the geology and stratigraphy of the project site was provided in the EIS. A typical geological cross section of the project site is provided in Figure 4. In summary, the Minyango deposit lies in the centre of the Bowen Basin which extends 600km in length and up to 250km in width, in Central Queensland. There are two major coal-bearing formations within the project site:

- The Rangal Coal Measures which contain the target coal seams for the project (Aries and Pollux) and commonly split and coalesce to form other seams throughout the region. The Rangal Coal Measures outcrop to the west of the project site where they have been extracted since 1968 through open cut mining at Blackwater Mine.
- The Fort Cooper Coal Measures which consist predominantly of lithic sandstone interbedded with siltstone, mudstone and conglomerate. The Fort Cooper Coal Measures also includes abundant, thick inferior coal which is interbedded with carbonaceous mudstone.

#### 4.10.2.4 Mineral resources and ore reserves

A detailed description of the ore reserves within the project area was provided in the EIS. Probable reserves within the project were estimated at 55Mt ROM which equates to 46.6Mt saleable coal.

#### 4.10.2.5 Soils and land suitability

The Queensland Government's strategic cropping land (SCL) trigger maps show the presence of approximately 35ha of potential SCL within the south of the project site (EIS Figure 8-3). As the potential SCL would not be disturbed by the project, it was not subject to a detailed assessment against the SCL criteria and the project would not impact on SCL.

Seven soil mapping units were described and mapped for the project area (EIS Table 8-2 and EIS Figure 8-4). The agricultural land class of the project site ranged from B to C3. Soil mapping unit B1 (664ha) was considered to be agricultural land class B and was assessed to be suitable for limited cropping land and good quality agricultural land (GQAL). Soil mapping units A1, B2 and S1 were classified as agricultural land class C2 and were assessed as being land suitable for native pastures (a total of 1841ha).

Land suitability classes and agricultural land classes (for grazing and broad scale cropping) for the project site were mapped and summarised in the EIS (EIS Table 8-2). All soil mapping units within the project site were assessed as being suitable for beef cattle grazing with some limitations and were classified as land suitability classes of 3 (2505ha) and 4 (689ha) (EIS Figure 8-5). Beef cattle grazing is currently the most common landuse within the project site and the land is in moderate to good condition with some moderate limitations to grazing. Much of the site has been cleared for improved pasture and Buffel Grass is well established.

In regards to suitability for rain-fed, broad acre cropping, approximately 664ha of land (soil mapping unit B1) within the project site was found to be marginal for rain-fed broad acre cropping (land suitability class 4) due to limitations in water storage potential (EIS Figure 8-6). The remainder of the project site was not considered suitable for cropping (land suitability class 5) due to the limited water storage potential of the soils.

Soil stripping depths for the project were detailed in the EIS and confirmed that there would be sufficient topsoil resources for proposed rehabilitation, as well as suitable capping resources for rehabilitation of the CDA. The depth of available topsoil resources varies from 0.2–0.5m.

#### 4.10.2.6 Contaminated land

No properties on the project site were found to be listed on the Contaminated Land Register. No known historical or existing contaminated sites were found within the project site.

One property (the Blackwater Landfill) within the project site was listed on the EMR, with the notifiable activity being disposing of waste. CHRC's submission on the EIS advised that it intends to continue to use the Blackwater Landfill site as a landfill for the foreseeable future but that no new liner systems for new cells would be constructed within the site. It also advised that while in its initial assessments CHRC had advised the proponent that landfilling had been confined to the northern end of the site, further assessments have indicated that landfilling has taken place over the majority of this site. CHRC advised that it would need to provide additional infrastructure on the site over time and where possible this is expected to the eastern side of the landfill site.

EHP's submission on the EIS requested the proponent to clarify whether or not the Blackwater Landfill has a site management plan given that the site is located on the EMR. In the response to this submission, the proponent stated that CHRC had advised that that there is a Landfill Management Plan for Blackwater Landfill produced by Connell Wagner (2006) which was commissioned by the site managers J.J. Richards and Sons to meet a clause in their Waste Management Contract. However, insufficient information was provided for EHP to determine whether this plan would satisfy the requirements of section 401 of the EP Act.

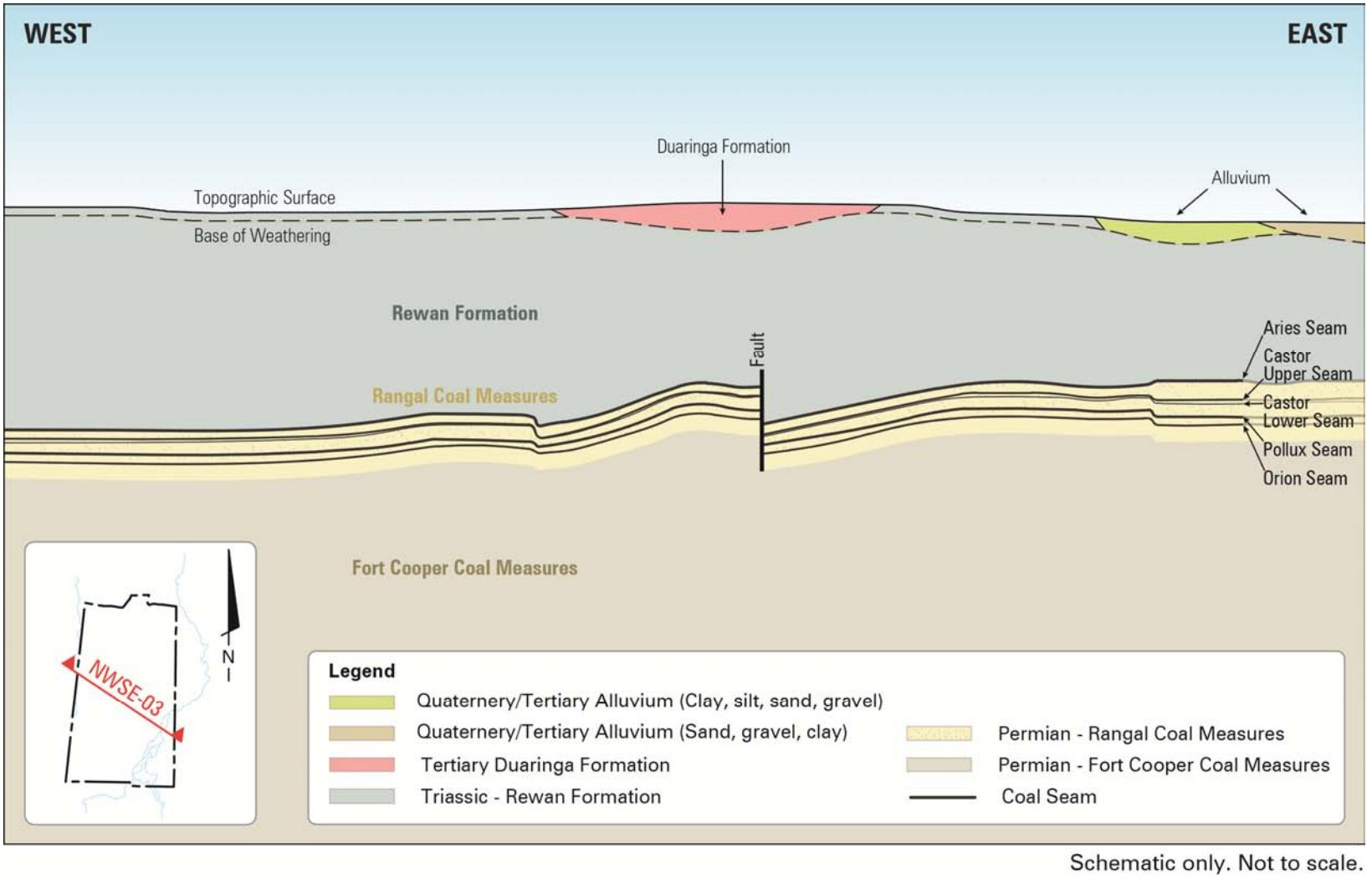


**Figure 4 Typical geological cross section of the project site (source: EIS Figure 4-7)**

## 4.10.3 Impacts

### 4.10.3.1 Resource utilisation and sterilisation

The Aries and Pollux Seams are the target coal seams for the project. Full extraction of these target seams is planned within the mine layout proposed.

A number of other seams exist in the Rangal Coal Measures and Fort Cooper Coal Measures, however it was asserted in the EIS that Aries and Pollux Seams are the only coal seams capable of producing a washed coal product at high yields whilst maintaining a market acceptable product ash percentage. All other seams are variable in thickness, too thin, contain significant partings or contain high inherent ash levels which make washing to achieve a product having a suitable ash content at sufficiently high yields, impractical.

The potential for sterilisation of other coal resources was discussed in detail in the EIS. The target coal seams for the project (Aries and Pollux Seams) sit at the top of the stratigraphy within the Rangal Coal Measures, within the project site (Figure 4). Seams below the Pollux Seam would be unaffected by longwall and bord and pillar mining. The Castor Seam is located between the Aries and the Pollux Seams and future mining of the Castor Seam within the project site is unlikely to be feasible. Consequently, it was estimated in the EIS that approximately 75Mt of coal from the Castor Seam (51Mt measure; 30MT indicated; 45Mt inferred) would be sterilised by the project (EIS Table 4-4) due to the techniques of underground longwall mining which would cause the Castor Seam to cave into the goaf of the Pollux Seam.

Submitters on the EIS raised a number of queries about the project's impacts on other natural resources (i.e. quarry material and forestry products):

- DNRM's submission on the EIS, requested clarification as to the volume and source of the quarry materials that would be required during construction including hard rock aggregates, sand and gravel material and requested that the potential impact of the depletion of extractive resources within the local community be addressed, along with any proposed mitigation measures. In the Response to EIS submissions, the proponent clarified that at this stage in the project's development the exact quantity, source, location and timing of quarry materials required during construction has not been determined. The volumes of extractive resources required for the project and potential sources of supply would be determined during detailed design and construction planning.
- DAFF's submission on the EIS requested the proponent liaise with private landowners of privately owned land parcels within and adjoining the project area, to facilitate the salvage harvesting of any privately owned (freehold land) commercial forest products that may be cleared, interfered with or sterilised from utilisation as a result of project related activities. In the response to EIS submissions, the proponent clarified that it does not propose any commercial extraction of forest products administered under the Forestry Act but had committed in the EIS to contact DAFF in relation to any potential salvage of forest products prior to clearing of any vegetation.

### 4.10.3.2 Landuse

Table 5-1 of the EIS provided a very brief overview of the potential impacts of the project on surrounding landuses and identified the relevant sections of the EIS that addressed each issue. Table 8 summarises this information and links to the appropriate section of this assessment report where the impacts are discussed.

Approximately 2km of the stockroute in the north and south of the MLA is within the predicted LOMS, with subsidence of up to 2.2m predicted.

Sunwater's submission on the EIS advised it operates five smaller stock and domestic offtakes within the project area which may be impacted by the project. These offtakes and their private supply lines would need to be taken into consideration in any future re-location proposals. In the response to EIS submissions, the proponent advised that it proposed to manage the subsidence of the pipeline and any associated offtakes in-situ but if this was not practicable, then it committed to take the pipelines into consideration in any future relocation proposals.

BMA's submission on the EIS requested clarification as to how the project and proposed mitigation measures suitably address the "restricted land" provisions of the MR Act (i.e. the project intersects with the R384 Blackwater Township Urban Exclusion Zone). In the response to EIS submissions, the

proponent clarified that the R384 Blackwater Township Urban Exclusion Zone was gazetted in accordance with section 391 of the MR Act on 9 December 2011. Section 391(3) of this act provides that the restriction does not affect the grant, or renewal, of a mining tenement applied for before the restriction took place. As MLA 80173 was lodged on 20 December 2010, it falls within this exclusion and as such the grant of MLA 80173 for the project should not be affected by R384.

BMA's submission on the EIS raised concerns about the potential impact of the project on BMA's accommodation village which was recently approved by CHRC, particularly in relation to potential impacts on vehicle movements, safety, water supplies via a BMA pipeline and dust and noise emissions. In the response to EIS submissions the proponent clarified that the development approval for the BMA accommodation village had not been granted at the time the EIS was lodged. Further, the proposed water pipeline and access road for the BMA accommodation village traverse an area of the project site that is not proposed to be used for mine surface infrastructure and would not be subject to mine subsidence. It concluded that there would be no significant impacts on these proposed facilities that would adversely impact vehicle movements, safety or water supply[4].

[4] Potential dust and noise related impacts of the project on BMA's approved accommodation village are discussed in sections 4.8–Air and 4.18–Noise and vibration of this assessment report.

**Table 8 Summary of potential impacts of the project on surrounding landuses**

| Landuse* | Potential impacts* | EIS reference* | EIS assessment report reference |
|---|---|---|---|
| Agricultural land | • Introduction and/or spread of weeds<br>• Disturbance to stock route | section 9 – Flora and fauna | section 4.16 – Ecology<br>section 4.10 – Land |
| Residential | Reduce residential amenity due to:<br>• Dust<br>• Odour<br>• Noise and blasting<br>• Visual | section 6 – Subsidence | section 4.8 – Air quality<br>section 4.18 – Noise and vibration<br>section 4.23 – Scenic values |
| Recreation | Reduced recreational amenity due to:<br>• Dust<br>• Odour<br>• Noise and blasting<br>• Visual | section 14 – Air quality (discusses both dust and odour)<br>section 15 – Noise and vibration<br>section 16 – Scenic values | |
| Coal mining | Cumulative impacts on:<br>• Land suitability<br>• Flora and fauna<br>• Groundwater<br>• Surface water<br>• Dust<br>• Noise and blasting<br>• Visual<br>• Socio-economics<br>• Traffic and transport | section 23 – Cumulative impacts | section 4.8 – Air quality<br>section 4.10 – Land<br>section 4.14 – Surface water<br>section 4.15 – Groundwater<br>section 4.16 – Ecology<br>section 4.17 – Transport<br>section 4.18 – Noise and vibration<br>section 4.19 – Economics<br>section 4.20 – Social<br>section 4.23 – Scenic values |
| Industrial | Reduced industrial amenity due to:<br>• Dust<br>• Odour<br>• Noise and blasting<br>• Visual | section 14 – Air quality (discusses both dust and odour)<br>section 15 – Noise and vibration<br>section 16 – Scenic values | section 4.8 – Air quality<br>section 4.18 – Noise and vibration<br>section 4.23 – Scenic values |

* Source: EIS Table 5-1

#### 4.10.3.3 Infrastructure

The proponent proposes, in the EIS documents, to subside existing infrastructure on the project site including the derelict residence (owned by the proponent), Blackwater Landfill, power transmission lines, water pipelines, telecommunication cables and fibre optics cables. Potential impacts are summarised in Table 9.

A number of submitters raised concerns about the project's impacts on existing infrastructure. Key issues included:

1. **Blackwater Lawn Cemetery**—QTT's submission on the EIS raised concerns about potential mining under the Blackwater Lawn Cemetery. It supported the proponent's commitments in EIS that there would be no surface subsidence of the cemetery and to ensure access to cemetery is maintained. In the response to EIS submissions, the proponent reiterated its commitment in the EIS to *'adopting mining methods and a mine layout that does not result in any surface subsidence of the Blackwater Lawn Cemetery, thereby ensuring that there will be no disturbance of the cemetery'* as well as *'ensuring continued public access to the cemetery throughout the life of the mine.'*

2. **Power transmission lines**—Powerlink's submission on the EIS, raised concerns about the impacts of subsidence on its power transmission lines traversing the north of the project site. It advised that the structural integrity of Powerlink's transmission structures can be compromised by subsidence activity associated with underground mining operations. The proximity by which

underground operations can occur surrounding these structures would need to be assessed based on relevant engineering and geological studies reviewed by Powerlink. In the response to EIS submissions, the proponent advised that they had consulted with Powerlink in relation to its submission on the EIS and had provided additional information to Powerlink on bord and pillar mining methods. The proponent stated that Powerlink was satisfied that the bord and pillar mining method would not cause subsidence that would require a change in management of Powerlink's infrastructure.

3. **Water pipelines**—Sunwater's submission on the EIS, raised concerns about the impact of subsidence on Sunwater's pipelines, particularly the proposal to manage subsidence in-situ and the inability of the pipelines to sustain subsidence. It was particularly concerned about the pipeline in the northern section of the project area where subsidence is scheduled to occur in years 2015 to 2017 and the limited timeframe remaining to negotiate an agreement. In the response to EIS submissions, the proponent reiterated that is considers it feasible to manage subsidence of the pipeline in-situ and provided an example (Central Colliery at German Creek, Queensland) of where such pipeline infrastructure had been successfully managed at other mines. However, should management in-situ not be feasible the proponent confirmed that there would be provisions for relocating the pipelines. Further, in the event that there was not sufficient time to reach agreement in relation to any relocation, the proponent advised that the mining schedule could be changed to delay mining beneath the pipeline until agreements could be achieved.

Sunwater's submission on the EIS also raised concerns that access along Sunwater's CRQ pipeline could be impacted upon by a number of proposed project activities (e.g. the overland conveyor from NSF to CHPP plant and underground communication and mine dewatering pipelines). They advised the proponent that at each of the interactions with Sunwater's existing land tenure, infrastructure protection and access would need specifically designed crossings and agreements to protect Sunwater's interests. The proponent advised in the response to EIS submissions, that it had been in discussions with Sunwater regarding its requirements for crossing its infrastructure and that it was considered by both parties that appropriate design of the project would protect Sunwater's interests. The design process would be included in the subsequent agreement with Sunwater.

**Table 9 Summary of impacts of subsidence on existing infrastructure within the project area and proposed mitigation measures (source: EIS documents)**

| Utility [landholder/leaser] | Potential impact* | Mitigation measures |
|---|---|---|
| Derelict residence [proponent] | To be subsided | No mitigation or monitoring measures proposed in the EIS as the residence is owned by the proponent and is currently not fit for residency. |
| Blackwater Landfill [CHRC] | ~75% of the landfill area is within the predicted LOMS with up to 1.8m of subsidence predicted. | No mitigation or monitoring measures proposed in the EIS.<br>Subsidence impacts on utilities and the Blackwater Landfill is proposed to be managed through agreements required under the MR Act which would detail any proposed mitigation and monitoring measures. |
| Power transmission lines [Ergon Energy] | ~5km of the transmission lines would be within the predicted LOMS with up to 2.6m of subsidence predicted in sections. | |
| Water pipeline [Sunwater Limited]<br>Telecommunications cable [Telstra]<br>Fibre optics cable [Nextgen Networks] | ~1.75km of each of these linear infrastructures in the north and south of the MLA is within the predicted LOMS, with subsidence of up to 2m predicted in sections. | |

* Source: Data obtained from the EIS or estimated using EIS Figure 6-2 and EIS Figure 6-5.

#### 4.10.3.4 Soils and land suitability

The impacts of the project on land suitability (broad acre cropping and beef cattle grazing) and agricultural land classes were quantified in the EIS (EIS Table 8-3 and Figures 8-5–8-7). Approximately 39ha of land suitability class 4 for broad acre cropping, 197ha of land suitability class 3 for grazing and 2ha of land suitability class 4 for grazing would be lost (i.e. downgraded to land suitability class 5) as a result of the road/rail realignment and CDA (Table 10).

Mine surface facilities would be decommissioned and rehabilitated and restored to their pre mining land suitability, where possible. Trough-like depressions and surface tension cracks as a result of subsidence would also be rehabilitated and minor remedial drainage earthworks would be installed to re-establish free drainage. It was asserted in the EIS that subsidence would not significantly alter the land suitability for grazing, cropping or the agricultural land classes and subsided areas would be able to continue to be used for grazing and/or limited cropping post mining.

Approximately 39ha of good quality agricultural land (GQAL) would be lost (agricultural land class B) as result of the CDA and potential realignment of Blackwater-Rolleston Road and the South Blackwater Mine Railway (Table 10). It was asserted in the EIS that this loss is acceptable as the project is considered to have overriding community benefits (utilisation of coal resources, employment opportunities and economic benefits) and that SPP 1/92 (Development and the conservation of GQAL) acknowledges that there would be developments that can legitimately alienate GQAL because they represent overriding benefit to the community.

**Table 10 Pre and post mining land suitability and agricultural land class (source: EIS Table 8-3)**

| Assessment category | | Impact assessment | | |
|---|---|---|---|---|
| | | Pre mine (ha) | Post mine (ha) | Change in area (ha) |
| **Land suitability class (rain-fed broad acre cropping)** | 1 | 0 | 0 | **0** |
| | 2 | 0 | 0 | **0** |
| | 3 | 0 | 0 | **0** |
| | 4 | 663.9 | 625.3 | **-38.6** |
| | 5 | 2529.8 | 2568.4 | **38.6** |
| | **Disturbed area** | **131.3** | **131.3** | **0** |
| | **Total** | **3325.0** | **3325.0** | |
| **Land suitability class (beef cattle grazing)** | 1 | 0 | 0 | **0** |
| | 2 | 0 | 0 | **0** |
| | 3 | 2504.8 | 2307.5 | **-197.3** |
| | 4 | 688.9 | 687.1 | **-1.8** |
| | 5 | 0 | 199.1 | **199.1** |
| | **Disturbed area** | **131.3** | **131.3** | **0** |
| | **Total** | **3325.0** | **3325.0** | |
| **Agricultural land class** | A* | 0 | 0 | **0** |
| | B* | 663.9 | 625.3 | **-38.6** |
| | C1* | 0 | 0 | **0** |
| | C2 | 1840.9 | 1682.2 | **-158.7** |
| | C3 | 688.9 | 687.1 | **-1.8** |
| | D | 0 | 199.1 | **199.1** |
| | **Disturbed area** | **131.3** | **131.3** | **0** |
| | **Total** | **3325.0** | **3325.0** | |

* Agricultural land classes A, B and C1 are considered to be GQAL

#### 4.10.3.5 Contaminated land and Blackwater Landfill

The EIS provided a list of notifiable activities under the EP Act to be undertaken on the project site as part of the project that have the potential to have a negative impact on the environment and/or result in land contamination (EIS Table 21-2).

The Blackwater Landfill located on the project site, is listed on the EMR (notifiable activity under the EP Act is disposing of waste). EHP's submission on the EIS stated that insufficient information had

been provided in the EIS on the potential for the release of contaminants on-site due to subsidence and tension cracking (particularly under the worst-case scenarios). While the EIS stated that initial groundwater monitoring results indicated that leachate from the landfill has not been a significant source of groundwater contamination to date, EHP stated that insufficient evidence had been provided in the EIS to completely discount the risk under worst-case subsidence. Under the worst-case scenario, vertical tension cracking from the project may occur up to a depth of 10m and groundwater may occur at 13.8m below ground level. This 3.8m difference poses a potential risk given that no information has been provided on the temporal variations in groundwater levels at the site. Thus, EHP requested the proponent assess the likelihood and impacts of potential release of contaminants on-site due to subsidence and tension cracking (particularly under the worst-case scenarios). This request included information on the potential for seepage to occur based on the strata type within the Rewan Formation and temporal variations in groundwater levels.

The proponent reported in the EIS addendum that the results of additional monitoring indicated that groundwater levels are likely to be just below the predicted 10m deep surface cracking zone generated by subsidence (the EIS had reported groundwater levels at the landfill site between 13.86m and 19.6m below ground level). However, the proponent asserted in the EIS addendum that the available water quality data did not suggest seepage of leachate from the landfill would be significant. It is considered likely the clay base of the waste pits, which are expected to be less than 3m deep according to the existing site management plan, hold water and create a perched water table that slows seepage to the underlying regional water table. The EIS addendum acknowledged that it is possible that a small volume of leachate could collect in the base of the trench cells if the capping material was permeable, but contended that this risk could be managed by draining any perched water that may be present in the landfill trench cells prior to subsidence of the landfill site and by maintaining the integrity of the capping material. The EIS addendum concluded that, with the implementation of a management plan developed in consultation with CHRC prior to landfill subsidence, there is a low risk of contamination (see section 4.10.4.2 for discussion on the proposed management plan).

## 4.10.4 Mitigation measures

### 4.10.4.1 Landuse and infrastructure

No monitoring and mitigation measures were described in the EIS to address impacts of subsidence on existing agricultural activities, Blackwater Landfill and existing infrastructure and facilities (including powerline and raw water pipelines.) The proponent proposed in the EIS to manage subsidence impacts on these landuses and infrastructure through agreements under the MR Act which the EIS states would detail any proposed mitigation and monitoring measures. More specifically:

- For **agricultural activities** on the project site, existing property improvements, such as farm dams, fencing, etc. within the project site would be managed through the land access arrangements with landholders. The land access agreements would address all issues related to the impacts of the project on the land within the mining lease to the satisfaction of the land owner.
- In relation to **stock routes**, the proponent proposes to manage the impacts of subsidence on the operation of the stockroute through agreements between the owners of the stockroute (i.e. DNRM and the CHRC). Mitigation measures to manage potential subsidence impacts on the stock would likely involve subsidence crack remediation and minor remedial drainage works.
- For the **existing and proposed powerline and raw water pipelines**, subsidence impacts would be managed through agreements with the relevant infrastructure owners prior to conducting any mining that would cause subsidence of the infrastructure in accordance with the MR Act and the CMSH Act.
- For the **Blackwater Landfill,** the proponent is proposing to manage subsidence of the Blackwater Landfill in consultation with the CHRC. In accordance with the MR Act, the proponent is required to have a land access agreement with the CHRC as owner of the landfill, prior to being able to conduct any mining that causes subsidence of the landfill. Further discussions would be undertaken with the CHRC to obtain its approval.

EHP's submission on the EIS raised concerns that insufficient rationale had been provided in the EIS to justify the proposed approach to manage subsidence of existing and proposed powerline and raw water pipelines, in-situ. The proponent provided further justification, including examples from other mines, on the feasibility of managing subsidence of powerline and pipelines in-situ in Appendix B of the response to EIS submissions. It also clarified that discussions had been undertaken with the

owners of the infrastructure (Powerlink and Sunwater) in relation to the management of subsidence impacts on powerlines and water pipelines within the project site. The proponent stated that the outcome of these meetings was that an agreement would be developed with each infrastructure owner in relation to the management of their infrastructure with alternatives for relocation in the unlikely event that management in-situ is not practicable.

EHP's submission on the EIS also raised concerns that the EIS had not described mitigation or management measures to address impacts of subsidence on the Blackwater Landfill, existing and proposed powerline and water pipelines, existing agricultural activities and facilities and stock-routes on the MLA, instead proposing that such measures would be dealt with through future agreements with the landholders/owners/leaseholders/managers of these infrastructure/facilities.

The proponent provided further information of potential management options for managing subsidence on the infrastructure/facilities/landuses in Appendix B of the response to EIS submissions. This was based on examples of successful management of this type of infrastructure in the past. Specifically the proponent clarified the following:

- **Powerlines:** A detailed assessment of the potential impacts of subsidence on the Ergon energy's 22kV powerline which traverses the site and development of a suitable management plan would be completed in consultation with and to the approval of Ergon Energy. Longwall subsidence of 22kV powerlines has been successfully managed at Central Colliery at German Creek Mines.
- **Water pipeline:** Pipeline subsidence has been successfully managed at other mines including Central Colliery at German Creek Mine. A typical management approach may include:
    - An engineering assessment to confirm whether the pipeline is likely to be capable of withstanding the subsidence movements (with or without excavation of the pipe trench to relieve stress loading).
    - In the event that the pipe can withstand the subsidence it would be monitored and repaired, as necessary, during the period of active subsidence. The potential to isolate the section of pipeline for the active subsidence period is also considered at this stage.
    - In the event the pipeline has to remain in service during active subsidence and can't withstand the subsidence movements, the section to be subsided would be replaced with a flexible section (i.e. polyethylene) placed on the surface. After active subsidence is complete the flexible section would be trenched.
- **Fibre optics:** A detailed assessment of the potential impacts of subsidence on the fibre optics cable and development of a suitable management plan would be completed in consultation with and to the approval of Nextgen Networks. Longwall subsidence of fibre optic cables has been successfully managed, with approval from Telstra, at the Mandalong Mine in New South Wales (NSW), Australia.
- **Telecommunications:** A detailed assessment of the potential impacts of subsidence on the telecommunications cables and development of a suitable management plan would be completed in consultation with and to the approval of Telstra. Longwall subsidence of telecommunications cables has been successfully managed, with approval from Telstra, at Central Colliery at German Creek Mines.
- **Stockroutes:** The management of subsidence of the stock route would involve minor remedial drainage works (as described in section 11.4 of the EIS) and minor works associated with crack rehabilitation (as described in section 8.2.1 of the EIS). These minor works would be conducted in consultation with DAFF.
- **Agricultural activities:** No agricultural facilities are expected to be subject to subsidence. Management of subsidence impacts on grazing land would be in accordance with the crack rehabilitation program and minor remedial drainage works discussed in the EIS.
- **Blackwater Landfill:** See section 4.10.4.2 below.

#### 4.10.4.2 Management of topsoil and subsoil

Measures to be adopted during stripping, stockpiling and respreading of topsoil and subsoils as described in the EIS included:

- the development of soil stripping plans
- maintenance of appropriate soil moisture conditions to avoid structural degradation of the soil
- the use of trained and/or supervised earthmoving plant operators to ensure that stripping operations are conducted in accordance with stripping plans
- erosion and sediment control measures including the diversion of drainage around stockpiles

- ripping and sowing of seeds on long term topsoil stockpiles and selective placement of topsoil and subsoil, i.e. more erodible materials being placed on flatter areas in order to minimise erosion.

Erosion and sediment control measures were described in the EIS to conserve soil resources during construction and minimise soil loss from rehabilitated areas.

#### 4.10.4.3 Contaminated land and Blackwater Landfill

The proponent proposed in the EIS to manage potential surface subsidence of the Blackwater Landfill in-situ in consultation with CHRC. EHP and CHRC's submissions on the EIS raised a number of concerns about the impacts of subsidence on the Blackwater Landfill:

- Given that the site is located on the EMR, EHP's submission on the EIS requested clarification on how any applicable site management plan would be appropriately considered and managed for the project (e.g. in terms of subsidence, groundwater contamination, etc.). In the response to EIS submissions, the proponent clarified that CHRC had advised that that there is a Landfill Management Plan for Blackwater Landfill but it is not clear whether this plan would satisfy the requirements section 401 of the EP Act. It stated that a management plan would be developed for the subsidence of the landfill in conjunction with the CHRC and that the requirements of this plan would need to be integrated into any operational management plans applicable to the landfill, at that time.
- EHP's and CHRC's submissions on the EIS requested further information on management and mitigation measures to be employed to prevent and minimise any potential impacts of subsidence (particularly tension cracking) of the Blackwater Landfill, particularly on adjacent areas, surface water and groundwater. In the EIS addendum, the proponent proposed that risks associated with any collection of leachate in the base of the trench cells could be managed by draining any perched water that may be present in the landfill trenches cells prior to subsidence of the landfill site and maintaining the integrity of the capping material. The proponent updated its commitment in the EIS addendum to develop a management plan in consultation with the CHRC with reference to the following measures: leachate management; surface crack monitoring; surface crack remediation by excavating and sealing with clay; remedial surface drainage as necessary and; remedial landfill operating procedure.

**General recommendation 2**: The proponent liaise with CHRC to determine an appropriate monitoring program and remediation strategy to ensure the impacts of subsidence on the Blackwater Landfill are monitored, identified and remediated by the proponent.

### 4.10.5 Conclusion and recommendations

The existing resources, landuse, infrastructure and soils of the project site were adequately described in the EIS documents and the potential impacts of the project on these values adequately predicted. Proposed measures to minimise and mitigate the impacts of the project on topsoil and subsoil were outlined.

Limited monitoring and mitigation measures were described in the EIS to address the predicted impacts of managing subsidence in-situ on existing landuses, infrastructure and facilities including powerline and raw water pipelines. However, EHP contends that sufficient justification was provided in the amended EIS to demonstrate that:

- the proponent had consulted with the relevant owners/lease owners of infrastructure regarding these impacts and proposed management options
- that appropriate mitigation and monitoring measures are available (and have been used successfully in other mines) that are conducive to the proponent's preferred option to manage the impacts of subsidence on infrastructure in-situ
- if in-situ management of subsidence is not deemed possible nor agreed on by relevant parties, then the impacts of alternative options have been appropriately explored in the EIS.

In accordance with the MR Act and the CMSH Act, the proponent would be required to sign agreements with both: landholders within the project site prior to the granting of the mining lease and; relevant infrastructure owners prior to conducting any mining that would cause subsidence of the infrastructure/land.

The EIS documents identified that subsidence of the Blackwater Landfill had the potential to contaminate groundwater but concluded that, with the implementation of a management plan developed in consultation with the CHRC prior to landfill subsidence, the risk was acceptably low. EHP assessed the environmental protection commitments in the EIS and concluded that the residual risks to the groundwater as a result of subsidence of the landfill can be adequately managed by the proponent. Conditions requiring the proponent to protect the groundwater have been included in the draft EA conditions in Appendix 3.

## 4.11 Non-mine waste management

EIS section 21—Non-mine waste management identified the waste streams expected to be generated by the projects activities, provided an assessment of the potential impacts of generated waste and described management options for waste minimisation and disposal.

It was stated in the EIS that uncontrolled and controlled releases of waste associated with the project's activities could potentially impact on land, air quality, ecology, water resources, visual amenity and health and safety. These impacts are discussed in the relevant sections of this assessment report.

### 4.11.1 Methodology

The EIS adequately described the legal and strategic framework for managing wastes and land contamination in Queensland.

The waste assessment in the EIS comprised a desktop study to identify:

- potential waste streams associated with the project's construction, operations and decommissioning activities
- likely impacts associated with waste streams
- management options for waste minimisation and disposal.

### 4.11.2 Waste characterisation and quantification

Table 21-1 of the EIS included a detailed list of wastes expected to be generated as part of mine construction and operational activities. This included the source, projected annual quantity and proposed management strategy for each waste. The main wastes anticipated to be generated by the project include: green waste, scrap metal, waste oils, other hydrocarbons and miscellaneous chemicals and batteries and tyres. Environmental values to be protected when managing waste were also identified.

EHP's submission on the EIS queried if brine would be a waste product from the reverse osmosis membrane of the water treatment plants proposed to be constructed and operated as part of the project and requested further information on any proposed use of permeate as part of the project. In the response to EIS submissions, the proponent clarified that no reverse osmosis water treatment plants are proposed as part of the project and as a result brine would not be generated.

### 4.11.3 Avoidance, mitigation and management measures

Avoidance, mitigation and management of potential waste impacts from the project would be achieved primarily through implementation of a waste management system. The waste management system would:

- meet the requirements of the waste management hierarchy under the *Waste Reduction and Recycling Act 2011* and other regulatory requirements
- provide for the identification of waste types
- commit to the use of licensed waste transport contractors
- outline a process for tracking of relevant regulated wastes.

A list of measures to be undertaken during mine establishment, operations and decommissioning to minimise land contamination was provided in the EIS (EIS section 21.2.5). Wastes would be separated and stored for collection, transport, recycling, recovery or disposal as described in the waste inventory (EIS section 21.1.5) and collected, handled and stored so as to protect mine site staff, community health and prevent nuisance.

The proponent committed to maintaining an inventory of all waste types and quantities produced by the project and their applicable disposal method in accordance with *Waste Reduction and Recycling Act 2011* and Environmental Protection (Waste Management) Regulation 2000. The proponent would also submit annual National Pollution Inventory reports in accordance with the National Pollutant Inventory Guide (SEWPaC 2012) and associated manuals, e.g. Emission Estimation Technique Manual for Mining (SEWPaC 2012), as required.

CHRC's submission on the EIS noted that the project would contribute to additional waste being delivered to its landfill, but was satisfied that reasonable contributions were proposed in the EIS to offset the extra impacts that increased waste being delivered to the site would have on the landfill. CHRC requested the proponent liaise with CHRC to determine the type and volume of waste likely to be delivered to the Blackwater Landfill.

### 4.11.4 Conclusions and recommendations

Requirements of the TOR in relation to general waste management were adequately addressed in the EIS. The overall commitment to apply and implement waste management principles in accordance with applicable legislation has been adequately demonstrated. The waste hierarchy has been appropriately identified and, generally adopted for identified waste streams, and reflected in general management measures. However, more specific and detailed waste management measures would need to be developed to ensure that the waste hierarchy was effectively implemented during mine operations.

The project would contribute to additional waste being delivered to CHRC's Blackwater Landfill. CHRC requested the proponent liaise with CHRC to negotiate the type and volume of waste likely to be delivered to the Blackwater Landfill.

**General recommendation 3:** The proponent liaises with CHRC to negotiate the type and volume of waste likely to be delivered to the Blackwater Landfill.

## 4.12 Mine waste management

The management of coal rejects material and drift spoil from the project was described in EIS section 7—Mine waste management. It included a discussion of the geochemical and geotechnical properties of the rejects material and drift spoil, as well as the design, construction, operation and rehabilitation of the proposed rejects CDA. Further details were provided in Appendix B—Rejects emplacement area conceptual design report and Appendix C—Geochemistry report of the EIS.

### 4.12.1 Methodology

A geochemical assessment of mine waste materials (rejects material and drift spoil) was conducted for the project (EIS Appendix C—Geochemistry report). The objectives of the geochemical assessment were to:

- Investigate the geochemical and physical characteristics of representative samples of rejects material and drift spoil.
- Assess the level of risk from acid generation, the presence and leaching of soluble metals and salts, and/or other salinity/erosion issues.
- Address any environmental management issues related to the geochemical and physical properties of rejects material and drift spoil.

It involved a site visit and review of existing geological information and a sampling and testing program (consistent with existing technical guidelines for geochemical assessment of mine waste material) to obtain representative samples of rejects material and drift spoil from the project. Fifty-eight reject samples (coal seam roof, parting and floor samples) were collected from 19 drill hole locations within and immediately surrounding the project site. Fifty-seven samples representing drift spoil were collected from nine drill hole locations within the project site (EIS Figure 7-1).

Rejects material and drift spoil samples were subjected to a series of static geochemical laboratory tests designed to assess the degree of risk from acid generation and leaching of soluble metals and salts as described in EIS section 7.3.3.

Planning of the CDA included:

- Laboratory testing to characterise the geotechnical properties of the rejects material. Reject material from the Cook Colliery was used in this assessment. Rejects from Cook Colliery were deemed to be representative of the rejects anticipated from the project as coal extracted at Cook Colliery is from the Argo Seam (which is the Pollux and Orion Seams coalesced) in the Rangal Coal Formation.
- Geotechnical testing of the foundation of the CDA, including permeability testing. This involved excavation of 12 geotechnical test pits across the footprint of the CDA. The test pits were characterised in the field and geotechnical samples of selected subsurface material were subject to laboratory testing.
- Preliminary design for the CDA.

### 4.12.2 Waste characterisation and quantification

The following mine wastes would be generated by the project:

- Coarse and fine rejects material from the washing of raw coal at the washplant.
- Drift spoil material generated during the construction of the project from the excavation of the drifts and portals.

The geochemistry assessment in the EIS concluded that the risk of potential environmental impacts from rejects material and drift spoil would be low. More specifically:

- The majority of the rejects material was classified as non-acid forming (NAF), had excess acid buffering capacity and a high factor of safety with respect to potential for acid generation. A relatively small amount (less than 2%) of potential acid forming (PAF) material may be generated from the Pollux Seam; however, this would be well blended with the NAF material from the Aries Seam and overall the rejects material would be NAF.
- The drift spoil was:
    - classified as NAF, has excess acid buffering capacity and a high factor of safety with respect to potential for acid generation.
    - likely to be alkaline, may be sodic and would need to be appropriately managed to address any potential issues related to erosion and dispersion.
- The concentration of total metals in the rejects material and drift spoil was typically below to well below the applied guideline criteria for soils and is unlikely to present any environmental issues associated with rehabilitation and final landuse.
- Surface runoff and seepage from rejects material and drift spoil generated by the project would likely to be alkaline (in the range of pH 7.4–10) and shows medium levels of salinity following surface exposure.

### 4.12.3 Mine waste management

Drift spoil material generated during the construction of the project from the excavation of the drifts and portals would be used as construction material, where suitable, or stored within the CDA.

Coarse and fine rejects material from the washing of raw coal at the washplant would be pumped in a single waste stream to a CDA in the south of the MLA for storage. It was concluded in the EIS that the properties of the project's reject materials (based on laboratory testing of rejects from the Cook Collier[5]) would be ideally suited to wet codisposal and that the mixing of rejects would eliminate the need for a tailings dam and enable the creation of a stable CDA landform that would be progressively rehabilitated.

The findings of the field investigation to assess the geotechnical characteristics of the CDA foundation materials indicated:

- a relatively shallow soil cover over weathered sedimentary rock within the CDA footprint
- relatively high overall shear strength

[5] Rejects from Cook Colliery were deemed to be representative of the rejects anticipated from the project as coal extracted at Cook Colliery is from the Argo Seam (which is the Pollux and Orion Seams coalesced) in the Rangal Coal Formation.

- typically high fine content of the soil suggesting permeability of the near surface is likely to be low. However, there is potential for sand layers to be present in the CDA footprint which would have higher permeability and would be excavated from the CDA footprint during construction
- the soil varies from high to relatively low dispersivity and there are no physical characteristics that could be used to distinguish the level of dispersiveness
- the medium plasticity clays and clayey sands present at the site would make very good construction materials.

The CDA was designed to have a total storage capacity of approximately 12Mm$^3$ which the EIS proposed would be sufficient for the life of mine rejects. The final CDA footprint would be approximately 96ha and would have a maximum height of approximately 37m. Slope stability analyses indicated that both the closure and temporary slopes exceed the appropriate minimum factor of safety requirements. Prior to rehabilitation, the external surface of the CDA would be shaped to provide an overall slope angle of 10% and the top surface of the CDA would be constructed with a 2% grade to promote runoff and prevent ponding. The shaping would direct drainage to runoff control structures located down the slopes of the CDA and to the CDA catch dam. The CDA catch dam is discussed further in sections 4.14—Surface water and section 4.13—Mine water management of this assessment report.

The EIS included a detailed description of the proposed site preparation procedures which would include clearing of the footprint, grubbing, removal of topsoil and subsoil material and preparations to provide a low permeability foundation and installation of water management structures and pipelines. The proposed development of the CDA over the life of the mine in 5 stages (years 1–5; 6–8; 9–12; 13–25) was described in the EIS (EIS section 7.4.5 and EIS Figures 7-2–Figures 7-6).

The CDA would be rehabilitated progressively over the life of the mine. The rehabilitation of the CDA would involve the placement of a subsoil capping layer on the final surface, in addition to topsoil. See section 4.25—Rehabilitation and decommissioning of this assessment report for further information on rehabilitation and decommissioning of the CDA and CDA catch dam.

BMA's submission on the EIS raised concerns about the potential leaching of salt from the CDA and CDA catch dam. In the response to EIS submission, the proponent asserted that the stability and geochemical properties of the project's rejects material and the feasibility of the conceptual design of the CDA had been adequately assessed in the EIS (i.e. EIS Appendix B, Rejects emplacement area conceptual design for the Minyango Project and EIS Appendix C, Geochemical assessment of drift spoil and coal reject materials from the Minyango Project).

### 4.12.4 Monitoring

A CDA monitoring program designed to monitor key environmental and design performance indicators was described in the EIS. The results of the monitoring would be used to assess the performance of the CDA and to undertake regular reviews of the design with respect to geotechnical stability and water management.

The proposed monitoring program would include:

- vibrating wire piezometers to assess pore water pressure within the rejects used to construct the outer perimeter of the CDA
- survey monuments to assess ongoing settlement and deflection of the CDA perimeter slopes with at least annual engineering survey reports
- regular inspections of the CDA including the decant structures by a certified engineer
- monitoring of the rejects material to confirm the acid producing potential and metal concentrations of the rejects
- annual inspections of the CDA catch dam and surface water management structures.

### 4.12.5 Conclusions and recommendations

Requirements of the TOR in relation to mine waste management were adequately addressed in the EIS. The management of coal rejects material and drift spoil from the project was adequately described and the geochemical and geotechnical properties of the rejects material and drift spoil, as well as the design, construction, operation and rehabilitation of the proposed rejects CDA, adequately discussed.

Based on the environmental protection commitments outlined in the EIS, appropriate conditions for tailings disposal based on EHP's Model Mining Conditions Guidelines (EHP, 2012) have been included in the draft EA conditions in Appendix 3.

## 4.13 Mine water management

Waters that would be generated by the project and proposed strategies for the management of mine-affected water was described in section 12—Mine water management of the EIS. A water balance for the project and the proposed site drainage and the mine water management system for the project were described. Detailed modelling of the performance of the mine water management system was presented in EIS Appendix J—Water balance report.

### 4.13.1 Mine affected water

The following waters would be generated by the project:

- underground mine pit water comprising saline groundwater inflow and excess water recycled from underground operations
- water generated by the rejects CDA include rainfall runoff and decant water from the CDA
- rainfall runoff from MIAs (including the CHPP area and NSF areas)
- groundwater from coal seam gas drainage bores.

The predicted quality and quantity of mine affected water described in the EIS is summarised in Table 11.

#### 4.13.2 Management of mine-affected water

The proposed water management strategies for each water type to be generated by the project were described in the EIS and are summarised in Table 11. A schematic of the overall water management system is shown in Figure 5.

**Table 11 Summary of the quantity and quality of different water types generated by the project and proposed management strategies (source: EIS)**

| Water type | Quantity and quality | Proposed management |
|---|---|---|
| **Underground mine pit water** comprising saline groundwater inflow and excess water recycled from underground operations. | • The volume of pit water would fluctuate over the life of the mine according to the rate of groundwater inflow.<br>• Groundwater inflow collected would peak at approximately 3.5ML/day by project year 14.<br>• Excess water from underground operations would be approximately 320ML/a. | • This water would be pumped to the surface and contained in the mine water dam (water stored in the mine water dam would be transferred to the CHPP for use as mine water supply). |
| **Water generated by the rejects CDA** comprising rainfall runoff and decant water from the CDA | Runoff from the reject material would generate neutral to alkaline, medium to highly saline runoff. | • Surface water runoff from the active placement areas of the CDA would be collected either in the decant ponds or in perimeter collection drains and directed into the CDA catch dam to prevent uncontrolled discharges from site.<br>• Diversion drains would be constructed around the final footprint of the CDA during stage 1 of CDA development to isolate the active CDA catchment and prevent any runoff from undisturbed areas entering the CDA runoff containment system.<br>• The perimeter collection drains and diversion drains for the CDA would have sufficient capacity to convey runoff from a critical storm with a 100 year Average Recurrence Interval (ARI) rainfall event. |
| **Rainfall runoff from mine infrastructure areas** (including CHPP area and NSF) | • Runoff from the CHPP area may contain elevated levels of suspended sediment and possibly hydrocarbons or other chemicals.<br>• Runoff from the NSF areas would contain elevated levels of suspended sediment and possibly hydrocarbons or other chemicals. | • Disturbed catchments would be isolated with diversion drains and bunding to minimise the collection of water from undisturbed areas and runoff from disturbed areas would drain to perimeter collection drains.<br>• Mine-affected water from the CHPP area and NSF area would be isolated with diversion drains and/or bunding, where necessary, directed through sediment traps (and oil separators where hydrocarbons are potentially present), and collected in the CHPP catch dam (for water from CHPP area) and NSF sediment dam (for water from NSF area). Water from the CHPP catch dam would be transferred to the mine water dam and used as mine water supply. The NSF sediment dam would control suspended sediment levels in runoff from the NSF area prior to passive overflow to downstream drainage.<br>• During construction, runoff from mine infrastructure areas would be collected in catch drains and directed through sediment traps and settling dams for control of suspended sediment prior to discharge from site. Sediment collected in sediment dams would be excavated at regular intervals and disposed of in the CDA. |
| **Groundwater from coal seam gas drainage bores** | Up to 50 ML/a of saline gas drainage water would be generated over the life of the mine. | Water separation facilities would be provided at each borehole to divert drained water, via temporary surface pipelines, to the mine water dam for reuse as mine water supply. |

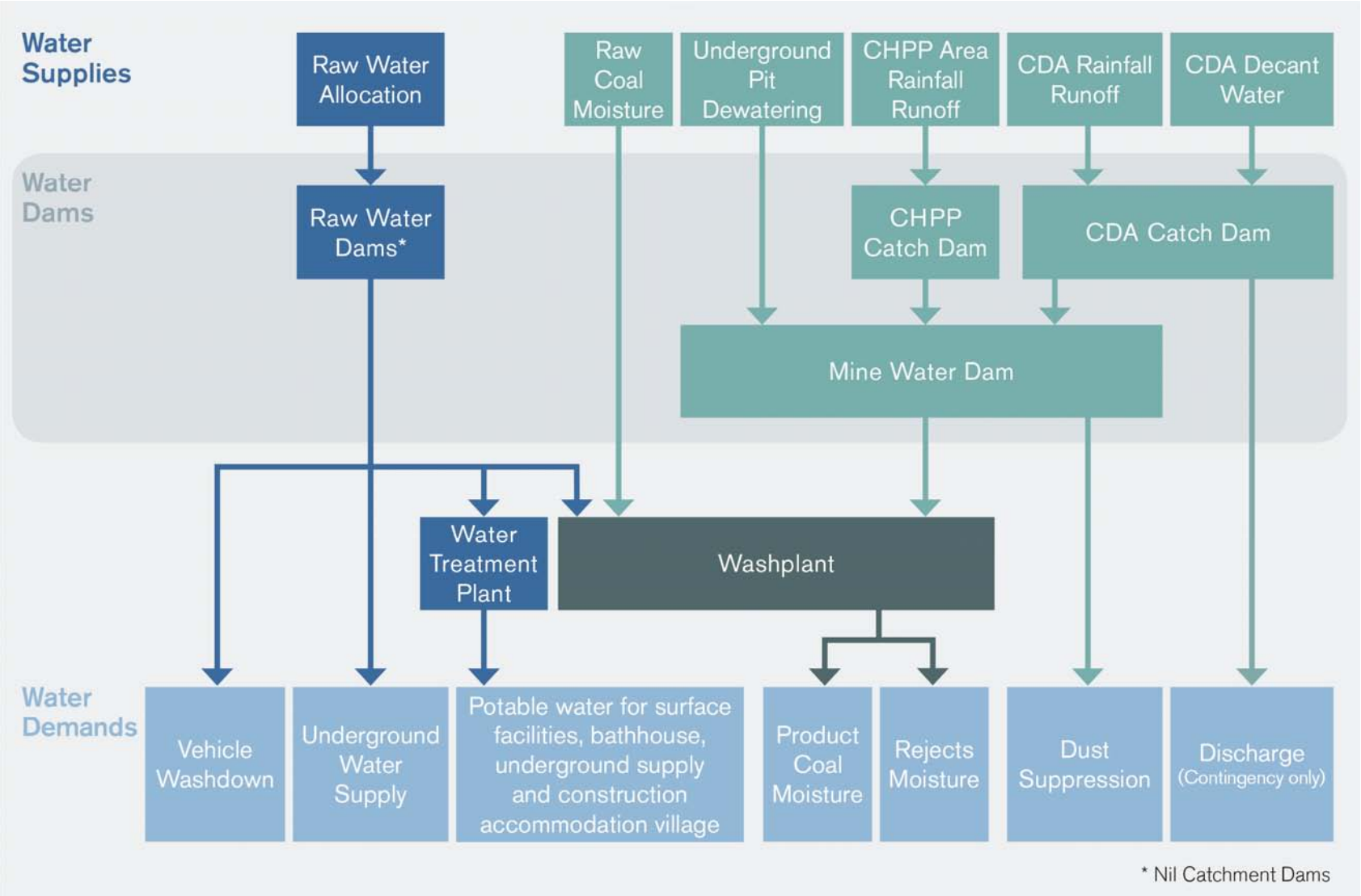


**Figure 5 Conceptual water management system (EIS Figure 12-1).**

### 4.13.3 Water storages

The following dams would be constructed on the project site as part of the mine water management system:

- Two raw water dams both having a capacity of 10ML.
- One mine water dam with a capacity of 630ML. The mine water dam would be the primary storage for mine-affected water and would be used to store all mine-affected water, including transfers from the underground mine operations, the CDA and CHPP Catch Dams. The mine water dam would be a 'turkey's nest' structure with nil contributing catchment. The mine water dam would be the primary source of water for the CHPP and dust suppression demands.
- A CHPP catch dam with a capacity of 120ML. Water collected in the CHPP Catch Dam would be transferred to the mine water dam and used as mine water supply.
- A CDA catch dam with a capacity of 1380 ML. It was concluded in the EIS that, based on the water balance modelling, the CDA catch dam would be of sufficient capacity to contain the runoff from the maximum recorded historical rainfall sequence without discharges. It was therefore designed to operate as a 'nil discharge' system with a very low risk of uncontrolled discharge even during extreme rainfall conditions. CDA water that collects in the CDA catch dam would be transferred by pumps to the mine water supply for use as mine water supply.

A preliminary hazard assessment was undertaken for the project storages in accordance with the former DERM's Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Regulated Dams Manual) and indicated that the proposed storages are 'significant' hazard structures. Design storage allowances and mandatory reporting levels were determined for all mine water dams in accordance with the Regulated Dams Manual requirements for 'significant' hazard category dams to ensure that the mine water management system would comply with the regulated dam requirements in the event that any of the storages are assessed as hazardous at the detailed design stage. A further detailed hazard category assessment would be conducted at the detailed design stage to confirm whether any of the mine water dams would be regulated dams under the EP Act.

EHP's submission on the EIS raised concerns about stability of the southeast corner of the catch dam given that the modelled PMF contours in the EIS, predicted inundation of significant flood depth (approximately 3–6m) close to the wall of the catch dam. In the response to EIS submissions, the proponent reiterated its commitment in the EIS that dams would be adequately designed and constructed to address the structural integrity of containment walls during climatic extremes (including times of drought and flood) and in accordance with relevant design standards and licence requirements (including standards defined in the Water Act).

DNRM's submission on the EIS, requested that the proponent outline how the capture of overland flow in the CHPP catch dam and the CDA catch dam meets the provisions of section 110 of the Fitzroy WRP. The proponent discussed the application of the Water Act to the project in section 2.2.3 of the EIS addendum.

### 4.13.4 Water balance model

The results of a water balance model (using GOLDSIM software), as described in the EIS, to simulate the operation of the mine water system indicated the following:

- The project's water demands would be highly variable (varying between 406 and 4667ML/a over the life of the mine).
- The project would meet the daily mine water demand between 92% and 100% of the time. The proponent is currently in negotiations to secure the necessary raw water allocation.
- The system would have a mine-affected water storage capacity of 2130ML, meaning that:
    - The aggregated design storage allowance of the system (833ML) would be achieved.
    - The storages would be able to operate within the applicable mandatory reporting levels.
    - There would be sufficient capacity within the mine water system to contain the maximum inventory of 2051ML estimated from modelling of system performance using 123 years of historical rainfall records.
- Individual storages would have sufficient capacity to contain mine-affected water generated by the project, including periods of extreme climatic conditions. Modelling of the proposed water management system indicates that there is a variable water deficit and that there would be no

discharges of mine-affected water from the water management system for the 123 years of rainfall data assessed. However as a contingency measure, discharges from the CDA catch dam and CHPP catch dam were included in the water management system outlined in the EIS. In the unlikely event that a discharge was required during an extreme rainfall event, this would need to be conducted in accordance with relevant EA conditions relating to the discharge of mine-affected water.

### 4.13.5 Conclusion and recommendations

The TOR in relation to mine-affected water systems was adequately addressed in the EIS. Broad strategies for the management of mine-affected water were described and a water balance model for the project presented to demonstrate sufficient consideration had been given to the long-term management of water for the project. An assessment of the project's potential impacts and proposed mitigation strategies to address the impact of the project on surface and groundwater values are discussed in sections 4.14 Surface water and 4.15 groundwater of this assessment report.

## 4.14 Surface water

The project's surface water catchment setting and the predicate impacts of the project on surface water values including surface drainage, flooding and geomorphic impacts, were described in section 11—Surface water of the EIS. More detail of the projects flood impacts and geomorphic assessment was provided in Appendix I—Surface water report of the EIS.

### 4.14.1 Methodology

The legislation, policies and guidelines relevant to identifying values, mitigating and managing impacts on surface water were adequately described in the EIS.

Environmental values for the existing surface water environment in the vicinity of the project site were derived from the Environmental Protection (Water) Policy 2009 (EPP Water) and subordinate plans and assessed through both geomorphic field observations and water quality analysis.

Monitoring data was collected during flow events at two locations along Blackwater Creek (to meet water monitoring requirements for the Cook Colliery EA). The data covered 57 sampling events over the period April 2009 to December 2012. Monitoring locations included a site on Blackwater Creek downstream of the Blackwater Mine and Cook Colliery operations (within the project site) and a site on Taurus Creek downstream of the Cook Colliery operations (upstream of the project site) (EIS Figure 11-1).

An assessment of the surface water and geomorphic impacts of mine subsidence on Blackwater Creek was undertaken using field observations and the development of hydrologic and hydraulic models. This included for:

- Blackwater Creek, an assessment of the existing and post subsidence flow paths, flood discharges, flood extents, depths and levels for the 2 and 50 year Average Recurrence Interval (ARI) flood events and the PMF
- Sagittarius Creek, an assessment of the existing flow paths, flood discharges, flood extents, depths and levels for the 100 year ARI flood event. The 100 year ARI flood event was used to identify the impacts of flooding for this minor tributary on the potential rail/road realignment which was determined to be the appropriate flood immunity for state controlled roads and rail infrastructure.

An XP-RAFTS hydrological model was used to estimate design flood discharges in the creeks and their tributaries. A one dimensional HECS-RAS hydraulic model and a two dimensional TUFLOW hydraulic model were used to estimate design flood levels, depths, velocities and extents along Blackwater and Taurus Creeks and to assess the impact of predicted mine subsidence and proposed mine infrastructure on flood behaviour.

The existing geomorphic condition of creeks and drainage features that would be affected by mine subsidence was described both through a site inspection and hydraulic modelling. Stream velocity was used as an indicator of stream impacts, where increases in velocities would suggest some change in the stream characteristics may occur. An assessment of the impact on bed shear stress and stream power was also provided. Modelling assumed that both the stream channel and over-bank

areas had subsided as per the mine subsidence predictions described in the EIS and that no infilling or erosion of the channel bed or banks had occurred.

## 4.14.2 Existing values

The project site is located within the Blackwater Creek catchment and is traversed by the ephemeral Blackwater Creek, Taurus Creek and Sagittarius Creek. The existing surface water environment was characterised in the EIS as being moderately disturbed by human activities (including grazing and mining) with naturally high sediment loads.

The EIS described Blackwater Creek as being heavily braided within the project site. The bed of Blackwater Creek being characterised by a sandy bed with sandy loam pools. 'Slugs' of sandy sediment approximately 0.5–1.0m deep are evident at several locations and the sand appears to travel in pulses moving downstream following each flood event. In between each slug, the bed material changes to a silty sand. The banks of Blackwater Creek consist of clay loam and are nearly vertical in places. Bank erosion is evident along much of Blackwater Creek. Taurus Creek was described in the EIS as being similar to Blackwater Creek.

The bed of Sagittarius Creek was characterised in the EIS as having a shallow sandy bed with cracking clays. The banks of Sagittarius Creek were described as varying from being near vertical to 1 vertical:2 horizontal and some bank erosion is evident along Sagittarius Creek.

Under the EPP Water, the project site lies within the Mackenzie River sub-basin catchment and is drained by the Mackenzie Southern Tributaries sub-catchment. Environmental values (EVs) relevant to the project include aquatic ecosystems, farm supply/use, stock water, human consumption, primary, secondary and visual recreation, drinking water, industrial use and cultural and spiritual values. The most sensitive of these EVs within the immediate vicinity of the project site were determined to be aquatic ecosystems and stock water.

The results of monitoring data that had been collected during flow events at two locations along Blackwater Creek were summarised in Table 11-1 of the EIS. In brief:

- existing concentrations of suspended solids and turbidity in Blackwater Creek exceeded the WQOs for a moderately disturbed aquatic ecosystem, with turbidity also elevated above the aesthetic WQO for drinking water. Turbidity levels in Taurus Creek also exceeded the aquatic ecosystem WQO. The presence of suspended solids is likely to be due to the naturally high sediment loads in the Blackwater Creek with the potential for additional input of suspended solids from local industrial operations
- salinity (as electrical conductivity) exceeded the low-flow moderately disturbed aquatic ecosystem WQO at both sites, but was within the high-flow WQOs. Salinity levels were within the WQOs for drinking water at both monitoring locations
- aluminium and copper concentrations also exceeded the aquatic ecosystem WQOs at both monitoring locations. High flow conditions and resultant potential for discharges from mines upstream, may explain these results
- all monitored mean values were within applicable WQOs for stock water.

At the request of EHP in its submission on the EIS, the proponent presented the water quality data in Table 11-1 of the EIS addendum as medians and percentile values to allow comparison against relevant data i.e. Queensland Water Quality Guidelines, ANZECC and ARMCANZ (2000).

## 4.14.3 Impacts

### 4.14.3.1 Subsidence impacts

Taurus Creek and Sagittarius Creek would not be subsided or directly impacted by the project.

Approximately 2.7km of Blackwater Creek would be subject to mine subsidence in the south-eastern corner of the project site.

The following impacts on surface water were predicted in the EIS.

1. **Changes to flood behaviour:** The modelled impacts of subsidence on changes in peak flow for various modelling points along Blackwater and Taurus Creeks for the 2 and 50 year ARI events were detailed in Table 6.1, Appendix L—Surface water report of the EIS. In summary:
   - **For Blackwater Creek:**
     - Peak 2 year and 50 year ARI flood levels (Figure 6) were predicted to decrease across the surface subsidence area of Blackwater Creek by a similar magnitude as the predicted maximum subsidence of the bed level (a maximum of 2.7m and 2.1m for the 2 and 50 year ARI respectively).
     - Some minor increases[6] and reductions[7] in the extent of flooding along Blackwater Creek and its channels were predicated in the 50 year ARI flood event (Figure 6).
     - A significant increase in over-bank flooding in some reaches of Blackwater Creek in the 50 year ARI flood event (e.g. resulting from the breakout flows from the R1 channel of Blackwater Creek) were predicted in the EIS. These flows were predicted to be broad and shallow and the duration of flooding inundation in the areas minor (up to two days). As a result, it was concluded in the EIS that these impacts would be unlikely to significantly increase the likelihood of channel avulsion, on the basis that breakout flows would be redirected back to Blackwater Creek and would be confined within the surface subsidence area. It was recommended in the EIS that pre-emptive measures to mitigate subsidence impacts on Blackwater Creek were not warranted due to the relatively minor nature of the anticipated impacts.
   - **Taurus Creek and Sagittarius Creeks** would be beyond the LOMS and would not be impacted by the project.

2. **Geomorphic impacts:** The velocity impacts within the surface subsidence area were shown for the 2 year and 50 year ARI flood events for Blackwater Creek. In summary:
   - Increases in bed scour along Blackwater Creek were predicted in the EIS as flood velocities increased where the creek drained into the subsidence zones and an increase in sediment deposition is predicted across the subsidence troughs where flood velocities decreased (EIS Figure 11-6 displayed flood velocities for the 2 year ARI flood events and EIS Figure 11-7 displayed the 50 year ARI event). Given the natural and regular movement of 'slugs' of sand within Blackwater Creek, it was predicted in the EIS that the mine subsidence troughs in the creek bed would fill with transported sediment during subsequent flood events. The time taken to fill the subsidence zones would therefore be highly dependent upon the frequency and nature of flood events.
   - Downstream of the surface subsidence area, peak velocities would be lower than pre-mining conditions, thereby reducing the potential for erosion. However, subsidence depressions in the creek bed would capture and reduce sediment loads thereby increasing the available energy in the downstream flows and potentially increasing the erosion potential (until such time as the subsidence depressions were filled with sediment). Overall it was concluded in the EIS that the long-term impact of mine subsidence on hydrogeological processes in Blackwater Creek downstream of the surface subsidence area would not be significant.

3. **Flood plain drainage:** Subsidence would likely result in the ponding of water in localised shallow surface depressions on the floodplain (EIS Figure 11-8).

FBA's submission on the EIS, stated that it did not support the proposed longwall mining under Blackwater Creek because of impacts associated with subsidence, including tension cracking and subsequent erosion. FBA argued that Blackwater Creek is recognised as a state significant corridor

[6] Along the north-western edge of the L2 channel of Blackwater Creek.

[7] To the right hand floodplain downstream of the R2 channel of Blackwater Creek and flood levels of Blackwater Creek approximately 2km downstream of the project site.

and should be retained in its present condition (at minimum) to support ecological connectivity in the region and to prevent downstream impacts due to increased erosion. It recommended the proponent adopt bord and pillar mining underneath Blackwater Creek, including an appropriate buffer zone, to ensure that subsidence impacts did not occur in this area. In the response to EIS submissions, the proponent contended that the potential impacts of subsidence on Blackwater Creek had been thoroughly assessed in the EIS and appropriate management and mitigation measures had been proposed.

TMR's submission on the EIS, requested further information on how drainage under Blackwater-Rolleston Road would be impacted, upgraded or managed for the project to facilitate overland flow paths which would be altered by subsidence. It requested the proponent demonstrate that the culverts on the Capricorn Highway downstream of the emergency release point had been considered in calculating allowable water discharges from the proposed project.

In the response to EIS submissions, the proponent clarified that the proposed rehabilitation measures for subsidence cracks and buckling presented in the EIS described the typical rehabilitation measures for subsidence of the site and were not intended or proposed to be used to repair infrastructure within the road reserve. It committed that any rectification of surface drainage or culverts within the road reserve affected by subsidence would be designed and implemented to the satisfaction of TMR and included in any road reconstruction works. Further, any discharges of water from the mine into Blackwater Creek would likely be less than one cubic metre per second ($m^3/s$) which is 1.2% and 0.15% of the 2 year and 50 year ARI flows at the Capricorn Highway, respectively. The proponent concluded that this minor increase in flows would not have a significant impact on the functioning of the highway culverts.

TMR's response to the amended EIS acknowledged that the information provided predicts minimal impact on the Capricorn Highway due to the discharge into Blackwater Creek. However, TMR requested the proponent provide evidence of the hydrology calculations. It advised that if TMR accepts the calculations are valid, then the proponent would be required to limit stormwater discharge to the volumes stated in the calculations.

**General recommendation 4:** The proponent liaises with TMR to agree on acceptable stormwater discharge volumes at the Capricorn Highway as a result of any discharges of water from the mine into Blackwater Creek.

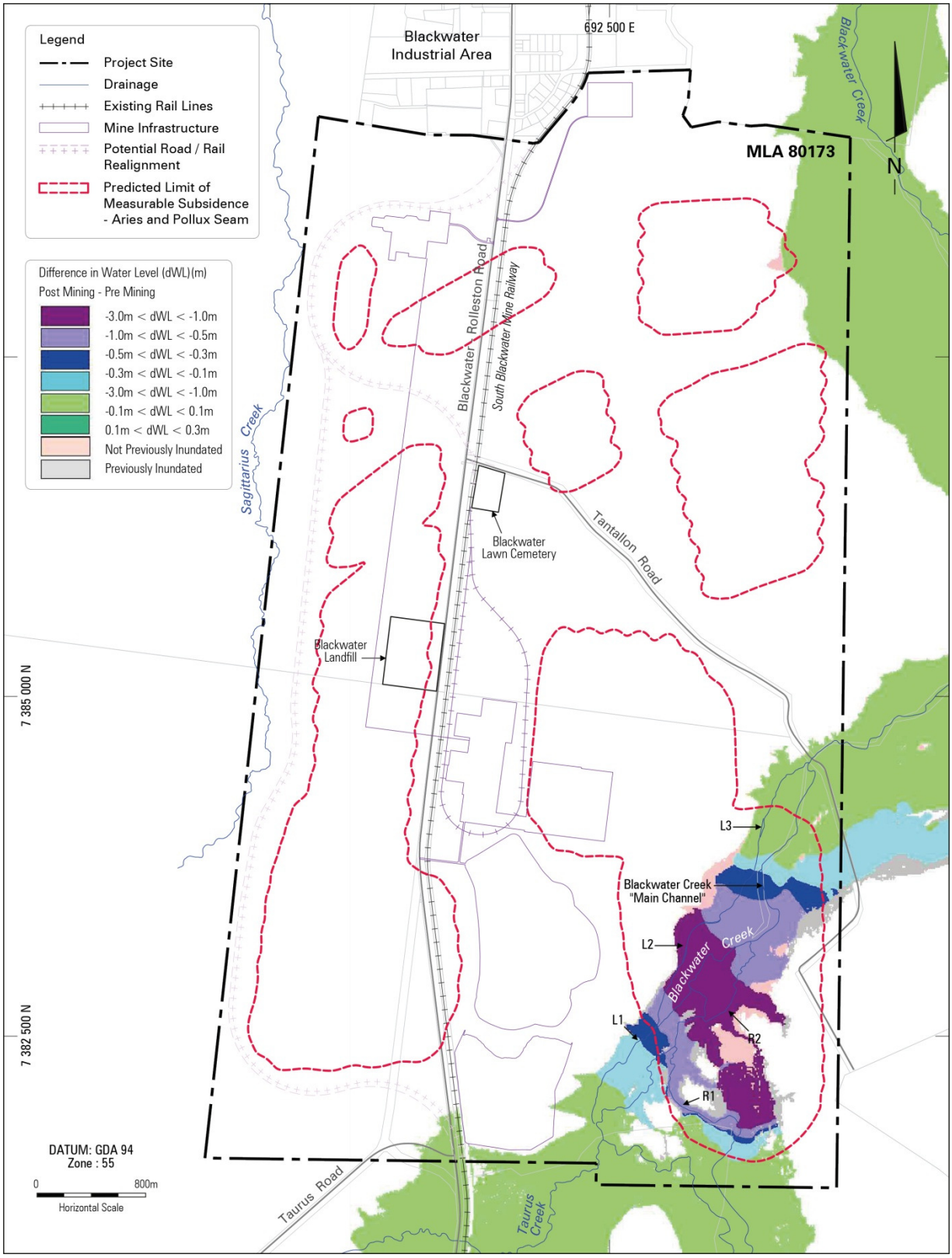


**Figure 6 Predicted post mining flood level impacts—50 Year ARI flood event (source: EIS Figure 11-5)**

#### 4.14.3.2 Risks of uncontrolled and controlled discharges

The results of a water balance model conducted for the EIS concluded that individual storages would have sufficient capacity to contain all mine-affected water generated by the project, including periods of extreme climatic conditions. Modelling of the proposed water management system indicated that there would be a variable water deficit and that there would have been no discharges of mine-affected water from the water management system for the 123 years of rainfall data assessed. However, as a contingency measure, discharges from the CDA catch dam and CHPP catch dam were included in the water management system.

EHP's submission on the EIS stated that the potential risks of both controlled and uncontrolled water releases to the environmental values of the receiving system had not been adequately considered in the EIS. It was stated in the EIS that water may need to be released from water storages under 'extreme rainfall conditions', but it did not specify whether the proposed releases would be controlled or uncontrolled or, provide any history of the extent, levels and frequency of floods in and around the project site and surrounding region and catchment to place the reference to 'extreme rainfall conditions' in context. Additionally, the potential impacts on local and downstream water quality and human health due to both uncontrolled and controlled discharges from the site were not adequately assessed in the EIS.

The proponent provided the requested information in the response to EIS submission. This included: a definition of the term 'extreme rainfall conditions'; discussion of the historic rainfall sequence used in modelling and the implications for release and; a description of the approaches to manage water levels in dams.

In relation to uncontrolled releases of water, EHP requested the proponent include a risk assessment for uncontrolled emissions from storages to water due to system, catastrophic failure or extreme weather events, assess the potential impacts of such emissions on local and downstream water quality and human health, and provide detailed measures to avoid or minimise impacts. The additional information on risks associated with uncontrolled releases of water from storages requested by EHP was not provided in the amended EIS. EHP has concluded that, while risks downstream from a release were not adequately defined in the EIS documents, it is satisfied that the application of model mining conditions in the EA, particularly for water discharges and regulated structures, would provide adequate protection of environmental values downstream of water storages.

In relation to both controlled and strategic water releases, EHP identified that the assimilative capacity of the receiving environment had not been adequately considered in the EIS. Blackwater Mine and Cook Colliery are both authorised to discharge mine affected water into Blackwater Creek, upstream of the proposed project. Therefore the proponent would need to provide appropriate release scenarios for mine affected water into Blackwater Creek. In the response to EIS submissions, the proponent contended that EA conditions proposed in the EM Plan in relation to water releases in accordance with EHP's model conditions, took into account potential for impacts on downstream water quality values, the assimilative capacity of the receiving waters and imposed necessary controls on any discharges. EHP accepts that, while the requested information has not been provided in full at this stage, application of EHP's model conditions would be an acceptable approach to take.

EHP's submission on the EIS raised concerns that the assessment of the environmental risks to downstream water quality of CDA water (using the analysis of water extracts from leachate testing for drift spoil and coal reject materials) used the stocking guidelines. Yet conclusions are drawn in the EIS in regards to water quality in general and aquatic ecosystems are identified as an environmental value for receiving waters (DERM, 2011). EHP requested the proponent reassess the risks of releasing mine water to downstream environmental values using water quality guidelines for aquatic ecosystems protection. Additionally, the EIS refers to *'marginally elevated selenium levels in some water extract samples from reject material and drift spoil'*. EHP requested that the proponent consider the off-site effects of selenium and any other contaminants of concern resulting from uncontrolled release of water from storage dams. The proponent provided a detailed response to these issues in the response to EIS submissions. EHP was subsequently satisfied that the proponent's response was adequate. While risks downstream from a release were not adequately defined in the EIS document, EHP is satisfied that the application of model mining conditions in the EA would provide adequate protection for environmental values downstream of water storages.

## 4.14.4 Mitigation measures

### 4.14.4.1 Subsidence impacts

It was concluded in the EIS that pre-emptive measures to mitigate subsidence impacts on Blackwater Creek were not warranted as flooding impacts on Blackwater Creek were assessed as being minor in nature. The proponent committed to prepare and implement a subsidence management plan for the project prior to any mining beneath Blackwater Creek to mitigate and manage subsidence impacts on watercourses. This would include monitoring of specific locations identified in the velocity impact assessment (e.g. L1 and main channels of Blackwater Creek which were predicted to have an increased hydraulic gradient, increased velocities and therefore increased erosion potential) and the implementation of erosion control measures, if required.

Subsidence ponding, as described in the EIS, would be mitigated by the installation of minor remedial drainage earthworks to re-establish free drainage. Drainage works may include the construction of excavated trapezoidal drainage channels, designed with sufficient capacity to cater for contributing catchments and with stable batter slopes. These channels would enable free drainage of subsidence depressions. Drainage channels would be located to avoid sensitive features and vegetation communities, as far as practicable.

FBA's submission on the EIS requested that proponent provide management actions to control erosion associated with Blackwater Creek, and to outline details of monitoring activities to be undertaken—including the type and frequency of monitoring activities proposed and what measures would be implemented if impacts are detected. DNRM's submission on the EIS advised that any proposed activities within a watercourse that are a result of mitigation/management strategies or rehabilitation associated with watercourse subsidence must be detailed in the subsidence management plan, including supporting evidence outlining the legitimacy of such activities or works. In the EIS addendum, the proponent committed that *'any subsidence rehabilitation works in a watercourse will be detailed in the Subsidence Management Plan (including supporting evidence) and carried out in accordance with the requirements of DNRM'.* It also committed in the response to EIS submissions, that the subsidence management plan would include mitigation measures to maintain landscape connectivity.

### 4.14.4.2 Uncontrolled and controlled discharges to waterways

EHP's submission on the EIS highlighted deficiencies in the EIS relating to the proposed authorisation of water discharges to Blackwater Creek. These were:

1. Insufficient information had been provided in the EIS to justify adoption of the model conditions to authorise the release of water to waterways. EHP requested that the proponent: further characterise the hazards of water discharge from the project's storages under extreme weather events and; provide justification that model conditions (including appropriate discharge water quality and quantity limits) could be met for discharges during extreme rainfall events.
2. A water monitoring strategy or receiving environment monitoring program (REMP) that meets the requirements of the TOR and model conditions for EA in the unlikely event that a controlled release or uncontrolled release of water should occur, was not provided in the EIS. EHP requested the proponent:
    - Provide a water monitoring strategy that as a minimum: describes suitable water quality and resource indicators for measuring environmental values; identifies objectives that would protect the identified values; and outlines how the achievement of objectives would be monitored, audited and managed.
    - Outline a REMP to be instituted in the event of any controlled or uncontrolled wastewater release to surface waters.

The requested information was not provided by the proponent in the amended EIS to the satisfaction of EHP and EHP requested that the proponent provide this information in an information request under section 62 of the EP Act (issued on 5 February 2014).

In response to the information request (see Appendix 2) the proponent provided additional information to support the development of draft conditions for an EA. This included the proposed location of mine affected water releases and proposed turbidity, sulphate and salinity water release limits. EHP assessed the additional information provided by the proponent and determined that:

- The sulphate (250mg/L) and salinity (1000µS/cm) release limits proposed by the proponent were acceptable for slightly to moderately disturbed system.

- The turbidity release limit proposed by the proponent (500 NTU or reference +10%) was not appropriate given that locally relevant WQO for turbidity scheduled under the EPP(water) are considerably lower at 50NTU.
- However, the proponent did not provide:
    - release limits for suspended solids
    - electrical conductivity release limits and maximum release rates for different flow events (i.e. Table F4 in Appendix 3)
    - a REMP.

In the absence of locally relevant water quality data, EHP proposed turbidity and suspended solids release limits in the draft EA conditions in Appendix 3, based on locally relevant WQO (EHP, 2011) scheduled under the EPP(water) until such time that locally specific release limits (derived from a suitable reference range) are provided[8]. Additionally, before any water releases to waterways can be authorised under the EA, EHP requires the proponent to provide in an amended EM Plan: 1) a REMP and; 2) EC release limits and maximum release rates (i.e. Table F4 in Appendix 3) for different flow events based on derivation of water quality data from a suitable reference range (see EM Plan requirement 3).

### 4.14.5 Conclusion and recommendations

The existing surface water values were described in the EIS. Potential impacts of subsidence on flood behaviour and flow velocities, geomorphic features and floodplain drainage were assessed for Blackwater and Taurus Creeks. Appropriate conditions have been included in the draft EA conditions in Appendix 3 of this assessment report which would require the proponent to maintain the functioning and flows of Blackwater and Taurus Creek after subsidence.

Potential impacts of controlled and uncontrolled water releases to the environmental values of the receiving system were discussed in the EIS documents. EHP is satisfied that the application of model mining conditions in the EA, particularly for waste water discharges and regulated structures, would provide adequate protection of environmental values downstream of water storages. However, the proponent is required to provide additional information on water quality and quantity to EHP before any water releases to waterways can be authorised (see EM Plan requirement 3).

**EM Plan requirement 3:** The proponent is required to address the following in an amended EM Plan consistent with the Model Water Conditions for Coal Mines in the Fitzroy Basin (EHP, 2013):

- Locally specific release limits derived from water quality data from a suitable reference range including EC release limits and maximum release rates for different flow events.
- A surface water monitoring strategy/REMP that meets the requirements of the TOR and model conditions

## 4.15 Groundwater

A summary of the key findings of the groundwater assessment undertaken for the project was provided in section 10—Groundwater of the EIS. A detailed report of the groundwater assessment was provided in the EIS Appendix H—Groundwater report.

### 4.15.1 Methodology

The legislation, policies and guidelines relevant to identifying values, mitigating and managing impacts on groundwater resources were adequately described in the EIS.

DNRM's submission on the EIS stated that the proponent had incorrectly referenced the relevant groundwater management area and legislation. It confirmed that while this area was previously located within the Highlands Subartesian Area, with the release of the Water Resource (Fitzroy Basin)

[8] Release limits proposed by EHP in the conditions in Appendix 3 were: 50NTU for turbidity or the 80th percentile of a suitable reference range and; <110 mg/L for suspended solids or the 80th percentile of a suitable reference range.

Plan 2011, this section of the Highlands Subartesian Area was replaced with the Highlands Groundwater Management Area. Hence the Fitzroy WRP is the relevant document when determining the need for entitlements. In response to this issue, the proponent corrected the reference to the relevant groundwater management area in the EIS addendum.

The groundwater impact assessment undertaken for the project included:

- A review of relevant groundwater, geotechnical and environmental reports and bore data for the project site and surrounding mines field investigations.
- The installation of monitoring bores and vibrating wire piezometers (VWPs) for measuring groundwater levels, quality and hydraulic parameters. A total of 16 monitoring bores and three VWPs were installed in the major geological units of the project Site (EIS Figure 10-1).
- The development of a three-dimensional numerical groundwater flow model (MODFLOW SURFACT) for the project to simulate the existing conditions of the groundwater regime and predict the potential impacts of mining during the operational and post-mining phases of the project. The model included hydrogeology (based on the conceptual groundwater model described above) and the project's proposed underground mining operations and associated subsidence fracturing of subsurface strata. The model also included existing nearby mines, including the Blackwater Mine.

DNRM's submission on the EIS provided advice to the proponent to assist with the interpretation of data from DNRM groundwater database. It also requested clarification on a number of issues relating to the collection of groundwater data, groundwater model assumptions and limitations. In the EIS addendum, the proponent clarified that the bore census was conducted on properties that were accessible within the project site and immediate surrounds and provided the requested information on groundwater inflows to the mine in ML/yr. In the response to EIS submissions, the proponent: clarified the reasons for the short records of data for some bores (i.e. lost data loggers and sensor malfunctions); clarified the depth of the Duaringa Sandstone under the project site and; justified the role of creeks and drains in the model and the constant head boundary assumptions used in the model.

DNRM's response to the amended EIS noted that the proponent had generally addressed the issues raised by DNRM in its EIS submission. While it accepted the model boundaries in the existing model and the justification provided by the proponent for the EIS process, DNRM advised that where practical the proponent should be endeavouring to simulate actual groundwater conditions with the aim of developing a model which would accurately predict impacts. It requested that the appropriateness of model boundaries be reviewed when the model is next updated (see EM Plan requirement 4 in section 4.15.6 of this assessment report). This request was accepted by EHP as being reasonable.

## 4.15.2 Existing values

The regional groundwater system in the vicinity of the project site consists broadly of three groundwater systems the:

- thin Quaternary/Tertiary Alluvial groundwater system that is not associated with Blackwater Creek
- Triassic Rewan Formation that occupies the majority of the project site
- Permian Rangal Coal Measures.

The groundwater systems within the vicinity of the project site are summarised in Table 12 and a schematic of the conceptual groundwater model is shown in Figure 7. It was stated in the EIS that groundwater is not widely used in the region because of low yields and variable water quality.

**Table 12 Summary of main regional groundwater systems in the vicinity of the project site (source: EIS Table 3)**

| | Alluvium | Rewan Formation | Rangal Coal Measures |
|---|---|---|---|
| **Overview** | • Shallow, thin layer of sediment across the floodplains of Blackwater and Taurus Creeks.<br>• Not considered an aquifer due to the limited quantity of groundwater. | • Outcrops over most of the project site.<br>• Up to 350m thick within the project site.<br>• Not considered an aquifer due to the limited quantity of groundwater. | • Coal measures include the target coal seams.<br>• At shallow depths the Rangal Coal Measures are a low yielding aquifer and at depths greater than approximately 250m, the potential for the coals to be considered an aquifer is significantly reduced due to declining permeability. |
| **Groundwater yield** | Only the deeper alluvial sediments host low yielding groundwater (0.3 litres per second; L/s). The shallow alluvial sediments do not host any groundwater. | Limited groundwater yields (<0.01–0.3 L/s). | Yield ranged from 0.1–0.7L/s. |
| **Recharge** | Recharged from direct rainfall and seepage is limited due to the presence of shallow clays and bedrock. | Recharged from infiltration of direct rainfall where the unit outcrops but only after prolonged rainfall events. | Recharged via vertical seepage from overlying and underlying geological units, horizontal seepage from adjacent geological units and through direct rainfall where the coal seams out-crop to the west of the project site. |
| **Discharge** | Discharge is unlikely to occur as baseflow to Blackwater or Taurus Creeks due to the presence of clays and bedrock beneath the creeks and above the low yielding deeper alluvial sediments which contain the limited groundwater. | Discharge potentially occurs through lateral flow towards the north and possibly upward flow to the alluvium. | Discharge via vertical seepage to overlying and underlying geological units, horizontal seepage to adjacent geological units, and via slow upward flow along fractured zones and faults. |
| **Water quality** | • Measured Electrical Conductivity (EC) was approximately 5000 microsemens per centimetre (µS/cm).<br>• Based on applicable guidelines, water quality is:<br>  ○ unsuitable for human consumption<br>  ○ suitable for stock water<br>  ○ contains ion concentrations which are toxic to fresh water aquatic ecosystems. | • Measured total dissolved solid (TDS) ranged from 4020–48,700 milligrams per litre (mg/L) indicating brackish to hypersaline groundwater.<br>• Based on applicable guidelines, water quality is:<br>  ○ unsuitable for human consumption and stock watering<br>  ○ contains metal concentrations which are toxic to fresh water aquatic ecosystems. | • Measured TDS is approximately 15,000mg/L indicating brackish to saline groundwater.<br>• Based on applicable guidelines, water quality is:<br>  ○ unsuitable for human consumption<br>  ○ unsuitable for stock water. |

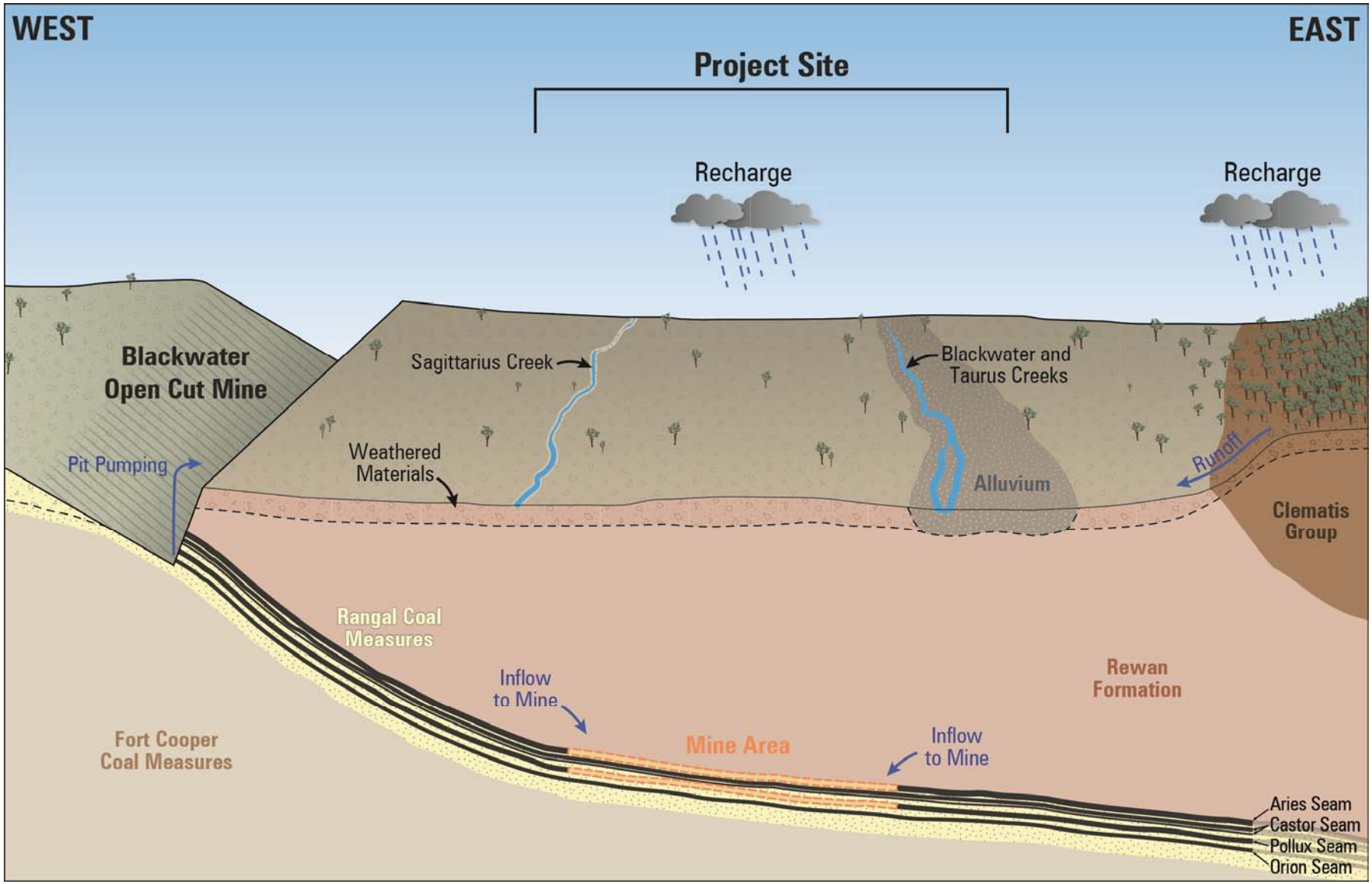


**Figure 7 Conceptual hydrogeological cross section of the project site (source: EIS Figure 10-3).**

## 4.15.3 Impacts

Key impacts on the groundwater regime identified in the EIS that may arise from underground mining include direct impacts on the Rangal Coal Measures from extraction of the target coal seams and sub-surface cracking in areas that have been subject to subsidence due to longwall mining. Key impacts as described in the EIS are summarised in the below sections.

### 4.15.3.1 Predicted groundwater drawdown

Groundwater inflow to the mining operations would occur from the coal seams. Numerical modelling predicted that total inflow volumes from both the Aries and Pollux Seams would be up to a maximum of approximately 41L/s (which equates to 3500 cubic metres ($m^3$/day) per day). It was stated in the EIS that these predictions were conservative, as the model did not account for faulting outside the project site which would act as a barrier to the flow of groundwater into the mine or losses due to infiltration of inflows to the walls and floor of the underground workings and evaporation losses.

The predictive modelling indicates that there would be drawdown in the Rangal Coal Measures due to the project. Depressurization (drawdown) in the Aries Seam would fall to less than 1m within approximately 2km from the project site and depressurisation in the Pollux Seam would reduce to less than 1m within approximately 5km from the project site. The depressurisation of the Pollux Seam would be more extensive than in the Aries Seam as the Pollux Seam receives less recharge from the overlying strata than the Aries Seam. Despite the predicted depressurisation, it was concluded in the EIS that significant adverse impacts on groundwater in the Rangal Coal Measures were not predicted for the following reasons:

- The Rangal Coal Measures would yield poor quality, brackish to saline groundwater.
- There is limited use of the groundwater within the Rangal Coal Measures within and surrounding the project site.
- There are no registered groundwater bores within the area of potential influence from the project (i.e. the predicted limit of drawdown).

Due to the high hydraulic gradients between the dewatered project site and the surrounding coal seams, it was predicted in the EIS that there would be a relatively rapid recovery of the Rangal Coal Seams after mining ceases with groundwater levels in the coal seams expected to have recovered to 80% of the pre-mining level within 30 years.

For the alluvium and Rewan formation, the potential for significant impacts on groundwater in these formations was predicted in the EIS to be very low. This is due to the fact that both the alluvium and the Rewan Formation yield very low quantities of poor quality, brackish to saline water and there is no use of groundwater from either of these strata within or surrounding the project site.

DNRM's submission on the EIS requested further information and clarification on the groundwater data presented and model outputs. Key requests included:

- an explanation of the discrepancy between the reporting and interpretation of water quality data (specifically salinity) for the alluvium bores between different sections of the EIS
- the provision of additional water quality data points for the Rangal Coal Measures as data from only one bore is presented in the EIS.

In the EIS addendum the proponent more accurately described the water quality of the alluvium aquifer as being 'brackish' not saline. In the response to EIS submissions, the proponent confirmed that only one bore had been installed in the coal seam as it was logistically and financially difficult to install more bores due to the depth of the bore (300–400m). It was argued that as the coal seam forms a confined aquifer the water quality is expected to be uniformly saline (consistent with experience from other mines in the region) and did not warrant additional monitoring bores given the drilling challenges and safety issues. It was noted that, once mining commenced, there would be a further opportunity to collect water samples from the coal face when the main headings and gate roads were constructed, which would enable the groundwater quality to be further characterised.

DNRM's response to the amended EIS, stated that the proponent had responded to DNRM's concerns in the EIS submission regarding the representativeness of one bore (MB2) when monitoring water quality in the Rangal Coal Measures by discussing cost, safety concerns and expressing a belief that water quality is uniform in the aquifer. However, DNRM considered that this issue should be addressed more fully in the groundwater monitoring plan to be developed for the project (see EM Plan requirement 4 in section 4.15.6 of this assessment report).

DAFF's submission on the EIS raised concerns that the EIS had not considered the potential impact of acquiring water from existing entitlement holders for the project on other entitlement holders and/or industries in the region as required in the TOR. In the response to EIS submissions, the proponent advised that it would be unlikely that entitlement holders would be impacted by the trading of allotted water on the water market as water allocations available for trade are usually surplus to requirements. DAFF provided no further comments on this issue in its response to the amended EIS.

#### 4.15.3.2 Impacts from sub-surface cracking

Key potential sources of groundwater contamination identified in the EIS were seepage from the rejects CDA, the Blackwater Landfill and the storage of hydrocarbons at workshops and vehicle servicing areas.

It was concluded in the EIS that groundwater contamination from the CDA was not considered to be a significant risk for the following reasons:

- The CDA would be constructed on a low permeability foundation (dense to very dense clay with occasional very stiff to hard sandy clay) which would restrict rainfall infiltration and minimise recharge to the shallow groundwater.
- Geochemical testing of the reject material predicted that the leachate would likely be pH neutral to alkaline and have a medium to high level of salinity in the short term and is expected to diminish over time as the salts are leached from the rejects. The concentration of soluble metals and major ions in runoff and seepage from the rejects would likely remain within the applied water quality guideline criteria and would be unlikely to present any significant environmental risk to the groundwater, especially as any leachate from the CDA would likely be of better quality than the underlying, saline groundwater. In the unlikely event there is seepage from the CDA, it was predicted in the EIS that this would not adversely impact on the shallow groundwater system as it already contains poor quality (brackish) water.

In regards to the subsidence of the landfill, it was concluded in the EIS that subsidence was not expected to result in any significant adverse groundwater impacts for the following reasons:

- Groundwater monitoring results indicated that currently, there was no significant contamination from the landfill and that the landfill is unlikely to be a significant potential source of groundwater contamination.
- There would be no hydraulic connectivity between the underground mine workings and the landfill.
- While it was predicted in the EIS that surface cracking could conservatively extend to depths in the order of 5–10m in the Blackwater Landfill area, it is highly unlikely that surface cracks in the vicinity of the landfill would extend into any underlying shallow groundwater, as groundwater monitoring bores at the landfill site recorded groundwater levels between 13.8m and 19.6m below ground level.

It was acknowledged in the EIS that it is possible that a small volume of leachate may collect in the base of the trenches if the capping material is permeable. However, it was argued that this risk could be managed by draining any perched water that may be present in the landfill trenches prior to subsidence of the landfill site and maintaining the integrity of the capping material. The proponent committed in the EIS to develop, in conjunction with the CHRC, a management plan for subsidence of the landfill. Further assessment of this commitment is provided in section 4.10.4.3 of this assessment report.

#### 4.15.3.3 Potential impacts on surface water

Modelling in the EIS indicated that there is no direct connection between Blackwater Creek and Taurus Creek and groundwater in the alluvium, Rewan Formation or Rangal Coal Measures. Therefore, it was concluded that any impacts on groundwater in these strata would not impact on surface water in Blackwater and Taurus Creeks.

#### 4.15.3.4 Potential impacts on Great Artesian Basin and springs

It was concluded in the EIS that the project would not impact on the Great Artesian Basin. The Triassic Clematis Group (an aquifer unit for the Great Artesian Basin) occurs approximately 7km to the south-east of the project site in the Arthur's Bluff State Forest. In addition, the boundary of the Mimosa Management Area (mapped under the Great Artesian Basin Water Resource Plan 2006 as being within the south of the project site; EIS Figure 10-6) is not within the predicted extend of maximum drawdown for the project. The nearest Great Artesian Basin associated springs are located approximately 20km from the south-eastern boundary of the project site and are well beyond the predicted drawdown extents from the project.

#### 4.15.3.5 Cumulative impacts

The cumulative impact of the Blackwater Mine was taken into account in the predictive groundwater model. Modelling presented in the EIS indicated that there would be no significant adverse impacts from the project on any of the three groundwater systems within or surrounding the project site. The depressurisation of the Rangal Coal Measures due to the project would not extend to the operations at Cook Colliery, Curragh Mine or Jellinbah Mine. Therefore, it was concluded in the EIS that no cumulative groundwater impacts are predicted with these mines.

### 4.15.4 Mitigation measures

The following mitigations measures were described in the EIS to minimise the impact of groundwater on environmental values:

- Groundwater inflow to the longwall panels and bord and pillar mine area would be managed as part of the proposed mine water management system (see section 4.13 of this assessment report).
- Hydrocarbon storage would be managed in accordance with standard practice described in EIS Table 21-1 to prevent the contamination of shallow groundwater systems (see section 4.24 of this assessment report).

Mitigation measures to minimise groundwater contaminated from the CDA and subsidence of the Blackwater Landfill are discussed in sections 4.12 Mine waste management and 4.10 Land of this assessment report.

### 4.15.5 Monitoring

The proponent proposed in the EIS that the groundwater monitoring program, established as part of EIS groundwater investigations, would be continued throughout the life of the project. This would include:

- Recording of groundwater levels from existing monitoring bores and VWPs (EIS Figure 10-1) to enable natural water level fluctuations (such as responses to rainfall and river/creek flows) to be distinguished from potential water level impacts due to depressurisation resulting from underground mining.
- Groundwater quality sampling of existing monitoring bores, approximately every six months, in order to provide longer term baseline groundwater quality, and to detect any changes in groundwater quality during and post mining. This would include groundwater monitoring bores within and next to both the CDA footprint and the Blackwater Landfill to confirm the quantity and quality of any seepage.

DNRM's response to the EIS addendum noted that a detailed groundwater monitoring plan to address the requirements of the TOR had not been provided in the EIS documents. DNRM requested that a detailed monitoring plan be developed by the proponent to the satisfaction of the department (see detailed information listed in EM Plan requirement 4) and submitted prior to the commencement of mining. EHP requested the proponent under section 62 of the EP Act; provide the information requested by DNRM. While some of this information was provided by the proponent in its response to the information request, EHP assessed that full information requested by DNRM was not provided.

### 4.15.6 Conclusion and recommendations

The existing groundwater resources were described in the EIS and the potential impacts of the project (in terms of both the quantity and quality of the groundwater) on aquifers, existing users and adjacent environmental values adequately assessed.

DNRM requested the proponent undertake further monitoring of water quality in the Rangal Coal Measures and continue to update the model to more accurately predict impacts on groundwater (including a review of the appropriateness of model boundaries in the next model update). While the proponent committed to continue groundwater sampling of existing monitoring bores during and post mining, the EIS did not include a detailed groundwater monitoring plan to the satisfaction of DNRM which addressed the requirements of the TOR. The proponent is required to address these issues in an amended EM Plan (see EM Plan requirement 4).

**EM Plan requirement 4:** The proponent is required to address the following in an amended EM Plan:

1. Commit to updating the groundwater model, in consultation with DNRM, to more accurately predict impacts including reviewing the appropriateness of model boundaries used in the EIS.
2. Provide a detailed groundwater monitoring plan to the satisfaction of EHP and DNRM. The plan is to, as a minimum, addresses the following:

- include a table of bores with locations, aquifers to be monitored, and a commitment to the frequency of monitoring water level and quality
- refer to water quality parameters listed in the project's TOR, including major ionic species, pH, electrical conductivity, total dissolved solids and any potentially toxic or harmful substances
- provide justification about how the bore monitoring network would meet the needs of providing baseline data, noting seasonal variation and determining impacts of mining
- provide for more comprehensive monitoring of water quality in the Rangal Coal Measures.

Based on the environmental protection commitments in the EIS, draft conditions to protect groundwater values based on EHP's Model Mining Conditions Guidelines (EHP, 2012) have been included in Appendix 3. The proponent would need to provide additional information (see EM Plan requirement 4) before the groundwater conditions in Appendix 3 can be fully populated.

## 4.16 Ecology

EIS section 19—Flora and fauna described the environmental values of the project site and summarised the predicted impacts of the project on flora and fauna described avoidance and mitigation measures.

### 4.16.1 Methodology

#### 4.16.1.1 Overview

The methodology of the terrestrial, aquatic and stygofauna ecology assessments were described in detail in the EIS in: Appendix E—Terrestrial fauna and fauna report, Appendix F—Aquatic fauna and fauna report and Appendix G—Stygofauna report.

As part of the EIS, desktop assessments were carried out to obtain background information on the historical and potential presence and distribution of species listed under the NC Act and regional ecosystems (REs) listed under the *Vegetation Management Act 1999* (VM Act), and to determine the potential presence of stygofauna information based on topography and potential habitat values. The desktop studies included, but were not limited to, database searches, reviews of previous studies undertaken in or adjacent to the project site, interpretation of recent high resolution aerial photography and review of DNRM's property maps of assessable vegetation (PMAV).

The information from the desktop studies was used to refine the field survey methodology in order to target a wide range of vegetation communities and terrestrial flora and fauna species during surveys, including listed threatened species and communities. The presence and extent of any pest plant and animal species (as listed under the LP Act) were also recorded. Several ecological surveys were carried out and included:

- Dry season terrestrial flora and fauna survey to field-validate the type, distribution and remnant or high value regrowth (HVR) status of vegetation communities throughout the project site and record fauna species present during late spring.
- Wet season terrestrial flora and fauna surveys to field-validate the type and distribution of vegetation throughout the project site and record fauna species active and present during late summer.
- Dry season aquatic field survey and an assessment of wet season aquatic values based on data collected from the Cook Colliery REMP.
- In-situ water quality measurements to collect data on key parameters, such as temperature, pH, EC, turbidity and dissolved oxygen.
- Stygofauna site investigation including collection of 11 groundwater samples for stygofauna testing and collection of field data on groundwater quality.
- Laboratory analysis of groundwater samples for stygofauna presence.
- Assessment of potential impacts of the project on terrestrial and aquatic flora and fauna as well as on stygofauna.

Once the field survey was complete, the likelihood of presence of NC Act listed species and VM Act listed vegetation communities was assessed, based on a consideration of whether each species/vegetation community was detected during field surveys, the availability and condition of potential habitat within the project site, the species' habitat requirements and ecology (including habitat type, roosting and/or foraging needs, home range and other biological requirements). The following four categories were used in the EIS documents to classify the likelihood a species being present ('*likelihood of occurrence*'): present, high, moderate and low.

The results of the proponent's ecological assessments are provided in section 14.16.2 of this assessment report while the summary of the potential impacts of the project on ecological values is summarised in section 4.16.3 of this assessment report.

#### 4.16.1.2 Discrepancies between mapped and ground-truthed vegetation

EHP's submission on the EIS requested the proponent provide further information on the discrepancies between mapped and ground-truthed REs and provide justification using photos and maps as to if and how ground-truthed REs vary from the certified PMAV maps. In the response to EIS submissions, the proponent provided further information based on certified PMAV maps and field-validated RE maps. EHP assessed this information and concludes that insufficient justification was provided by the proponent in the amended EIS to demonstrate that ground-truthed REs varied from the HVR shown on the certified PMAV maps. While EHP can accept ground-truthed RE data as part of the EIS assessment process, the proposed changes must be presented and accompanied by an RE amendment report with photos, maps and justifications for each change. EHP requires the proponent to provide this information as part of an amended EM Plan (see EM Plan requirement 5 in section 4.16.6).

#### 4.16.1.3 Classification on the likelihood of occurrence for listed threatened species

EHP's submission on the EIS identified that the potential impacts for some listed threatened species under the NC Act had not been appropriately described or assessed in the EIS. For example, in regards to Table 16 of the Terrestrial flora and fauna report (EIS, Appendix E):

- The Australian painted snipe (*Rostratula australis*) was stated as potentially utilising flooded gilgai areas. However, gilgai areas were not sampled in field surveys.
- The black-throated finch (*Poephila cincta cincta*) and the star finch (eastern) (*Neochmia ruficauda ruficauda*) were classified in the EIS with a '*low potential to occur in the study site*'. EHP commented that survey efforts to target these species were inadequate.
- The ornamental snake (*Denisonia maculata*) was classified in the Table 16 of the EIS as '*unlikely to occur'* which was contrary to other parts of Table 16 which stated that the species had a '*low to moderate potential to occur'* and habitat for the species (gilgais) was found to occur on-site.
- All bat species, including the south-eastern long-eared bat (*Nyctophilus corbeni*), were classified in the EIS as '*low to moderate potential to occur'* despite the EIS identifying suitable foraging habitat (e.g. along the creek line) and/or roosting habitat (e.g. tree hollows and under bark).

EHP requested the proponent to revise the classification of the likely occurrence in the '*potential to occur in the study area*' column of Table 16, based on the abovementioned matters. In the response to EIS submissions, the proponent provided a detailed response on the likely occurrence of each of the species identified by EHP and argued that no changes to Table 16 was warranted as the purpose of this table was to assess the potential for listed threatened species to occur on the project site.

#### 4.16.1.4 Insufficient information on field techniques

EHP's and a private submitter raised a number of concerns and queries regarding survey techniques and intensity used for listed threatened species in the EIS assessment. EHP requested the proponent outline the number of hours spent on different survey techniques and the specific techniques conducted during each field trip. Additionally, the following specific issues were identified by EHP:

- The aquatic field surveys were only conducted during the middle of the dry season. This is insufficient in highly ephemeral situations.
- The fauna field survey effort does not appear adequate for sampling of restricted/fragmented range reptiles. In particular, there were concerns that the current survey effort had not adequately sampled for restricted/fragmented range reptiles such as: the skink *Egernia rugosa*, the snakes *Hemiaspis damelii* and *Denisonia maculata* and the pygopod *Paradelma orientalis*.
- The methodology or outline of the survey effort used to detect red goshawk (*Erythrotriorchis radiates*) nests was not described.
- The EIS provided insufficient detail on the survey methods used to target black-throated finch (southern) and star finch (eastern).

EHP requested the proponent provide justification for the field surveys conducted and in some cases conduct surveys. Additionally, if listed threatened species were identified as occurring at the site or it was assessed that they are likely to occur, EHP required the proponent to outline appropriate measures to avoid and/or mitigate any potential impacts on this species. In the response to the EIS submissions, the proponent clarified the number of hours spent on different survey techniques for each species. The proponent argued the fauna survey efforts were considered adequate to sample the fauna species present on the project site and that additional surveys were not warranted.

EHP assessed the additional information provided in the amended EIS and identified the following information deficiencies in the EIS documents which the proponent is required to provide in an amended EM Plan (see EM Plan requirement 5 in section 4.16.6):

- Information on the number of hours spent on the different survey techniques and the specific techniques conducted during each field trip to target terrestrial fauna species identified in EHP's submission on the EIS.
- Detail on the survey method used for star finch (eastern) including the locations where surveys for star finch (eastern) took place and their proximity to the project site and whether or not any of the surveys included avifauna.

Additionally, EHP identified the survey techniques described in the EIS documents for the Australian painted snipe and endangered black-throated finch (southern), were inadequate. Specifically, the following surveys are recommended:

- Additional surveys for the Australian painted snipe (e.g. spotlighting searches) to meet the minimum recommended survey times identified in Magrath *et al*, 2010.
- Surveys of RE 11.3.25 and waterholes for the endangered black-throated finch (southern).

EHP requires the proponent to commit, in an amended EM Plan, to conduct additional surveys for these species plan as part of a baseline ecological condition assessment prior to subsidence to meet the draft EA conditions proposed in Appendix 3 (see EM Plan requirement 6 in section 4.16.6).

#### 4.16.1.5 Gilgais as potential habitat

EHP's submission on the EIS raised concerns that the potential for gilgais as habitat for listed threatened species had not been adequately quantified or discussed in the EIS, despite the occurence of gilgais over a third of the site (i.e. 664ha with prominent gilgais associated with Soil Mapping Unit B1 and 700ha with minor gilgais associated with Soil Mapping Unit B2). Moreover, no aquatic surveys had been conducted on any of the gilgais. EHP requested the proponent conduct further flora and fauna surveys of the gilgais, especially in areas of high impacts, discuss and quantify the area of potential gilgai habitat on the site and discuss the potential significance of gilgais as habitat for flora and fauna, including listed threatened species.

In the EIS addendum the proponent provided additional maps depicting the area of well-developed gilgai habitat on the project site. The proponent advised in the response to EIS submissions that survey efforts targeting threatened species in these habitats were conducted during suitable conditions without success. The response further stated that given this area is relatively small and isolated from other suitable habitat, proponent argued that further survey effort in this highly disturbed and modified habitat were not warranted.

After considering the amended EIS, EHP concluded that the proponent had not adequately addressed issues raised by EHP in its EIS submission. The proponents response to EHP's issues, did not consider the fact that wet season aquatic surveys had not been conducted for the project. EHP considers that gilgai areas represent potential suitable habitat, especially during wet weather conditions, for a range of aquatic, semi-aquatic and terrestrial species; including listed threatened species under state and Commonwealth legislation (e.g. ornamental snake). Further, EHP considers that the significant areas of gilgai habitat on the project site (approximately 1350ha), have not been adequately surveyed and the potential impacts to listed threatened species, adequately assessed in the EIS documents. EHP requires the proponent to commit in an amended EM Plan to conduct additional surveys for gilgai habitat (and any associated listed threatened species) as part of a baseline ecological condition assessment prior to subsidence, in order to meet the draft EA conditions in Appendix 3 (see EM Plan requirement 6 in section 4.16.6).

#### 4.16.1.6 Stygofauna

EHP's submission on the EIS stated that the presence and nature of any stygofauna had not been assessed in accordance with the requirements of the TOR. It requested the proponent confirm the identity and habitat of stygofauna for relevant groundwater zones within the project area as per the requirements of the TOR. In the response to EIS submissions, the proponent provided justification that the stygofauna assessment was undertaken in accordance with relevant guidelines. The EIS addendum was modified to clarify that one taxa of stygofauna, *Copepoda cyclopoida* (microcrustacean), was recorded in the alluvium. The proponent concluded in the addendum that these are stygoxenes, which are not dependent upon groundwater and were commonly found in the surface waters of the project site.

EHP assessed the additional information and advised that the presence of stygofauna has not been adequately assessed in the EIS in accordance with the TOR and warranted further investigation. EHP requires the proponent to commit in an amended EM Plan to conduct additional surveys for these species as part of a baseline ecological condition assessment prior to subsidence, in order to meet the draft EA conditions in Appendix 3 (see EM Plan requirement 6 in section 4.16.6).

### 4.16.2 Existing values

#### 4.16.2.1 Terrestrial ecology

The project site and surrounding area had largely been cleared of native vegetation with no remnant vegetation remaining. Based on DNRM's certified PMAV, 6.5ha of 'endangered' HVR, 59.5ha of 'of concern' HVR, and 0.2ha of 'least concern' HVR were mapped. Field surveys carried out as part of the EIS assessment; however, identified several inconsistencies between DNRM's published PMAV maps and ground-truthed REs. Field studies identified approximately 73ha of mainly of concern HVR vegetation, consisting of three REs (EIS Figure 11); largely associated with the riparian vegetation along Blackwater Creek and Taurus Creek and a remnant patch to the east of the cemetery (Table 13). It was concluded in the EIS that these creeks are important for maintaining landscape connectivity in the fragmented landscape as they are mapped as a state and regionally significant corridors under the Queensland Government's Biodiversity Planning Assessment Mapping. The remainder of the project site was cleared grazing land or disturbed by existing infrastructure and activities; except for the small remnant to the east of the cemetery.

**Table 13 Ground-truthed regional ecosystems in the project area (source: adapted from EIS Appendix E—Terrestrial flora and fauna report)**

| Regional ecosystem (high value regrowth) | Description | VM Act Class[1] | Biodiversity status[2] | Total area on project site (ground-truthed; ha) |
|---|---|---|---|---|
| 11.3.3 | *Eucalyptus coolabah* woodland on alluvial plains | Of concern | Of concern | 54.2 |
| 11.3.25 (60%)/<br>11.3.3 (40%) | *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines/<br>*Eucalyptus coolabah* woodland on alluvial plains | Least concern/<br>Of concern | Of concern/<br>Of concern | 4.5 |
| 11.9.7** | *Eucalyptus populnea, Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks | Of concern | Of concern | 15.8 |

[1]VM Act Class - Conservation status under the VM Act
[2]Biodiversity status - Conservation status under the EP Act
**The EIS documents contained several different RE classifications for RE 11.9.7, such as RE 11.9.7 (in the EIS report), RE 11.9.7(i) on Figure 8 in the Addendum report and RE 11.9.7(ii) in Table 9 of the Terrestrial flora and fauna report.

It was concluded in the flora and fauna assessment section of the EIS (Appendix E) that the vegetated habitats within the project site had been heavily disturbed due to clearing of native vegetation for grazing, agriculture and mining. The areas of riparian woodland that fringe Blackwater and Taurus Creek were found to have low to moderate habitat value. These areas of vegetation were considered as being narrow and fragmented and having a high cover of exotic species. Some hollow bearing trees were present and there was a reasonable cover of fallen timber. The remainder of the project site was considered to be of low habitat quality in the EIS due to the limited and fragmented nature of the woody vegetation, high cover of exotic species and lack of fallen timber and deep leaf litter. Hence it was concluded in the EIS that this open habitat would provide suitable habitat for only generalist species that are able to adapt to such highly modified environments.

A total of 236 flora species were recorded during field surveys. The EIS stated that no listed threatened flora species under the NC Act were found during field surveys. However, one species, the endangered *Solanum elachophyllum*, was considered to have a low to moderate likelihood to occur within the project site. Thirty-six introduced weed species were identified with seven of these being classified as Class 2 under the LP Act and/or also declared as weeds of national significance under Commonwealth legislation.

A total of 145 terrestrial vertebrate species were found during the field surveys, including 14 amphibian, 20 reptile, 79 bird and 32 mammal species. Of these, the following listed threatened species under the NC Act were recorded during field surveys, namely the:

- squatter pigeon (*Geophaps scripta scripta*) – vulnerable
- cotton pygmy-goose (*Nettapus coromandelianus*) – near threatened
- little pied bat (*Chalinolobus picatus*) – near threatened
- echidna (*Tachyglossus aculeatus*) – special least concern.

Desktop searches carried out as part of the EIS impact assessment found that 20 listed threatened fauna species under the NC Act to potentially occur within the project site. Of these species, the following species were considered likely to occur on the project site, based on the known habitat preferences of these species, the availability and condition of habitats within the project site and the results of the field surveys:

- brigalow scaly foot (*Paradelma orientalis*; vulnerable) – high likelihood to occur
- large-eared pied bat (*Chalinolobus dwyeri*; vulnerable) – moderate likelihood to occur
- Australian painted snipe (*Rostratula australis*; vulnerable) – moderate likelihood to occur
- ornamental snake (*Denisonia maculata*; vulnerable) – moderate likelihood to occur
- south-eastern long-eared bat (*Nyctophilus corbeni,* formerly known as *N. timoriensis*); vulnerable) – moderate

likelihood to occur

- red goshawk (*Erythrotriorchis radiates*; endangered) – moderate likelihood to occur.

Field surveys identified five introduced terrestrial vertebrate species: cane toads (*Rhinella marina*), house mice (*Mus musculus*), brown hares (*Lepus capensis*), European rabbits (*Oryctolagus cuniculus*), feral pigs (*Sus scr*ofa), and wild dogs/dingos (*Canis familiaris*). Three of these species (rabbit, pig and wild dog/dingo) are declared Class 2 pest species under the LP Act.

#### 4.16.2.2 Aquatic ecology

Several aquatic habitats were identified during field surveys, consisting of three ephemeral creeks and tributaries (Blackwater Creek and tributaries; Taurus Creek; and Sagittarius Creek and tributaries), several permanent farm dams and one ephemeral pond.

The aquatic flora and fauna report in the EIS (Appendix F) described the condition of the Blackwater Creek and its tributaries as moderate due to impacts from agriculture, grazing and mining. Blackwater Creek is the largest tributary to the Mackenzie River in the southern tributaries subcatchment and flows north through the project site and east of Blackwater township. Taurus Creek is a tributary to Blackwater Creek and located in the south of the project site. The creek is used by grazing, agriculture and mining but remained in good condition.

Sagittarius Creek is a tributary to Blackwater Creek, and the confluence is north of the Blackwater Township. Current influences to Sagittarius Creek and its tributaries as described in the EIS were grazing and agriculture. The general condition of this creek on the project site was described as moderate to good.

Several farm dams and an ephemeral pond are located within the project site. The farm dams are man-made dams to store water for livestock and irrigation. The high sloping banks are typically vegetated and only receive input from rainfall. Current influences are limited to grazing and dewatering for irrigational purposes. The condition of farm dams and the ephemeral pond was described as good and could provide refuge for aquatic flora and fauna during the dry season.

During the field survey an ephemeral ponded area was present. The EIS documents described that this area is rarely ponded as it was not present during previous wet season surveys, and did not show on historic aerial photography. The flooded area also contained thriving mature trees that prefer dry conditions. The aquatic assessment concluded that the ephemeral ponded area was likely to be a remnant from the January 2011 floods.

No wetlands of state, national or international significance were identified or found on the project site.

Despite the impacts from agriculture, grazing and mining, most sites had moderate habitat bioassessment scores, with some resulting in good scores. Channel diversity (i.e. the ratio of pools, runs and riffles) was found to be low at all sites and limited to pool habitat, where water was present. Bends and changes in water depth were described in the aquatic report to be able to provide some channel diversity during periods of higher flow. The surveys of the in-stream habitats (i.e. structural elements including overhanging vegetation) found that the aquatic habitat could potentially provide refuge and food for aquatic fauna such as fish, turtles and macrocrustaceans. In-stream habitat was found to be dominated by aquatic vegetation (i.e. macrophytes) and woody debris and was generally in moderate condition.

Although stream banks at all sites were assessed as being mostly stable, bank erosion was found to be extensive at sites accessed by livestock and sites where periods of flow washed away sparsely vegetated banks. The aquatic assessment concluded that heavy rainfall during the preceding wet season also would have contributed to bank erosion.

Field surveys identified a total of 18 aquatic flora species. None of these are listed as threatened under the NC Act. Emergent aquatic plants were the most common growth form at all sites. There were submerged aquatic plants at the dams and ephemeral pond sites only, where water was relatively deep. Only one species of free-floating aquatic plant was found. The assessment concluded that the lack of submerged and floating aquatic plants in the creeks reflected the ephemeral nature of the creeks, suggesting that water levels fluctuate considerably and/or that the water column was likely to be highly turbid at most sites.

A total of 48 aquatic macroinvertebrate families, three species of macrocrustaceans and five fish species were recorded during field surveys. No turtles were caught or sighted and no turtle nesting banks were found.

#### 4.16.2.3 Stygofauna

Samples of 11 groundwater bores were obtained, representative of the three groundwater systems found within the project site, namely the alluvium (one bore), the Rewan Formation (9 bores) and the Rangal Coal Measures (one bore).

Two of the 11 bores contained stygofaunal taxa, namely:

- one specimen of Oligochaeta: Naididae (worm) – found in the coal seam bore (MB2)

- one specimen of Coleoptera: Hydraenidae (beetle) – found in the coal seam bore (MB2)
- two specimen of Copepoda: Cyclopoida (microcrustacean) – found in the alluvial bore (MB9).

The Stygofauna report (Appendix G) concluded that the sampled stygofaunal taxa were identified to family or order and all specimens caught were considered to be stygoxenes (aquatic fauna that use groundwater ecosystems, but are not dependent on groundwater to complete their life cycle). It was further concluded in the EIS that these taxa were consequently not considered as significant stygofauna taxa.

## 4.16.3 Impacts

The EIS described that the mine surface facilities would be located in such a way to avoid the need for any clearing of HVR vegetation within the project site (EIS Figure 9-4). However, the following project activities have the potential to impact on vegetation communities and flora and fauna species within the project site:

- Minor disturbance of HVR vegetation within areas subject to surface cracking due to mine subsidence (EIS Figure 9-5).
- The potential for project activities to spread weeds and thereby impact vegetation.
- Secondary impacts due to the effects of noise, vibration and lighting from operating equipment and infrastructure.

These impacts are described further below.

### 4.16.3.1 Impacts on vegetation communities

***Subsidence crack rehabilitation***

The EIS identified that subsidence would result in localised surface cracking due to tensile strain on the ground surface. However, the exact location of cracks would only be confirmed through monitoring, although the EIS stated that the majority of the subsided surface area would be unaffected by cracking. Residual tension cracks would occur within a few weeks of an area being mined.

It was stated in the EIS, that while tension cracking itself would not necessarily impact on vegetation communities, the rehabilitation of cracks would need to be carefully managed to avoid detrimental impacts on vegetation. The rehabilitation program for tension cracking proposed in the EIS would include a non-intrusive, targeted method of surface subsidence crack rehabilitation to minimise disturbance of vegetation.

The EIS further identified a 2.7km section along Blackwater Creek which supports HVR which may experience tension cracking with the potential for erosion of the river following crack remediation. However, the proponent would implement erosion control and monitoring measures to evaluate and mitigate any significant impacts on the river banks from erosion. The EIS also stated that natural regeneration would be successful, given that only small areas would be disturbed, canopy trees would be retained wherever possible and a weed control program would be implemented.

***Subsidence related changes to drainage***

The EIS identified subsidence ponding as a result of subsidence troughs that would result in localised alteration of surface drainage paths and create ponding areas. However, mitigation measures would be implemented through the installation of minor remedial drainage earthworks to re-establish free drainage. It was concluded in the EIS that with the installation of minor remedial drainage earthworks and the re-instatement of free drainage, no residual ponding on the floodplain, and consequently no impact on vegetation would occur.

EHP's submission on the EIS stated that the EIS had not provided adequate recognition nor did it propose mitigation and offset measures to protect high value regrowth vegetation on the project site. EHP's submission requested the proponent to:

- Outline measures/commitments to minimise and mitigate subsidence impacts on the high value regrowth vegetation associated with Blackwater Creek. This should include rehabilitation of any disturbance to this vegetation with endemic native plant species.
- Outline commitments to improve the current condition of HVR vegetation associated with Blackwater Creek to maintain its ecological functionality over the life of the mine.
- Include in the subsidence management plan a risk-based approach for each of the identified state significant biodiversity values (SSBVs), including clear monitoring criteria to assess any potential impacts. This would include potential residual long-term impacts on all SSBVs resulting from underground mining (e.g. subsidence impacts, change of water flow, changes of groundwater, etc.) and managing subsidence (e.g. remedial clearing).

- If mitigation of impacts would not be possible, an offsets strategy would need to be prepared, consistent with Queensland's Biodiversity Offset Policy (QBOP, 2011).

In the response to EIS submissions, the proponent stated that the requirements requested by EHP had already been included in the outlined for the subsidence management plan. Relevant sections of the EIS were updated to highlight specific measures to manage HVR. It was concluded in the EIS that '*as significant adverse impacts on the HVR are not expected and any minor impacts are proposed to be mitigated using proven techniques, an offsets strategy is not required*'.

#### 4.16.3.2 Impacts on flora and fauna

***Listed threatened species (terrestrial and aquatic)***

The EIS concluded that no significant impacts on listed threatened flora and fauna species (terrestrial and aquatic) would occur as a result of the proposed project. In terms of impacts on fauna habitat, the EIS concluded that disturbance would occur within areas of HVR vegetation within the project site to facilitate tension crack remediation; especially along the 2.7km reach of Blackwater Creek within the predicted surface subsidence area (EIS Figure 9-5). Disturbance due to crack rehabilitation would be up to 2–3m in width with potential impacts on ground and shrub layers. However, fragmentation of HVR was considered likely to be very small in magnitude and temporary in nature and the EIS did not predict any significant medium or long term barriers to the movement of fauna within the project site, including less mobile species of ground dwelling mammals and reptiles. No impacts on stygofauna were predicted in the EIS.

EHP's submission on the EIS stated that the EIS had not adequately assessed the potential impacts or outline measures to manage impacts of subsidence (and associated rehabilitation techniques) of Blackwater Creek on rare and listed threatened species. EHP requested the proponent to:

- Assess the potential impacts of subsidence of Blackwater Creek (including any associated rehabilitation measures) on sedentary and terrestrial fauna such as reptiles and rare and listed threatened species.
- Outline measures to avoid or mitigate any potential impacts on these identified species, particularly mitigation measures that, in themselves, do not significantly increase disturbance.

The proponent responded that the project would not lead to a long-term decrease in an important population of the sedentary and terrestrial species, such as the listed threatened ornamental snake, for the following reasons:

- There was no evidence to indicate that an important population of this species existed within the project site.
- The best quality potential habitat for the ornamental snake was considered to be an area of gilgai in the center of the project site.
- Subsidence rehabilitation works associated with rehabilitation of subsidence cracks or minor remedial surface drainage works would have the potential to result in attrition of individual snakes through mechanical impacts. However, snakes that would be present in the work areas would be likely to move away in response to physical disturbance and vibration and, therefore, these impacts are improbable.
- Mining of the project's coal resources would occur over a period of approximately 25 years. The rate at which surface areas are subsided would be, therefore, slow. Any rehabilitation works required for surface subsidence effects would occur only intermittently and would be limited to relatively small, localised areas.

***Noise, vibration and lighting***

The EIS stated that noise, vibration and lighting emissions would not impact on fauna and any impact would be limited to the immediate vicinity of the infrastructure.

#### 4.16.3.3 Impacts on watercourses

***Subsidence***

The impacts of subsidence on watercourses, their floodplains and farm dams were described in Appendix F—Aquatic flora and fauna report, which draws on the findings of Appendix A—Subsidence report and Appendix I—Surface Water Report and was summarised in section 9.5.3 of the EIS. Overall, subsidence would not have significant impacts on the ecological values of the Blackwater Creek or any of the farm dams. Key findings were as follows:

- Although subsidence would result in the formation of shallow depressions within the bed of Blackwater Creek, these would fill with sediment within a few wet seasons. The project would not significantly impact on water velocity, erosion potential or morphology of the Blackwater Creek. Hence, no pre-emptive mitigation measures were warranted.
- Monitoring would be undertaken along Blackwater Creek, in accordance with the requirements of a subsidence management plan (EIS section 9.5) to avoid long term impacts.

- Cracking may occur within the bed and banks of Blackwater Creek located within the LOMS (EIS Figure 9-5). The cracks would be shallow, with no connection to underground workings, and any cracks in the bed of Blackwater Creek would fill quickly with sediment following subsequent flow events.
- A rehabilitation program for tension cracks would be implemented for the project to ensure that all cracks would be remediated (EIS section 9.5).
- Sub-surface cracking would not impact overlying creeks and the likelihood of hydraulic connectivity between surface water and the underground mine workings would be very low.
- Subsidence would result in localised alteration of surface drainage paths and would create remnant ponding areas on the floodplain. This subsidence ponding would be mitigated by the installation of minor remedial drainage earthworks to re-establish free drainage.
- Repair of subsidence cracks in the floodplain would be undertaken in accordance with the proponent's rehabilitation program, which has been designed to limit impacts on vegetation and prevent erosion and associated sedimentation.
- The potential impacts of subsidence on farm dams would include cracking of the earth embankment and changes in the lateral extent and depth of the pond area. Remedial actions would include minor civil earthworks. The management of any impacts on these dams would be determined in consultation with landowners.

EHP's submission on the EIS stated that the EIS had not adequately assessed the impacts on aquatic ecosystems due to increased sedimentation. For example, the EIS stated that a reduction in fish habitat would occur due to a predicted increase in sedimentation and that these fish rely on available habitat for reproduction. However, the EIS also stated that '*there are unlikely to be any significant changes to habitat values for fish*…' (Appendix F, p. 79) and '*…further sediment deposition in localised areas is not expected to result in a significant impact to aquatic ecology*' (s.9.4.5, p.161). EHP requested further clarification and evidence to support these claims, especially in regards to the effects of habitat loss (i.e. smothering of benthic taxa, egg burial, loss of primary productivity, loss of habitat for reproduction). EHP requested information on the potential impacts of sediment aggradation in terms of risks to populations at the catchment scale.

In the response to EIS submissions, the proponent provided clarification of the potential impacts of sediment on aquatic ecosystems. The proponent was adamant that sediment deposition in localised areas in the bed of the creek due to subsidence would not significantly impact on aquatic ecology, as the creek bed is naturally sandy with high sediment transport loads and low habitat diversity.

***Impacts on flow regimes***

Minor changes to the distribution and velocity of flows within the creek channels could impact aquatic ecology, especially along the subsided section of Blackwater Creek. However, the EIS concluded that the increases in peak velocity would not impact significantly on the aquatic ecology.

Aquatic fauna use a variety of structures for habitat including large and small woody debris, bed and banks, detritus, tree roots, boulders, undercut banks, and in stream, overhanging and trailing bank vegetation. It was stated in the EIS that a reduction in peak velocity could increase the amount of sediment deposition and may reduce the amount of habitat for aquatic fauna in the project site. The deposition of fine sediment could also decrease the roughness of the stream bed and decrease habitat diversity, and may result in existing pools being filled in. However, it was concluded in the EIS that given that benthic substrate in Blackwater Creek is primarily sand, which acts as a fine sediment and naturally decreases the roughness and habitat diversity in the stream bed, further sediment deposition in localised areas would not be expected to result in a significant impact to aquatic ecology.

***Impacts on water quality***

It was stated in the EIS that no significant changes to habitat values for fish and other aquatic biota within or downstream of the project site would occur due to discharges of mine-affected water from the site.

#### 4.16.3.4 Impacts on groundwater

It was concluded in the EIS there would be no impacts on groundwater levels in the alluvium or any of the creeks within the project site and on any biological values associated with groundwater.

### 4.16.4 Mitigation measures

The EIS stated that measures would be implemented to avoid impacts to vegetation and habitat loss, such as:

- The siting of the surface infrastructure for the project away from vegetation.
- Clearing in accordance with the proponent's permit to disturb process (restricting the area to be cleared to that required for the safe construction and operation of facilities).
- Work areas in the vicinity of HVR vegetation would be clearly delineated during construction to prevent

disturbance of HVR vegetation.
- Implementation of pre-clearing inspections.
- Particular care would be taken in relation to any work in or adjacent to the creeks within the project site.
- Erosion and sediment control works as part of an erosion and sediment control plan.
- Rehabilitation of riparian areas using native flora species.
- Implementation of a tension crack rehabilitation program to reduce impacts on flora and fauna.
- Implementation of a pest animal and weed management plan.
- Controlling grazing pressures in the crack rehabilitation areas.

The EIS further described a number of management plans and procedures that would be put in place to limit impacts on flora and fauna. These included:

- A **rehabilitation management plan** that would implement monitoring actions to assess the success of natural regeneration of disturbance from crack remediation within areas of natural vegetation. The monitoring would be undertaken on a regular basis to enable appropriate weed control actions to be determined and areas requiring weed control to be prioritised. If monitoring would indicate that natural regeneration is slow, additional measures such as seeding or planting of native species would be undertaken to ensure effective revegetation.
- A **pest animal and weed management plan** that would outline environmental management measures to prevent the transportation of pest plants, particularly *Parthenium*, off the property; prevent the introduction of additional pest species; and manage and reduce the area of occupancy of pest plants such as *Parthenium* on the site.
- A **species management program** that would monitor impacts on the breeding habitat of animals, in accordance with the requirements of the Nature Conservation (Wildlife Management) Regulation 2006 and that would outline actions to be taken to minimise impacts on animal breeding places. This program would be submitted to EHP for approval prior to the commencement of construction activities.
- A **subsidence management plan** that would be developed in accordance with the requirements of the EHP guideline (Watercourse Subsidence—Central Queensland Mining Industry [Draft Version 7]) and would include:
    - details of a survey describing the pre-subsidence condition
    - preventative works required to mitigate impacts
    - a monitoring and reporting plan that would detail the data required to demonstrate the stability and functionality of the watercourse over a suitable range of rainfall and flow events.
- An **erosion and sediment control plan** that would include management measures to reduce the potential for increased sediment load in Blackwater Creek, including construction activities undertaken in or in close proximity to the creeks.

In its submission FBA requested that if hollow-bearing trees were to be removed as part of the project activities, the proponent should supply a substitute for any hollows by installing natural hollows (salvaged from felled trees on the project site) and/or nest boxes in the nearest suitable vegetation. The proponent responded by amending the EIS and EM Plan to commit to the provision of suitable habitat features (in the form of natural hollows or nest boxes) if hollow bearing trees would be removed due to crack rehabilitation works.

DAFF's submission on the EIS identified that that EIS had omitted details on declared plant species not yet identified from within the project site, but that are present in the local government area. DAFF further requested a map that would show the location of these invasive plant species and a list of pest animal species (consistent with animal priorities species in the local government area). In the response to DAFF's submissions, the proponent reiterated its commitments to develop a pest animal and weed management plan for the project. This plan would be designed to prevent the transport of additional declared plant species not yet present in the project site into the project site.

### 4.16.5 Biodiversity offsets

The EIS concluded that the project would not significantly impact the HVR vegetation communities within the project site or any potentially occurring flora or fauna species. Therefore, no biodiversity offsets were proposed in the EIS documents. However, if any residual impacts to SSBV are identified (e.g. as part of longwall subsidence), then the proponent would be required to offset these impacts consistent with the latest versions of EHP's biodiversity offset strategy.

### 4.16.6 Conclusion and recommendations

Survey methods used to identify biodiversity values on the project site were described in the EIS. EHP determined that additional information on survey efforts and methods for a number of listed threatened species under the NC Act is required in an amended EM Plan (see EM Plan requirement 5). EHP also identified a number of deficiencies

in the survey efforts used to determine the presence of: a number of listed threatened species under the NC Act (i.e. Australian painted snipe and endangered black-throated finch (southern)); gilgae areas; and stygofauna. EHP requires the proponent to conduct additional surveys for these species and habitats as part of baseline studies for an ecological monitoring program prior to subsidence (EM Plan requirement 6).

**EM Plan requirement 5:** The proponent is required to provide the following information in an amended EM Plan:

1. Sufficient justification to demonstrate that ground-truthed REs varied from the HVR shown on the certified PMAV maps (i.e. an RE amendment report with photos, maps and justifications for each change).
2. Information on:

- the number of hours spent on the different survey techniques and the specific techniques conducted during each field trip to target terrestrial fauna species identified in EHP's submission on the EIS.
- the survey method used for star finch (eastern) including the locations where surveys for star finch (eastern) took place and their proximity to the project site and whether or not any of the surveys included avifauna.

The following existing biodiversity values were identified in the EIS as occurring on the project site:

- present or likely to occur listed threatened species
- a state and regionally significant corridor under the Queensland Government's Biodiversity Planning Assessment Mapping
- 73ha of mainly of concern HVR, including a remnant patch of HVR (mapped currently as endangered in the certified PMAV) in the center of the project site (east of the cemetery)
- over 1350ha of gilgais
- riparian vegetation with some remaining mature trees along Blackwater and Taurus creeks
- some remaining areas of good aquatic habitat
- an ephemeral pond – which according to EHP's review based historical and current imagery suggests an unmapped ephemeral palustrine wetland.

No significant impacts to ecological values were predicted in the EIS. However, EHP considers that the ecological habitats identified on the project site provide important refuge and corridor functions for remaining flora and fauna species including listed threatened species. Therefore, appropriate outcome based conditions have been included in the draft EA conditions in Appendix 3 to protect ecological values. This includes conditions requiring the proponent to ensure that the ecosystem functionality of the habitat for threatened listed species, state and regional corridors, riparian vegetation, high value regrowth, ephermal wetland and gilgae areas can be demonstrated to have returned to close to (or better) than pre development condition.

To meet the conditions outlined in Appendix 3 the proponent would need to develop and implement an ecological monitoring program to characterise the baseline ecological values and health, monitor any impacts of the project on these values and implement measures to mitigate impacts (if necessary) and enhance existing ecological values (EM Plan requirement 6). If any residual impacts to SSBV are identified, then the conditions in Appendix 3 would require the proponent to offset any impacts on SSBV consistent with the latest versions of EHP's biodiversity offset strategy.

**EM Plan requirement 6:** The proponent is required to commit in an amended EM Plan to develop and implement an outcomes based ecological monitoring program which characterises the baseline ecological values and health of the project site (prior to project impacts), monitors any impacts of the project on ecological values (e.g. as a result of indirect impacts such as subsidence, remedial clearing and the construction of tracks and ventilation holes) and includes measures to mitigate impacts (if deemed necessary) and enhance existing ecological values. The ecological monitoring program:

1. Must include surveys for values identified by EHP that were not adequately addressed in the EIS including:
- wet season aquatic surveys
- surveys for the Australian painted snipe (e.g. spotlighting searches) to meet the minimum recommended survey times identified in Magrath *et al*, 2010
- surveys of RE 11.3.25 and waterholes for the endangered black-throated finch (southern)
- surveys of gilgai habitat (especially during wet weather conditions) and associated listed threatened species.

2. Must commence prior to construction to allow adequate determination of baseline ecological values.
3. Should be conducted bi-annually to include both wet and dry season characteristics, with riparian health conducted at least annually throughout construction, operation and decommissioning.
4. Must address (but is not limited to) the following ecological values:
- listed threatened species (present on site or likely to occur on site)
- state and regionally significant corridors under the Queensland Government's Biodiversity Planning Assessment Mapping
- of concern HVR, including a remnant patch of HVR (mapped currently as endangered in the certified PMAV) in the center of the project site (east of the cemetery)
- riparian vegetation
- aquatic ecosystems
- gilgai areas
- an ephemeral pond (which according to EHP's historical and current imagery suggests an unmapped ephemeral palustrine wetland) and any ephemeral wetlands.

# 4.17 Transport

A summary of the impacts of the project on road traffic, rail, port and air transport was provided in section 19—Traffic and transport of the EIS. A more detailed road impact assessment (RIA) was presented in Appendix N—Road impact assessment of the EIS.

## 4.17.1 Road traffic

### 4.17.1.1 Methodology

The legislation, policies and guidelines relevant to identifying values, mitigating and managing impacts on road traffic were described in the EIS documents. TMR submission on the EIS advised Blackwater Coal that the road transport task of 50,000 tonnes per year (t/year) of ROM coal to the Cook Colliery may constitute a 'notifiable road use' (as defined in section 318EO of the MR Act) and may be subject to a road use direction. They requested the proponent consult with Planning Management Branch of the TMR in regard to this matter. In the Response to EIS submissions, the proponent clarified that it was not intending to haul more than 50,000t/year on a state controlled road and is therefore not proposing to conduct a notifiable road use.

A RIA was carried out for the project in accordance with the TMR's Guidelines for Assessment of Road Impacts of Development. The impacts assessed include those affecting the operation of external intersections, pavement loading and road safety. Traffic operation impacts were assessed up to the ten-year design horizon following commencement of mining operations.

Existing road condition data was sourced from TMR and the CHRC. This included data relating to traffic volumes, crashes and school bus routes, as well as information pertaining to future planning for the road network. Data was obtained for the Capricorn Highway, Blackwater-Rolleston Road and Mackenzie Street as these were the roads deemed to carry the majority of project traffic.

A traffic growth rate of 3.5% compound per annum was adopted for Blackwater-Rolleston Road, the Capricorn Highway and Mackenzie Street. The adopted traffic growth rates considered the historic rates provided by TMR and cumulative traffic impacts from the future development of the nearby Washpool Coal Mine Project. TMR's submission on the EIS requested the proponent justify the use of a 3.5% growth rate given that historic rates are significantly larger. TMR advised that a 5% compound growth used by similar projects within the region may be more appropriate. It requested the proponent discuss and agree appropriate growth rates with TMR and include these in a revised RIA submitted with an amended EIS.

In the response to EIS submissions, the proponent provided additional justification for the adoption of a 3.5% compound growth rate using historic data and TMR forecast increases for the Capricorn Highway and Blackwater-Rolleston Road. In their response to the amended EIS, TMR advised that the traffic growth rates to be developed for the project would need to be negotiated and agreed on with TMR before finalising the RIA. Traffic estimates in the RIA would also need to be revised using the agreed growth rates and potential impacts and mitigation strategies reassessed (see conditions recommended by TMR in Appendix 4 of this assessment report).

The initial construction phase was used as the basis for assessment of worst-case construction traffic. Vehicle movements generated during the construction phases were anticipated to be predominately associated with the delivery of construction equipment, materials and consumables, the removal of wastes and workforce transportation. Vehicle movements generated during the operations phase were anticipated to be predominately associated with the delivery of equipment and consumables, removal of wastes and workforce transportation.

A detailed traffic and transport impact assessment which considered the impacts of traffic generated by the project on public roads and intersections was completed. The traffic study provided conservative worst-case project traffic volumes and estimates of the increase in total traffic volumes for affected public roads.

In regards to road safety, traffic accident data for the affected road network was obtained from TMR for the period from 1 January 2005 to 30 September 2012 to assess any trends that could potentially be exacerbated by the increase in traffic associated with the project.

#### 4.17.1.2 Existing environment

The project site is connected to Rockhampton via Blackwater-Rolleston Road which traverses the project site and the Capricorn Highway.

Tantallon and Taurus Roads traverse the east of the project site and are owned by the CHRC. Tantallon Road provides access to the Blackwater Lawn Cemetery and to a derelict homestead owned by the proponent. There is a bridge over Blackwater Creek along Tantallon Road. A section of Tantallon Road, beyond the public access to the cemetery, may be impacted by subsidence. However, as this section of the road only provides access to the proponent's derelict residence, it was not discussed further in the EIS. A small section of Taurus Road traverses the south-west of the project site. Taurus Road provides access to grazing land within the MLA. Taurus Road would not be impacted by the project and was not discussed further in the EIS.

#### 4.17.1.3 Impacts

***Subsidence impacts***

The project proposes to subside a number of state and local roads. The following impacts on road infrastructure were predicted as a result of longwall mining in both the Aries and Pollux Seams:

- Approximately 1.9km of the state owned **Blackwater-Rolleston Road** is predicted to be within the LOMs. This includes: approximately 0.6km of the road in the north of the MLA where subsidence of 0.02–2m is predicted and; approximately 1.3km of the road in the south of the MLA where subsidence of 0.02–1m is predicted.
- A small section (<0.2km) of **Tantallon Road** owned by CHRC is within the predicted LOMS, with subsidence of ~0.02–0.05m predicted.

A number of submission's raised concerns about the potential feasibility and impacts of the proponent proposal to manage subsidence of Blackwater-Rolleston Road in-situ. BMA's submission on the EIS raised safety concerns about subsiding Blackwater-Rolleston (Ardurad) Road. TMR's submission on the EIS advised that insufficient information was provided in the EIS for it to assess the impacts of subsidence from longwall mining on Blackwater-Rolleston Road. Further information would be required for TMR to determine if it would accept the project without re-alignment of the road reserve and the physical relocation of the existing road infrastructure. Similarly, EHP's submission on the EIS stated that insufficient justification had been provided on the feasibility of the proposal to management subsidence of Blackwater-Rolleston Road in-situ

The proponent provided justification, including examples from other mines, on the feasibility of managing subsidence of road infrastructure in-situ in Appendix B of the response to EIS submissions. It advised that while bord and pillar mining under the road and rail is technically feasible, it would significantly impact the economic feasibility of the project. The proponent advised that it had met with TMR and discussed the timing and nature of subsidence impacts on the road, the technical aspects of the subsidence management and examples of successful in-situ management of subsidence of roads. This issue is discussed further in section 4.17.1.4 of this assessment report.

***Access to the project site***

TMR's submission on the EIS noted the proponent's proposal to construct three new accesses to the mine and accommodation village on Blackwater-Rolleston Road. It requested the proponent investigate the option of

accessing the accommodation village via Turpentine and Jarrah streets which would improve safety by minimising the number of accesses along the state controlled road. In the response to EIS submissions, the proponent advised that it had considered the option to access the temporary construction village via Turpentine and Jarrah streets but determined that it was not the preferred option for a number of reasons which were listed in the response to EIS submissions.

BMA's submission on the EIS advised the proponent that it would require access to Tantallon Road to access its water monitoring point on Blackwater Creek. In the response to EIS submissions, the proponent confirmed that it intended to maintain public access along Tantallon Road by managing subsidence in-situ. Only minimal subsidence of less than 0.1m (EIS Figure 6-2) was predicted for Tantallon Road which the proponent advised could be readily repaired by grading following any subsidence.

***Impacts on state-controlled roads***

A detailed analysis of the project's potential impact on a number of intersections (Capricorn Highway/Blackwater-Rolleston Road intersection; Capricorn Highway/Mackenzie Street intersection; Blackwater-Rolleston Road/NSF access intersection; Blackwater-Rolleston Road/construction accommodation village access intersection; Blackwater-Rolleston Road/MIA access intersection) was provided in the EIS. It was concluded that the traffic generated by the project would not adversely impact the performance of the existing intersections, and that the proposed intersections would meet industry standard performance thresholds.

Significance assessment was undertaken to identify if the additional heavy vehicle movements generated during the project's construction and operations phases would significantly impact on the state-controlled road network. The assessment concluded that the project would result in significant impacts for: one section of the Capricorn Highway; three sections of Blackwater-Rolleston Road during construction and; two sections of Blackwater-Rolleston Road during operations. Therefore, a pavement impact assessment was conducted on these impacted intersections.

In accordance with TMR's guidelines, the pavement impact assessment considered both the pavement rehabilitation impacts and the pavement maintenance impacts. The pavement impact assessment concluded the following:

- The project would significantly impact pavement rehabilitation for one section of Blackwater-Rolleston Road (from the intersection at Jarrah Street to the intersection at the NSF access road). The proponent calculated a one-off contribution in the EIS to be provided to TMR. The pavement maintenance impacts were calculated based on the percentage increase of equivalent standard axles on each road segment for the life of the project. Both the Capricorn Highway and Blackwater-Rolleston Road would require a maintenance contribution from the proponent for project impacts.
- The project would impact on the timing of pavement rehabilitation for a section of Blackwater-Rolleston Road and would impact the timing of pavement maintenance for both Blackwater-Rolleston Road and the Capricorn Highway.

TMR submission on the EIS, disagreed with the compound growth rated used in the RIA (see section 4.17.1.1 of this assessment report). The proponent did not amend the growth rate in the amended EIS. TMR reasserted in its response to the amended EIS, that traffic growth rates would need to be negotiated and agreed on with TMR. It requested the proponent provide a revised RIA which includes growth rates agreed on by both TMR and the proponent and includes further detailed analysis of the impacts of the proposed development and the increased traffic that results from it on the Capricorn Highway and its intersection with Blackwater-Rolleston Road. In particular, the interaction of road traffic and the crossing of the railway line would require further investigation in relation to safety and efficiency.

***Road safety and public infrastructure***

An assessment of the crash data for the road network indicated no obvious trends that could potentially be exacerbated by the projected increase in traffic associated with the project.

In regards to public infrastructure, it was concluded in the EIS that the project would be unlikely to significantly impact on:

- The two school bus routes which currently travel via the Capricorn Highway and into Blackwater Township as school start and end times typically do not correspond with the start and end of mine shifts and the goods delivered to the project site were anticipated to be spread throughout the day.
- The daily bus route which services various towns between Longreach and Rockhampton, including Blackwater.
- Alternative transport infrastructure, such as pedestrian and cycling pathways.

DETE's submission on the EIS stated that it was satisfied that the school start and end times would not typically correspond with the start and end of mine shifts.

#### 4.17.1.4 Mitigation measures

***Subsidence of road infrastructure***

The proponent proposed in the EIS to manage potential subsidence of Tantallon Road in-situ. This would likely involve minor regrading to repair any subsidence cracks in the road's surface. In accordance with the MR Act, the proponent is required to have an agreement with the CHRC as owner of Tantallon Road, prior to being able to conduct any mining that causes subsidence of the road. Further discussions would be undertaken with the CHRC in regards to the management of Tantallon Road.

Subsidence of Blackwater-Rolleston Road was also proposed to be managed in-situ by the proponent subject to approval by TMR as required under the MR Act and CMSH Act. Should detailed investigations undertaken in consultation with TMR identify that managing subsidence in-situ was not feasible, realignment of Blackwater-Rolleston Road may be required. A conceptual realignment of Blackwater-Rolleston Road and the South Blackwater Mine Railway within the project site along the western boundary (Figure 1) which is beyond the predicted LOMS was described in the EIS. Mitigation or monitoring measures to be used to manage subsidence of road infrastructure in-situ were not described in the EIS.

TMR and EHP's submission's requested the proponent outline mitigation and management measures to address impacts of subsidence on Blackwater-Rolleston Road. TMR's submission on the EIS, raised concerns that measures for managing surface cracking and buckling described in the EIS (which largely involved ripping or ploughing the cracks and some form of revegetation and monitoring), would not be appropriate for treatment of cracking or buckling within the road reserve or the road infrastructure itself and hence such measures would not be supported by TMR. It also requested the proponent demonstrate how the drainage under Blackwater-Rolleston Road would be impacted, upgraded or managed to allow for the overland flow paths which would be altered by subsidence. QTT recommended the appropriate authorities require a security deposit or similar assurance to ensure compliance with the realignment of the existing road infrastructure can be undertaken if subsidence in-situ was not manageable.

In the response to EIS submissions, the proponent clarified that the proposed rehabilitation measures for subsidence cracks and buckling presented in the EIS were not intended nor proposed to be used to repair infrastructure within the road reserve. It provided examples of mitigation measures used to successfully manage subsidence in-situ on a state controlled road previously (i.e. Middlemount-Dysart Road). These measures had been developed in consultation with TMR and implemented with its approval. It asserted that the standard and level of traffic on Blackwater-Rolleston Road is similar to the road example provided and the extent and nature of road subsidence is also likely to be similar between the two projects. The proponent concluded that it was therefore reasonable to expect that a similar approach for this project would be acceptable to TMR.

TMR's response to the amended EIS advised that the proponent and TMR had not yet agreed on the likely impacts of under-mining of the Blackwater-Rolleston Road including more how impacts would be mitigated. However, it confirmed that it was continuing to liaise with the proponent about the Compensation Agreement required under the provisions of the MR Act and subsequent Infrastructure Agreement to document how road infrastructure impacts such as repair and costs of subsidence of state-controlled road would be managed. As part of managing subsidence, TMR advised that stormwater drainage under Blackwater-Rolleston Road and all ponding issues in the state-controlled road reserve must also be adequately managed (see Appendix 4 for TMR conditions recommended by TMR).

***Project related road impacts***

The following mitigation measures were proposed in the EIS to mitigate and offset the impacts of the project on road infrastructure and safety:

- A one-off contribution from the proponent to TMR was proposed in the EIS in accordance with TMR guidelines to offset the impact of the project on pavement rehabilitation and pavement maintenance.
- In relation to oversized vehicles, the proponent committed to obtain all relevant permits from the Queensland Police Service (QPS) in accordance with the requirements of the Transport Operations (Road Use Management – Mass, Dimensions and Loading) Regulation 2005 and the *Transport Operations (Road Use Management) Act 1995*. It also committed to provide a schedule to the QPS regarding the number and size of these loads and their timing, once detailed construction planning had commenced.

BMA's submission on the EIS requested the proponent outline specific impact mitigation measures to address increased traffic on Blackwater-Rolleston (Ardurad) Road during both construction and operation phases and as well as additional congestion at the Ardurad Road Level Crossing. In its response to EIS submissions, the proponent argued that the road impact assessment report in the EIS (Appendix N) had appropriately considered these issues including peak construction and operations traffic where relevant and included proposed mitigation measures.

TMR advised in it comments on the EIS and amended EIS that potential impacts and mitigation strategies would need to be reassessed in light of an amended RIA which addresses the outstanding issue raised by TMR (see section 4.17.1.3 of this assessment report). It advised that the proponents may be required to upgrade or contribute to intersection upgrades where the RIA clearly indicates the intersections would not be operating satisfactorily (see TMR recommended conditions in Appendix 4 of this assessment report). If TMR have no planned upgrades, the proponent would need to demonstrate how it would manage its impacts on the road network. Additionally, the design and construction of all new or upgraded accesses and intersections would need to be in accordance with TMR warrants, standards and requirements.

***Road safety and public transport***

To minimise impacts on road safety, a bus service to transport personnel to and from the on-site construction accommodation village and the off-site operations accommodation village at the start/end of the block shift periods was proposed in the EIS. The provision of a bus service would result in a reduction in the number of private vehicle trips between the project site and Blackwater, and would therefore improve road safety, as it would result in fewer personnel potentially driving fatigued on the roads.

CHRC's submission on the EIS suggested the proponent investigate the possibility of a bus run to Rockhampton airport (in addition to the possible bus run to and from Emerald already proposed in the EIS). This may mitigate potential safety impacts as a result of increased pressure on the intersection of Capricorn Highway and Ardurad Road intersection. It also requested the proponent consider public transport when planning for accommodation types, especially the project's accommodation village given that there is no public transport within or from Blackwater, and no taxi service within the town. In the response to EIS submissions, the proponent reiterated its commitment to provide bus transport between the project site and the accommodations village for its workforce. Provision of a bus from Blackwater would be considered depending on the number of workers who choose to reside in Blackwater Township.

DCS's submission on the EIS requested further information on the fatigue management policy proposed in the EIS and recommended that a driver fatigue management plan be implemented to assist in the education and management of workers driving whilst fatigued to their home bases after completion off their rostered shifts. In the response to EIS submissions, the proponent described its existing Fitness for Work – Fatigue Management Policy (currently implemented at the Cook Colliery) which would be applied to the project and all employees. In addition, the proponent confirmed that a fatigue management plan would be developed as part of health safety and environment (HSE) activities during the operational phase of the project.

## 4.17.2 Rail

### 4.17.2.1 Methodology

An assessment of the project's road traffic on the performance of the Ardurad Road Level Crossing was conducted by analysing the ALCAM assessment data from TMR and the project's impact on the current Risk and VT Exposure Scores.

### 4.17.2.2 Impacts

Coal from the project is proposed to be transported on the Blackwater Railway (owned by Aurizon Holdings Limited (Aurizon) (formerly QR National)) to the Wiggins Island Coal Export Terminal located in the Port of Gladstone. At its peak production capacity, the project would be serviced by approximately two coal trains per day. The project would require the construction of a rail loop and spur connecting to the existing South Blackwater Mine Railway line to transport coal to the port. The rail loop and train loading facilities would be constructed on the project site adjacent to the CHPP. The rail loop and spur would be constructed over an area that would not be mined, and therefore would not be impacted by subsidence.

The project proposes to subside the South Blackwater Mine Railway which traverses the project site starting at Blackwater and runs south from the Blackwater Railway to the Cook Colliery. The following impacts were predicted in the EIS:

- ~ 0.6km of the railway in the north of the MLA is within the predicted LOMS, with subsidence of 02–2m predicted
- ~ 1.2km of the railway in the south of the MLA is within the predicted LOMS, with subsidence of 0.02–0.06m predicted.

The proposed rail loop and spur would be constructed on the MLA over an area that would not be mined (Figure 1), and therefore would not be impacted by subsidence.

Project traffic would cross the Ardurad Road Level Crossing in order to reach the Capricorn Highway and Blackwater Township. An assessment of the project's road traffic on the performance of the Ardurad Road Level Crossing concluded that project traffic would not have a significant impact on the Ardurad Road Level Crossing. Project rail traffic would travel east from Blackwater and would not impact the Ardurad Road Level Crossing.

#### 4.17.2.3 Mitigation measure

The proponent proposed in the EIS to manage potential subsidence along South Blackwater Mine Railway in-situ (subject to approval by TMR and Aurizon). Should detailed investigations undertaken in consultation with TMR and Aurizon identify that managing subsidence in-situ is not feasible, realignment of the South Blackwater Mine Railway may be required. A conceptual realignment of the South Blackwater Mine Railway to the western site boundary was identified in the EIS. The alignment, while classified in the EIS as 'conceptual', identified a potential alternative alignment for the South Blackwater Mine Railway. This demonstrated that there are potential alignments that could be implemented should managing subsidence in-situ not be feasible. It was stated in the EIS that alternative alignment options to that outlined in the EIS may be identified during detailed design.

QTT's submission on the EIS recommended that the appropriate authorities (i.e. TMR and Aurizon) assess subsidence risks to railway infrastructure and if they consider this a genuine risk, consider requiring a security deposit or similar assurance in relation to enforcing compliance with the proponents EIS statement that (as a worst case scenario) the existing rail and road infrastructure would be realigned. In the response to EIS submissions, the proponent advised that subsidence of sections of the Blackwater Mine Railway and the Blackwater-Rolleston Road would be managed through compensation agreements between the infrastructure owners and the proponent. Mining activities cannot occur in the project site until a compensation agreement has been agreed by both parties.

### 4.17.3 Port

Coal from the project is proposed to be transported by rail to the Wiggins Island Coal Export Terminal located in the Port of Gladstone. Stage one is currently being constructed and would have a capacity of 27Mtpa and is expected to be completed by September 2014. This capacity would increase to over 80Mtpa once the terminal is fully developed. Stage one is privately owned by a consortium of eight coal companies, including Caledon Coal. The terminal would be operated by the Gladstone Ports Corporation, once commissioned.

It was stated in the EIS that the Wiggins Island Coal Export Terminal would have adequate rail, storage and shipping capacity for the 9Mtpa of product coal from the project. Environmental management of the port is the responsibility of the owners and operators of the terminal.

### 4.17.4 Air

The project would have a fly-in-fly-out component of its workforce. The nearest airport to Blackwater is the Emerald Airport (one hour drive). The Rockhampton Airport could also be used to access the project site as it is approximately a two hour drive to Blackwater.

The project would generate additional demands for regional airline services out of Rockhampton and Emerald. It was concluded in the EIS that this additional demand would be unlikely to have any detectable impact on flight schedules and trip costs due to the small size of the fly-in-fly-out component of the non-resident project workforce.

### 4.17.5 Conclusions and recommendations

The EIS documents adequately described the existing road, rail, port and air infrastructure associated with the project site and surrounds. The project's impacts on port and air infrastructure were adequately assessed and described.

On-site impacts of the project on road and rail infrastructure as a result of subsidence from longwall mining, was predicted in the EIS. Approximately 1.8km of South Blackwater Mine Railway, 1.9km of state-controlled Blackwater-Rolleston Road and <0.2km of Tantallon Road owned by CHRC was predicted to be within the maximum area of subsidence (LOM) all of which the proponent proposed to manage in-situ. No site-specific mitigation and monitoring measures were described in the EIS to address how the proponent intends to manage impacts of subsidence on road and rail infrastructure. However, EHP is satisfied that justification was provided by the proponent to comply with the TOR and demonstrate that:

- mitigation and monitoring measures are available (and have been used in other mines) that are conducive to the proponent's preferred option to manage the impacts of subsidence on infrastructure in-situ
- that the proponent had consulted with the relevant owners/lease owners of infrastructure regarding these impacts and proposed management options

- that if in-situ management of subsidence is not deemed possible or agreed on by relevant parties, then alternative options had been appropriately explored in the EIS and that worst cause potential impacts of these options had been assessed.

In accordance with the MR Act and the CMSH Act, the proponent would be required to sign agreements with relevant infrastructure owners prior to conducting any mining that would cause subsidence of road and rail infrastructure.

On and off-site impacts of the project on state-controlled road network as a result additional heavy vehicle movements likely to be generated during the project's construction and operations phases was assessed in a RIA. The proponent proposed a one-off contribution to TMR (calculated in accordance with TMR guidelines) to offset the impact of the project on pavement rehabilitation and pavement maintenance. TMR advised that a number of issues in the RIA are still to be agreed upon between the proponent and TMR (see section 4.17.1.3 of this assessment report) and the proponent would need to revise its RIA once agreement is achieved. TMR also advised that impacts and mitigation strategies would also need to be reassessed by the proponent in light of the revised RIA. TMR recommended a number of conditions to address outstanding issues relating to the road impact assessment and management of state-controlled road and rail infrastructure (see Appendix 4).

**General recommendation 5:** The proponent address and implement all conditions and requirements outlined by TMR in Appendix 4 of this assessment report.

## 4.18 Noise and vibration

A summary of the acoustic environmental values within the project area and an assessment of the potential for these values to be affected by direct and indirect impacts associated with the project was provided in section 15—Noise and vibration of the EIS. Detailed information on the assessment of noise and vibration impacts was included in Appendix L—Noise report.

### 4.18.1 Methodology

Legislation, policies and guidelines relevant for identifying values, mitigating and managing noise and vibration impacts on environmental values were adequately described in the EIS.

The noise and vibration impact assessment involved identification of the baseline noise environment, modelling of potential noise sources, and assessment of potential noise impacts associated with the project. Modelling of noise levels expected to be produced by the project was calculated using RTA Technology's Environmental Noise Model software. Noise levels that would be produced by equipment operating as part of the project were determined from noise measurements taken at other operating mines.

The project's noise model was modified to calculate $LA_{eq}$[9] noise levels for the worst case sleep disturbance noise sources close to the sensitive receptors. Project noise generated from the MIA was excluded due to its significant distance from any of the sensitive receptors.

### 4.18.2 Existing environment

Seven sensitive noise receptors were identified in proximity to the project site (listed in EIS Table 15-1 and shown in EIS Figure 15-1). The receptors were selected to be representative of: the nearest suburban residences in the residential area of Blackwater (north of the Capricorn Highway); isolated rural residences; the nearest school; and the nearest commercial and industrial facilities (including caretaker residences) in the industrial area of Blackwater.

Three additional residences were identified in the EIS in the vicinity of the project, but were not considered sensitive receptors. These were:

- One residence located within the north of the project site. This residence is owned by BHP Billiton Mitsubishi Alliance (BMA) and it was proposed in the EIS that any impacts from the project would be managed via a land access agreement between the proponent and BMA in accordance with the MR Act.
- A derelict residence located within the south-east of the project site. This residence is owned by the proponent and would remain unoccupied as it is currently unsuitable for use as a dwelling.

[9] $LA_{eq}$ is the equivalent or energy-averaged, continuous A-weighted sound pressure level.

- A third residence, known as Mountain View, is located south of the project site and is owned by BMA. Any impact from the project to this residence was proposed to be managed via an agreement between BMA and the proponent.

The existing acoustic environment was described in the EIS using data from environmental noise monitoring at three receptor locations. Measured noise levels proposed to be adopted for the project (which form the basis of the noise criteria) were summarised in EIS Table 15-2. EHP's submission on the EIS, noted that very high background noise levels were recorded from the three receptor locations where noise was measured, particularly at night time. The high night time noise level measurements in relation to the predicted noise levels from the project were not discussed in the EIS. EHP's submission requested more information on the noise environment associated with existing industrial and residential activities adjoining the project site and the potential noise impact (if any) of the project—focussing on the potential for the project to create noise that would result in sleep disturbance. It also suggested that it would be in the proponent's best interest to undertaken a more comprehensive assessment of background noise levels prior to project commencement to assist in responding to any future noise complaints. In the response the EIS submissions, the proponent provided a detailed justification of the background noise planning levels adopted for the project based on monitoring of the three receptor locations which were consistent with the recommended outdoor background noise planning levels for various receiver areas in EHP's Planning for Noise Control Guideline. The proponent asserted that additional background noise monitoring and discussion were not warranted.

The regulatory requirements relevant to the project were described in the EIS. The planning noise levels to be adopted for the project at all sensitive receptors were outlined in Table 15-2 of the EIS. EHP's submission noted that the EIS had incorrectly referenced the receptor area category as 'residential' for monitoring location M1 and the resulting adopted noise level criteria in Table 5, EIS Appendix L was incorrect. It requested the proponent update the reference in according with EHP's Planning for Noise Control Guideline to reflect a dominant landuse of rural residential with a school for monitoring location M1. The proponent justified classifying monitoring location M1 located within the Blackwater residential area as 'residential' in the response to EIS submissions and deemed that no changes to the EIS addendum were warranted.

In regards to sleep disturbance, EHP's submission on the EIS, requested the proponent remove reference to windows 'partly closed' and 'fully closed' and only use the 'wide open' for the corresponding outdoor lifestyle in Queensland. In the response to EIS submissions, the proponent argued that it was acceptable to present sleep disturbance as 'partly closed' in the context that was provided in the EIS and proposed no changes to the EIS.

## 4.18.3 Impacts

### 4.18.3.1 Noise criteria

The EIS described and justified the specific noise level criteria to be adopted for:

- each sensitive receptor (EIS Table15-2)
- sleep disturbance (47 $LA_{max}$[10] for windows wide open; 52 $LA_{max}$ assuming windows partly closes and 62 $LA_{max}$ for windows fully closed)
- road traffic noise (63 $LA_{10,18hr}$ between 6–12am from a public road and 68 $LA_{10,\ 18hr}$ for state controlled roads such as Blackwater-Rolleston Road)
- rail traffic noise (65 $LA_{eq,24hr}$ and a maximum level of 87 $LA_{max}$)
- low frequency noise (50 decibel (linear) (dBL)) for frequencies up to 200 hertz (Hz) which would be approximately equal to 60dBL outside a dwelling).

### 4.18.3.2 Construction noise

The earthmoving phase for each construction phase (described in section 2.3 of this assessment report) would typically produce the highest sound power level and was therefore considered in the noise assessment. Appendix L—Noise report of the EIS described the equipment fleet expected to be required for construction of the mine surface facilities. Assuming all machines operate continuously at full power, a total construction sound power level of 128 decibel (A-weighted) (dBA) was predicted.

[10] $L_{Amax}$ is the equivalent or energy-averaged, A-weighted maximum sound pressure level.

It was concluded in the EIS, that the construction of the MIA was expected to produce acceptable noise levels at any time of the day or night, given the distance of approximately 4.5km from the MIA to the nearest residential receptor. Table 15-6 of the EIS described the predicted noise levels from construction activities in the north of the project site (i.e. NSF and construction accommodation camp) and from the potential construction of the rail/road diversion which would occur simultaneously with project operations.

Table 15-6 of the EIS demonstrated that construction noise levels were predicted to be below the planning noise levels at all sensitive residential receptors.

#### 4.18.3.3 Noise impacts

The predicted noise levels at each sensitive receptor, along with the intrusive noise criteria and planning noise levels were summarised in Table 15-4 of the EIS. It was concluded in the EIS that the predicted noise levels would meet relevant noise criteria at all noise sensitive receptors, except at the cemetery and Mountain View residence as follows:

- **Cemetery (R4)—**Noise levels in the centre of the cemetery were predicted to be 4dBA above planning noise levels for passive recreation areas. Visitors to the cemetery are currently exposed to noise from traffic on the adjacent Blackwater-Rolleston Road and trains on the adjacent South Blackwater Mine Railway. Additional project related noise heard at the cemetery would be almost entirely generated by the overland conveyor located approximately 600m to the west of the cemetery. Noise from the project would therefore only be audible as a constant background hum rather than a closer, intrusive source. It was concluded in the EIS that due to the relatively short duration of a typical cemetery visit, the current noise from the adjacent road and rail and the conservatism in the cemetery noise criteria adopted for this assessment, visitors to the cemetery would not be expected to be significantly impacted by noise from the project.
- **Mountain View residence:** Predicted noise levels at the Mountain View residence would likely to be compliant with the day and evening criteria. Noise levels at night are likely to exceed the noise criteria; however this exceedance would be mitigated via an agreement between the proponent and the landowner (mining company BMA). Therefore, no further mitigation measures were proposed in the EIS for the Mountain View residence.

BMA's submission on the EIS raised concerns about the project's noise impacts on Blackwater Township and lack of recognition of the Primary School in proximity to the mine's surface facilities. The proponent confirmed in the response to EIS submissions that the primary school was considered as receptor R7 and that noise levels were predicted to be within the criteria at the school. DETE's submission on the EIS, advised that it was satisfied with the consideration of noise and its effect on the Blackwater State School (Way Street Primary School) being within statutory guidelines.

BMA's submission on the EIS raised concerns about the project's noise impacts on an accommodation village to the west of the site which was approved in June 2013. In the response to EIS submissions, the proponent advised that the development approval for the BMA accommodation village was not granted at the time the EIS was lodged. Diagrams summarising the project's predicted noise impacts in relation to the proposed BMA accommodation village were provided in the response to EIS submissions (Figures BMA 1-10, Appendix E). The proponent concluded that noise levels were predicted to be within all relevant criteria at the proposed accommodation village location. As the affected land is owned by BMA, the proponent would need to reach an agreement with BMA in relation to this land prior to the grant of the mining lease. The proponent would conduct further consultation with BMA in the future in relation to a land access agreement for the mining lease. EHP assessed the additional information provided in the response to EIS submissions and was satisfied that the predicted noise levels were within relevant criteria.

#### 4.18.3.4 Impacts on sleep disturbance

Potential noise sources that would be capable of producing a short sharp noise identified in the EIS included vehicle reverse alarms, occasional material handling impacts within the mine surface facilities and compressed air operated starter motors on mining vehicles. The maximum predicted noise level at any of the residential sensitive receptors was 47 $LA_{max}$ which complied with the sleep disturbance criteria nominated in the EIS.

#### 4.18.3.5 Road traffic

Worst case construction traffic noise levels would be generated by up to 12 truck and 30 car movements per hour on Blackwater-Rolleston Road north of the project site and the Capricorn Highway. There would be up to 16 bus trips between the on-site construction accommodation village and the NSF and MIA, however as the buses would not pass close to any road receptors they have not been included in the assessment. Worst case operational traffic noise levels would be generated by up to 4 truck, 10 bus and 40 car movements per hour on Blackwater-Rolleston Road north of the project site and the Capricorn Highway.

Road traffic noise levels were calculated based on the Calculation of Road Traffic Noise method, assuming the adopted hourly traffic flows occur in all hours of the day. The predicted received noise level contributions from

project related traffic along Blackwater-Rolleston Road and the Capricorn Highway was presented in EIS Table 15-5. Calculated traffic noise levels from project related traffic was estimated to be more than 5dBA below relevant traffic noise criteria at sensitive receptors along the Capricorn Highway and Blackwater-Rolleston Road and were therefore predicted to be below the criteria at all residential receptors.

#### 4.18.3.6 Rail traffic

Noise levels from the operation of the project's trains on both the South Blackwater Mine and Blackwater Railway lines were calculated. It was estimated that train movements associated with the project on the:

- South Blackwater Mine Railway line would produce a noise level of 47$LA_{eq,24hr}$ during an average day and 51$LA_{eq,24hr}$ from both the project and existing trains at a nominal distance of 50m from the track, with a maximum passing noise level of 78 $LA_{max}$.
- Blackwater Railway line would produce a noise level of 57 $LA_{eq,24hr}$ during an average day and 58$LA_{eq,24hr}$ from both the project and existing trains at a nominal distance of 50m from the track, with a maximum passing noise level of 78 $LA_{max}$.

Along both railway lines, predicted noise levels were well below the 65 $LA_{eq,24hr}$ and 87 $LA_{max}$ criteria at a distance of 50m from the railway line.

#### 4.18.3.7 Cumulative impacts

Sensitive receptors for the project would be potentially exposed to cumulative noise impacts from the following additional significant industrial developments:

- Blackwater Mine—an operating open cut mine with the open cut pit located approximately 4km west of the project site
- Cook Colliery—an operating underground mine with the CHPP located approximately 6km south of the project site.

It was concluded in the EIS that existing noise from these mines is insignificant at all assessed receptors based on the attended background noise monitoring undertaken for the project and the distance of the sensitive receptors to the mines. Cumulative noise impacts are therefore unlikely to occur and a detailed assessment of cumulative noise in the EIS was not warranted.

### 4.18.4 Mitigation measures and monitoring

To minimise any potential noise and vibration impacts of the project on residential amenity, the proponent proposed in the EIS to locate surface facilities with potentially elevated noise levels (including the CHPP, rail loop and train loading facilities and CHPP workshop) approximately 4km south of the Blackwater Industrial Area and approximately 5km south of the Blackwater Residential Area.

No further mitigation measures were proposed in the EIS as it was argued that the noise impact assessment for the project predicted compliance with the noise criteria at all residential receptors. Similarly, no noise mitigation measures were proposed for the cemetery despite the EIS predicting exceedance of the planning noise levels for passive recreation areas at the cemetery. It was argued in the EIS that the predicted noise levels at the cemetery were not likely to adversely impact visitors to the Blackwater Lawn Cemetery.

The proponent committed to develop a complaints handling procedure which would include investigation of any noise complaints and monitoring, if necessary. If deemed to be necessary by the proponent, additional noise control measures would be applied to the project to address any noise compliance issues.

CHRC submission on the EIS, recommended that the proponent consider a long term noise monitoring program to compare baseline data with actual construction and operational noise levels. This is because the project would be much closer to the town of Blackwater than other the existing mines and it is likely that the perceived impacts, particularly of equipment such as mine ventilation fans may be higher. Additionally, the engineering design of the buildings and other infrastructure should include best practice sound attenuation elements wherever practicable, as described in EIS section 15.5. In the response to EIS submissions, the proponent confirmed that ventilation fans were considered in the noise assessment and provided no commitment to monitor long term noise from the project unless noise complaints are received.

### 4.18.5 Conclusions and recommendations

The EIS documents adequately describe the exiting noise environment of the project, the likely impacts of the project and indicate that noise levels within statutory and world health organisation recommended levels can be achieved.

Based on the environmental protection commitments in the EIS, appropriate conditions for noise based on EHP's Model Mining Conditions Guidelines (EHP, 2012) have been included in Appendix 3.

## 4.19 Economics

A description of the existing economic environment and the economic impacts of the project was provided in section 15—Noise and vibration of the EIS.

### 4.19.1 Methodology

The economic assessment quantified the potential positive and negative economic impacts associated with the construction and operation of the project. The economic impacts of the project were estimated using input-output modelling built from national economic data published by the Australian Bureau of Statistics. Models for the national economy were scaled to state and regional level models using employment data or other relevant indicators.

The economic impacts of the construction and operations phases of the project were examined separately. For both the construction and operations phases, the economic impacts were identified for the:

- local study area—defined as the Central Highlands local government areas (LGA) including the towns of Blackwater and Emerald
- regional study area—defined as the Central Queensland Region incorporating the Central Highlands, Gladstone, Banana, Woorabinda and Rockhampton LGA
- State of Queensland.

### 4.19.2 Existing environment

The existing regional and local economic environment was described in the EIS. In summary, the Central Queensland Region had a gross regional product of $14 billion and an annual growth rate of 12.3% in 2005–06. The Central Queensland Region and Mackay, Isaac and Whitsunday Region were the only regions in Queensland to increase their share of gross state product over the five years to 2005–06, largely driven by developments in the mining industry.

The economy of the Central Highlands LGA is dominated by the mining sector, with mining representing 63% of the total output in the Central Highlands LGA in 2010–2011. Analysis of industry sector contributions to the local economy suggests that the economy of the Central Highlands LGA has undergone significant structural change since 2006, with increases in the contribution of sectors such as financial and insurance services and wholesale trade, and decreases in the share of the agriculture, forestry and fishing sectors.

In 2011, both the Central Queensland Region and the Central Highlands LGA experienced low levels of unemployment, high participation rates and high levels of employment specialisation in the mining sector, relative to Queensland. Furthermore, both the Central Queensland Region and the Central Highlands LGA had high median incomes compared to Queensland, driven largely by wage inflation from the mining sector.

### 4.19.3 Impacts

The following economic benefits of the project were predicted in the EIS:

**Economic benefits:** The predicted net production benefits of the project were estimated to be approximately $648 million over the life of the project, distributed as follows:

- Royalty payments to the Queensland Government of potentially $470 million.
- Increased tax receipts to the Australian Government in the form of any company tax payable or Minerals Resource Rent Tax from the project.
- Direct employment as a result of the project was anticipated to generate approximately $160 million in income taxes to the Australian Government over the life of the project.
- The construction phase of the project was estimated to result in $135 million in value-added for Queensland annually. At full production, the project is anticipated to contribute $912 million in value-added to the Queensland economy annually, of which $555 million would be created in the economy of the Central Queensland Region. Of this contribution to the Central Queensland Region, $466 million would be created in the Central Highlands LGA economy.

**Employment:**

- The construction phase of the project was predicted to create approximately 1115 FTE positions for residents in Queensland.
- The full production phase of the project would require 502 FTE direct employees which is anticipated to be generated in the following local and regional areas: 75 FTE positions for existing and new residents with a

home base in Blackwater or Emerald; 296 FTE positions for residents with a home base in the rest of the Central Queensland Region; and 131 FTE positions for residents in the remainder of Queensland.
- A further 4098 flow-on FTE jobs were predicted in Queensland during full production phase of the project — 1138 are anticipated to be located in the Central Queensland Region, with 413 of these in the Central Highlands LGA.

**Income:**

- The project was estimated to generate an average of $81 million in income in Queensland during each year of construction.
- At full production, the project was estimated to generate $374 million in income in Queensland annually, with $140 million in the Central Queensland Region—$40 million of this is expected to accrue in the Central Highlands LGA each year.

Some adverse economic impacts were also estimated in the EIS. The significant employment boost predicted for regional and local economies may place further stress on the already tight labour market at both the local and regional level. Additional pressures on the labour market may also be generated from the cumulative effect of the project and other mining developments in the Central Queensland Region and neighbouring regions.

### 4.19.4 Mitigation measures

To mitigate the project's potential impacts on the labour market, the proponent committed to implement commitments contained in action plan 2–workforce management of the social impact management plan (EIS Appendix M—Socio-economic impact assessment, Appendix A—social impact management plan). Key commitments included:

- Provision of workforce estimates and profiles in a timely manner to Regional Development Australia and key industry stakeholders for the purposes of developing the Central Queensland Workforce Strategy.
- Establish contacts at Blackwater State High School and Emerald State High School and conduct presentations about project related vocational opportunities to encourage applications for workforce opportunities.
- Build collaborative partnerships with government and community organisations to enhance the capacity of locals to develop skills and secure jobs. The proponent has a number of initiatives to promote skills development in the region including a university sponsorship program and university graduate program.

CHRC submission on the EIS encouraged the proponent to contact Central Highlands Development Corporation to obtain updates on local economic trends. The proponent noted this request in the response to EIS submissions but made no commitments. CHRC made no further comments on this issue in its response to the amended EIS.

### 4.19.5 Conclusions and recommendations

The EIS documents adequately met the requirements of the TOR in relation to economic impacts. The existing economic environment of the project area was adequately described in the EIS, impacts of the project predicted and broad strategies to minimise economic impacts of the project described.

## 4.20 Social

A description of the social environment within the project development area and an assessment of the potential social impacts associated with the project was provided in section 17—Social Impact Assessment (SIA) of the EIS. A more detailed assessment of the project's social impacts was presented in Appendix M—SIA report of the EIS. Some minor amendments to Appendix M, SIA report were made in the EIS addendum report in response to submissions on the EIS.

### 4.20.1 Methodology

The methodology for the SIA included the following components:

- Identification of the SIA study areas–both local and regional.
- Profiling the socio-economic environment of the SIA study area based on a review of existing data and consultation with relevant stakeholders.
- Identification and assessment of potential socioeconomic impacts. The assessment focused on the impacts likely to affect the local and regional study area and in particular the town of Blackwater, as the nearest township to the project site. Impacts were identified based on the information collected during baseline profiling and the results of stakeholder consultation, and with consideration of the cumulative impacts from other developments taking place in the Central Queensland Region.

- Development of appropriate management commitments to address socio-economic impacts and to maximise community benefits. Strategies identified to manage potential negative impacts and enhance positive impacts were informed through consultation conducted with key government agencies and service providers, the CHRC and the broader Blackwater community.

Consultation was conducted as part of the SIA process to gather information on community perceptions, to better understand the current social setting and to assist in the prediction of potential social impacts (see section 4.4 of this assessment report for more information).

DSDIP's submission on the EIS, advised the proponent of policy changes to social impact management plan (SIMP) requirements and that a new SIA guideline was in use[11]. DSDIP recommended the proponent adopt the policy changes by submitting a revised SIA draft Action Plan for review prior to final EIS submission. In the response to EIS submissions, the proponent responded that the project's SIMP was prepared in accordance with the project's TOR and the previous Queensland Government's SIMP Guideline and that this is consistent with the transitional arrangements of the new SIA guideline for resource projects.

### 4.20.2 Existing environment

A thorough profile of the existing socio-economic environment of Blackwater and the surrounding local and regional study areas was provided in the EIS (EIS sections17.5 and EIS Appendix M—SIA report). This included a detailed assessment of community demographics, housing and accommodation, social infrastructure accessibility, community liveability and economic vitality.

Challenges facing the community of Blackwater, as well as local, regional and state service providers described in the EIS included:

- Managing population and demographic change due to a rapid and significant increase in the non-resident worker population.
- Housing not only the workforce associated with the rapidly expanding mining industry, but also the workforce of the related service industries.
- Balancing the needs of the community with the demands of the mining industry.
- Maintaining and enhancing the lifestyle and amenity of Blackwater.
- Servicing the needs (e.g. health, educational and recreational) of the resident and non-resident worker population.
- Providing for the long-term sustainability of the community.

A number of submissions on the EIS, including those from DSDIP, DHPW and CHRC, acknowledged that the majority of the socio-economic data used in the SIA of the EIS had been captured during the peak phase in the mining cycle. Since the EIS was undertaken there has been a shift in the housing market due to the downturn in the resource industry and new housing delivered in Urban Land Development Authority/Economic Development Queensland Urban Development Areas and as a result, housing availability and vacancy rates in the Central Queensland housing market have risen significantly since mid-2012. However, the submissions also acknowledged that while housing market forecasts reflected in the proponent's socio-economic impact assessment may not reflect current conditions, it is appropriate to consider the project within a longer timeframe as the nature of the mining sector is cyclical and the project may proceed in a more favourable economic climate. In the response to EIS submissions, the proponent agreed that the baseline profiling of socio-economic issues, including housing and accommodation in the local area was undertaken at a peak period in the mining cycle, and the recent slowdown in the mining industry is likely to contribute to an increase in housing availability and affordability. Therefore estimates of project impacts in these areas are conservative.

### 4.20.3 Impacts

Potential project socio-economic impacts and management measures were identified in the EIS covering six thematic areas: community demographics; housing and accommodation; social infrastructure accessibility; community liveability; labour market and training and; economic vitality. Potential impacts are summarised in **Table 14**.

[11] http://www.dsdip.qld.gov.au/assessments-and-approvals/social-impact-assessment.html

**Table 14 Summary of potential socio-economic impacts and management commitments (source: EIS)**

| Potential socio-economic impacts | Management |
|---|---|
| **Community demographics** | |
| Increase in non-resident worker population of Blackwater<br>Cumulative impacts on demographic structure of Blackwater population | Implement action plan 1–housing and accommodation to support housing choice for the project workforce, including the provision of financial rental assistance to support eligible employees who choose to rent in Blackwater.<br>Seek to support workforce diversity. |
| **Housing and accommodation** | |
| Cumulative impacts on housing availability and affordability<br>Cumulative increases in demand for short term accommodation in Blackwater | Implement commitments described in action plan 1–housing and accommodation. Specifically:<br>• develop an on-site construction accommodation village<br>• secure accommodation for all non-resident workers associated with the project's operations in a third party accommodation village. |
| **Social infrastructure** | |
| Cumulative increases in demand for community health services<br>Cumulative increases in demands on emergency services | Implement commitments described in action plan 4–social infrastructure accessibility. Specifically:<br>• Gauge and anticipate the demand generated by the project for social infrastructure and services and minimise the impact through participation in future planning with local and regional social infrastructure and service providers.<br>• Source and/or provide suitable accommodation, in collaboration with other projects and proponents, for use by visiting community service providers, where demand indicates this is necessary.<br>• Participate in the annual resource sector workforce surveys conducted by the Office of Economic and Statistical Research.<br>• Develop and implement an emergency management and response plan in consultation with relevant emergency services to ensure shared knowledge of key aspects of emergency preparedness. |
| **Community liveability** | |
| Increased traffic and associated impacts on road safety<br>Impact on community safety<br>Breakdown of social networks and community relationships | Implement commitments described in action plan 5–community liveability. Specifically:<br>• Apply the existing Caledon Fitness For Work Policy to the project to address fatigue management.<br>• Provide a bus service between the off-site operations workforce accommodation village and the project site to reduce the volume of project related traffic on the local road network.<br>• Provide a bus service between the on-site construction accommodation village and the surface facilities areas.<br>• Implement the project Workforce Code of Conduct to support positive social behaviour by the workforce in the Blackwater community.<br>• Apply the Caledon Fitness For Work Policy–Drug and Alcohol Procedure including conducting random drug and alcohol testing of employees, contractors and consultants. |

| | |
|---|---|
| | • Implement the existing community complaint and grievance mechanism for the construction and operations phases of the project.<br>• Promote involvement in locally based social and recreational programs (calendar of events) for non-resident workers located at the on-site construction accommodation village and at the off-site operations phase accommodation village. |
| **Economic vitality** | |
| Cumulative impacts on non-mining sectors of the local and regional economy, and increases in local and regional economic specialisation<br><br>Cumulative impacts on other sectors of the economy | Implement commitments contained within action plan 4–social infrastructure accessibility, including the timely provision of accurate project information to relevant agencies to inform capital investment. |
| **Labour market and training** | |
| Cumulative impacts on labour and skilled labour availability in Blackwater, the Central Highlands LGA and Central Queensland Region<br><br>Cumulative impacts on employment specialisation in Blackwater, and the Central Highlands LGA | Implement commitments contained in action plan 2–workforce management including:<br>• Provision of workforce estimates and profiles in a timely manner to Regional Development Australia and key industry stakeholders for the purposes of developing the Central Queensland Workforce Strategy.<br>• Identify potential barriers to Indigenous participation on the project and work with key stakeholders to develop appropriate strategies to support increased Indigenous workforce participation on the project.<br>• Establish contacts at Blackwater State High School and Emerald State High School and conduct presentations about project related vocational opportunities to encourage applications for workforce opportunities.<br>• Build collaborative partnerships with government and community organisations to enhance the capacity of locals to develop skills and secure jobs. The proponent has a number of initiatives to promote skills development in the region including a university sponsorship program and university graduate program. |

## 4.20.4 Mitigation measures

Strategies and actions to be taken by the proponent to manage and monitor the potential social impacts of the project were described in a SIMP (EIS Appendix M—Socio-economic impact assessment, Appendix A—SIMP). The SIMP described five action plans and their key objectives as follows:

- **Action plan 1–housing and accommodation:** Attract and retain suitable labour for the project, whilst making a positive contribution to community vitality and minimising potential impacts on housing availability and affordability in Blackwater.
- **Action plan 2–workforce management:** Support labour force up-skilling in the mining and non-mining sectors of the Central Queensland LGA, and in particular in Blackwater, and support employment retention and career development for vulnerable sectors across the Central Queensland Region.
- **Action plan 3–local and regional business development:** Support capacity and capability increases in local and regional business, and enable access for local businesses to supply chain opportunities that arise from the presence of the proponent's operations in the Central Queensland Region.
- **Action plan 4–social Infrastructure accessibility:** Contribute to the continuing development of Blackwater as a sustainable community by proactively managing any increase in demand on community services and facilities from project related workforces and their families.
- **Action plan 5–community liveability:** Support a welcoming, safe and secure residential environment for the project workforce, residents and non-resident population of Blackwater.

Each of these areas is discussed in more detail in the following sections.

### 4.20.4.1 Housing and accommodation

DHPW's submission on the EIS stated that they are generally supportive of action plan 1–housing and accommodation, particularly actions which provide accommodation solutions aimed at minimising impacts on Blackwater and Emerald and strongly supported the proponent's close liaison with the CHRC, the Blackwater community and state agencies proposed in the SIMP.

CHRC's submission requested further information on the facilities and longer-term plans for the on-site accommodation village for the construction workforce. The proponent committed in the response to EIS submissions, to provide further details in relation to the camp design after further project planning. It confirmed that the construction village would be removed from the site following the completion of the second phase of construction.

Submissions from DSDIP, DHPW and CHRC raised a number of issues regarding action plan 1–housing and accommodation in the SIMP. These included:

- **Key performance indicators:** DSDIP's submission on the EIS, recommended a number of changes to the housing and accommodation action plan including: making all key performance indicators (KPIs) measurable and outcome focused; amalgamating the monitoring frameworks to performance goals and linking them to the stakeholder engagement plan; and providing more detail on the bed capacity of the accommodation village and accommodation options for new resident and non-resident workers.
- **Affordable housing to non-resource sectors:** Submissions from DHPW, DSDIP, DCS and QPS raised concern about the delivery of affordable housing to non-resource sectors of the workforce including emergency service personnel in securing suitable accommodation at reasonable costs. DHPW submission recommended the proponent include support for CHRC's Highlands Housing Company in the housing and accommodation action plan in SIMP in the event that monitoring indicates rising housing stress in these communities over the life of the project.
- **Employee Accommodation Assistance:** DSDIP and DHPW's submissions on the EIS acknowledged the benefits and supported the inclusion of an Employee Accommodation Assistance Scheme in the housing and accommodation action plan, but also raised concerns that the scheme may risk inadvertently inflating the rental market in any future increase in market pressure. This has the potential to reduce the limited housing stock available for rent by the general community and in particular, low income earners.
- **Monitoring:** Submissions from CHRC, DSDIP and DHPW requested improvements to the housing and accommodation action plan's monitoring framework including further consideration for the wider impacts of the project on the housing market (including the rental market and housing price trends) over the life of the project and further consideration of longer-term housing affordability (rather than short-term accommodation monitoring which is the current focus of the SIMP).
- **Accommodation choices and non–resident works:** Submissions from DSDIP and CHRC raised concerns that the SIMP had not provided adequate measures to address the imbalance in both the ratio of permanent

residents to non-resident workers and gender representation, particularly given the proposal for 100% of the workforce to be accommodated at the accommodation village and not locally. Both DSDIP and CHRC recommended that the proponent outline measures to offer a choice of accommodation for employees to encourage workers to live locally in Blackwater and regional communities to minimise the impact of non-resident workers as a percentage of population, to improve gender balance within the community and to promote community development, thereby ensuring the long term sustainability of the Blackwater community.

The proponent responded to each of these issues in its response to EIS submissions and made a number of changes to the management actions and associated monitoring frameworks in the housing and accommodation action plan in the amended EIS to address key concerns. CHRC and DSDIP raised no further issues in their response to the EIS addendum. DHPW's response to the amended EIS stated that the SIMP's housing and accommodation action plan would need to play a key role in managing the project's longer term impacts on housing for non-resource sector workers in affected townships.

#### 4.20.4.2 Infrastructure

DSDIP, CHRC and DCS's submissions on the EIS raised concerns about the projects impacts on social, community health and service infrastructure and recommended a number of changed to action plan 4–social infrastructure accessibility. In particular,

- DSDIP requested evidence of the project's contribution to addressing barriers to recruiting and timeframes for monitoring.
- CHRC raised concerns about the cumulative impacts of the project on demographics particularly the family based communities shifting to single person settlements. CHRC encouraged the proponent support a 'birth to death community' for Blackwater and advocate for aged care facilities locally.
- CHRC advised that many medical services in Blackwater have been upgraded or have employed extra staff. It stated that the commitment provided in the EIS to encourage workforce to access non-urgent medical treatment at medical facilities in their home base rather than in Blackwater (to minimise impacts on local medical facilities), was not necessary in the current economic climate. CHRC's submission encourage d the proponent to undergo periodic discussions with the two medical centres, hospital and allied health facilities in Blackwater over the life of the project to stay connected with the needs of the community and availability of services to support local businesses.

The proponent made a number of amendments to action plan 4–social infrastructure accessibility, to address concerns raised in these submissions. DSDIP, CHRC and DCS raised no further concerns in their response to the EIS addendum.

RRC's submission on the EIS stated that the EIS and SIMP had not described strategies to address the project's impacts on the RRC LGA where the majority of the long-term operational workforce would be housed. It argued that the project's workforce would have significant cumulative impacts on the use of hard and soft infrastructure in the Rockhampton LGA (including roads, education and health systems). In the response to EIS submission, the proponent advised that the predicted project workforce associated with the proposed project would represent approximately 0.6% of the predicted population growth in the Rockhampton LGA and contended that this was unlikely to have any noticeable and significant impact on the services of Rockhampton. Further, the project would generate revenue for the state in the form of royalties and the state government 'Royalties for the Regions' program is intended to reallocate these taxes and royalties to the impacted communities.

#### 4.20.4.3 Community liveability

DSDIP, CHRC and QPS's submission on the EIS raised a number of concerns about the project's impacts on community liveability. In summary:

- DSDIP recommended a number of changed to the community liveability action plan including, a KPI of 100% participation rate on induction records and mitigation strategies for addressing ongoing complaints.
- DCS raised concerns about the cumulative impacts of the project on crime rates and requested ongoing dialogue with the proponent and on-going input into the development of mitigation strategies relevant to policing matters.
- CHRC raised concern about the cumulative impacts of the resource sector on community cohesion (segregation of the community), increasing social conflict and reduced community networking associated with changing work patterns and transient populations and changes in community identity shifting from family based communities to single person settlements. It recommended the proponent implement a number of initiates to address these concerns such as: a family friendly work roster for employees (including contract employees); employment of a community relations officer; a community development fund; and monitoring social issues for the major source of the non-resident workforce to ensure the company is aware of major trends impacting on their workforce.

In the response to EIS submissions, the proponent noted or responded to these issues and made minor amendments to action plan 5–community liveability in the EIS addendum to address some of the concerns raised in the submissions. This included a commitment to undertake ongoing consultation with the DCS. DSDIP, CHRC and DCS raised no further concerns in their response to the EIS addendum.

#### 4.20.4.4 Local and regional business development

DSDIP and CHRC's submission on the EIS made numerous recommendations to strengthen proposed measures in the SIMP, particularly action plan 3—local and regional business development, relating to local suppliers and businesses. Specifically:

- In regards to promoting local supplier and business opportunities, DSDIP recommended the proponent adopt the Queensland Resources and Energy Sector Code of Practice for Local Content (as appose to the Local Industry Policy 2010 in the SIMP which was no longer relevant to private sector resources and energy projects). It requested the proponent develop local buy programs and work with potential local suppliers to build their capability and develop capability statements, management systems and/or identify compliance requirements. DSDIP requested the proponent identify DSDIP as a key stakeholder to support the delivery of business and supply chain development for the project.
- CHRC's submission raised similar concerns about the cumulative impacts of the project on local business operators and service/facility providers who may be unable to increase capacity or diversify services due to staff recruitment, retention issues and limited housing. CHRC encouraged the proponent to support local suppliers and businesses and 'buy local' when possible and consider opportunities or partnerships to support small to medium size enterprises development in Blackwater.

The proponent strengthened a number of commitments in action plan 3—local and regional business development in the EIS addendum to address concerns raised by DSDIP and CHRC. This included a commitment to liaise with DSDIP and CHRC on local buy initiatives and to identify suitable opportunities or partnerships to support small to medium size local business development in Blackwater including considering partial funding of a Blackwater Business Development Officer.

#### 4.20.4.5 Employment

DETE's submission on the EIS requested the proponent continue to liaise with DETE to strengthen strategies in the SIMP aimed at increasing training and skilling opportunities. It requested the proponent:

- Reflect commitments made for mitigation of social impacts in the SIMP in any subcontracting arrangements, including during the construction period.
- Address the participation of groups disadvantaged in the labour market that occur through the development of major projects, particularly given that the SIMP currently has no commitments, or strategies, attached to employment and/or skilling targets for equity groups or those disadvantaged in the labour market (e.g. women, Indigenous people, apprentices, people from culturally and linguistically diverse backgrounds and people with a disability).

The proponent amended the SIMP in the EIS addendum to address DETE's concerns, to include commitments to:

- Incorporate management strategies for social impacts into subcontractor arrangements where possible.
- Build collaborative partnerships with government (including DETE) and community organisations to enhance the capacity of locals to develop skills and secure jobs.
- Engage with education and training providers in relation to the identification of suitable targets for workforce diversity.

DATSIMA's submission on the EIS requested the proponent strengthen its commitment to support Indigenous employment opportunities by:

- Assessing all major contractor existing workforce management strategies and programs to ensure they support the proponents commitment to offer training and employment opportunities to Indigenous people (both local and from wider Queensland).
- Committing to actively seek and deliver opportunities for local Indigenous people through the development and implementation of an Indigenous Participation Plan

The proponent amended the SIMP in the EIS Addendum to include commitments to:

- Examine all major contractor existing workforce management strategies and programs to ensure they support the proponent's commitment to offer training and employment opportunities to Indigenous people.

- Prepare an Indigenous Participation Plan for the project construction and operations phase which would seek to enhance accessibility for Indigenous people to direct and indirect employment and training opportunities associated with the project.

### 4.20.5 Conclusions and recommendations

The requirements of the TOR in relation to describing the existing social environment, outlining potential impacts of the project and proposing broad management measures to mitigate social impacts through the form of a SIMP have been adequately met in the EIS. The ability of the project to minimise adverse social impacts of the project on the local and regional area, would rely on:

- the successful implementation of these strategies by the proponent
- on-going monitoring and communication with agencies, stakeholders and the community to assess the effectiveness of strategies in mitigating potential negative cumulative impacts of the project in an ever-changing socio-economic environment.

DSDIP requested the proponent provide annual progress reports on mitigation measures for social impacts.

**General recommendation 6:** The proponent provide annual progress reports to DSDIP on mitigation measures for social impacts.

## 4.21 Indigenous cultural heritage

A brief overview of the Aboriginal cultural heritage issues associated with the project was provided in section 20.1 of the EIS.

The EIS described the relevant Commonwealth and State legislation relating to the protection of Aboriginal cultural heritage.

In relation to Commonwealth legislative requirements relating to Aboriginal cultural heritage the EIS reported:

- There were no sites within the project site listed on Commonwealth heritage lists established under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- No declarations in relation to Aboriginal heritage had been made under Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* for the project site.

In relation to State legislative requirements regarding Aboriginal cultural heritage the EIS reported:

- The cultural heritage requirements under the ACH Act (which require a Cultural Heritage Management Plan (CHMP) to be developed for projects that require an EIS), were satisfied with a Cultural Heritage Investigation and Management Agreement which was accepted by the former DERM in 2012.
- There are no sites within the project site that are listed on the state cultural heritage register.

### 4.21.1 Conclusion and recommendations

The requirements of the TOR in relation to Indigenous cultural heritage including requirements of the ACH Act were adequately addressed in the EIS.

An appropriate condition for cultural heritage has been included in Appendix 3.

## 4.22 Non-Indigenous cultural heritage

A description of the non-Indigenous cultural heritage values within the project site and an assessment the potential for these values to be impacted by the project was provided in section 20 of the EIS. A more detailed cultural heritage assessment was provided in Appendix O—Non-Indigenous cultural heritage report of the EIS.

### 4.22.1 Methodology

The non-Indigenous heritage assessment conducted as part of the EIS included a desktop review (including interviews with local residents) to identify heritage themes in the region and predict the locations and types of items of cultural heritage potentially located on the project site. Based on the information gathered during the desktop review and EIS stakeholder consultation, 12 sites were identified within the project site as having potential heritage interest.

A field inspection targeting these sites was undertaken to locate and describe any cultural heritage. The field inspection also involved general searches of the project site for cultural heritage sites not identified in the initial desktop review. Any cultural heritage that was located during the field survey was assessed against heritage criteria, based on the Burra Charter, to determine if it had local, state or national significance.

### 4.22.2 Existing values

The EIS reported that the project site does not contain sites that are recorded on any heritage lists or registers. Based on the information gathered during the desktop review and EIS stakeholder consultation, 12 sites were identified within the project site as having potential heritage interest.

Only one of these sites (the Blackwater Lawn Cemetery) was assessed as having the potential to be of local heritage significance after the field inspection. The Blackwater Lawn Cemetery was assessed as having local heritage significance but did not meet the criteria for either state or national significance. The Blackwater Lawn Cemetery meets local heritage significance status because of its aesthetic significance due to its picturesque, evocative and/or symbolic qualities and the association with local history (i.e. many current residents have family members buried at the Blackwater Lawn Cemetery and there are also graves of important local Blackwater individuals).

### 4.22.3 Impacts

The Blackwater Lawn Cemetery was subject to an assessment of significance and impact assessment. The proponent committed in the EIS to:

- prevent any surface subsidence of the Blackwater Lawn Cemetery i.e. through mine planning to ensure that the cemetery is beyond the limit of measurable subsidence
- to maintain access to the cemetery throughout the life of the mine.

It was concluded in the EIS that potential dust, noise and visual impacts from the project on the cemetery would not give rise to any significant adverse impacts on the cemetery (refer to section 4.8–Air and section 4.18–Noise and vibration of this assessment report for further information).

### 4.22.4 Mitigation measures

The proponent committed in the EIS to liaise with CHRC regarding the Blackwater Lawn Cemetery and to obtain its approval as the landowner of the cemetery.

The EIS outlined a number of procedures to mitigate impacts in the unlikely event that previously unrecorded sites of non-Indigenous cultural heritage are located during ground disturbance associated with the project.

### 4.22.5 Conclusion and recommendations

The requirements of the TOR in relation to non-Indigenous cultural heritage have been adequately met in the EIS documents.

## 4.23 Landscapes and visual amenity

The existing visual setting of the project site and surrounding area and an assessment of the project's impacts on the visual quality and character of the surrounding area was provided in section 16 of the EIS. Measures to mitigate and manage impacts were also identified.

### 4.23.1 Methodology

Visual impacts for each visual receptor were determined using a visual assessment matrix (EIS Table 16-1) which considered an assessment of the visual sensitivity of receptors and the visual effect of the project. The following terms were defined in the EIS:

- Visual sensitivity—A measure of how critically the various components of a project are viewed by people utilising different landuses in the vicinity.
- Visual effect—A measure of the level of visual contrast between the project elements and the existing visual environment.
- Visual impact—The level of visual impact was based on a consideration of the visual sensitivity of the potential visual receptors and the visual effect.

The visual assessment matrix used a scale of low, moderate and high to assess the visual sensitivity of a visual receptor against the visual effect of the project. The result of this assessment was a level of impact ranging from high impact to low impact.

### 4.23.2 Existing visual setting

The visual quality and character of the project and surrounding areas were adequately described in the EIS. The local visual landscape was reported to be dominated by Blackwater Mine, grazing land, industrial landuses and the Arthur's Bluff State Forest/Blackdown Tableland National Park. The following elements of the project were identified as having the potential to impact on visual amenity: northern surface facilities, construction accommodation village, mine industrial area, CDA and CDA catch dam.

The EIS identified the following visual receptors for the project:

- Blackwater Industrial Area
- Blackwater Residential Area
- Blackwater-Rolleston Road
- Capricorn Highway
- rural residences
- Blackwater Lawn Cemetery
- Blackwater Landfill.

### 4.23.3 Impacts

The visual assessment undertaken for the project concluded that the visual impact on sensitive receptors would be low or low to moderate. The project would be an underground operation with limited surface facilities and consequently would have a relatively low visual effect. Any views of the project would be set within a landscape of existing mining and industrial landuse because of the location of the site adjacent to an Blackwater/South Blackwater Mines, one of the largest open cut coal mines in Queensland and adjacent to the industrial area of Blackwater Township. The visual impact is reduced by the fact that the majority of visual receptors would be within an existing industrial landscape and the visual receptors would have limited views of the surface facilities of the mine due to screening by intervening vegetation, the topography of the area, and/or extended viewing distances.

### 4.23.4 Mitigation measures

The following mitigation measures were described in the EIS to minimise the visual and lighting impacts of the project:

- minimise the clearing of vegetation on the project site around the MIA, CDA, NSF and construction accommodation village
- the use of neutral tones in the cladding of infrastructure to blend with the surrounding environment
- designing external lighting to minimise off-site impacts
- progressive rehabilitation the CDA throughout the life of the project with vegetation to minimise the impact of the CDA on the Blackwater Lawn Cemetery.

CHRC's submission on the EIS, noted that the visual impact of the project at the Blackwater Lawn Cemetery was assessed in the EIS to be low to moderate and acknowledged the close proximity of the Cemetery to the road, railway and other infrastructure. However, given the nature and purpose of the Cemetery, CHRC recommended that the proponent assess methods of augmenting and improving the visual amenity within the cemetery for visitors and discuss the development of a surrounding low embankment around Cemetery (suitably landscaped with low maintenance vegetation), with CHRC.

### 4.23.5 Conclusion and recommendations

The requirements of the TOR in relation to landscape and visual amenity were adequately met in the EIS. CHRC requested the proponent investigate methods of augmenting and improving the visual amenity within the Blackwater Cemetery for visitors in consultation with the CHRC (general recommendation 7).

**General recommendation 7:** The proponent investigates methods of augmenting and improving the visual amenity within the Blackwater Cemetery for visitors in consultation with the CHRC.

## 4.24 Hazard and risk

EIS section 22, Hazard and risk described the potential impacts of the project on the community in terms of health, safety and quality of life; identified risks to the public; and described a method for hazard response.

### 4.24.1 Methodology

Section 22.2 of the EIS described the suite of legislation in relation to hazard management at mine sits and Occupational Health and Safety (OHS) requirements. Consistent with the scope of the TOR for the project, OHS issues were not considered further in the hazard and risk assessment in the EIS. Powerlinks's submission on the EIS advised the proponent that it would need to comply with the *Electrical Safety Act 2002* (including a Code of Practice under the Act) and the *Electrical Safety Regulation 2002* (including any safety exclusion zones defined in the Regulation). The EIS addendum (Table 22-1) was updated to include these requirements.

A Preliminary Hazard Analysis that was undertaken to assess the level of risk that the project presents to surrounding landuses and community values (EIS Table 22-4).

### 4.24.2 Existing values

Community values and concerns identified in the EIS that were relevant to the assessment included:

- safety in relation to the impacts of major accidents when in public spaces and on private property
- amenity value in residential areas
- continuity of services (including emergency services)
- clean air and water.

### 4.24.3 Impacts

The project would involve the transport, storage and use of a range of hazardous materials that may create hazardous conditions if not managed in an appropriate manner. Section 22.3 of the EIS described the hazardous substances and dangerous goods that would be transported, stored or processed as part of the project. Table 22-3 of the EIS included an indicative list of hazardous substances including maximum inventories and rates of use or generation and Table 22-3 of the EIS listed dangerous goods. Infectious substances, as defined within the Australian Dangerous Goods Code (7th edition), would not be used, transported or produced as part of the project.

It was reported in the EIS that industrial gauges within the coal processing plant would, in some instances, incorporate radioactive substances used for a variety of purposes, such as level and density gauging, control purposes and in-stream analysis.

Some small scale blasting would be conducted as part of the construction of mine entries (i.e. the box cuts) or infrequently during mining operations due to the occurrence of unexpected rock intrusions in the coal seams. Bulk explosive material would be brought to site by a licensed contractor and the blasting would be undertaken by experienced and appropriately trained explosives contractors. Storage of explosives on-site would be limited to detonators and small quantities of ancillary materials, as detailed in Table 22-3 of the EIS. The proposed site of the explosives magazine was not provided in the EIS, other than noting that it would be located away from any sensitive receptors.

The highest risks derived under the Preliminary Hazard Analysis related to loss of containment and combustion of dangerous goods. These hazards were deemed to have moderate consequences but have a low likelihood of occurrence, resulting in a medium risk. The overall risk profile for the project was assessed as being low due to the controls that have been included within the current design and proposed safety and health management system (SHMS) operations. Overall it was concluded in the EIS that the project poses a low level of risk to both private infrastructure and people using public land.

### 4.24.4 Mitigation measures

#### 4.24.4.1 Safety and health management system (SHMS)

The proponent committed in the EIS to implement a SHMS, which would meet the requirements of appropriate legislation and standards and address the construction, operations and decommissioning phases of the project. The SHMS would include operational hazard analysis, regular hazard audits, fire safety, emergency response plans, qualitative risk assessment, and construction safety. The proponent would develop a Hazard, Defect and Incident Procedure to monitor conformance with the SHMS. Audits, inspections, reviews and independent contributions would all be used to identify corrective actions as part of the process of continual improvement in the SHMS.

DCS's submission on the EIS provided advice, raised a number of issues and requested a number of actions relating to the proposed emergency response procedures in the EIS including a request for on-going involvement with emergency response personnel over the life of the project. In the response to EIS submissions, the proponent provided a detailed response to each of the matters raised in DCS's submission and committed to ongoing consultation with local and regional representatives of the DCS in relation to the management of hazard and risks. Some changes were also made to section 22.4.3 of the EIS addendum to address DCS's concerns.

#### 4.24.4.2 Public health

QH's submission on the EIS provided the following advice to the proponent in relation to certain public health matters associated with the project:

- The proponent would need to manage subsidence to minimise the creation of mosquito breeding areas and ensure compliance with the *Public Health Act 2005* and the Public Health Regulation 2005 in relation to providing breeding grounds for mosquitoes.
- If a medical facility is not provided as part of the proposed Emergency Preparedness and Response Plan (EPR), the proponent would need to ensure that suitably qualified persons are available in the event that scheduled drugs and poisons are stored or used on-site. The proponent would need to ensure that the necessary approvals are obtained from QH for any facilities on the project site which would be obtaining, possessing and using scheduled drugs and poisons in accordance with the Health (Drugs and Poisons) Regulation 1996.
- The proponent should be aware of the requirements for providing smoking areas in the accommodation camp facilities and the need to comply with the *Tobacco and Other Smoking Act 1998.*
- The proponent should be aware that any potable water supply associated with the project would need to comply with the Australian Drinking Water Guideline 2011. It recommended implementing a water sampling program for the treated water supplied by the proposed portable water supply.

The proponent addressed these matters in the response to EIS submissions, acknowledging its requirements to comply with relevant legislation and guidance with respect to smoking areas, potable water and the storage and provision of scheduled drugs and poisons on-site. It reiterated commitments described in the EIS to undertake minor remedial drainage earthworks to re-establish free drainage, which would be applied to any ponding that occurs as a result of subsidence.

### 4.24.5 Conclusions and recommendations

The requirements of the TOR in relation to hazard impacts have been adequately met in the EIS. A summary of the potential hazards associated with the project was included in the EIS and a broad assessment of their risks to people and property conducted.

## 4.25 Rehabilitation and decommissioning

The proposed rehabilitation and decommissioning strategies for the project were described in section 8—Rehabilitation of the EIS. Soil rehabilitation measures are discussed in section 4.10 of this assessment report.

### 4.25.1 Rehabilitation activities

Rehabilitation activities described in the EIS to be undertaken as part of the project include:

1. ongoing rehabilitation of areas disturbed by subsidence (i.e. proposed subsidence crack rehabilitation program)
2. progressive rehabilitation of the CDA
3. rehabilitation of areas disturbed by the construction of surface infrastructure as part of mine closure.

These are described further in the following sections of the assessment report.

#### 4.25.1.1 Subsidence crack rehabilitation program

The proposed subsidence crack rehabilitation program described in the EIS involves monitoring areas likely to be subjected to cracking and repairing any individual cracks that develop. It was stated in the EIS that this non-intrusive, targeted method of surface subsidence crack rehabilitation was proposed in order to minimise disturbance of vegetation. A rehabilitation program for tension cracking was described in detail in the EIS.

DNRM submission on the EIS, advised the proponent that it would be required to provide detailed information on the proposed stabilisation works associated with subsidence of rivers/creeks, within the subsidence management plan. In the response to EIS submissions, the proponent noted that section 11.5.2 of the EIS states that the content of the subsidence management plan, would include*: 'Preventative works and engineered structures required to*

*ensure stability of watercourse beds and banks that may be impacted by subsidence'*. DNRM made no further comments on this issue in its response to the amended EIS.

#### 4.25.1.2 Rehabilitation of the CDA

Progressive rehabilitation of the CDA throughout the mine life was proposed in the EIS (section 7.4.6). This would involve:

- Rehabilitation of the lower slopes around the southern and eastern sides of the CDA at the completion of stage 3 (approximately project year 12).
- Rehabilitation of the higher slopes around the southern and eastern sides of the CDA and the lower slopes at the north of the CDA at the completion of stage 4 (approximately project year 25).
- Rehabilitation of remaining areas of CDA (approximately project year 26).
- Decommissioning of the rehabilitated CDA (see EIS Figure 7-6).

Progressive rehabilitation would involve reshaping the external slopes of the final landform, provision of capping and topsoil layers, and seeding. Pasture grass would be established on the CDA.

#### 4.25.1.3 Decommissioning of mine surface infrastructure and mine closure

The mine surface infrastructure areas would be decommissioned and rehabilitated in accordance with a mine closure plan. The mine closure plan would provide guidance on mine closure activities and include:

- rehabilitation goals
- an overview of closure and rehabilitation activities
- performance criteria
- monitoring and reporting.

During site decommissioning all buildings and mining infrastructure including conveyors, underground support facilities and the CHPP would be dismantled and removed from site. The infrastructure hardstand areas would be inspected for any hydrocarbon contamination and remediated, as necessary. The hardstand areas would then be contoured, topsoiled, ripped and seeded with the aim of restoring the site to the required landuse. Topsoil would be placed at a minimum depth of 0.25m. Revegetation species would include a mixture of pasture grasses. The portals of the underground mine access drifts would be permanently sealed at mine closure in accordance with the requirements of DNRM.

If realignment of Blackwater-Rolleston Road and/or South Blackwater Mine Railway is required for the project (i.e. detailed investigations determine that managing subsidence of Blackwater-Rolleston Road and the South Blackwater Mine Railway in-situ is not feasible), than the EIS proposed that such an alignment would be a permanent feature owned by TMR and Aurizon and would therefore not be suitable for any other use. Any rehabilitation of the decommissioned section of rail or road would be undertaken in accordance with standard rail line and road decommissioning practice. This would likely include the removal of the track, sleepers and other infrastructure and regrading of formation embankment and cutting batters to stable slopes and revegetation. For the road, decommissioning would include the removal of pavement, cutting batters to stable slopes as necessary, and revegetation.

### 4.25.2 Rehabilitation objectives, indicators and goals

Table 8-1 and Table 24-9 of the EIS summarised the rehabilitation goal and objectives for the project as described in the EIS.

EHP's submission of the EIS, advised that the EIS had not met the relevant rehabilitation requirements for the EM Plan under section 203 of the EP Act. While the environmental protection objectives are defined in the EIS's EM Plan, standards, measurable indicators and specific completion criteria for rehabilitation are missing or inadequate. EHP requested the proponent update Table 24-9 of the EIS (rehabilitation requirements) consistent with EHP's Rehabilitation Requirements for Mining Project Guideline (EM1122).

The proponent provided some additional rehabilitation information in the EIS addendum and proposed to provide the detailed information on rehabilitation objectives, indicators or completion criteria requested by EHP at a later stage as part of a rehabilitation management plan. The proponent acknowledged that further work would need to be undertaken as part of the development of this plan, including establishing reference sites and collecting baseline information from these sites.

EHP assessed the amended EIS and determined that the rehabilitation requirements provided as part of the amended EIS did not meet relevant rehabilitation requirements for the EM Plan under section 203 of the EP Act. EHP requested the proponent provide additional information on rehabilitation requirements as part of a 'Request for Information' issued under section 62 of the EP Act on 4 February 2014 (Appendix 2). In its response to the

information request, the proponent provided amended rehabilitation criteria which EHP has included in the draft conditions in Appendix 3 of this assessment report (i.e. Attachment 4 of Appendix 3).

### 4.25.3 Monitoring and mitigation

Monitoring and mitigation measures described in the EIS for rehabilitation include:

- a subsidence management plan
- a crack rehabilitation program
- a rehabilitation management plan
- a mine closure plan.

The rehabilitation management plan would be developed for the project and would include at least the following components:

- rehabilitation methodologies for all rehabilitation to be undertaken as part of the project
- rehabilitation monitoring programs including details of reference sites
- rehabilitation completion criteria
- contingency planning for rehabilitation maintenance or redesign.

CHRC's submission on the EIS requested the proponent consult with CHRC regarding rehabilitation of the site particularly the Blackwater Landfill and Ardurad Rd. It recommended the proponent consider the Blackwater Community Plan (CH2022), which described the community's vision, values and priorities, when developing the rehabilitation management plan for the site. In the response to EIS submissions, the proponent committed to consult with CHRC in relation to the development of a subsidence management plan for the landfill site prior to any subsidence of the landfill.

A private submission raised concerns that the year of decommissioning proposed in the EIS and ongoing maintenance of rehabilitation activities was inadequate. In the response to EIS submissions, the proponent clarified that the year of decommissioning described in section 4.11 of the EIS related to the deconstruction (decommissioning) of infrastructure only. A further period of rehabilitation after this would be required to ensure that the conditions of the EA in relation to rehabilitation are met. The rehabilitation activities would be monitored to ensure that the intended outcomes are achieved. In addition, mining proponents would be required in accordance with the EP Act to provide financial assurance for the rehabilitation program.

### 4.25.4 Conclusions and recommendations

The requirements of the TOR in relation to rehabilitation and decommissioning were substantially addressed in the EIS. Based on the environmental protection commitments in the EIS, appropriate conditions for rehabilitation have been included in Appendix 3.

# 5 Adequacy of the Environmental Management Plan

Changes to the EP Act about the content requirements for an EA application came into force on 31 March 2013 (*Environmental Protection (Greentape Reduction) and other Legislation Amendment Bill 2012*). These changes included the repeal of the requirement for a proponent to submit an EM Plan that meets the content requirements of section 203 of the EP Act. However, the project already had an active EA application under assessment prior to 31 March 2013, and therefore, the transitionary provisions of the EP Act require the proponent to submit an EM Plan that meets the content requirements of the previous section 203 of the EP Act.

EIS section 24 presented an EM Plan intended to meet the requirements of section 5 of the TOR, and section 310D of the *Environment Protection Act 1994*. Revisions to the EM Plan were made in the EIS Addendum in partial response to a number of deficiencies identified by EHP and other submissions on the EIS.

EHP assessed the EM Plan against the statutory content requirements and found that information is required with regard to:

1. A commitment to locate the raw water pipelines, power transmission lines and gas drainage infrastructure on the MLA to avoid 'sensitive features'. A definition of 'sensitive feature' should be provided and include as a minimum, remnant regrowth vegetation, creek lines including an appropriate buffer distance, gilgae areas and potential habitat for listed threatened species.

2. Address the following matters relating to air quality:
   - Report the maximum 24-hour average $PM_{10}$ GLC for the Landfill (R4) and outline management measures and a monitoring program at the Landfill to demonstrate the proponent's compliance with the EPP air quality objectives for $PM_{10}$ GLC.
   - Outline measureable performance criteria for achieving air quality objectives and a monitoring program to measure how control strategies perform against the performance criteria.

3. Address the following matters relating to surfacewater consistent with the Model Water Conditions for Coal Mines in the Fitzroy Basin (EHP, 2013):
   - Provide locally specific release limits derived from water quality data from a suitable reference range including EC release limits and maximum release rates for different flow events.
   - Provide a surface water monitoring strategy/REMP that meets the requirements of the TOR and model conditions

4. Address the following matters in relation to groundwater:
   - Commit to updating the groundwater model, in consultation with DNRM, to more accurately predict impacts including reviewing the appropriateness of model boundaries used in the EIS.
   - Provide a detailed groundwater monitoring plan to the satisfaction of EHP and DNRM. The plan is to, as a minimum, address the following:
     - include a table of bores with locations, aquifers to be monitored, and a commitment to the frequency of monitoring water level and quality
     - refer to water quality parameters listed in the project's TOR, including major ionic species, pH, electrical conductivity, total dissolved solids and any potentially toxic or harmful substances
     - provide justification about how the bore monitoring network would meet the needs of providing baseline data, noting seasonal variation and determining impacts of mining
     - provide for more comprehensive monitoring of water quality in the Rangal Coal Measures.

5. Address the following matters in relation to ecological survey methodology:
   - Provide sufficient justification to demonstrate that ground-truthed REs varied from the HVR shown on the certified PMAV maps (i.e. an RE amendment report with photos, maps and justifications for each change).
   - Provide information on:
     - the number of hours spent on the different survey techniques and the specific techniques conducted during each field trip to target terrestrial fauna species identified in EHP's submission on the EIS.
     - the survey method used for star finch (eastern) including the locations where surveys for star finch (eastern) took place and their proximity to the project site and whether or not any of the surveys included avifauna.

6. Commit to develop and implement an outcomes based ecological monitoring program which characterises the baseline ecological values and health of the project site (prior to project impacts), monitors any impacts of the project on ecological values (e.g. as a result of indirect impacts such as subsidence, remedial clearing and the construction of tracks and ventilation holes) and includes measures to mitigate impacts (if deemed necessary)

and enhance existing ecological values. The ecological monitoring program:

- Must include surveys for values identified by EHP that were not adequately addressed in the EIS including:
    - wet season aquatic surveys
    - surveys for the Australian painted snipe (e.g. spotlighting searches) to meet the minimum recommended survey times identified in Magrath *et al*, 2010
    - surveys of RE 11.3.25 and waterholes for the endangered black-throated finch (southern)
    - surveys of gilgai habitat (especially during wet weather conditions) and associated listed threatened species.
- Must commence prior to construction to allow adequate determination of baseline ecological values.
- Should be conducted bi-annually to include both wet and dry season characteristics, with riparian health conducted at least annually throughout construction, operation and decommissioning.
- Must address (but is not limited to) the following ecological values:
    - listed threatened species (present on site or likely to occur on site)
    - state and regionally significant corridors under the Queensland Government's Biodiversity Planning Assessment Mapping
    - of concern HVR, including a remnant patch of HVR (mapped currently as endangered in the certified PMAV) in the center of the project site (east of the cemetery)
    - riparian vegetation
    - aquatic ecosystems
    - gilgai areas
    - an ephemeral pond (which according to EHP's historical and current imagery suggests an unmapped ephemeral palustrine wetland) and any ephemeral wetlands.

It is recommended that the proponent seek advice on the various aspects of the EM Plan and proposed EA conditions from the delegate responsible for assessing the EA, located in the Environmental Services and Regulation (Mining) unit in EHP's Mackay Office, before submitting any amended documentation. EHP will require an amended EM Plan to be submitted by the proponent, before the draft EA conditions can be completed.

# 6 Recommendations about the suitability of the project

In this EIS process the information compiled by the proponent about the environmental values of the proposed project development area, and the potential impacts on those values from project activities, has been scrutinised by representatives of state and local government, industry and members of the public through an open, public review process. The proponent has also met the EIS process requirements including notification, responding to comments and submissions as required by Chapter 3 of the EP Act.

The EIS documents adequately addressed the TOR and described a range of mitigation measures to avoid or minimise environmental impacts. While the majority of issues were covered satisfactorily in the EIS documents and in the proponent's responses to the submissions and revised documents, a number of issues have not been fully resolved. These have been clearly described in the relevant sections of this assessment report.

The following matters should be addressed by the proponent prior to/or at the appropriate stage of the project's planning/implementation:

1. Liaise with Powerlink after the concept design stage to ensure health and safety issues and Powerlink's access needs are considered during all stages of the project.
2. Liaise with CHRC to determine an appropriate monitoring program and remediation strategy to ensure the impacts of subsidence on the Blackwater Landfill are monitored, identified and remediated by the proponents.
3. Liaise with CHRC to negotiate the type and volume of waste likely to be delivered to the Blackwater Landfill.
4. Liaise with TMR to agree on acceptable stormwater discharge volumes at the Capricorn Highway as a result of any discharges of water from the mine into Blackwater Creek.
5. Address and implement all conditions and requirements outlined by TMR in Appendix 4 of this assessment report.
6. Provide annual progress reports to DSDIP on mitigation measures for social impacts.
7. Investigate methods of augmenting and improving the visual amenity within the Blackwater Cemetery for visitors in consultation with the CHRC.

EHP has considered the submitted EIS, all submissions and the EP Act standard criteria. The project is assessed as being suitable to proceed on the basis of the EM Plan being completed and any subsequent EA, being conditioned suitably to implement the specific environmental protection commitments set out in the EIS and as described in this report. Consequently, the project is considered suitable to proceed to the next stage of the approval process noting that the recommendations of this assessment report should be fully implemented.

# 7 Recommendations for conditions for any approval

## 7.1 *Environmental Protection Act 1994* (EP Act)

An environmental authority (EA) to authorise and regulate the mining activities undertaken on the project site is required subject to Chapter 5, Part 5, Division 2 of the EP Act. The previous section 202 of the EP Act, which is applicable under the statutory transitional arrangements, states that the purpose of the EM Plan is to propose environmental protection commitments to help the administering authority prepare conditions for the project EA. EHP considers that the submitted EM Plan is currently insufficient in some areas for EHP to finalise conditions for the draft EA (see part 5 of this report).

However, as required by section 59(d) of the EP Act, this report includes recommended EA conditions which are contained in Appendix 3. EHP's model mining conditions (EHP, 2013)[12] and the model conditions for regulated structures (EHP, 2013)[13] were considered in the development of the recommended EA conditions. The recommended conditions are not considered complete or finalised until a revised EM Plan that addresses the matters outlined in part 5 of this report has been received. Additionally, condition C4 and conditions H7–H15 would need to be replaced by more outcome focussed conditions.

Additional or revised conditions would be developed once a finalised EM Plan has been submitted that substantially addresses the matters identified in Part 5 of this report.

## 7.2 Approvals under other legislation

A number of other approvals for the project have been identified in section 3.3 of this report. Conditions for these other approvals would be developed during the relevant application and assessment processes. Consequently, recommendations for conditions for any other approvals are not included in this assessment report, with the exception of conditions recommended by TMR in relation to road and rail issues (Appendix 4).

[12] Available at: https://www.ehp.qld.gov.au/land/mining/pdf/model-mining-conditions-em944.pdf

[13] Available at: http://www.ehp.qld.gov.au/land/mining/pdf/guide-structures-dams-levees-mining-em634.pdf

# 8 Report Certification

The EIS process is completed when this EIS assessment report is approved by the delegate for the chief executive and given to Blackwater Coal Pty Ltd.

| | |
|---|---|
|  | 24/03/2014 |
| Signature | Date |


Lindsay Delzoppo
Director, Statewide Environmental Assessments
Environmental Performance and Coordination
Environmental Services and Regulation Division
Department of Environment and Heritage Protection
**Delegate of the chief executive**
*Environmental Protection Act 1994*

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# Appendix 1—Summary of changes to Queensland Government departments

| Former departments | New department(s) (as of 3 April 2012)[1] |
|---|---|
| Department of Employment, Economic Development and Innovation | Department of State Development, Infrastructure and Planning<br>Queensland Treasury and Trade<br>Department of Agriculture, Fisheries and Forestry<br>Department of Water Supply |
| Department of Environment and Resource Management | Department of Environment and Heritage Protection<br>Department of Natural Resources and Mines<br>Department of Energy and Water Supply<br>Department of Science, Information Technology, Innovation and the Arts<br>Department of National Parks, Recreation, Sport and Racing |
| Department of Education and Training | Department of Education, Training and Employment |
| Department of Local Government and Planning | Department of Local Government, Community Recovery and Resilience) |
| Department of Communities | Department of Communities, Child Safety and Disability Services |
| Department of Public Works | Department of Housing and Public Works |
| **No changes:**<br>Department of Transport and Main Roads<br>Department of Community Safety<br>Queensland Police Service<br>Queensland Health | |
| **New departments:** | Department of Housing and Public Works<br>Department of Aboriginal and Torres Strait Islander and Multicultural Affairs<br>Tourism, Major Events, Small Business and the Commonwealth Games |

[1]Based on The Public Service Departmental Arrangements Notice (No.4) 2012, Queensland Government and Administrative Arrangements Order (No. 1) 2013, Queensland Government.

# Appendix 2—Proponent's response to information request

| Submission | Response |
|---|---|
| **Department of Natural Resources and Mines (DNRM) Minyango Coal Project SEIS Submissions—14 January 2014** | |
| **Groundwater** | |
| The responses to all previously raised DNRM groundwater concerns with the Environmental Impact Study (EIS) have generally dealt adequately with the issues raised.<br>Despite this however, a detailed Groundwater Monitoring Plan has not been adequately completed. Page 28 of the Terms of Reference, requests the proponent "*develop and describe a network of observation points and a monitoring program that would satisfactorily monitor groundwater resources both before and after commencement of operations*". Such a plan to the satisfaction of the department is required to be developed and submitted prior to the commencement of mining.<br>As a minimum, the department expects to see a table of bores with locations, aquifers to be monitored, and a commitment to the frequency of monitoring water level and quality. In relation to quality parameters to be reported - the ToR mentions major ionic species, pH, electrical conductivity, total dissolved solids and any potentially toxic or harmful substances.<br>There would also need to be some discussion about how the network will meet the needs of providing baseline data, noting seasonal variation and determining impacts of mining.<br>For further information please contact Ashley Bleakley Principal Project Officer (Hydrology) 54 337714.<br>Additionally, two further issues are raised below which specifically relate to issues raised by DNRM at the EIS stage and relate to responses in the Minyango RTS Report SEIS December 2013. | A groundwater monitoring plan, containing the location of bores, the aquifers to be monitored, the frequency of monitoring and the parameters to be monitored has been provided in Table 10-1 Groundwater Monitoring Program, in section 10.4 of the EIS and Table 24-11 Groundwater Monitoring Program, in section 24.4.4 of the EM Plan. The monitoring parameters include major ions, pH, electrical conductivity, total dissolved solids and other potentially harmful substances (e.g. metals and nutrients). Figure 10-1 Groundwater Monitoring Plan and Figure 24-27 both show the location of the bores in the groundwater monitoring program.<br><br>Section 10.4 of the EIS and section 24. 4.4 of the EM Plan discuss how these bores have been monitored prior to the commencement of mining to collect baseline data. As described in the Groundwater Report (Appendix H), groundwater data was collected in December 2011, January 2012, March 2012, April 2012, August 2012 and September 2012 thus ensuring seasonal variations. Section 10.4 of the EIS and section 24.4.4 also state that this groundwater monitoring program will continue throughout the life of the project to detect any changes in groundwater quality or quantity. |
| **Section 10—Issue 12 (Page-93)**<br><br>*Issue:* DNRM raised concerns about model boundaries and the proponent has responded by suggesting that the boundaries will if anything result in 'increased drawdown in the model and is an appropriate conservative assumption for an EIS where the 'worst case scenario' is required'.<br><br>The department considers that where practical the proponent should be | The recommendation to review the model boundaries and update the model when it is next reviewed has been noted. |

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| endeavouring to simulate actual groundwater conditions with the aim of developing a model which will accurately predict impacts.<br>DNRM accept the model boundaries in the existing model and the justification provided by the proponent for the existing EIS process, however consider that the appropriateness of model boundaries in use should be reviewed when the model is next reviewed.<br>*Recommendation:* The appropriateness of model boundaries should be reviewed when the model is next reviewed. | |
| **Section 10—Issue 8 (Page-91)**<br>*Issue:* DNRM previously raised concerns about the representativeness of one bore (MB2) when monitoring water quality in the Rangal Coal Measures.<br>The proponent has addressed this issue by discussing cost, safety concerns and expressing a belief that water quality is uniform in the aquifer.<br>It is considered that this issue could be addressed more fully in the groundwater monitoring plan to be developed.<br>*Recommendation:* The monitoring of water quality in the Rangal Coal Measures should be investigated and described in more detail in the groundwater monitoring plan. | Section 10.4 of the EIS and section 24.4.4 of the EM Plan, which contain the groundwater monitoring program, have been amended as per the response to DNRM issue number 8 in the Response to Public Submissions on the Environmental Impact Statement. Section 10.4 of the EIS and section 24.4.4 of the EM Plan have been amended as follows:<br>"Only a single monitoring bore was installed in a coal seam because:<br>• Being an underground mine the coal seams are relatively deep at typically between 300 m and 400 m, and in most areas the pressures preclude the use of standard PVC monitoring bores due to the risk of casing collapse;<br>• Due to the risk of casing collapse, bore MB2 in the coal seam was constructed with steel casing, which is a time consuming and expensive method for installing monitoring bores;<br>• The depth and large diameter of the steel bores are difficult to use for ongoing monitoring due to the large volumes that need to be purged from the bores;<br>• The high concentration of methane gas in the groundwater meant that gas was venting from bore MB2 constructed in the coal seam presenting a safety hazard during sampling; and<br>• As the coal seam forms a confined aquifer the water quality is expected to be uniformly saline (consistent with experience from other mines in the region) and did not warrant additional monitoring bores given the drilling challenges and safety issue.<br>Once mining commences there will be a further opportunity to collect water samples from the coal face when the main headings and gate roads are constructed, which will enable the groundwater quality to be further characterised." |

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| **Department of Environment and Heritage Protection (EHP) Minyango Project—Review of the amended EIS and proponent's response to submissions—Key issues for information request—23 January 2014** | |
| **Environmentally relevant activities**<br><br>*Issue:* Environmentally relevant activity (ERA) 33 Crushing, milling, grinding or screening has been listed as an ERA that will be carried out as part of the project. Figure 2-2 in the SEIS indicates that this ERA is proposed to be located at the Coal Handling and Preparation Plant (CHPP). If ERA 33 is proposed to be carried out as part of the CHPP operation, then this ERA is not required as ERA 31 Mineral processing authorises the processing of coal at a CHPP.<br><br>*Recommendation:* Clarify if ERA 33 is proposed to occur solely as part of the operation of the CHPP and therefore should be removed from the Environmental Management Plan (EM Plan). | ERA 33 is proposed to occur as part of the operation of the CHPP and therefore it has been removed from section 24.1.2 and Figure 24-2 of the EM Plan. |
| *Issue*: The EIS states that an onsite package water treatment plants would be installed in the mine surface facilities area and at the construction accommodation village. It also lists ERA 64 - Water Treatment (section 2.1.3) as an activity that would occur as part of the mining activity. However, in the EIS addendum ERA 64 - Water Treatment was removed from the list of ERA's as part of the project without any explanation. Reference to the requirements for an onsite package water treatment plant also remain in other sections of the EIS (e.g. Table 4-5).<br><br>*Recommendation:* Please clarify if ERA 64 - Water Treatment is proposed to occur as part of the mining activity. | On site water treatment plants will be installed at the mine surface facilities area and at the construction accommodation village. The project will need to treat approximately 3.3 ML/day of raw water. Therefore, ERA 64 was removed from the ERA list as the project is unlikely to meet the following minimum thresholds of ERA 64:<br><br>• Threshold 3: Treating 10 ML or more raw water in a day; or<br>• Threshold 4: Carrying out, in a day, advanced treatment of 5 ML or more of water, allowing the release of waste to waters other than seawater.<br><br>The project does not involve desalination and therefore thresholds 1 and 2 of ERA 64 are not applicable. |
| **Mine Water Release Strategy (Issues 16 and 17 in EHP's submission on the EIS)**<br><br>*Issue:* The proponent has proposed environmental authority (EA) conditions for the release of mine affected water "in accordance with EHP's model conditions". The application of the model water conditions for coal mines in the Fitzroy Basin is supported. However, the following tables included within Schedule F – Water (Fitzroy model conditions) of the proposed EA conditions have values marked as "TBC":<br><br>• Table F1 – Mine affected water release points, sources and receiving waters.<br><br>• Table F2 – Mine affected water release limits. | The proponent has installed stream flow gauges to collect background information on the receiving waters for the project. However, there have been limited flows in the creek since the installation of the flow gauges and therefore the proponent currently only has limited information. Therefore, the proponent proposes to use the ANZECC 2000 and QWQG 2009 limits in the EA until such time as adequate water quality data has been collected and these limits can be amended.<br><br>EA conditions F3, F4, F5, F11 and F18 of the draft EA in the EM Plan have been amended to include these limits. |

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| • Table F3 – Release contaminant trigger investigation levels, potential contaminants.<br>• Table F4 – Mine affected water release during flow events.<br>• Table F5 – Receiving waters contaminant trigger levels.<br>• Table F6 – Receiving water upstream background sites and downstream monitoring points.<br><br>The department will not authorise the release of mine affected water if the proposed release point locations, monitoring point locations (upstream and downstream receiving waters), contaminant trigger investigation levels and release limits are not included in the EA. Proposed conditions must be based on ANZECC 2000, the *Queensland Water Quality Guidelines 2009 (*QWQG*),* background monitoring data and other relevant information.<br><br>It appears that sufficient information (i.e. flow and predicted storage concentrations) should be available to the proponent to allow many of details in these tables can be populated (e.g. locations of release points and flow trigger release limits for Total Suspended Solids, Electrical Conductivity and sulfate) to be stipulated. At a meeting between EHP and Hansen Bailey on 25 November 2013, it was noted that the proponent had recently installed a stream gauging station on Blackwater Creek and this will be utilised to gather stream flow data to assist with the formulation of release conditions. The department supports the collection of locally relevant data as it is imperative that accurate stream flow and water quality (continuous and grab samples) data are gathered to inform release limits and to determine potential impacts of water release on the environmental values of the receiving environment. The release of mine affected water cannot be reflected in the EA until such data is provided.<br><br>*Recommendation:* As the department does not support including release conditions in the absence of a description of releases and release limits, the proponent is presented with two options in terms of conditioning the draft environmental authority until the relevant background monitoring data is gathered:<br><br>1. The release of mine affected water to the receiving environment may be authorised through applying release limits pertaining to ANZECC 2000 and QWQG 2009. Once the relevant background monitoring data is gathered and analysed so as to populate EA Tables the proponent may then apply for an amendment of the EA to include release to waters.<br><br>2. The proponent can liaise with EHP and DSITIA in order to discuss the potential application of suitable release limits based on the collation of the information provided in the EIS and SEIS; from the newly installed gauging station on Blackwater Creek; and any other data (i.e. data from other mine sites or Queensland government water monitoring stations) that may be used to determine locally relevant Environmental Values. However, if EHP | |

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| and DSITIA determine that there is insufficient data available to inform a mine water release strategy during the EA Decision period, options 1 above will apply.<br><br>The EM plan should be updated to demonstrate how model conditions would be met. | |
| **Sedimentation impacts on streams (Issue 34 in EHP's submission on the EIS)**<br><br>*Issue:* Subsidence of the stream is expected to alter sedimentation patterns. The proponent suggests that sediment and habitat loss will not be significant and while this response is accepted by EHP it is important to ensure that such potential impacts are considered in the EA and REMP. The proposed EA conditions in the SEIS will include a limit for Total Suspended Solids. Targeted monitoring of sediment impacts on biota would be a useful addition to the REMP.<br><br>*Recommendation:* Ensure final conditions in the EA will include water quality objectives for TSS. Include monitoring of potential sediment impacts on biota in the REMP. | Water quality objectives for Total Suspended Solids (TSS) are already included in Condition F18 of the draft EA in the EM Plan.<br><br>Subsidence impacts from the project, including subsidence impacts on watercourses, will be address in the subsidence management plan as required in draft EA conditions I29 and I30. Draft EA Condition I30 has been amended to include monitoring of the potential sediment impacts on biota. |
| **Rehabilitation Requirements and EM Plan (Issues 8 and 43 in EHP's submission on the EIS)**<br><br>*Issue:* The rehabilitation requirements provided as part of the revised EM Plan and Table H1 of the proposed EA conditions are insufficient in terms of addressing the level of detail required for rehabilitation objectives, indicators and completion criteria. The indicators provided are ambiguous / non-prescriptive and do not adequately consider the rehabilitation hierarchy in terms of the environmental values that are to be protected or restored post-mining (refer to EHP's Guideline: *Rehabilitation requirements for mining projects,* EM1122 – attached). Furthermore, the department considers that the indicators do not adequately reflect the requirements of section 5.1 (defining good indicators) of the Guideline.<br><br>The Minyango *Response to Submitters* (RTS) report justifies the absence of complete rehabilitation requirements by the provision of including such information in a Rehabilitation Management Plan. However, a Rehabilitation Management Plan is not proposed to be required under the EA. As such, this document will have no statutory bearing and the reliance of such a document for updating rehabilitation requirements is not considered to be appropriate by the department. Additionally, this information is required to be included in an EA under the Model Mining Conditions. These conditions were developed following extensive consultation with the Queensland Resources Council to ensure they were practical from the industry's point of view and would support the environmental outcomes expected by the Queensland Government.<br><br>Furthermore, the Guideline states that where suitable rehabilitation information is not | Table 24-10 in section 24.4.1 of the EM Plan has been amended with rehabilitation criteria as per the EHP guideline Rehabilitation Requirements for Mining Projects (EM1122). A new figure (Figure 24-21 – Rehabilitation Domains) has also been included in the EM Plan. |

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| available in the EIS, the following must occur:<br><br>"*…the environmental authority must contain criteria based on similar mines or general research and should contain a condition requiring the commencement of on-site trials to verify or modify these criteria within a relatively short timeframe (e.g. less than two years). The absence of field trials to verify the criteria is not a justification for omitting completion criteria from the EM Plan."*<br><br>The RTS report also states that the proposed rehabilitation requirements criteria should be accepted as they are similar to that of the Grosvenor EA. The Grosvenor EA was issued on 21 September 2012 and also includes tables for "Final Land use and rehabilitation approval schedule" and "Landform design criteria"; of which the proposed Minyango EA does not.<br><br>Under the EP Act, the department must consider the *standard criteria* when making environmental management decisions. This includes the consideration of the best practice environmental management activities under any relevant instrument. The draft Kevin's Corner (dated 5 July 2013) and draft Alpha Coal Project EA (dated 12 December 2012) are considered to contain best practice environmental management activities in terms of its rehabilitation requirements. The draft Alpha Coal Project EA was sent to Hansen Bailey via email on 25 November 2013. It was communicated to Hansen Bailey in this email, and during the teleconference between EHP and Hansen Bailey on 25 November 2013, that rehabilitation requirements in this draft EA are considered to be best practice. The draft Kevin's Corner EA is available on EHP's website at the following location: http://www.ehp.qld.gov.au/land/mining/pdf/draft-ea-kevins-corner.pdf.<br><br>*Recommendation:* In order for the EM Plan to meet content requirements of the EP Act, the following must be included in the EM Plan:<br><br>• More detailed rehabilitation goals, rehabilitation objectives, indicators and completion criteria in accordance with section 203 of the EP Act.<br>• Detailed schematics of the final landform clearly showing the different domains.<br>• The proposed vegetation species for each domain and coverage range.<br>• The pre- and post- land use based on land suitability classes (based on the Land Suitability Assessment technique).<br>• Breakdown of the landform design criteria for each domain with supporting evidence justifying the chosen landform designs.<br>• The geographical coordinates and a description of rehabilitation reference sites.<br>• Proposed maintenance, monitoring and reporting of rehabilitation as it is | |

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| completed.<br><br>The department's guideline *Rehabilitation requirements for mining projects guideline* (EM1122) has been attached to these comments and provides further guidance with developing the rehabilitation criteria. | |
| **Regulated Dams (new issue)**<br><br>*Issue:* In November 2013, the department released a new regulated structures manual (*Manual for Assessing Consequence Categories and Hydraulic Performance Structures,* EM635*)* and guideline (*Structures which are dams or levees constructed as part of environmentally relevant activities,* EM634). It is noted that these documents were released after the submission of the EIS; however these documents supersede the versions of the manual and guideline that the Minyango Project EIS utilised.<br><br>The department will be applying the new model conditions for regulated structures to the draft EA. As such, it is requested that the proponent conduct an assessment under the new manual and guideline for inclusion within the EM Plan.<br><br>*Recommendation:* It is recommended that the proponent conduct an assessment under the following documents to be included within the EM Plan:<br><br>• *Manual for Assessing Consequence Categories and Hydraulic Performance Structures,* EM635.<br><br>• *Structures which are dams or levees constructed as part of environmentally relevant activities,* EM634. | The EIS acknowledges the need to define the consequence category of dams under the current regulatory framework in order to develop appropriate conditions for the project's Environmental Authority.<br><br>A preliminary hazard category assessment of the proposed concept-level water storages was therefore presented in the EIS, in accordance with the principles in the 2012 edition of the Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (EM635) (Regulated Dams Manual). The 2012 Regulated Dams Manual hazard category assessment comprised two parts: an assessment of potential environmental harm; and contaminant concentration thresholds. The hazard category assessment found that no significant or sensitive features, active working areas or important public facilities/utilities were present in the containment failure path and the potential for environmental harm was therefore consistent with a 'low' hazard category. However, the quality of water within the mine storages was found to be marginally above the salinity concentration threshold of 4,000 µS/cm and on this basis alone, the dams were concluded to be 'significant' hazard category structures.<br><br>The Regulated Dams Manual was revised in December 2013. As part of this revision, the assessment of hazard category for each dam was replaced by a process of consequence category assessment. Under a consequence category assessment, a dam is assigned a consequence rating for environmental harm over a range of dam break or failure to contain scenarios. This assessment is comparable to the previous hazard category assessment. A key change to the assessment of consequence categories is the removal of salinity concentration thresholds for all structures except 'high' consequence dams i.e. there is no longer a salinity threshold for lower consequence dams such as those proposed by the project.<br><br>An initial re-assessment of the proposed concept-level water storages has been undertaken using the revised Regulated Dams Manual. The conclusions of this initial assessment are essentially consistent with those presented in the EIS, and are summarised as follows:<br><br>• No significant active working areas are likely to be present in the containment |

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| | failure path. People are not routinely present in the failure path and loss of life is not expected. This is consistent with a 'low' consequence category.<br>• Contamination of human drinking waters is not likely. This is consistent with a 'low' consequence category.<br>• The release of stored water is unlikely to result in significant loss or damage or remedial measures. Permanent alteration of ecosystems is unlikely given the stored water quality and ecological setting, with any minor impacts localised in the immediate vicinity. This is consistent with a 'low' consequence category.<br><br>Based upon this initial consequence assessment, the proposed concept-level water storages are considered 'low' consequence category structures and are therefore unlikely to be regulated storages under the *Environmental Protection Act 1994*. This assessment aligns with the previous hazard category assessment which concluded that all proposed water storages were 'low' risk in terms of containment failure and dam break scenarios.<br><br>As noted in section 12.2.1 of the EIS, the EIS already includes a commitment provide a detailed consequence category assessment for all dams at the time of undertaking detailed engineering design and prior to the construction of any dams. This approach is consistent with the model conditions J1-J6 presented in the Guideline *Structures which are dams or levees constructed as part of environmentally relevant activities* (the Regulated Dams Guideline) which require that the consequence category of all structures must be assessed *"prior to design and construction"*.<br><br>As per the intent of Explanatory Note 2 of the Regulated Dams Guideline, where a structure is assessed as a 'low' consequence structure, and later assessment results in the structure being determined to be a 'significant' or 'high' consequence category structure, an amendment to the environmental authority can be undertaken to capture or update any conditions specifically related to those regulated dams.<br><br>It is acknowledged that the consequence (or hazard) category of a dam can affect its design and storage requirements and that this can affect the project impacts. For the purposes of assessing worst-case impacts, the EIS conservatively assessed dam sizes and containment performance under the 'significant' hazard category requirements of the previous Regulated Dams Manual. This approach ensured that should any assessment report undertaken for the detailed dam design result in the proposed dams being deemed regulated structures, the mine water system presented in the EIS can achieve the requisite level of containment and performance. |

# Appendix 3—Recommended conditions for the Minyango Project environmental authority (resource activities)

## Schedule A - General

**A1** This environmental authority authorises environmental harm referred to in the conditions. Where there is no condition or this environmental authority is silent on a matter, the lack of a condition or silence does not authorise environmental harm.

**Scope of approval**

**A2** This environmental authority authorises the extraction of no more than 9 million tonnes of run-of-mine (ROM) coal per annum.

**A3** In carrying out the mining activity authorised by this environmental authority, the holder of this environmental authority must comply with **Attachment 1 – Minyango Coal Mine: Project Layout** of this environmental authority.

**A3** The holder of this environmental authority must:

a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority;
b) maintain such measures, plant and equipment in a proper and efficient condition;
c) operate such measures, plant and equipment in a proper and efficient manner; and
d) ensure all instruments and devices used for the measurement or monitoring of any parameter under any condition of this environmental authority are properly calibrated.

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**Monitoring**

**A4** Except where specified otherwise in another condition of this environmental authority, all monitoring records or reports required by this environmental authority must be kept for a period of not less than 5 years.

**A5** Upon request from the administering authority, copies of monitoring records and reports should be made available and provided to the administering authority's nominated office within 10 business days or an alternative timeframe agreed between the administering authority and the holder.
Any management or monitoring plans, systems or programs required to be developed and implemented by a condition of this environmental authority should be reviewed for effectiveness in minimising the likelihood of environmental harm on an annual basis, and amended promptly if required, unless a particular review date and amendment program is specified in the plan, system or program.

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**Financial assurance**

**A6** The activity must not be carried out until the holder of this environmental authority has given financial assurance to the administering authority as security for compliance with this environmental authority and any costs or expenses, or likely costs or expenses, mentioned in section 298 of the Act.

**A7** The amount of financial assurance must be reviewed by the holder of this environmental authority when a plan of operations is amended or replaced or the authority is amended.

**Risk management**

**A8** The holder of this environmental authority must develop and implement a risk management system for mining activities which mirrors the content requirement of the Standard for Risk Management (ISO31000:2009), or the latest edition of an Australian standard for risk management, to the extent relevant to environmental management, by <<Insert date 3 months from date of issue>>

**Notification of emergencies, incidents and exceptions**

**A9** The holder of this environmental authority must notify the administering authority by written notification within 24 hours, after becoming aware of any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with, the conditions of this environmental authority.

**A10** Within 10 business days following the initial notification of an emergency or incident, or receipt of monitoring results, whichever is the latter, further written advice must be provided to the administering authority, including the following:

a) results and interpretation of any samples taken and analysed;
b) outcomes of actions taken at the time to prevent or minimise unlawful environmental harm; and
c) proposed actions to prevent a recurrence of the emergency or incident.

**Complaints**

**A11** The holder of this environmental authority must record all environmental complaints received about the mining activities including:

a) name, address and contact number of the complainant;
b) time and date of complaint;
c) reasons for the complaint;
d) investigations undertaken;
e) conclusions formed;
f) actions taken to resolve the complaint;
g) any abatement measures implemented; and
h) person responsible for resolving the complaint.

**A12** The holder of this environmental authority must, when requested by the administering authority, undertake relevant specified monitoring within a reasonable timeframe nominated or agreed to by the administering authority to investigate any complaint of environmental harm. The results of the investigation (including an analysis and interpretation of the monitoring results) and abatement measures, where implemented, must be provided to the administering authority within 10 business days of completion of the investigation, or no later than 10 business days after the end of the timeframe nominated by the administering authority to undertake the investigation.

**Third-party reporting**

**A13** The holder of this environmental authority must:

a) within 1 year of the commencement of this environmental authority, obtain from an appropriately qualified person a report on compliance with the conditions of this environmental authority;
b) obtain further such reports at regular intervals, not exceeding 3 yearly intervals, from the completion of the report referred to above; and
c) provide each report to the administering authority within 90 days of its completion.

**A14** Where a condition of this environmental authority requires compliance with a standard, policy or guideline published externally to this environmental authority and the standard is amended or changed subsequent to the issue of this environmental authority, the holder of this environmental authority must:

a) comply with the amended or changed standard, policy or guideline within 2 years of the amendment or change being made, unless a different period is specified in the amended standard or relevant legislation; and

b) until compliance with the amended or changed standard, policy or guideline is achieved, continue to remain in compliance with the corresponding provision that was current immediately prior to the relevant amendment or change.

## Schedule B - Air

### Dust and particulate matter monitoring

**B1** The Proponent shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that the dust and particulate matter emissions generated by the mining activities do not cause exceedances of the following levels when measured at any sensitive or commercial place:

a) Dust deposition of 120 milligrams per square metre per day, averaged over 1 month, when monitored in accordance with the most recent version of Australian Standard AS3580.10.1 Methods for sampling and analysis of ambient air—Determination of particulate matter—Deposited matter – Gravimetric method.

b) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometres (PM10) suspended in the atmosphere of 50 micrograms per cubic metre over a 24-hour averaging time, for no more than 5 exceedances recorded each year, when monitored in accordance with the most recent version of either:

1. Australian Standard AS3580.9.6 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—$PM_{10}$ high volume sampler with size-selective inlet – Gravimetric method; or
2. Australian Standard AS3580.9.9 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—$PM_{10}$ low volume sampler—Gravimetric method.

c) A concentration of particulate matter with an aerodynamic diameter of less than 2.5 micrometres (PM2.5) suspended in the atmosphere of 25 micrograms per cubic metre over a 24-hour averaging time, when monitored in accordance with the most recent version of AS/NZS3580.9.10 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—PM (sub)2.5(/sub) low volume sampler—Gravimetric method.

d) A concentration of particulate matter suspended in the atmosphere of 90 micrograms per cubic metre over a 1 year averaging time, when monitored in accordance with the most recent version of AS/NZS3580.9.3:2003 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—Total suspended particulate matter (TSP)—High volume sampler gravimetric method.

## Schedule C - Waste management

**C1** Unless otherwise permitted by the conditions of this environmental authority or with prior approval from the administering authority and in accordance with a relevant standard operating procedure, waste must not be burnt.

**C2** The holder of this environmental authority may burn vegetation cleared in the course of carrying out extraction activities provided the activity does not cause environmental harm at any sensitive place or commercial place.

**Tailings disposal**

**C3** Tailings must be managed in accordance with procedures contained within the current plan of operations. These procedures must include provisions for:

a) containment of tailings;
b) the management of seepage and leachates both during operation and the foreseeable future;
c) the control of fugitive emissions to air;
d) a program of progressive sampling and characterisation to identify acid producing potential and metal concentrations of tailings;
e) maintaining records of the relative locations of any other waste stored within the tailings;
f) rehabilitation strategy; and
g) monitoring of rehabilitation, research and/or trials to verify the requirements and methods for decommissioning and final rehabilitation of tailings, including the prevention and management of acid mine drainage, erosion minimisation and establishment of vegetation cover.

**Waste Rock**

**C4** A waste rock and spoil disposal plan should be developed and include, where relevant, at least:

a) effective characterisation of the waste rock and spoil to predict under the proposed placement and disposal strategy the quality of runoff and seepage generated concerning potentially environmentally significant effects including salinity, acidity, alkalinity and dissolved metals, metalloids and non-metallic inorganic substances;
b) a program of progressive sampling and characterisation to identify dispersive and non-dispersive spoil and the salinity, acid and alkali producing potential and metal concentrations of waste rock;
c) a materials balance and disposal plan demonstrating how potentially acid forming and acid forming waste rock will be selectively placed and/or encapsulated to minimise the potential generation of acid mine drainage;
d) where relevant, a sampling program to verify encapsulation and/or placement of potentially acid-forming and acid-forming waste rock;
e) how often the performance of the plan will be assessed;
f) the indicators or other criteria on which the performance of the plan will be assessed; and
g) rehabilitation strategy.

## Schedule D - Noise

### Noise limits

**D1** The holder of this environmental authority must ensure that noise generated by the mining activities does not cause the criteria in **Table D1—Noise limits** to be exceeded at a sensitive place or commercial place.

**Table D1—Noise limits**

| | | Noise level dB(A) measured as LAeq, adj, 15 mins | | | Noise level dB(A) measured as LAmax |
|---|---|---|---|---|---|
| | | 7am to 6pm | 6pm to 10pm | 10pm to 7am | 10pm to 7am |
| **Off-Lease** | | | | | |
| Sensitive place | Blackwater residences including Way Street Primary School | 39 | 38 | 36 | 39 |
| | Industrial residences including BMA Accommodation village | 47 | 43 | 40 | 47 |
| | Rural residences | 38 | 38 | 33 | 40 |
| | Other | 38 | 38 | 33 | 40 |
| Commercial place | | 52 | 48 | 45 | 49 |
| **On-Lease** | | | | | |
| | Blackwater Landfill | 50 | N/A | N/A | N/A |
| | Blackwater Lawn Cemetery | 39 | N/A | N/A | N/A |

*Note: "N/A" not relevant as places are unoccupied at night.*

**Noise limits relate to outside noise.*

### Airblast overpressure nuisance

**D2** The holder of this environmental authority must ensure that blasting does not cause the limits for peak particle velocity and air blast overpressure in **Table D2—Blasting noise limits** to be exceeded at a sensitive place or commercial place.

**Table D2—Blasting noise limits**

| Blasting noise limits | Sensitive or commercial Blasting noise limits place limits | |
|---|---|---|
| | 7am to 6pm | 6pm to 7am |
| Airblast overpressure | 115 dB (Linear) Peak for 9 out of 10 consecutive blasts initiated and not greater than 120 bB (Linear) Peak at any time. | No blasting. |
| Ground vibration peak particle velocity | 5mm/second peak particle velocity for 9 out of 10 consecutive blasts and not greater than 10 mm/second peak particle velocity at any time. | No blasting. |

**Monitoring and reporting**

**D3** Noise monitoring and recording must include the following descriptor characteristics and matters:

a) LAN,T (where N equals the statistical levels of 1, 10 and 90 and T = 15 mins);
b) background noise LA90;
c) the level and frequency of occurrence of impulsive or tonal noise and any adjustment and penalties to statistical levels;
d) atmospheric conditions including temperature, relative humidity and wind speed and directions;
e) effects due to any extraneous factors such as traffic noise;
f) location, date and time of monitoring; and
g) if the complaint concerns low frequency noise, Max LpLIN,T and one third octave band measurements in dB(LIN) for centre frequencies in the 10 – 200 Hz range.

**D4** The holder of this environmental authority must develop and implement a blast monitoring program to monitor compliance with **Table D2 – Blasting noise limits** for:

a) all blasts undertaken on this site in each month at the nearest sensitive place or commercial place; and
b) all blasts conducted during any time period specified by the administering authority at the nearest sensitive place or commercial place.

*Note: The blasting monitoring requirements as per condition **D4 a)** may be reviewed after two (2) years of mining operations.*

## Schedule E - Groundwater

### Contaminant release

**E1** The holder of this environmental authority must not release contaminants to groundwater.

### Monitoring and reporting

**E2** All determinations of groundwater quality and biological monitoring must be performed by an appropriately qualified person.

**E3** Groundwater quality and levels must be monitored at the locations and frequencies defined in **Table—E1 Groundwater monitoring locations and frequency** and illustrated in **Attachment 2—Groundwater Monitoring Bores** of this environmental authority for the quality characteristics identified in **Table E2—Groundwater quality triggers and limits**.

**Table E1—Groundwater monitoring locations and frequency**

| Monitoring Point | Location | | Surface RL (m)* | Monitoring Frequency |
|---|---|---|---|---|
| | Easting (GDA94 – Zone 54) | Northing (GDA94 – Zone 54) | | |
| **Monitoring Bores** | | | | |
| MB2 | 692307.5 | 7387920.4 | TBA | Quarterly |
| MB3R | 691374 | 7383883 | | |
| MB4 | 690254.1 | 7387551.8 | | |
| MB5 | 690887.7 | 7384771.5 | | |
| MB6 | 693827.0 | 7384125.2 | | |
| MB9 | 693289.0 | 7382886.7 | | |
| MB10 | 693828.2 | 7384117.9 | | |
| MB11 | 692685.6 | 7384661.1 | | |
| MB12 | 694058.9 | 7388731.5 | | |
| MB13A | 694145.4 | 7388034.5 | | |
| MB13B | 694144.6 | 7388029.4 | | |
| MB16 | 691422 | 7382182 | | |
| MB17 | 692424 | 7382611 | | |
| MB14A | 691080.4 | 7385595.7 | | |
| MB14B | 691079.8 | 7385590.6 | | |
| MB15 | 691174.8 | 7385181.1 | | |
| **Vibrating Wire Piezometers** | | | | |
| MB1 | 692817.6 | 7388523.7 | TBA | Daily |
| MB7 | 691388 | 7383867 | | |
| MB8 | 693499 | 7384246 | | |

1. Surface RL ("TBA") must be submitted to the administering authority prior to impacting the relevant aquifers.
2. Monitoring is not required where a bore has been removed as a direct result of the mining activity.
3. RL must be measured to the nearest 5cm from the top of the bore casing.
4. Reference sites must:
   (a) have a similar flow regime;
   (b) be from the same bio-geographic and climatic region
   (c) have similar geology, soil types and topography
   (d) not be so close to the test sites that any disturbance at the test site also results in a change at the reference site.

**Table E2 - Groundwater quality triggers and limits**

| Parameter | Contaminant Triggers | Contaminant Limit |
|---|---|---|
| Aluminium | mg/L | TBA |
| Antimony | mg/L | TBA |
| Arsenic | mg/L | TBA |
| Calcium | mg/L | TBA |
| Chlorine | mg/L | TBA |
| $CO_3$ | mg/L | TBA |
| Dissolved Solids (Total) | mg/L | TBA |
| Electrical Conductivity | µS/cm | TBA |
| $HCO_3$ | mg/L | TBA |
| Iron | mg/L | TBA |
| Magnesium | mg/L | TBA |
| Mercury | mg/L | TBA |
| Molybdenum | mg/L | TBA |
| pH | pH Units | TBA |
| Potassium | mg/L | TBA |
| Selenium | mg/L | TBA |
| Silver | mg/L | TBA |
| $SO_4$ | mg/L | TBA |
| Sodium | mg/L | TBA |
| Suspended Solids (Total) | mg/L | TBA |
| Petroleum Hydrocarbons (Total) | mg/L | TBA |

*Note: Fields marked 'TBA' must be submitted to the administering authority for approval by <insert date 3 years after EA approval>, or before the commencement of mining activities, whichever is earlier.*

**E4** Groundwater levels when measured at the monitoring locations specified in **Table E3 - Groundwater monitoring locations and frequency** must not exceed the groundwater level trigger change thresholds specified in **Table E5—Groundwater level monitoring** below.

**Table E3—Groundwater level monitoring**

| Monitoring location | Level trigger threshold |
|---|---|
| TBA | TBA |
| TBA | TBA |
| TBA | TBA |

*Note: Fields marked 'TBA' must be submitted to the administering authority for approval by <insert date 3 years after EA approval>, or before the commencement of mining activities, whichever is earlier.*

**Exceedance Investigation**

**E5** If quality characteristics of groundwater from compliance bores identified in **Table E3 - Groundwater monitoring locations and frequency** exceed any of the trigger levels stated in **Table E4 - Groundwater quality triggers and limits** or exceed any of the groundwater level trigger threshold stated in **Table E5 - Groundwater level monitoring**, the holder of this environmental authority must compare the compliance monitoring bore results to the reference bore results and complete an investigation in accordance with the ANZECC and ARMCANZ 2000.

**E6** Results of groundwater monitoring from compliance bores identified in **Table E3 - Groundwater monitoring locations and frequency**, must not exceed any of the limits defined in **Table E4 - Groundwater quality triggers and limits**.

**Groundwater Impacts from Subsidence of Blackwater Landfill**

**E7** If the groundwater monitoring program required under conditions **E3** and **E4** indicates that the aquifer(s) within the vicinity of the Blackwater Landfill exceed the trigger or compliance levels stated in **Table E4 - Groundwater quality triggers and limits** or exceed any of the groundwater level trigger threshold stated in **Table E5 - Groundwater level monitoring**, an investigation must be undertaken by a suitably qualified person to determine the following:

a) if the exceedance(s) were related to subsidence of the landfill from the mining activities;
b) if the exceedances are found to be related to landfill subsidence from mining activities:
    i) determine the extent of the impact zone for contamination;
    ii) conduct an exceedance investigation in accordance with condition E5 of this environmental authority;
    iii) implement measures to prevent contamination of groundwater for current and future mining activities; and
    iv) develop an extended groundwater monitoring program to determine:
        1) the extent of potential impacts on groundwater values from leachate contamination; and
        2) the effectiveness of mitigation measures.

**E8** The investigation report required under condition **E7** must be provided to the administering authority within thirty (30) days of providing an initial exceedance report under condition **A9** of this environmental authority.

**Bore construction and maintenance and decommissioning.**

**E9** The construction, maintenance and management of groundwater bores (including groundwater monitoring bores) must be undertaken in a manner that prevents or minimises impacts to the environment and ensures the integrity of the bores to obtain accurate monitoring.

## Schedule F - Water (Fitzroy model conditions)

### Contaminant release

**F1** Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters as a result of the authorised mining activities, except as permitted under the conditions of this environmental authority.

**F2** Unless otherwise permitted under the conditions of this environmental authority, the release of mine affected water to waters must only occur from the release points specified in **Table F1—Mine affected water release points, sources and receiving waters** and depicted in Figure 1 attached to this environmental authority.

**F3** The release of mine affected water to internal water management infrastructure installed and operated in accordance with a water management plan that complies with condition F28 is permitted.

**Table F1—Mine affected water release points, sources and receiving waters**

| Release Point (RP) | Latitude (decimal degree, GDA94) | Longitude (decimal degree, GDA94) | Mine Affected Water Source and Location | Monitoring Point | Receiving waters description |
|---|---|---|---|---|---|
| RP 1 CHPP Dam | 692039 | 7381789 | CHPP Runoff | CHPP Dam | Blackwater Creek |
| CDA Catch Dam | 691377 | 7384878 | CDA Runoff | CDA Catch Dam | Blackwater Creek |

**F4** The release of mine affected water to waters in accordance with condition **F2** must not exceed the release limits stated in **Table F2—Mine affected water release limits** when measured at the monitoring points specified in **Table F1—Mine affected water release points, sources and receiving waters** for each quality characteristic.

**Table F2—Mine affected water release limits**

| Quality Characteristic | Release Limits | Monitoring frequency | Comment |
|---|---|---|---|
| Electrical conductivity (uS/cm) | 1,000 | Daily during release (the first sample must be taken within 2 hours of commencement of release) | As per the release limits in the upstream Cook Colliery environmental authority. |
| pH (pH Unit) | 6.5 (minimum) | Daily during release (the first sample must be taken within 2 hours of commencement of | |

| | | | |
|---|---|---|---|
| | 9.0 (maximum) | release) | |
| Turbidity (NTU) | 50 or the 80$^{th}$ percentile of a suitable reference range | Daily during release (first sample must be taken within 2 hours of commencement of release) | Turbidity is required to assess ecosystems impacts and can provide instantaneous results.<br>As per the release limits in the upstream Cook Colliery environmental authority. |
| Total Suspended Solids (mg/L) | 110 or the 80$^{th}$ percentile of a suitable reference range | Daily during release (the first sample must be taken within 2 hours of commencement of release) | Locally relevant water quality objectives scheduled under the *Environmental Protection Policy (Water) 2009* |
| Sulphate (mg/L) | 250 | Daily during release (the first sample must be taken within 2 hours of commencement of release) | Drinking water environmental values from NHMRC 2006 guidelines OR ANZECC |

**F5** The release of mine affected water to waters from the release points must be monitored at the locations specified in **Table F1—Mine affected water release points, sources and receiving waters** for each quality characteristic and at the frequency specified in **Table F2 - Mine affected water release limits** and **Table F3—Release contaminant trigger investigation levels, potential contaminants**.

*Note: the administering authority will take into consideration any extenuating circumstances prior to determining an appropriate enforcement response in the event condition F5 is contravened due to a temporary lack of safe or practical access. The administering authority expects the environmental authority holder to take all reasonable and practicable measures to maintain safe and practical access to designated monitoring locations.*

**Table F3—Release contaminant trigger investigation levels, potential contaminants**

| Quality Characteristic | Trigger Levels (µg/L) | Comment on Trigger Level | Monitoring Frequency |
|---|---|---|---|
| Aluminium | 55 | *For aquatic ecosystem protection, based on SMD guideline* | Commencement of release and thereafter weekly during release |
| Arsenic | 13 | *For aquatic ecosystem protection, based on SMD guideline* | |
| Cadmium | 0.2 | *For aquatic ecosystem protection, based on SMD guideline* | |
| Chromium | 1 | *For aquatic ecosystem protection, based on SMD guideline* | |
| Copper | 2 | *For aquatic ecosystem protection, based on LOR for ICPMS* | |
| Iron | 300 | *For aquatic ecosystem protection, based on low reliability guideline* | |
| Lead | 4 | *For aquatic ecosystem protection, based on SMD guideline* | |
| Mercury | 0.2 | *For aquatic ecosystem protection, based on LOR for CV FIMS* | |
| Nickel | 11 | *For aquatic ecosystem protection, based on SMD guideline* | |
| Zinc | 8 | *For aquatic ecosystem protection, based on SMD guideline* | |
| Boron | 370 | *For aquatic ecosystem protection, based on SMD guideline* | |
| Cobalt | 1.4 | *For aquatic ecosystem protection, based on low reliability guideline* | |
| Manganese | 1,900 | *For aquatic ecosystem protection, based on SMD guideline* | |
| Molybdenum | 34 | *For aquatic ecosystem protection, based on low reliability guideline* | |
| Selenium | 10 | *For aquatic ecosystem protection, based on LOR for ICPMS* | |
| Silver | 1 | *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 | 900 | *For aquatic ecosystem protection, based on SMD guideline* | |
| Nitrate | 1,100 | *For aquatic ecosystem protection, based on ambient Qld WQ Guidelines (2006) for TN* | |
| Petroleum hydrocarbons (C6-C9) | 20 | | |
| Petroleum hydrocarbons (C10-C36) | 100 | | |
| Fluoride (total) | 2,000 | *Protection of livestock and short term irrigation guideline* | |
| Sodium | TBA | | |

***Table F3 - Release contaminant trigger investigation levels, potential contaminants*** *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. *The quality characteristics required to be monitored as per **Table F3 - Release contaminant trigger investigation levels, potential contaminants** can be reviewed once the results of 2 years monitoring data is available, or if sufficient data is available to adequately demonstrate negligible environmental risk, and it may be determined that a reduced monitoring frequency is appropriate or that certain quality characteristics can be removed from **Table F3 - Release contaminant trigger investigation levels, potential contaminants** by amendment.*

3. *SMD – slightly moderately disturbed level of protection, guideline refers ANZECC & ARMCANZ (2000).*

4. *LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical method required to achieve LOR.*

5. *Fields marked 'TBA' must be submitted to the administering authority for approval by* <insert date 3 years after EA approval>*, or before the commencement of mining activities, whichever is earlier.*

**F6** If quality characteristics of the release exceed any of the trigger levels specified in **Table F3 - Release contaminant trigger investigation levels, potential contaminants** during a release event, the environmental authority holder must compare the downstream results in the receiving waters to the trigger values specified in **Table F3 - Release contaminant trigger investigation levels, potential contaminants** and:

a) where the trigger values are not exceeded then no action is to be taken; or

b) where the downstream results exceed the trigger values specified in **Table F3 - Release contaminant trigger investigation levels, potential contaminants** for any quality characteristic, compare the results of the downstream site to the data from background monitoring sites and

1. if the result is less than the background monitoring site data, then no action is to be taken; or
2. if the result is greater than the background monitoring site data, complete an investigation into the potential for environmental harm and provide a written report to the administering authority within 90 days of receiving the result, outlining
   (i) details of the investigations carried out; and
   (ii) actions taken to prevent environmental harm.

*Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with **F6 b) .)** of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.*

**F7** If an exceedance in accordance with condition **F6 b) 2.** is identified, the holder of the environmental authority must notify the administering authority in writing within 24 hours of receiving the result.

**Mine Affected Water Release Events**

**F8** The holder must ensure a stream flow gauging station/s is installed, operated and maintained to determine and record stream flows at the locations and flow recording frequency specified in **Table F3—Release contaminant trigger investigation levels, potential contaminants**.

**F9** The release of mine affected water to waters in accordance with condition **F2** must not exceed the Maximum Release Rate (for all combined release point flows) for each receiving water flow criterion for discharge specified in **Table F4—Mine affected water release during flow events** when measured at the monitoring points specified in **Table F1—Mine affected water release points, sources and receiving waters**.

**Table F4—Mine affected water release during flow events**

| Receiving waters/ stream | Release Point (RP) | Gauging station | Gauging Station Latitude (decimal degree, GDA94) | Gauging Station Longitude (decimal degree, GDA94) | Receiving Water Flow Recording Frequency | Receiving Water Flow Criteria for discharge ($m^3/s$) | Maximum release rate (for all combined RP flows) | Electrical Conductivity Release Limits |
|---|---|---|---|---|---|---|---|---|
| Blackwater Creek | RP 1 and RP2 | Blackwater Creek Crossing at Tantallon | 693978 | 7384545 | Continuous (minimum daily) | **Low** <1 $m^3/s$ | TBA | TBA |
| | | | | | | **Medium** <1 $m^3/s$ | TBA | TBA |
| | | | | | | | TBA | TBA |
| | | | | | | **High** >10 $m^3/s$ | TBA | TBA |

*Note: Fields marked 'TBA' must be submitted to the administering authority for approval by <insert date 3 years after EA approval>, or before the commencement of mining activities, whichever is earlier.*

**F10** The daily quantity of mine affected water released from each release point must be measured and recorded.

**F11** Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build-up of sediment in such waters.

**Notification of Release Event**

**F12** The environmental authority holder must notify the administering authority as soon as practicable and no later than 24 hours after commencing to release mine affected water to the receiving environment. Notification must include the submission of written advice to the administering authority of the following information:

a) release commencement date/time;
b) details regarding the compliance of the release with the conditions of Department Interest: Water of this environmental authority (that is, contaminant limits, natural flow, discharge volume);
c) release point/s;
d) release rate;
e) release salinity; and
f) receiving water/s including the natural flow rate.

*Note: Notification to the administering authority must be addressed to the Manager and Project Manager of the local Administering Authority via email or facsimile.*

**F13** The environmental authority holder must notify the administering authority as soon as practicable and nominally no later than 24 hours after cessation of a release event of the cessation of a release notified under Condition F13 and within 28 days provide the following information in writing:

a) release cessation date/time;
b) natural flow rate in receiving water;
c) volume of water released;
d) details regarding the compliance of the release with the conditions of Department Interest; Water of this environmental authority (i.e. contaminant limits, natural flow, discharge volume) ;
e) all in-situ water quality monitoring results; and
f) any other matters pertinent to the water release event.

*Note: Successive or intermittent releases occurring within 24 hours of the cessation of any individual release can be considered part of a single release event and do not require individual notification for the purpose of compliance with conditions **F13** and **F14**, provided the relevant details of the release are included within the notification provided in accordance with conditions **F13** and **F14**.*

**Notification of Release Event Exeedance**

**F14** If the release limits defined in **Table F2 - Mine affected water release limits** are exceeded, the holder of the environmental authority must notify the administering authority within 24 hours of receiving the results.

**F15** The environmental authority holder must, within 28 days of a release that is not compliant with the conditions of this environmental authority, provide a report to the administering authority detailing:

a) the reason for the release;
b) the location of the release;
c) the total volume of the release and which (if any) part of this volume was non-compliant;
d) the total duration of the release and which (if any) part of this period was non-compliant;
e) all water quality monitoring results (including all laboratory analyses);
f) identification of any environmental harm as a result of the non-compliance;
g) all calculations; and
h) any other matters pertinent to the water release event.

**Receiving Environment Monitoring and Contaminant Trigger Levels**

**F16** The quality of the receiving waters must be monitored at the locations specified in **Table F6—Receiving water upstream background sites and downstream monitoring points** and illustrated in **Attachment 3—Surface Water Release Points, Monitoring Points and Receiving Waters** for each quality characteristic and at the monitoring frequency stated in **Table F5—Receiving waters contaminant trigger levels**.

**Table F5—Receiving waters contaminant trigger levels**

| Quality Characteristic | Trigger Level | Monitoring Frequency |
|---|---|---|
| pH | 6.5 – 9.0 | Daily during the release |
| Electrical Conductivity (µS/cm) | 1,000 | |
| Suspended solids (mg/L) | TBA once sufficient data is available from the new Cook gauging station and model conditions are completed. | |
| Sulphate ($SO_4^{2-}$) (mg/L) | 250 | |

*Note: Fields marked 'TBA' must be submitted to the administering authority for approval by <insert date 3 years after EA approval>, or before the commencement of mining activities, whichever is earlier.*

**Table F6—Receiving water upstream background sites and downstream monitoring points**

| Monitoring Points | Receiving Waters Location Description | Latitude (decimal degree, GDA94) | Longitude (decimal degree, GDA94) |
|---|---|---|---|
| **Upstream Background Monitoring Points** | | | |
| Washery In | Taurus Creek upstream of RP1 and RP2 | 692216 | 7371859 |
| **Downstream Monitoring Points** | | | |
| Blackwater Creek at Tantallon Road Crossing | Blackwater Creek | 693978 | 7384545 |

*Table F6 - Receiving water upstream background sites and downstream monitoring points notes:*

a) *Fields marked 'TBA' must be submitted to the administering authority for approval by <insert date 6 months after EA approval>, or before the commencement of mining activities, whichever is earlier.*

*b) The upstream monitoring point should be within Xkm the release point.*

*c) The downstream point should not be greater than Xm from the release point.*

d) *The data from background monitoring points must not be used where they are affected by releases from other mines.*

**F17** If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in **Table F5—Receiving waters contaminant trigger levels** during a release event, the environmental authority holder must compare the downstream results to the upstream results in the receiving waters and:

a) where the downstream result is the same or a lower value than the upstream value for the quality characteristic then no action is to be taken; or

b) where the downstream results exceed the upstream results, complete an investigation into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:

i) details of the investigations carried out; and

ii) actions taken to prevent environmental harm.

*Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with **F19 b)** of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.*

**F18** All determinations of water quality and biological monitoring must be performed by an appropriately qualified person.

**Receiving Environment Monitoring Program (REMP)**

**F19** The environmental authority holder must develop and implement a Receiving Environment Monitoring Program (REMP) to monitor, identify and describe any adverse impacts to surface water environmental values, quality and flows due to the authorised mining activity. This must include monitoring the effects of the mine on the receiving environment periodically (under natural flow conditions) and while mine affected water is being discharged from the site. For the purposes of the REMP, the receiving environment is the waters of Blackwater Creek and Taurus Creek and connected or surrounding waterways within 9.5km downstream of the release. The REMP should encompass any sensitive receiving waters or environmental values downstream of the authorised mining activity that will potentially be directly affected by an authorised release of mine affected water.

**F20** A REMP Design Document that addresses the requirements of the REMP must be prepared and made available to the administrating authority upon request.

**F21** A report outlining the findings of the REMP, including all monitoring results and interpretations must be prepared annually and made available on request to the administrating authority. This must include an assessment of background reference water quality, the condition of downstream water quality compared against water quality objectives, and the suitability of current discharge limits to protect downstream environmental values.

**Water reuse**

**F22** Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority and deposited into artificial water storage structures, such as farm dams or tanks, or used directly at properties owned by the environmental authority holder or a third party (with the consent of the third party).

**Annual Water Monitoring Reporting**

**F23** The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format:

a) the date on which the sample was taken;

b) the time at which the sample was taken;

c) the monitoring point at which the sample was taken;

d) the measured or estimated daily quantity of mine affected water released from all release points;

e) the release flow rate at the time of sampling for each release point;

f) the results of all monitoring and details of any exceedances of the conditions of this environmental authority; and

g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

**Water Management Plan**

**F24** A Water Management Plan must be developed by an appropriately qualified person and implemented.

**Stormwater and Water sediment controls**

**F25** An Erosion and Sediment Control Plan must be developed by an appropriately qualified person and implemented for all stages of the mining activities on the site to minimise erosion and the release of sediment to receiving waters and contamination of stormwater.

**F26** Stormwater, other than mine affected water, is permitted to be released to waters from:

**a)** erosion and sediment control structures that are installed and operated in accordance with the Erosion and Sediment Control Plan required by condition **F26**; and

b) water management infrastructure that is installed and operated, in accordance with a Water Management Plan that complies with condition **F25**, for the purpose of ensuring water does not become mine affected water.

## Schedule G - Sewage treatment

**G1** The only contaminant permitted to be released to land is treated sewage effluent in compliance with the release limits stated in **Table G1—Contaminant release limits to land.**

**Table G1—Contaminant release limits to land**

| Contaminant | Unit | Release limit | Limit type | Frequency |
|---|---|---|---|---|
| 5 day Biochemical oxygen demand (BOD)1 | mg/L | 20 | Maximum | Monthly |
| Total suspended solids | mg/L | 30 | Maximum | Monthly |
| Nitrogen | mg/L | 30 | Maximum | Monthly |
| Phosphorus | mg/L | 15 | Maximum | Monthly |
| E-coli | Organisms/100ml | 1000 | Maximum | Monthly |
| pH | pH units | 6.0 – 9.0. | Range | Monthly |

**G2** Treated sewage effluent may only be released to land for the purpose of dust suppression and/or firefighting in accordance with the conditions of this approval.

**G3** The application of treated effluent to land must be carried out in a manner such that:

(a) vegetation is not damaged;

(b) there is no surface ponding of effluent; and

(c) there is no run-off of effluent.

**G4** If areas irrigated with effluent are accessible to employees or the general public, prominent signage must be provided advising that effluent is present and care should be taken to avoid consuming or otherwise coming into unprotected contact with the effluent.

**G5** All sewage effluent released to land must be monitored at the frequency and for the parameters specified in **Table G1 - Contaminant release limits to land**.

**G6** The daily volume of effluent release to land must be measured and records kept of the volumes of effluent released.

**G7** When circumstances prevent the irrigation or beneficial reuse of treated sewage effluent such as during or following rain events, waters must be directed to a wet weather storage or alternative measures must be taken to store/lawfully dispose of effluent.

**G8** Treated sewage effluent must only be supplied to another person or organisation that has a written plan detailing how the user of the treated sewage effluent will comply with their general environmental duty under section 319 of the Act whilst using the treated sewage effluent.

## Schedule H - Land and rehabilitation

**H1** Land disturbed by mining must be rehabilitated in the rehabilitation domains identified in **Attachment 4 – Rehabilitation Domains** in accordance with **Attachment 5 - Rehabilitation Requirements** of this environmental authority.

**H2** Rehabilitation must commence progressively in accordance with the plan of operations.

**H3** Land disturbed by mining, as determined by an appropriately qualified person, must be managed and rehabilitated to ensure:

a) that the ecosystem functionality and health of land, watercourses, floodplains, potential habitat for listed threatened species (present on site or likely to occur on site), state and regional corridors under Queensland's Biodiversity Planning Assessment Mapping, high value regrowth, riparian vegetation, ephemeral wetlands and aquatic habitats and gilgae areas are demonstrated to have returned to close to or better than pre development condition.
b) that subsided longwall panels:
    i) do not result in the capture of overland flow
    ii) maintain watercourse flows within existing channels without causing increased erosion of bed or banks.

**Contaminated Land**

**H4** Before applying for surrender of a mining lease, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the mining lease which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use.

**H5** Before applying for progressive rehabilitation certification for an area, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the area the subject of the application which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use under condition H1.

**H6** Minimise the potential for contamination of land by hazardous contaminants.

**Subsidence Management Plan**

**H7** A Subsidence Management Plan must be developed by an appropriately qualified person(s) and implemented by the holder of this environmental authority prior to the commencement of activities that result in subsidence.

**H8** The Subsidence Management Plan must:

a) provide for the proper and effective management of the actual and potential environmental impacts resulting from the mining activity and to ensure compliance with the conditions of this environmental authority;

b) be developed in accordance with the Draft departmental guideline "*Watercourse Subsidence – Central Queensland Mining Industry"* or any subsequent versions;

c) describe the proposed impacts of subsidence on any land, watercourse and floodplain including but not limited to:

i. physical condition of surface drainage:

- erosion;
- areas susceptible to higher levels of erosion such as watercourse confluences;
- incision processes;
- stream widening;
- tension cracking;
- lowering of bed and banks;
- creation of instream waterholes;
- changes to local drainage patterns;

ii. overland flow:

- capture of overland flow by subsided long-wall panels;
- increased overbank flows due to lowering of high bank of watercourses;
- the portion of local and large scale catchment likely to be captured by subsided;
- long-wall panels and the associated impacts on downstream users;

iii. water quality:

- surface water;
- groundwater;

iv. land condition: current land condition to be impacted by subsidence;

v. infrastructure: detail of existing infrastructure (pipelines, railway, powerlines and haul roads) should be identified where there is a potential impact from effects of land subsidence;

vi. monitoring of the potential sediment impacts on biota;

d) propose options for mitigating any impacts associated with subsidence and how these mitigation methods will be implemented;

e) describe cumulative impacts on watercourses or catchments;

f) describe impacts on groundwater; and

g) describe contingency procedures for emergencies; and include a program for monitoring and review of the effectiveness of the Subsidence Management Plan.

**H9** The Subsidence Management Plan must be reviewed each calendar year and a report prepared by an appropriately qualified person. The report must:

a) assess the plan against the requirements under condition **H8**;

b) include recommended actions to ensure actual and potential environmental impacts are effectively managed for the coming year; and
c) identify any amendments made to the Subsidence Management Plan following the review.

**H10** The holder of this environmental authority must attach to the review report required by condition **H9**, a written response to the report and recommended actions, detailing the actions taken or to be taken by the environmental authority on stated dates:

a) to ensure compliance with this environmental authority; and
b) to prevent a recurrence of any non-compliance issues identified.

**H11** The review report required by condition **H9** and the written response to the review report required by condition **H9** must be submitted to the administering authority upon request.

**H12** The holder of this environmental authority must arrange for each subsided longwall panel to be inspected annually by a suitably qualified and experienced person, in accordance with conditions **H13** through **H14**.

**H13** The annual inspection must be conducted between **1 April and 1 November** each year.

**H14** At each annual inspection, the condition of each subsided longwall panel must be assessed, including the structural, geotechnical and hydraulic adequacy of the subsided longwall panel and the adequacy of the works with respect to the Subsidence Management Plan.

**H15** For each inspection, copies of a report certified by the suitably qualified and experienced person, including any recommendations to ensure the integrity of each subsided longwall panel must be provided to the administering authority upon request.

**Biodiversity Offsets**

**H16** The holder of this environmental authority must provide an offset for impacts on applicable state significant biodiversity values (SSBV's), in accordance with the latest version of the administering authority's biodiversity offset policy. The biodiversity offset must be consistent with the requirements for an offset as identified in the Biodiversity Offset Strategy (as per condition **H17**) and must be provided:

a) prior to impacting on SSBV's; or
b) where a land based offset is to be provided, within 12 months of identifying that subsidence has impacted SSBVs; or
c) where an offset payment is to be provided, within 4 months of identifying that subsidence has impacted SSBVs; or
d) the relevant stage identified in the Biodiversity Offset Strategy submitted under condition **H17**.

**H17** In the event that subsidence from longwall panels impacts SSBVs, a Biodiversity Offset Strategy must be developed and submitted to the administering authority within either 30 days, or a lesser period agreed to by the administering authority, prior to impacting additional SSBVs.

**Chemicals and flammable or combustible liquids**

**H18** All explosives, hazardous chemicals, corrosive substances, toxic substances, gases and dangerous goods should be stored and handled in accordance with the current Australian standard where such is applicable. Flammable and combustible liquids, including petroleum products, should be stored and handled in accordance with the latest edition of AS1940—The storage and handling of flammable and combustible liquids. Where no relevant Australian standard exists store such materials within an effective on-site containment system.

## Schedule J – Regulated Structures

**Assessment of consequence category**

**I1** The consequence category of any structure must be assessed by a suitably qualified and experienced person in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (EM635) at the following times:

a) prior to the design and construction of the structure; or
b) prior to any change in its purpose or the nature of its stored contents.

**I2** A consequence assessment report and certification must be prepared for each structure assessed and the report may include a consequence assessment for more than one structure.

**I3** Certification must be provided by the suitably qualified and experienced person who undertook the assessment, in the form set out in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (EM635).

**Design and construction[14] of a regulated structure**

**I4** All regulated structures must be designed by, and constructed[15] under the supervision of, a suitably qualified and experienced person in accordance with the requirements of the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (EM635).

**I5** Construction of a regulated structure is prohibited unless the holder has submitted a consequence category assessment report and certification to the administering authority has been certified by a suitably qualified and experienced person for the design and design plan and the associated operating procedures in compliance with the relevant condition of this authority.

**I6** Certification must be provided by the suitably qualified and experienced person who oversees the preparation of the design plan in the form set out in the Manual for *Assessing Consequence Categories and Hydraulic Performance of Structures* (EM635), and must be recorded in the Regulated Dams/Levees register.

**I7** Regulated structures must:

a) be designed and constructed in accordance with and conform to the requirements of the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (EM635);
b) be designed and constructed with due consideration given to ensuring that the design integrity would not be compromised on account of:
   i) floodwaters from entering the regulated dam from any watercourse or drainage line; and
   ii) wall failure due to erosion by floodwaters arising from any watercourse or drainage line.

[14] Construction of a dam includes modification of an existing dam—refer to the definitions

[15] Certification of design and construction may be undertaken by different persons

c) for regulated dams that are dams associated with a failure to contain – seepage: have the floor and sides of the dam designed and constructed to prevent or minimise the passage of the wetting front and any entrained contaminants through either the floor or sides of the dam during the operational life of the dam and for any period of decommissioning and rehabilitation of the dam.

**I8** Certification by the suitably qualified and experienced person who supervises the construction must be submitted to the administering authority on the completion of construction of the regulated structure, and state that:

a) the 'as constructed' drawings and specifications meet the original intent of the design plan for that regulated structure; and
b) construction of the regulated structure is in accordance with the design plan.

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**Operation of a regulated structure**

**I9** Operation of a regulated structure is prohibited unless:

a) the holder has submitted to the administering authority:
   i) one paper copy and one electronic copy of the design plan and certification of the 'design plan' in accordance with condition **I6**;
   ii) a set of 'as constructed' drawings and specifications;
   iii) certification of those 'as constructed drawings and specifications' in accordance with condition J8;
   iv) where the regulated structure is to be managed as part of an integrated containment system for the purpose of sharing the DSA volume across the system, a copy of the certified system design plan;

b) the requirements of this authority relating to the construction of the regulated structure have been met;

   v) c) the holder has entered the details required under this authority, into a Register of Regulated Dams; and
   d) there is a current operational plan for the regulated structure.

**I10** Each regulated structure must be maintained and operated, for the duration of its operational life until decommissioned and rehabilitated, in a manner that is consistent with the current operational plan and, if applicable, the current design plan and associated certified 'as constructed' drawings.

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**Mandatory reporting level**

**I11** Conditions **I12** to **I15** inclusive only apply to Regulated Structures which have not been certified as low consequence category for 'failure to contain – overtopping'.

**I12** The Mandatory Reporting Level (the MRL) must be marked on a regulated dam in such a way that during routine inspections of that dam, it is clearly observable.

**I13** The holder must, as soon as practical and within forty-eight (48) hours of becoming aware, notify the administering authority when the level of the contents of a regulated dam reaches the MRL.

**I14** The holder must, immediately on becoming aware that the MRL has been reached, act to prevent the occurrence of any unauthorised discharge from the regulated dam.

**I15** The holder must record any changes to the MRL in the Register of Regulated Structures.

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**Design storage allowance**

**I16** The holder must assess the performance of each regulated dam or linked containment system over the preceding November to May period based on actual observations of the available storage in each regulated dam or linked containment system taken prior to 1 July of each year.

**I17** By 1 November of each year, storage capacity must be available in each regulated dam (or network of linked containment systems with a shared DSA volume), to meet the Design Storage Allowance (DSA) volume for the dam (or network of linked containment systems).

**I18** The holder must, as soon as possible and within forty-eight (48) hours of becoming aware that the regulated dam (or network of linked containment systems) will not have the available storage to meet the DSA volume on 1 November of any year, notify the administering authority.

**I19** The holder must, immediately on becoming aware that a regulated dam (or network of linked containment systems) will not have the available storage to meet the DSA volume on 1 November of any year, act to prevent the occurrence of any unauthorised discharge from the regulated dam or linked containment systems.

**Annual inspection report**

**I20** Each regulated structure must be inspected each calendar year by a suitably qualified and experienced person.

**I21** At each annual inspection, the condition and adequacy of all components of the regulated structure must be assessed and a suitably qualified and experienced person must prepare an annual inspection report containing details of the assessment and include recommended actions to ensure the integrity of the regulated structure.

**I22** The suitably qualified and experienced person who prepared the annual inspection report must certify the report in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (EM635).

**I23** The holder must:

a) within twenty (20) business days of receipt of the annual inspection report, provide to the administering authority:
   i) the recommendations section of the annual inspection report; and
   ii) if applicable, any actions being taken in response to those recommendations; and
   iii) if, following receipt of the recommendations and (if applicable) actions, the administering authority requests a full copy of the annual inspection report from the holder, provide this to the administering authority within 10 business days of receipt of the request.

**Transfer arrangements**

**I24** The holder must provide a copy of any reports, documentation and certifications prepared under this authority, including but not limited to any Register of Regulated Structures, consequence assessment, design plan and other supporting documentation, to a new holder on transfer of this authority.

**Decommissioning and rehabilitation**

**I25** Dams must not be abandoned but be either:

a) decommissioned and rehabilitated to achieve compliance with condition **I27**; or
b) be left in-situ for a beneficial use(s) provided that:
   i) it no longer contains contaminants that will migrate into the environment;
   ii) it contains water of a quality that is demonstrated to be suitable for its intended beneficial use(s); and
   iii) the administering authority, the holder of the environmental authority and the landholder agree in writing that the dam will be used by the landholder following the cessation of the environmentally relevant activities).

**I26** After decommissioning, all significantly disturbed land caused by the carrying out of the environmentally relevant activities) must be rehabilitated to meet the following final acceptance criteria:

a) the landform is safe for humans and fauna;
b) the landform is stable with no subsidence or erosion gullies for at least three (3) years;
c) any contaminated land (e.g. contaminated soils) is remediated and rehabilitated.
d) not allowing for acid mine drainage; or
e) there is no ongoing contamination to waters (including groundwater);
f) rehabilitation is undertaken in a manner such that any actual or potential acid sulfate soils on the area of significant disturbance are treated to prevent or minimise environmental harm in accordance with the Instructions for the treatment and management of acid sulfate soils (2001);
g) all significantly disturbed land is reinstated to the pre-disturbed soil suitability class;
h) for land that is not being cultivated by the landholder:
    i) groundcover, that is not a declared pest species is established and self-sustaining;
    ii) vegetation of similar species richness and species diversity to pre-selected analogue sites is established and self-sustaining,; and
    iii) the maintenance requirements for rehabilitated land is no greater than that required for the land prior to its disturbance caused by carrying out the petroleum activity(ies).
i) for land that is to be cultivated by the landholder, cover crop is revegetated, unless the landholder will be preparing the site for cropping within three (3) months of resource activities being completed.

**Register of Regulated Dams**

**I27** A Register of Regulated Dams must be established and maintained by the holder for each regulated dam.

**I28** The holder must provisionally enter the required information in the Register of Regulated Dams when a design plan for a regulated dam is submitted to the administering authority.

**I29** The holder must make a final entry of the required information in the Register of Regulated Dams once compliance with condition **I10 and I11** has been achieved.

**I30** The holder must ensure that the information contained in the Register of Regulated Dams is current and complete on any given day.

**J30** All entries in the Register of Regulated Dams must be approved by the chief executive officer for the holder of this authority, or their delegate, as being accurate and correct.

**J31** The holder must, at the same time as providing the annual return, supply to the administering authority a copy of the records contained in the Register of Regulated Dams, in the electronic format required by the administering authority.

## Schedule K – Cultural Heritage

**K1** No excavation, construction or other activity that may cause harm to Aboriginal cultural heritage may take place on MLA80173 without the development and approval of a Cultural Heritage Management Plan under the *Aboriginal Cultural Heritage Act 2003*.

## End of conditions

## Definitions

Key terms and/or phrases used in this document are defined in this section. Applicants should note that where a term is not defined, the definition in the *Environmental Protection Act 1994*, its regulations or environmental protection policies must be used. If a word remains undefined it has its ordinary meaning.

**'airblast overpressure'** means energy transmitted from the blast site within the atmosphere in the form of pressure waves. The maximum excess pressure in this wave, above ambient pressure is the peak airblast overpressure measured in decibels linear (dBL).

**'annual inspection report'** means an assessment prepared by a suitably qualified and experienced person containing details of the assessment against the most recent consequence assessment report and design plan (or system design plan):

a) against recommendations contained in previous annual inspections reports;
b) against recognised dam safety deficiency indicators;
c) or changes in circumstances potentially leading to a change in consequence category;
d) for conformance with the conditions of this authority;
e) for conformance with the 'as constructed' drawings;
f) for the adequacy of the available storage in each regulated dam, based on an actual observation or observations taken after 31 May each year but prior to 1 November of that year, of accumulated sediment, state of the containment barrier and the level of liquids in the dam (or network of linked containment systems); and
g) for evidence of conformance with the current operational plan.

**'annual exceedance probability'** or **'AEP'** the probability that at least one event in excess of a particular magnitude will occur in any given year.

**'appropriately qualified person'** means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relating to the subject matter using the relevant protocols, standards, methods or literature.

**'assessed'** or **'assessment'** by a suitably qualified and experienced person in relation to a consequence assessment of a dam, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit of the assessment:

a) exactly what has been assessed and the precise nature of that determination;
b) the relevant legislative, regulatory and technical criteria on which the assessment has been based;
c) the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
d) the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.

**'authority'** means an environmental authority.

**'background'**, with reference to the water schedule means the average of samples taken prior to the commencement of mining from the same waterway that the current sample has been taken.

**'blasting'** means the use of explosive materials to fracture:

a) rock, coal and other minerals for later recovery; or
b) structural components or other items to facilitate removal from a site or for reuse.

**'certification'** means assessment and approval must be undertaken by a suitably qualified and experienced person in relation to any assessment or documentation required by this Manual, including design plans, 'as constructed' drawings and specifications, construction, operation or an annual report regarding regulated structures, undertaken in accordance with the Board of Professional Engineers of Queensland Policy Certification by RPEQs (ID: 1.4 (2A)).

**'certifying, certify or certified'** have a corresponding meaning as 'certification'.

**'commercial place'** means a workplace used as an office or for business or commercial purposes, which is not part of the mining activity and does not include employees' accommodation or public roads.

**'consequence'** in relation to a structure as defined, means the potential for environmental harm resulting from the collapse or failure of the structure to perform its primary purpose of containing, diverting or controlling flowable substances.

**'consequence category'** means a category, either low, significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (EM635).
'c**onstruction'** or **'constructed'** in relation to a dam includes building a new dam and modifying or lifting an existing dam, but does not include investigations and testing necessary for the purpose of preparing a design plan.
**'dam'** means a land-based structure or a void that contains, diverts or controls flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works.

**'dam crest volume'** means the volume of material (liquids and/or solids) that could be within the walls of a dam at any time when the upper level of that material is at the crest level of that dam. That is, the instantaneous maximum volume within the walls, without regard to flows entering or leaving (for example, via spillway).

**'design plan'** is a document setting out how all identified consequence scenarios are addressed in the planned design and operation of a regulated structure.

**'design storage allowance'** or **'DSA'** means an available volume, estimated in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (EM635) published by the administering authority, must be provided in a dam as at 1 November each year in order to prevent a discharge from that dam to an annual exceedance probability (AEP) specified in that Manual.

**'disturbance'** of land includes:

a) compacting, removing, covering, exposing or stockpiling of earth;
b) removal or destruction of vegetation or topsoil or both to an extent where the land has been made susceptible to erosion;
c) carrying out mining within a watercourse, waterway, wetland or lake;
d) the submersion of areas by tailings or hazardous contaminant storage and dam/structure walls;
e) temporary infrastructure, including any infrastructure (roads, tracks, bridges, culverts, dam/structures, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be removed after the mining activity has ceased; or
f) releasing of contaminants into the soil, or underlying geological strata.

However, the following areas are not included when calculating areas of 'disturbance':

a) areas off lease (e.g. roads or tracks which provide access to the mining lease);
b) areas previously disturbed which have achieved the rehabilitation outcomes;
c) by agreement with the administering authority, areas previously disturbed which have not achieved the rehabilitation objective(s) due to circumstances beyond the control of the mine operator (such as climatic conditions);
d) areas under permanent infrastructure. Permanent infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dam/structures, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be left by agreement with the landowner.
e) disturbance that pre-existed the grant of the tenure.

**'EC'** means electrical conductivity.

**'effluent'** treated waste water released from sewage treatment plants.

**'holder'** means any person who is the holder of, or is acting under, the environmental authority.

**'hydraulic performance'** means the capacity of a regulated dam to contain or safely pass flowable substances based on the design criteria specified for the relevant consequence category in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (EM635).

**'infrastructure'** means water storage dams, levees,, roads and tracks, buildings and other structures built for the purpose of the mining activity.

**'land'** in the 'land schedule' of this document means land excluding waters and the atmosphere, that is, the term has a different meaning from the term as defined in the *Environmental Protection Act 1994*. For the purposes of the *Acts Interpretation Act 1954*, it is expressly noted that the term 'land' in this environmental authority relates to physical land and not to interests in land.

**'land use'** means the selected post mining use of the land, which is planned to occur after the cessation of mining operations.

**'leachate'** means a liquid that has passed through or emerged from, or is likely to have passed through or emerged from, a material stored, processed or disposed of at the operational land which contains soluble, suspended or miscible contaminants likely to have been derived from the said material.

**'levee'** means an embankment that only provides for the containment and diversion of stormwater or flood flows from a contributing catchment, or containment and diversion of flowable materials resulting from releases from other works, during the progress of those stormwater or flood flows or those releases; and does not store any significant volume of water or flowable substances at any other times.

**'low consequence dam'** means any dam that is not a high or significant consequence category as assessed using the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (EM635).

**'licensed place'** means the mining activities carried out at the mining tenements detailed in the table titled "Environmentally relevant activity and location details" on page 1 of this environmental authority.

**'m'** means metres.

**'Mandatory reporting level'** or **'MRL'** means a warning and reporting level determined in accordance with the criteria in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (EM635) published by the administering authority.

**'Manual'** means *the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635) p*ublished by the administering authority.

**'Modification'** or **'modifying'** (see definition of 'construction')
**'mine affected water':**

a) means the following types of water:
    i) pit water, tailings dam water, processing plant water;
    ii) water contaminated by a mining activity which would have been an environmentally relevant activity under Schedule 2 of the *Environmental Protection Regulation 2008* if it had not formed part of the mining activity;
    iii) rainfall runoff which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated, excluding rainfall runoff discharging through release points associated with erosion and sediment control structures that have been installed in accordance with the standards and requirements of an Erosion and Sediment Control Plan to manage such runoff, provided that this water has not been mixed with pit water, tailings dam water, processing plant water or workshop water;
    iv) groundwater which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated;
    v) groundwater from the mine's dewatering activities;
    vi) a mix of mine affected water (under any of paragraphs i)-v) and other water.
b) does not include surface water runoff which, to the extent that it has been in contact with areas disturbed by mining activities that have not yet been completely rehabilitated, has only been in contact with:
    i) land that has been rehabilitated to a stable landform and either capped or revegetated in accordance with the acceptance criteria set out in the environmental authority but only still awaiting maintenance and monitoring of the rehabilitation over a specified period of time to demonstrate rehabilitation success; or
    ii) land that has partially been rehabilitated and monitoring demonstrates the relevant part of the landform with which the water has been in contact does not cause environmental harm to waters or groundwater, for example:
        1. areas that are been capped and have monitoring data demonstrating hazardous material adequately contained with the site;
        2. evidence provided through monitoring that the relevant surface water would have met the water quality parameters for mine affected water release limits in this environmental authority, if those parameters had been applicable to the surface water runoff; or
        3. both.

**'measures'** includes any measures to prevent or minimise environmental impacts of the mining activity such as bunds, silt fences, diversion drains, capping, and containment systems.

**'NATA'** means National Association of Testing Authorities, Australia.

**'natural flow'** means the flow of water through waters caused by nature.

**'non-polluting'** means having no adverse impacts upon the receiving environment.

**'Operational plan'** includes:

a) normal operating procedures and rules (including clear documentation and definition of process inputs in the DSA allowance);
b) contingency and emergency action plans including operating procedures designed to avoid and/or minimise environmental impacts including threats to human life resulting from any overtopping or loss of structural integrity of the regulated structure.

**'peak particle velocity (ppv)'** means a measure of ground vibration magnitude which is the maximum rate of change of ground displacement with time, usually measured in millimetres/second (mm/s).

**'protected area'** means – a protected area under the *Nature Conservation Act 1992*; or

a) a marine park under the *Marine Parks Act 1992*; or
b) a World Heritage Area.

**'receiving environment'** in relation to an activity that causes or may cause environmental harm, means the part of the environment to which the harm is, or may be, caused. The receiving environment includes (but is not limited to):

a) a watercourse;
b) groundwater; and
c) an area of land that is not specified in Schedule # – Table # (Authorised Activities) of this environmental authority.

The term does not include land that is specified in Schedule # – Table # (Authorised Activities) of this environmental authority.

**'receiving waters'** means the waters into which this environmental authority authorises releases of mine affected water.

**'Register of Regulated Dams'** includes:

a) date of entry in the register;
b) name of the dam, its purpose and intended/actual contents;
c) the consequence category of the dam as assessed using the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635);
d) dates, names, and reference for the design plan plus dates, names, and reference numbers of all document(s) lodged as part of a design plan for the dam;
e) name and qualifications of the suitably qualified and experienced person who certified the design plan and 'as constructed' drawings;
f) for the regulated dam, other than in relation to any levees –
    i) the dimensions (metres) and surface area (hectares) of the dam measured at the footprint of the dam;
    ii) coordinates (latitude and longitude in GDA94) within five metres at any point from the outside of the dam including its storage area
    iii) dam crest volume (megalitres);
    iv) spillway crest level (metres AHD);
    v) maximum operating level (metres AHD);
    vi) storage rating table of stored volume versus level (metres AHD);
    vii) design storage allowance (megalitres) and associated level of the dam (metres AHD);
    viii) mandatory reporting level (metres AHD);
g) the design plan title and reference relevant to the dam;
h) the date construction was certified as compliant with the design plan;
i) the name and details of the suitably qualified and experienced person who certified that the constructed dam was compliant with the design plan;
j) details of the composition and construction of any liner;
k) the system for the detection of any leakage through the floor and sides of the dam;
l) dates when the regulated dam underwent an annual inspection for structural and operational adequacy, and to ascertain the available storage volume for 1 November of any year;
m) dates when recommendations and actions arising from the annual inspection were provided to the administering authority; and
n) dam water quality as obtained from any monitoring required under this authority as at 1 November of each year

**'Regulated dam'** means any dam in the significant or high consequence category as assessed using the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (EM635) published by the administering authority.

**'Regulated structure'** includes land-based containment structures, levees, bunds and voids, but not a tank or container designed and constructed to an Australian Standard that deals with strength and structural integrity.

**'Residual drilling material'** means waste drilling materials including muds and cuttings or cement returns from well holes and which have been left behind after the drilling fluids are pumped out.
**'rehabilitation'** the process of reshaping and revegetating land to restore it to a stable landform

**'release event'** means a surface water discharge from mine affected water storages or contaminated areas on the licensed place.

**'RL'** means reduced level, relative to mean sea level as distinct from depths to water.

**'representative'** means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

**'saline drainage'** The movement of waters, contaminated with salts, as a result of the mining activity.

**'sensitive place'** means:

a) a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
b) a motel, hotel or hostel; or
c) an educational institution; or
d) a medical centre or hospital; or
e) a protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 1992* or a World Heritage Area; or
f) a public park or gardens.

*Note: The definition of 'sensitive place' and 'commercial place' is based on Schedule 1 of* Environmental Protection (Noise) Policy 2008*. That is, a sensitive place is inside or outside on a dwelling, library & educational institution, childcare or kindergarten, school or playground, hospital, surgery or other medical institution, commercial & retail activity, protected area or an area identified under a conservation plan under* Nature Conservation Act 1992 *as a critical habitat or an area of major interest, marine park under* Marine Parks Act 2004*, park or garden that is outside of the mining lease and open to the public for the use other than for sport or organised entertainment. A commercial place is inside or outside a commercial or retail activity.*

*A mining camp (i.e., accommodation and ancillary facilities for mine employees or contractors or both, associated with the mine the subject of the environmental authority) is not a sensitive place for that mine or mining project, whether or not the mining camp is located within a mining tenement that is part of the mining project the subject of the environmental authority. For example, the mining camp might be located on neighbouring land owned or leased by the same company as one of the holders of the environmental authority for the mining project, or a related company. Accommodation for mine employees or contractors is a sensitive place if the land is held by a mining company or related company, and if occupation is restricted to the employees, contractors and their families for the particular mine or mines which are held by the same company or a related company.*

*For example, a township (occupied by the mine employees, contractors and their families for multiple mines that are held by different companies) would be a sensitive place, even if part or all of the township is constructed on land owned by one or more of the companies.*

**'Structure'** means dam or levee.

**'Spillway'** means a weir, channel, conduit, tunnel, gate or other structure designed to permit discharges form the dam, normally under flood conditions or in anticipation of flood conditions.

**'Suitably qualified and experienced person'** in relation to regulated structures means a person who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the *Professional Engineers Act 2002*, and has demonstrated competency and relevant experience:

a) for regulated dams, an RPEQ who is a civil engineer with the required qualifications in dam safety and dam design.
b) for regulated levees, an RPEQ who is a civil engineer with the required qualifications in the design of flood protection embankments.

*Note: It is permissible that a suitably qualified and experienced person obtain subsidiary certification from an RPEQ who has demonstrated competence and relevant experience in either geomechanics, hydraulic design or engineering hydrology.*

**'System design plan means'** a plan that manages an integrated containment system that shares the required DSA and/or ESS volume across the integrated containment system.
**'the Act'** means the *Environmental Protection Act 1994*.

**'µS/cm'** means micro siemens per centimetre.

**'Watercourse'** has the same meaning given in the *Water Act 2000*.

Watercourse includes the bed and banks and any other element of a river, creek or stream confining or containing water.

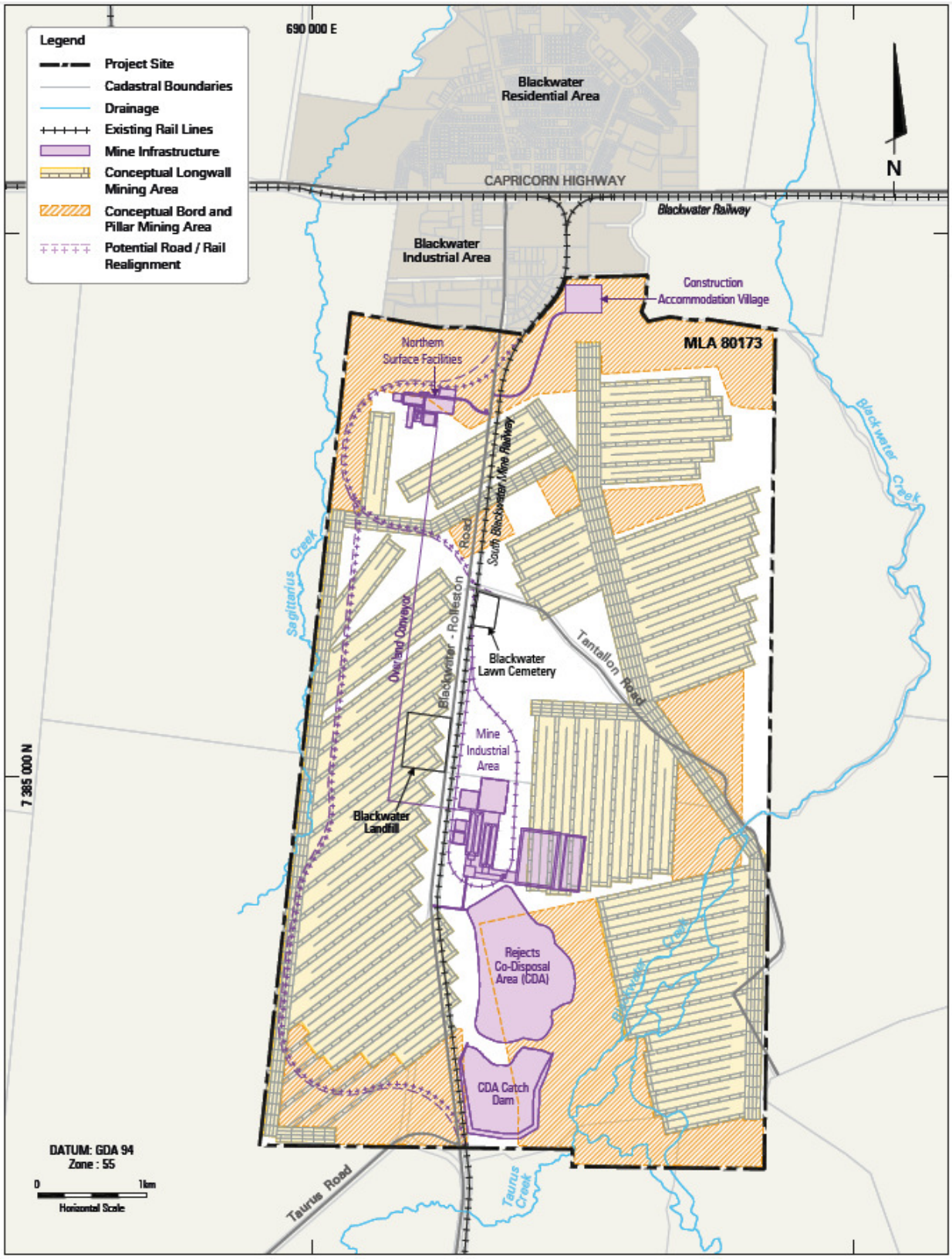
**'Waters'** includes all or any part of a river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water in natural or artificial watercourses, bed and banks of a watercourse, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater.

**'Water year'** means the 12-month period from 1 July to 30 June.

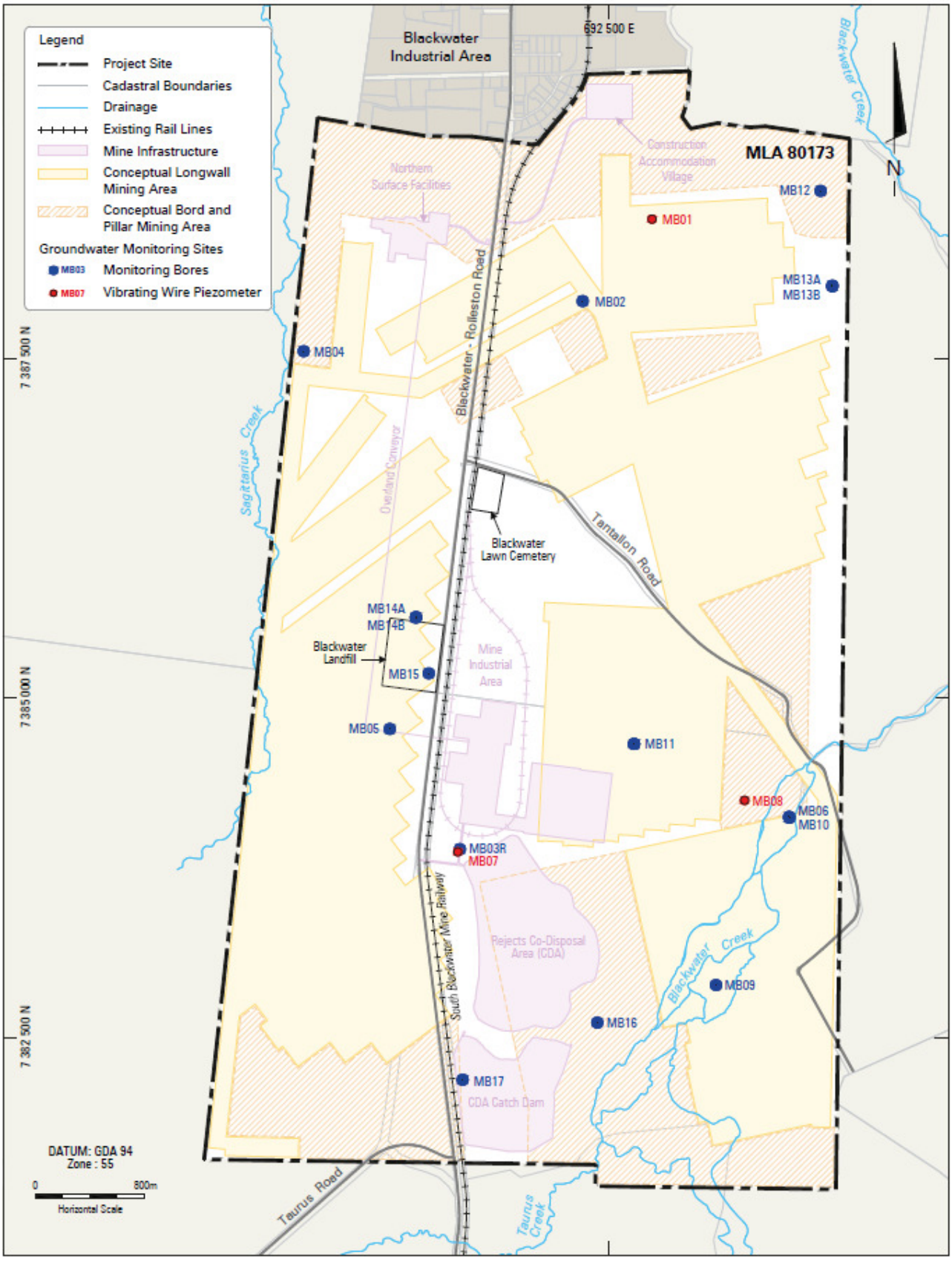
**'Wet season'** means the time of year, covering one or more months, when most of the average annual rainfall in a region occurs. For the purposes of DSA determination this time of year is deemed to extend from 1 November in one year to 31 May in the following year inclusive.

## Attachments

### Attachment 1 – Minyango Coal Mine: Project Layout



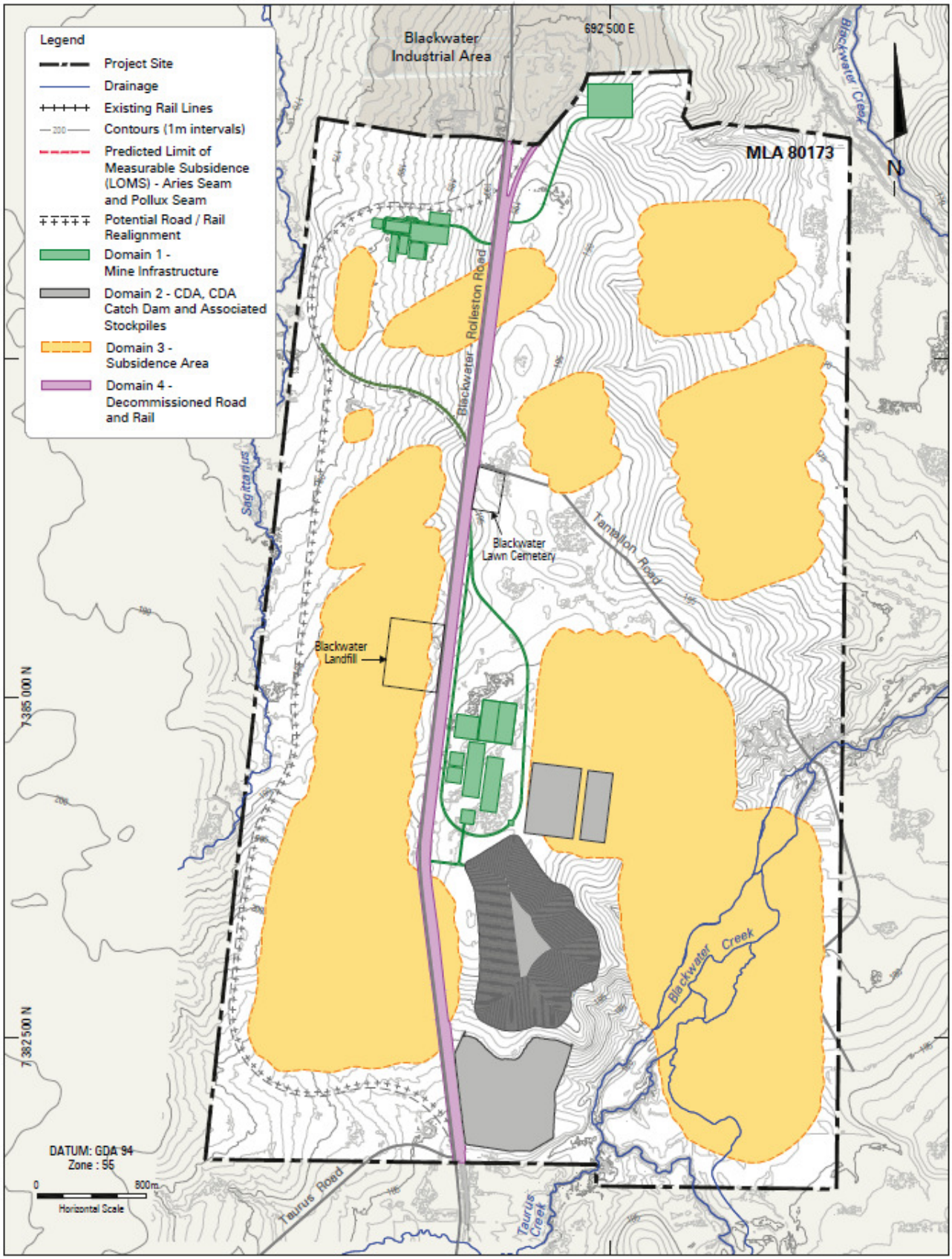
## Attachment 2 – Groundwater Monitoring Bores



## Attachment 3 – Surface Water Release Points, Monitoring Points and Receiving Waters

TBA

## Attachment 4 – Rehabilitation Domains



**Attachment 5—Rehabilitation Requirements**.

| Mine Domain | Rehabilitation Goal | Rehabilitation Objectives | Indicators | Completion criteria |
|---|---|---|---|---|
| Domain 1 - Mine Infrastructure Mine:<br>Mine surface facilities<br>Construction accommodation village<br>Internal roads<br>Mine rail infrastructure<br>Minor surface facilities above underground mining area | Long-term safety | Rehabilitation or conversion of exploration drill holes and groundwater monitoring bores | All non-artesian exploration drill holes and all monitoring bores established on the Mining Lease have been rehabilitated or converted to water bores | Certification of the following by an appropriately qualified person:<br>All non-artesian exploration drill holes not converted to water bores have been rehabilitated.<br>All sub-artesian aquifers have been isolated where non-artesian exploration drill holes have intersected more than one sub-artesian water bearing strata, in accordance with the *'Minimum Construction Requirements for Water Bores in Australia' (Australian Government, February 2012)* or latest edition.<br>All non-artesian exploration drill holes converted to a water bore have been converted in accordance with the *'Minimum Construction Requirements for Water Bores in Australia' (Australian Government, February 2012)* or latest edition. |
| | | Site is safe for humans and animals | Appropriate decommissioning of infrastructure | A risk assessment is to be undertaken by an appropriately qualified person at closure to ensure the site is safe and all infrastructure has been decommissioned appropriately. |
| | | | Remediate contaminated land | Evidence in the Rehabilitation Report that all areas contaminated by hydrocarbons or other chemicals used during the life of the mine have been excavated and disposed of appropriately. |
| | Non-polluting | No contamination of surface water and groundwater resources | Downstream surface water quality | Evidence in the Rehabilitation Report that surface water monitoring demonstrates the quality of water in receiving environment meets relevant water quality objectives. |
| | | | Groundwater quality | Evidence in the Rehabilitation Report that groundwater monitoring demonstrates that the groundwater quality is not negatively impacted compared to the baseline monitoring results. |
| | Stable landform | Landform achieves appropriate erosion rates | Slope angle and length | Evidence in the Rehabilitation Report that rehabilitated surfacesmatch the slope of surrounding land surfaces. |

| Mine Domain | Rehabilitation Goal | Rehabilitation Objectives | Indicators | Completion criteria |
|---|---|---|---|---|
| | | | Engineered structures to control water flow | Evidence in the Rehabilitation Report that required contour banks, channel linings, surface armour, engineered drop structures, etc are in place and functioning. |
| | | | Erosion control | Evidence in the Rehabilitation Report that rehabilitated surfaces are stable and not actively eroding. |
| | | Appropriate vegetation cover | Vegetation type and density | Evidence in the Rehabilitation Report that the vegetation type and density of species in rehabilitated areas are suited to the soil composition, slope, aspect, climate and other factors. |
| | | | | Evidence in the Rehabilitation Report that the vegetation types and densities in rehabilitated areas are comparable with the relevant reference site. |
| | | | Foliage Cover | Minimum of 70% ground cover is present (or 50% if rocks, logs or other features of cover are present). No bare surfaces >20 $m^2$ in area or >10 m in length down slope. |
| | | | Maintain species composition, diversity, and community structure (flora and fauna) | Evidence in the Rehabilitation Report that the species composition and community structure will be similar to appropriate reference sites chosen based on their current land use, soil type, vegetation community type and health. |
| | Sustainable land use | Soil properties support the desired land use | Topsoil and subsoil support the proposed vegetation and land use | Evidence in the Rehabilitation Report that soil properties (e.g. pH, salinity, nutrient content, sodium content) provide a suitable growth medium for relevant vegetation species. |
| | | Establish self-sustaining natural vegetation or habitat | Plant regeneration | Evidence in the Rehabilitation Report that species in rehabilitated areas show evidence of flowering, viable seed setting, germination and emergence. |
| | | | Presence of key plant species | Evidence in the Rehabilitation Report that the vegetation includes the presence of species, density and composition suited to the soil composition, slope, aspect, climate and other factors, by comparison to appropriate reference sites. |
| | | | Density of key plant species | |

| Mine Domain | Rehabilitation Goal | Rehabilitation Objectives | Indicators | Completion criteria |
|---|---|---|---|---|
| | | | Composition of key plant species | |
| | | | Abundance of declared plants (weeds) identified through inspection | Evidence in the Rehabilitation Report that declared weeds and pest animals are adequately controlled on the site. |
| | | | Abundance of exotic grasses | |
| | | | Actions taken to eradicate plants declared under local or State legislation | |
| | | Agricultural cattle grazing | Land is suitable for cattle grazing | Evidence in the Rehabilitation Report that cattle grazing is able to be undertaken on rehabilitated areas, by comparison to reference sites. |
| | | | Landform stable when grazed | Evidence in the Rehabilitation Report that land maintenance requirements are comparable to reference sites. |
| | | | | Evidence in the Rehabilitation Report that the rehabilitated landform is safe for stock and for undertaking management activities associated with stock. |
| | | | Stock access to water sources | Stock only allowed access to water sources that meet stock water requirements. |

| Mine Domain | Rehabilitation Goal | Rehabilitation Objectives | Indicators | Completion criteria |
|---|---|---|---|---|
| Domain 2 - Mine Waste Storage Facilities:<br>CDA<br>CDA Catch Dam<br>Associated Stockpiles | Long-term safety | Structurally safe with no hazardous materials | Safety assessment of landform stability (geotechnical issues) | Certification by an appropriately qualified and experienced person, in the Rehabilitation Report, that the CDA has been constructed as-designed, including:<br>Provision of as-built plans of the final CDA;<br>Confirmation that slopes are stable in the long term;<br>Confirmation that cover thickness is appropriate;<br>Evidence of revegetation success;<br>Confirmation that drainage has been appropriately established and are not actively eroding; and<br>Confirmation that erosion and sediment control measures have been installed and are operating as designed. |
| | | | Exposure to, and availability of heavy metals and other toxic materials | Evidence in the Rehabilitation Report, based on the results of progressive sampling and geochemical characterisation required by the EA, confirming the low potential for acid drainage. |
| | Non-polluting | No contamination of surface water and groundwater resources | Downstream surface water quality | Evidence in the Rehabilitation Report that surface water monitoring demonstrates the quality of water in receiving environment meets relevant water quality objectives. |
| | | | Groundwater quality | Evidence in the Rehabilitation Report that groundwater monitoring demonstrates that the groundwater quality is not negatively impacted compared to the baseline monitoring results. |
| | | | | |

| Mine Domain | Rehabilitation Goal | Rehabilitation Objectives | Indicators | Completion criteria |
|---|---|---|---|---|
| | Stable landform | Landform design achieves appropriate erosion rates | Safety assessment of landform stability (geotechnical issues) | Certification by an appropriately qualified and experienced person, in the Rehabilitation Report, that the CDA has been constructed as-designed, including:<br>Provision of as-built plans of the final CDA;<br>Confirmation that slopes are stable in the long term;<br>Confirmation that cover thickness is appropriate;<br>Evidence of revegetation success;<br>Confirmation that drainage has been appropriately established and are not actively eroding; and<br>Confirmation that erosion and sediment control measures have been installed and are operating as designed. |
| | Sustainable land use | Soil properties support the desired land use | Topsoil and subsoil support the proposed vegetation and land use | Evidence in the Rehabilitation Report that soil properties (e.g. pH, salinity, nutrient content, sodium content) provide a suitable growth medium for relevant vegetation species. |
| | | | | Evidence in the Rehabilitation Report that topsoil has been respread to suitable depths. |
| | | Establish self-sustaining natural vegetation or habitat | Plant regeneration | Evidence in the Rehabilitation Report that species in rehabilitated areas show evidence of flowering, viable seed setting, germination and emergence. |
| | | | Presence of key plant species | Evidence in the Rehabilitation Report that the vegetation includes the presence of species, density and composition suited to the spoil composition, slope, aspect, climate and other factors, by comparison to appropriate reference sites. |
| | | | Density of key plant species | |
| | | | Composition of key plant species | |
| | | | Abundance of declared plants (weeds) identified through inspection | Evidence in the Rehabilitation Report that declared weeds and pest animals are adequately controlled on the site. |
| | | | Abundance of exotic grasses | |

| Mine Domain | Rehabilitation Goal | Rehabilitation Objectives | Indicators | Completion criteria |
|---|---|---|---|---|
| | | | Actions taken to eradicate plants declared under local or State legislation | |
| | | Agricultural cattle grazing on appropriate areas | Control of stocking rates on slopes not suitable or safe for cattle grazing | Evidence in the Rehabilitation Report that access to slopes not suitable for cattle grazing is controlled. |
| | | | Stock access to water sources | Stock only allowed access to water sources that meet stock water requirements. |
| Domain 3 - Subsidence Area:<br>Areas within the limit of measurable subsidence (LOMS) | Long-term safety | Ensure site is safe for humans and animals | Rehabilitation of subsidence impacts | Evidence in the Rehabilitation Report that rehabilitation of subsidence impacts has been undertaken in accordance with the Subsidence Management Plan. |
| | Non-polluting | No contamination of surface water and groundwater resources | Downstream surface water quality | Evidence in the Rehabilitation Report that surface water monitoring demonstrates the quality of water in receiving environment meets relevant water quality objectives. |
| | | | Groundwater quality | Evidence in the Rehabilitation Report that groundwater monitoring demonstrates that the groundwater quality is not negatively impacted compared to the baseline monitoring results. |
| | Stable landform | Surface water drainage | Stable drainage works | Evidence in the Rehabilitation Report that remedial drainage works have been properly designed and constructed and are note actively eroding. |
| | | | Stabilise subsided banks of rivers/creeks | Evidence in the Rehabilitation Report that subsided sections of Blackwater Creek will be maintained in a stable condition post-subsidence. |
| | | No significant changes to hydrological conditions | Ponding | Evidence in the Rehabilitation Report that there are no residual subsidence ponds in the LOMS. |
| | | Landform achieves appropriate erosion rates | Tension cracks rehabilitated | Evidence in the Rehabilitation Report that tension cracks have been rehabilitated in accordance with the Subsidence Management Plan and are stable and not actively eroding. |

| Mine Domain | Rehabilitation Goal | Rehabilitation Objectives | Indicators | Completion criteria |
|---|---|---|---|---|
| | | | | Evidence in the Rehabilitation Report that rehabilitated tension cracks have been successfully revegetated, by comparison to reference sites. |
| | | Appropriate vegetation cover | Vegetation type and density | Evidence in the Rehabilitation Report that the vegetation type and density of species in rehabilitated areas are suited to the spoil composition, slope, aspect, climate and other factors. |
| | | | | Evidence in the Rehabilitation Report that the vegetation types and densities in rehabilitated areas are comparable with the relevant reference site. |
| | | | Foliage Cover | Minimum of 70% ground cover is present (or 50% if rocks, logs or other features of cover are present). No bare surfaces >20 $m^2$ in area or >10 m in length down slope. |
| | | | Maintain species composition, diversity, and community structure (flora and fauna) | Evidence in the Rehabilitation Report that the species composition and community structure will be similar to appropriate reference sites chosen based on their current land use, soil type, vegetation community type and health. |
| | Sustainable land use | Soil properties support the desired land use | Topsoil and subsoil support the proposed vegetation and land use | Evidence in the Rehabilitation Report that soil properties (e.g. pH, salinity, nutrient content, sodium content) provide a suitable growth medium for relevant vegetation species. |
| | | Establish self-sustaining natural vegetation or habitat | Plant regeneration | Evidence in the Rehabilitation Report that species in rehabilitated areas show evidence of flowering, viable seed setting, germination and emergence. |
| | | | Presence of key plant species | Evidence in the Rehabilitation Report that the vegetation includes the presence of species, density and composition suited to the spoil composition, slope, aspect, climate and other factors, by comparison to appropriate reference sites. |
| | | | Density of key plant species | |
| | | | Composition of key plant species | |

| Mine Domain | Rehabilitation Goal | Rehabilitation Objectives | Indicators | Completion criteria |
|---|---|---|---|---|
| | | | Abundance of declared plants (weeds) identified through inspection | Evidence in the Rehabilitation Report that declared weeds and pest animals are adequately controlled on the site. |
| | | | Abundance of exotic grasses | |
| | | | Actions taken to eradicate plants declared under local or State legislation | |
| | | Agricultural cattle grazing | Land is suitable for cattle grazing | Evidence in the Rehabilitation Report that cattle grazing is able to be undertaken on rehabilitated areas, by comparison to reference sites. |
| | | | Landform stable when grazed | Evidence in the Rehabilitation Report that land maintenance requirements are comparable to reference sites. |
| | | | | Evidence in the Rehabilitation Report that the rehabilitated landform is safe for stock and for undertaking management activities associated with stock. |
| | | | Stock access to water sources | Stock only allowed access to water sources that meet stock water requirements. |
| Domain 4 - Decommissioned Road and Rail:<br>Existing alignment of Blackwater – Rolleston Road<br>Existing alignment of South Blackwater Mine Railway | Long-term safety | Site is safe for humans and animals | Appropriate decommissioning of infrastructure | A risk assessment is to be undertaken by an appropriately qualified person at closure to ensure the site is safe and all infrastructure has been decommissioned appropriately. |
| | | | Remediate contaminated land | Evidence in the Rehabilitation Report that all areas contaminated by hydrocarbons or other chemicals used during the life of the mine have been excavated and disposed of appropriately. |
| | Non-polluting | No contamination of surface water and groundwater resources | Downstream surface water quality | Evidence in the Rehabilitation Report that surface water monitoring demonstrates the quality of water in receiving environment meets relevant water quality objectives. |

| Mine Domain | Rehabilitation Goal | Rehabilitation Objectives | Indicators | Completion criteria |
|---|---|---|---|---|
| Note: decommissioning of these features is only required if the potential road / rail realignment is constructed | | | Groundwater quality | Evidence in the Rehabilitation Report that groundwater monitoring demonstrates that the groundwater quality is not negatively impacted compared to the baseline monitoring results. |
| | Stable landform | Landform achieves appropriate erosion rates | Slope angle and length | Evidence in the Rehabilitation Report that rehabilitated surfaces match the slope of surrounding land surfaces. |
| | | | Engineered structures to control water flow | Evidence in the Rehabilitation Report that any required contour banks, channel linings, surface armour, engineered drop structures, etc are in place and functioning. |
| | | | Erosion control | Evidence in the Rehabilitation Report that rehabilitated surfaces are stable and not actively eroding. |
| | | Appropriate vegetation cover | Vegetation type and density | Evidence in the Rehabilitation Report that the vegetation type and density of species in rehabilitated areas are suited to the spoil composition, slope, aspect, climate and other factors. |
| | | | | Evidence in the Rehabilitation Report that the vegetation types and densities in rehabilitated areas are comparable with the relevant reference site. |
| | | | Foliage Cover | Minimum of 70% ground cover is present (or 50% if rocks, logs or other features of cover are present). No bare surfaces >20 $m^2$ in area or >10 m in length down slope. |
| | | | Maintain species composition, diversity, and community structure (flora and fauna) | Evidence in the Rehabilitation Report that the species composition and community structure will be similar to appropriate reference sites chosen based on their current land use, soil type, vegetation community type and health. |
| | Sustainable land use | Soil properties support the desired land use | Topsoil and subsoil support the proposed vegetation and land use | Evidence in the Rehabilitation Report that soil properties (e.g. pH, salinity, nutrient content, sodium content) provide a suitable growth medium for relevant vegetation species. |

| Mine Domain | Rehabilitation Goal | Rehabilitation Objectives | Indicators | Completion criteria |
|---|---|---|---|---|
| | | Establish self-sustaining natural vegetation or habitat | Plant regeneration | Evidence in the Rehabilitation Report that species in rehabilitated areas show evidence of flowering, viable seed setting, germination and emergence. |
| | | | Presence of key plant species | Evidence in the Rehabilitation Report that the vegetation includes the presence of species, density and composition suited to the spoil composition, slope, aspect, climate and other factors, by comparison to appropriate reference sites. |
| | | | Density of key plant species | |
| | | | Composition of key plant species | |
| | | | Abundance of declared plants (weeds) identified through inspection | Evidence in the Rehabilitation Report that declared weeds and pest animals are adequately controlled on the site. |
| | | | Abundance of exotic grasses | |
| | | | Actions taken to eradicate plants declared under local or State legislation | |
| | | Agricultural cattle grazing | Land is suitable for cattle grazing | Evidence in the Rehabilitation Report that cattle grazing is able to be undertaken on rehabilitated areas, by comparison to reference sites. |
| | | | Landform stable when grazed | Evidence in the Rehabilitation Report that land maintenance requirements are comparable to reference sites. |
| | | | | Evidence in the Rehabilitation Report that the rehabilitated landform is safe for stock and for undertaking management activities associated with stock. |
| | | | Stock access to water sources | Stock only allowed access to water sources that meet stock water requirements. |

# Appendix 4–Conditions proposed by the Department of Transport and Main Roads

## Part A: Rail-related conditions

1. Given the Minister for TMR is the designated "land-owner" for the South Blackwater Mine Railway corridor and in accordance to the *Mineral Resources Act 1989* section 271A sub-section 2, the proponent must consult with Roads, Rail and Ports System Management Branch of TMR with regards to surface and sub-surface mining activities. A request for Ministerial consent to the mining lease application and any enquiries regarding this matter should be directed to the Manager (Rail Corridor Management), Mr Craig England, phone 3066 7418, email: craig.d.england@tmr.qld.gov.au.

2. Potential impacts of the project on rail must be assessed and Track Protection strategies be developed. Any impact mitigation requirements including Track Protection strategies must be undertaken before commencement of any mining activities which may adversely affect safe and efficient rail operation.

## Part B: Road-related conditions

1. **Updated Road Impact Assessment:** When additional information regarding the final design and finalised traffic generation estimates of the project are available, the proponent shall undertake the following, no later than six months prior to the commencement of any project construction works:
   - Review and finalise the RIA to include details of the latest project traffic generation and all project transport impacts on the safety, condition and efficiency of state-controlled roads in accordance with *Guidelines for Assessment of Road impacts of Development (2006)* in consultation with the Manager of TMR Central Queensland Regional Office in Emerald.
   - Submit the updated RIA to the Manager of the Central Qld Regional Office in Emerald for review and approval.

2. **Road-use Management Plan:** The proponent must prepare a road-use management plan (RMP) for all use of state-controlled roads for each phase of the project, in accordance with TMR's *Guide to Preparing a Road Use Management Plan* (guideline attached). The RMP should detail non-infrastructure impact mitigation strategies, such as reduction in speed on road diversions as part of managing road safety during expected subsidence of public roads. The RMP must be approved by TMR Emerald office prior to its implementation and must be based on the finalised RIA.

3. **Traffic Management Plan/s:**
   - Three months prior to the commencement of any project construction works, the proponent shall prepare detailed drawings and traffic management plan/s (TMP) for all construction and other activities in state-controlled road corridors, to demonstrate how these road works will be safely undertaken.
   - The proponent shall implement the TMP during construction and commissioning of the project, construction of all access road intersection/s and other works to be undertaken within a state-controlled road corridor.
   - The TMP shall incorporate a provision that, prior to commencing any oversize/over-mass transport movements that may be required for the construction of the project, the proponent will consult with TMR's Heavy Vehicle Road Operations Program Office in Rockhampton (centralpermits@tmr.qld.gov.au or phone 1300 105 647and the relevant regional council/s.
   - The proponent shall obtain the necessary permits for any excess mass or over-dimensional loads associated with the project as required under *the Transport Operations (Road Use Management) Act (Qld) 1995*.

4. **Infrastructure Agreement:** The proponent will enter into an Infrastructure Agreement with the state (represented by TMR) to document how road infrastructure impacts including subsidence will be managed, through works or contributions towards impact mitigation, before commencement of significant project traffic ("significant" meaning traffic numbers or axle loadings [equivalent standard axles] greater than 5% of those currently occurring on roads used by project traffic).

5. **Undertaking road impact mitigation strategies:** The proponent shall present detailed drawings of any required roadworks and traffic management plans for review and approval by TMR and take account of the reviews. The proponent shall undertake any required roadworks and road-use management strategies detailed in the RMP and TMP.