BARALABA SOUTH

Baralaba South Project

Environmental Impact Statement

CHAPTER 2

Project Description

ENVIRONMENTAL SOLUTIONS

Table of Contents

List of Figures

List of Tables

2 Project Description

2.1 Proposed development

The steel production industry continues to demand high quality metallurgical coal. To meet this demand, Baralaba South Pty Ltd (the Proponent) is seeking approval to develop the Baralaba South Project (the Project). The Project objective is to develop an open cut, metallurgical coal resource able to export a low volatile pulverised coal injection (PCI) product for use by the steel production industry. The Proponent is proposing to develop a greenfield, metallurgical coal mine of small scale, having contemporary environmental management systems and plans in place sufficient to address all identified environmental impacts.

2.1.1 Project objective, nature and scale

The proposed Project is a greenfield, metallurgical coal mine development located approximately 8 km south of the town of Baralaba and 115 km west of Rockhampton in the lower Bowen Basin region of central Queensland. Approximately 49 Mt ROM coal is estimated to be mined to produce approximately 36 Mt of product coal over the 23-year life of the Project.

This EIS describes the Project of a reduced scale and design than previous proposals in response to concerns regarding the potential environmental or social impact from flooding from the Dawson River associated with previously proposed plans that were larger in terms of production and mine footprint. In response to these concerns, the proposed Project has been substantially revised to a much smaller mine with the mine footprint outside the 10% AEP flood extent with mining to occur outside the forecasted 0.1% AEP flood design extent.

The Project will produce up to approximately 2.5 million tonnes per annum (Mtpa) of ROM coal, equivalent to 1% of the total 2021/22 metallurgical coal production in Queensland, at a rate equivalent to the 50th percentile of metallurgical coal mines in Queensland (based on 2021/2023 data). The identified resource area supports a mine with an operational life of approximately 23 years under optimal mining conditions. Factors such as engineering optimisation, market conditions and environmental factors may affect the overall operational life of the Project. It is intended that construction of the Project will commence within 24 months of primary approvals being granted.

The mining activity is to advance from the north to south along the eastern tenure boundary of Mining Lease Application (MLA) 700057 which covers a total area of 2,214 ha. Overburden and interburden will be placed in the mined-out pit and out-of-pit WREs located on-site and contiguous with the pit excavation. The open cut pit behind the advancing operations will be progressively backfilled and rehabilitated to minimise the total disturbance at any time and consequent risks to the environment. A conventional Coal Handling and Preparation Plant (CHPP) will be constructed on-site for coal washing. Dry disposal of tailings and reject material is proposed within the WREs. Processed wastewater will be recovered for recycling through the CHPP. Other associated infrastructure will include offices, crib rooms, warehouses, workshops, a vehicle wash down bay, refuelling facility, and laboratory.

The maximum area proposed to be disturbed within the MLA footprint is 1,211 ha. Disturbance associated with required supporting infrastructure located outside of the MLA includes the electricity transmission line (approximately 16 ha disturbance, refer section 2.6.1), the access easement for the pump station and water release/extraction pipeline (approximately 1 ha disturbance) and the Baralaba – Moura road realignment (approximately 14 ha disturbance, refer section 2.4.2).

Product coal will be transported via road trains 40 km south along the existing Baralaba North Mine haul route (a public road) to the existing train load out (TLO) facility east of Moura for export by transport service providers *via* rail to the Port of Gladstone and then to international markets.

Project development requires some key construction activities that are outside the MLA boundary including the realignment of 4.5km of the Moura-Baralaba Road, part of the Banana Shire Council rural road network, as well as the provision of power *via* an electricity transmission line from the Baralaba Substation south to within the MLA boundary (refer 2.4Construction Activities). The preferred electricity transmission line route that incurs the least potential impacts to landholders, road users and the environment is directly east of the MLA boundary. The final alignments and approvals of third-party infrastructure will be subject to separate permitting processes under the Queensland *Planning Act 2016*. Road impacts of the Project will be subject to agreements with Banana Shire Council and underlying tenement holders. A pipeline and access track extend approximately 670 m off-lease from the north-western corner of the lease to the Dawson River just downstream of its confluence with Banana Creek for water extraction and release infrastructure.

All land disturbed by mining activities will be rehabilitated to achieve a post-mining land use. Rehabilitation will occur progressively during the mine life in accordance with the Progressive Rehabilitation and Closure (PRC) Plan for the Project, which will be submitted to the DES for approval prior to commencement. Queensland's 'Mined Land Rehabilitation Policy' and associated legislative amendments to the EP Act have been considered in the design of all phases of the Project, and rehabilitation of the Project will occur accordingly. A draft PRC Plan has been developed for the Project and is provided in Appendix AA.

Total Capital expenditure for the Project is estimated at $157.0 million. The Project will contribute to economic growth through increased industry output and Gross Regional Product (GRP) during construction and operation, as well as decommissioning and rehabilitation, flowing from both direct and indirect impacts. The Project is estimated to support an additional:

- $13.5 million in GRP per annum in the regional catchment during construction;
- $170.2 million GRP per annum in the regional catchment during operations; and
- $1.6 million GRP per annum in the regional catchment during post-mine decommissioning and rehabilitation.

At its peak, the Project is estimated to result in an increase in GRP of 2.5% compared to what would be expected to occur without the Project.

2.1.2 Schedule of construction

Construction and mine development activities required to enable the commencement of the open cut mining operation are planned to occur over a period of approximately 24 months anticipated to commence within 24 months of approval and grant of the Mining Lease (ML), EA and all other permit requirements for the Project. For consistency throughout the EIS, 'Year 0' is forecast to occur in 2029 with coal production to commence in 'Year 1' (currently forecast for 2030). In chronological order:

- construction commencement will occur in 'Year -1';
- the peak construction period will occur in 'Year 0'; and
- coal production will commence in 'Year 1'.

Details of proposed construction activities are provided in section 2.4.

2.1.3 Schedule of operations

The identified resource area supports a mine with a production life of approximately 23 years under optimal mining conditions. However, it is anticipated that external factors may influence production schedules, resulting in an extended mine life.

The optimal mine life is presented in this EIS, as it represents the most conservative impact assessment approach, being the highest intensity mining scenario that is likely to occur.

Progressive rehabilitation will be a statutory requirement, with binding rehabilitation milestones imposed on the Project in accordance with a PRC Plan schedule approved by DES. The PRC Plan will provide DES with the opportunity to carefully review and condition every detail of proposed rehabilitation on-site, including the proposed post-mining land use for each area of the site and each step that must be taken from the commencement of operation to mine closure to ensure and expedite a successful rehabilitation outcome.

The rehabilitation strategy for the Project is described further in Chapter 3, Rehabilitation and a draft PRC Plan provided in Appendix AA.

It is expected that an additional three-year rehabilitation period will follow the cessation of production, with ongoing monitoring and maintenance for a period of five to ten years thereafter, subject to the performance of completed rehabilitation.

Details of the proposed schedule of operations, including production quantities, and mining progression and stage plans, are provided in section 2.4.5.

2.1.4 Coal resource

2.1.4.1 Exploration history

Exploration for coal in and around the Project began in the 1960s. From the mid-1960s to the early 1990s, Brigalow Mines Pty Ltd held an EPC over the Project area and conducted exploration activities including 136 drillholes and 34.4 km of surface electro-magnetic surveys. Coal intersections were promising, but seam correlation proved difficult because of the structural complexity of the deposit.

During 2001 and 2002, Mt Robert Coal Pty Ltd began exploring the Project area drilling 169 holes within the historic tenements of EPCs 674 and 742. Mt Robert Coal Pty Ltd followed similar traverse lines to earlier work by Brigalow Mines Pty Ltd, perpendicular to the strike. Drill holes were spaced 50 m to 100 m apart, and drill traverse lines were approximately 500 m apart. All holes were geophysically logged. Two seismic lines were also completed across two of the traverse lines.

From 2005 to 2007, Cockatoo Coal Limited (Cockatoo Coal) drilled 235 open and four cored holes. Holes were drilled to an average depth of 120 m and spaced 50 m apart. Drill traverse lines were 150 m to 250 m apart. The closer line spacing allowed for improved stratigraphic and structural interpretation.

Exploration in 2011 and 2012 drilled a further 297 boreholes, including 44 partially cored holes to collect samples for coal quality testing. Drilling occurred on lines spaced between 100 m and 300 m apart, with a typical spacing of 50 m or 100 m.

2.1.4.2 Resource estimation

Geological interpretation and modelling

3D geological modelling has been carried out using Ventyx Minescape Stratmodel software, which is designed to generate 3D geological models of strata-bound deposits. The software includes various interrogation functions and provides the capabilities necessary for generating resource estimates. A total of 842 holes have been used in the development of the Baralaba South geological model. The borehole locations are shown in Figure 2.1.

Resource estimation results

As described in the Coal Resource Report, 'Baralaba South Coal Deposit' (Boyd 2017), the coal resource has been classed into measured, indicated and inferred confidence categories in accordance with the JORC code (2012) as summarised in Table 2.1.

Table 2.1: Summary of resources within the MLA by coal seam (Boyd 2017)

Seam reference	Measured (Mt)	Indicated (Mt)	Inferred (Mt)	Total (Mt)
REI	0.0	0.0	0.4	0.4
DBT	0.0	0.0	2.6	2.6
DAW	1.9	4.6	11.7	18.2
DUN	4.5	3.3	3.8	11.6
WRI	4.7	2.9	6.1	13.7
DBL	5.0	11.4	6.4	22.8
COO	5.7	9.6	12.8	28.1
DRT	0.8	4.6	4.6	10.0
Total (ML)	**22.6**	**36.4**	**48.3**	**107.4**

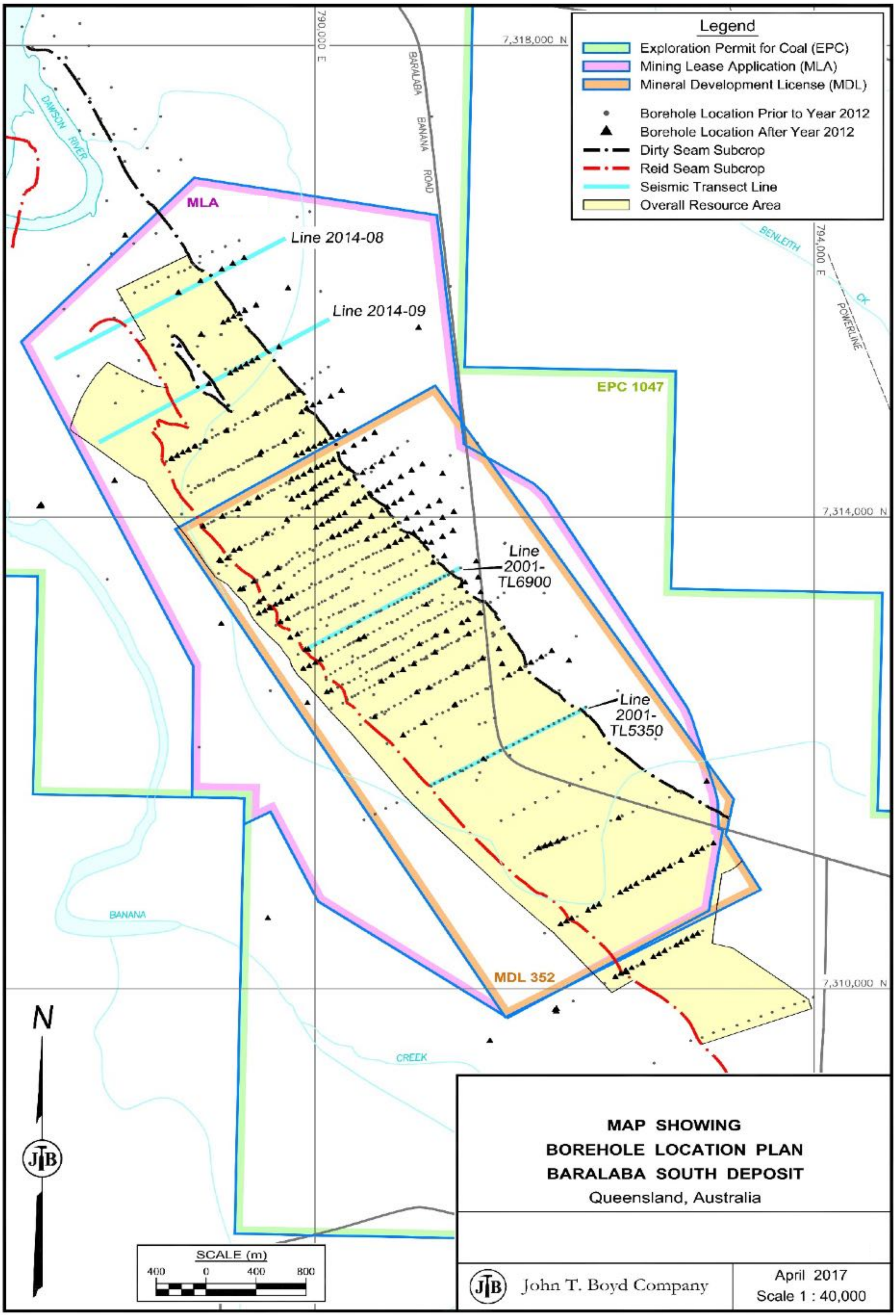

Figure 2.1: Location of structural and quality boreholes within the Project

2.1.5 Project rationale

International steel manufacturers rely on high quality metallurgical coal for the steel fabrication process. The Queensland metallurgical coal industry is a long-standing supplier of high quality coking coal for the global steel manufacturing industry. In so doing, the Queensland metallurgical coal industry has sustained thousands of jobs in Queensland and has made massive economic contributions locally, regionally and nationally including through the direct payment of royalties and taxes to government.

The Project aims to establish an open cut metallurgical coal mine in the Bowen Basin in central Queensland for the supply of metallurgical coal to international coal markets. The Project will utilise existing coal transport infrastructure and port facilities to capitalise on increases in global demand for metallurgical coal. Metallurgical coal is used in the production of 71% of the world's steel (World Coal Association, 2020) for which there is no feasible alternative. It is expected that international demand for metallurgical coal will grow to 323 Mt in 2024 (Resources and Energy Quarterly, 2022).

Australian metallurgical coal holds a very strong position in the traditionally important markets of India, China, Japan, Korea and Taiwan, attributed to its higher quality (particularly for coal from the Bowen Basin which is generally considered one of the best metallurgical coals in the world), proximity to key Asian markets, and Australia's geopolitical stability (Geoscience, 2022). In 2019-2020 Australia was the world's largest exporter of metallurgical coal (Resources and Energy Quarterly, 2022). Japan and India are now Australia's largest markets for metallurgical coal, accounting for over 50% of product, with China, South Korea and Taiwan also being significant long-term importers (Geoscience, 2022).

The Project development will result in benefits for the local community via employment and through the procurement of local services and ongoing support of community initiatives. In addition, the Project is estimated to provide additional tax revenues of approximately $68.7 million per annum to the Australian Government and approximately $62.6 million per annum to the Queensland Government.

During the peak construction period (2029), the Project's contribution to the economy is predicted at approximately $14 million annually in gross regional profit (approximately $26 million in gross state product). During operations, the Project's contribution to the economy is expected to average approximately $170 million annually in gross regional profit ($255 million annually in gross state product). Once operations are completed, the Project's contribution to gross regional profit is expected to drop to between $1.6-2.3 million annually as a result of post-mining decommissioning and rehabilitation activity.

Supply lines during the operational phase of the Project are likely to be via Baralaba and extend to the wider area. As such, the regional economy is expected to benefit from the economic flow-on effects of the Project through the provision of goods and services. The development of the Project is also likely to have a positive regional impact through establishment of additional new spin-off businesses and encouragement of support infrastructure development.

2.1.6 Location

2.1.6.1 Regional context

The Project is located on existing grazing land approximately 115 km west of Rockhampton in the Bowen Basin region of central Queensland (Figure 2.2). The Project is approximately 11 km south of the existing Baralaba North Mine (Figure 2.3) within the Banana Shire Council local government area (Figure 2.4).

The town of Baralaba is situated 8 km to the north of the Project. The towns of Moura and Banana are both situated a little over 30 km from the Project to the south and south-east respectively.

The Project is located:

- Within the north-eastern portion of the Brigalow Belt South Bioregion, as defined by the Interim Biogeographic Regionalisation for Australia (DoEE 2012) (Figure 2.5).

- In the Lower Dawson Sub-catchment Area of the Fitzroy Basin, as defined by the Water Resource (Fitzroy Basin) Plan 2011 (DES, 2011) (Figure 2.6).
- Outside of the Great Artesian Basin and Other Regional Aquifers Water Plan and outside of any declared Groundwater Management Areas (Figure 2.7).
- In the rural zone in the Banana Town Planning Scheme (2021), which allows for mining where the specific outcomes of the zone are met; the specific outcomes include environmental considerations, amenity, and separation distances. The Banana Town Planning Scheme's Mining Resources Overlay is also relevant in assessing mining developments and has the outcomes of protecting mineral resources of major economic significance, and compatibility with nearby uses and works.
- Outside of zones mapped as PLAs and Priority Agricultural Areas (PAA) under the *Regional Planning Interests Act 2014* (Figure 2.8). The Project contains some strategic cropping land trigger area (Figure 2.9).
- Within the area covered by the Inland Fitzroy and Southern Burdekin Suitability Framework (DNRM and DSITIA, 2013a).
- Within the Gaangalu Nation People (QC2012/009) native title application area (Figure 2.10).

2.1.6.2 Local context

The local region is primarily grazing land with areas of cropping, particularly along the floodplains of the Dawson River and larger watercourses. Mount Ramsay is located to the east of the Project, providing a topographic landmark for the area.

Access to the Project site is from the Moura-Baralaba Road, which intersects the MLA in its current location. The road connects the towns of Moura and Baralaba and provides access to several local properties in between. The Moura-Baralaba Road is also the main haul road used by the existing Baralaba North Mine to transport product coal to the TLO facility, approximately 4 km east of Moura. The road has undergone substantial upgrades and maintenance to facilitate the haulage of coal. A 4.5 km section of the Moura-Baralaba Road will require realignment to facilitate the mining activity. Access to all local properties will be maintained.

2.1.7 Relationship to other projects

Other coordinated or major resource projects that are publicly known in the region include:

- The Baralaba North Mine; a metallurgical coal mine with tenements held by Baralaba Coal Pty Ltd and Wonbindi Coal Pty Limited located approximately 12 km to the north of the Project. The Project will share use of off-lease infrastructure, including a 40 km stretch of the public road that has been upgraded for transport of product coal and the existing TLO facility located east of Moura, which is permitted for 50,000 t of coal stockpiling.
- The Dawson Mine; with tenements held by Anglo Coal (Dawson) Limited and located between Moura and Baralaba, approximately 25 km south-east of the Project. ML 5656 extends from the northern open cut pit at Dawson approximately 23 km to the north, ending at the south-eastern boundary of the Project MLA (refer Figure 2.14). The unmined portion of ML 5656 represents possible future mining potential; however, the intentions of the holder with regards to this tenement are not known.
- The Meridian Coal Seam Gas Project; located approximately 28 km south of the Project, near Moura and the Dawson Mine. The gas field started production in 1999 and has been operated by Westside since its acquisition in 2010. The project owns gas compression and pipeline infrastructure which is connected to Queensland's commercial gas network and a trunk line of the GLNG Project. The Project includes Petroleum Lease 94 and gas rights in mining leases.
- The Mungi North proposed gas field (PL 1048 and PL 1049); which comprises a Petroleum Lease application to the north of the Meridian Coal Seam Gas Project. The proposed Project, which extends to within 5 km of the Project but does not overlap it in any way, was approved in 2020.

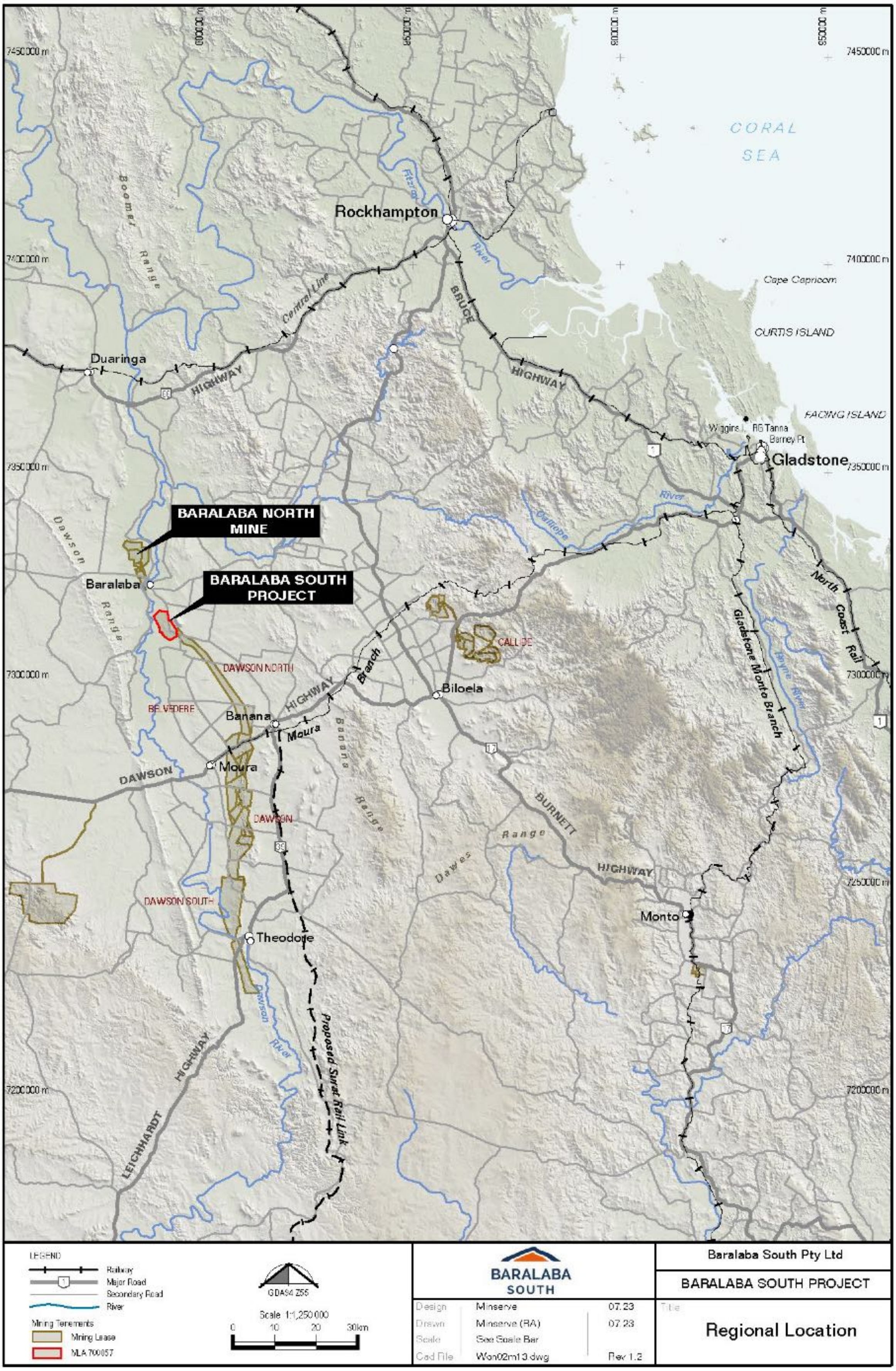

Figure 2.2: Regional Project location

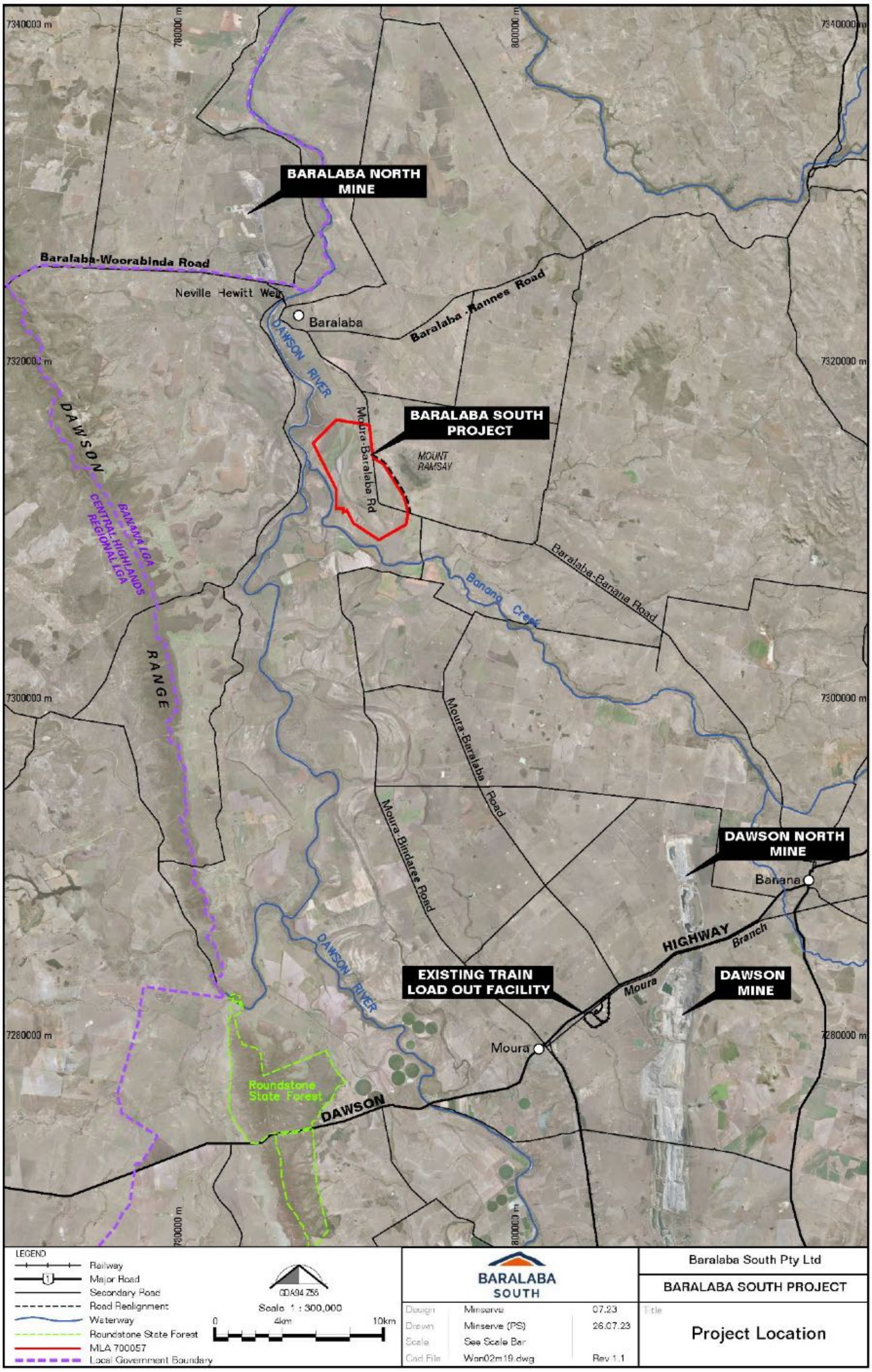

Figure 2.3: Project locality

Figure 2.4: Local government areas

Figure 2.5: Brigalow Belt South Bioregion

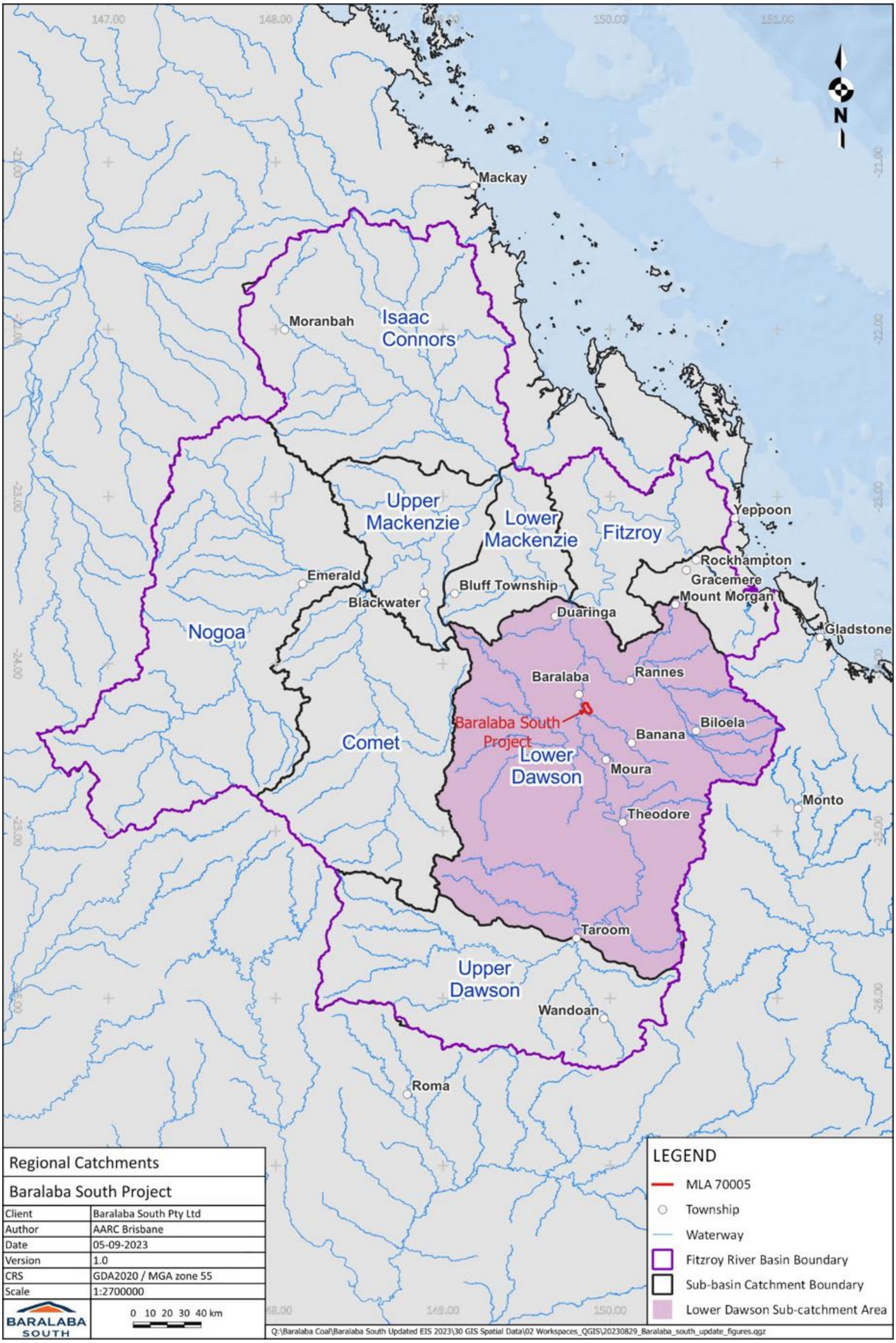

Figure 2.6: Regional water catchments

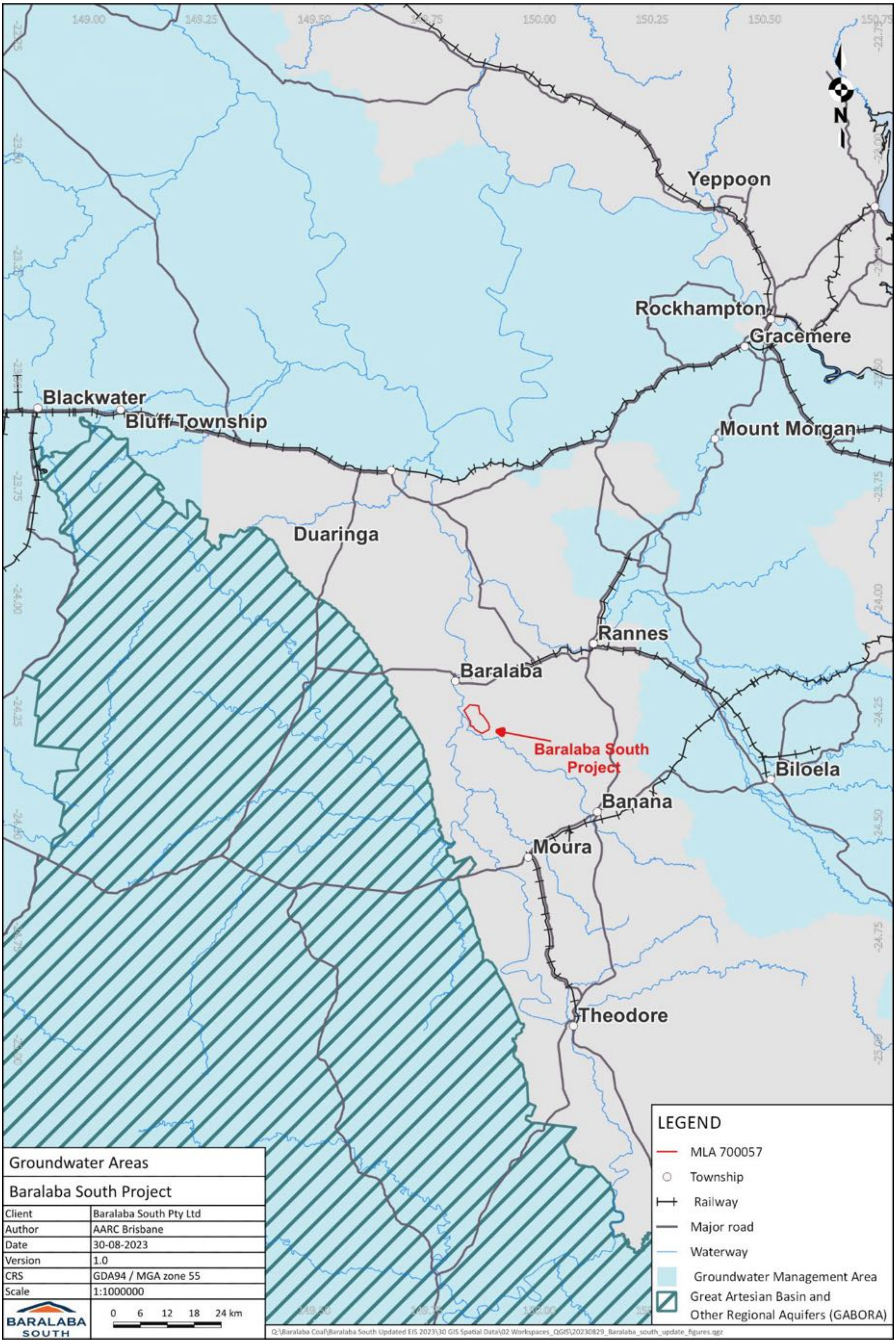

Figure 2.7: Groundwater areas

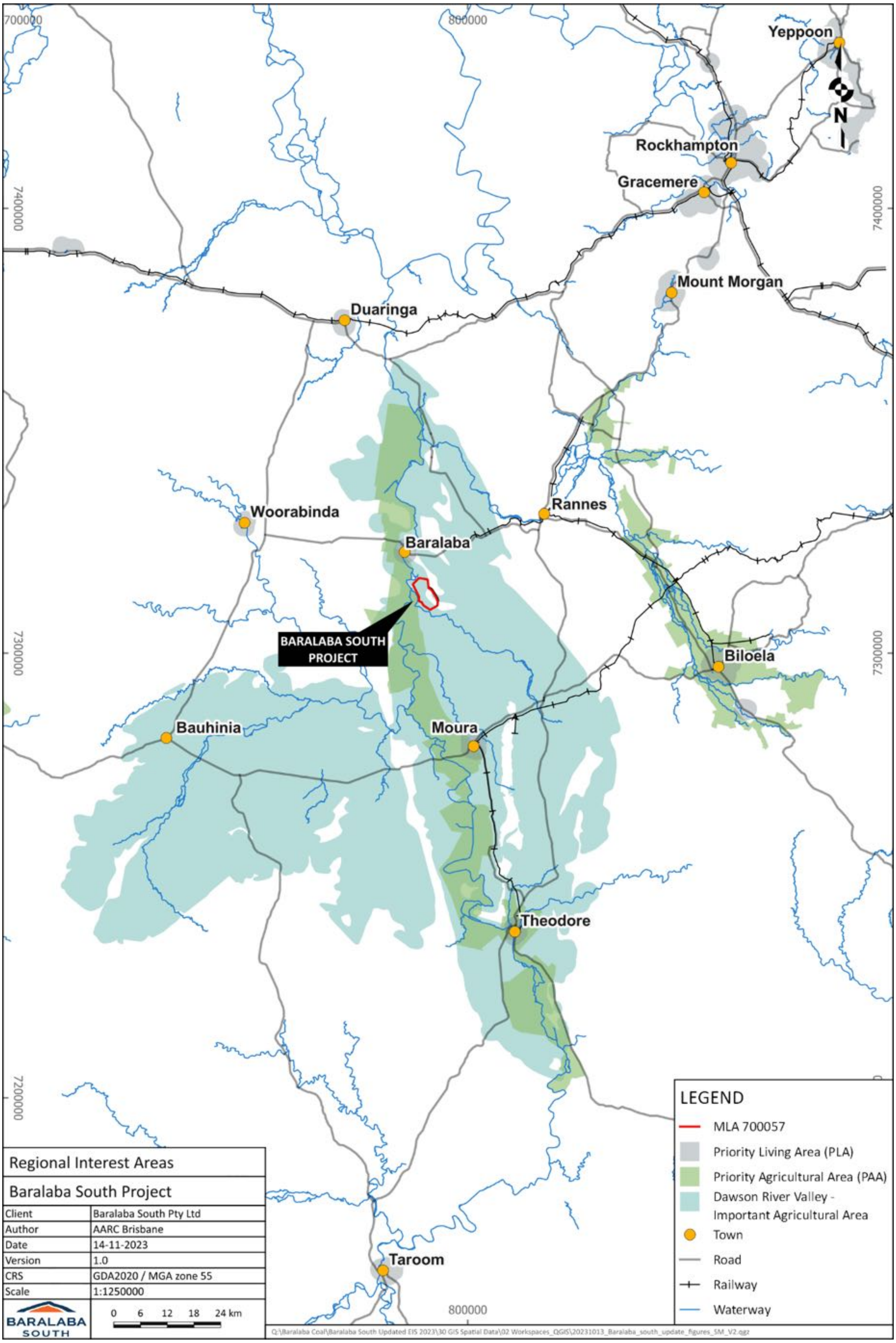

Figure 2.8: Regional interest areas

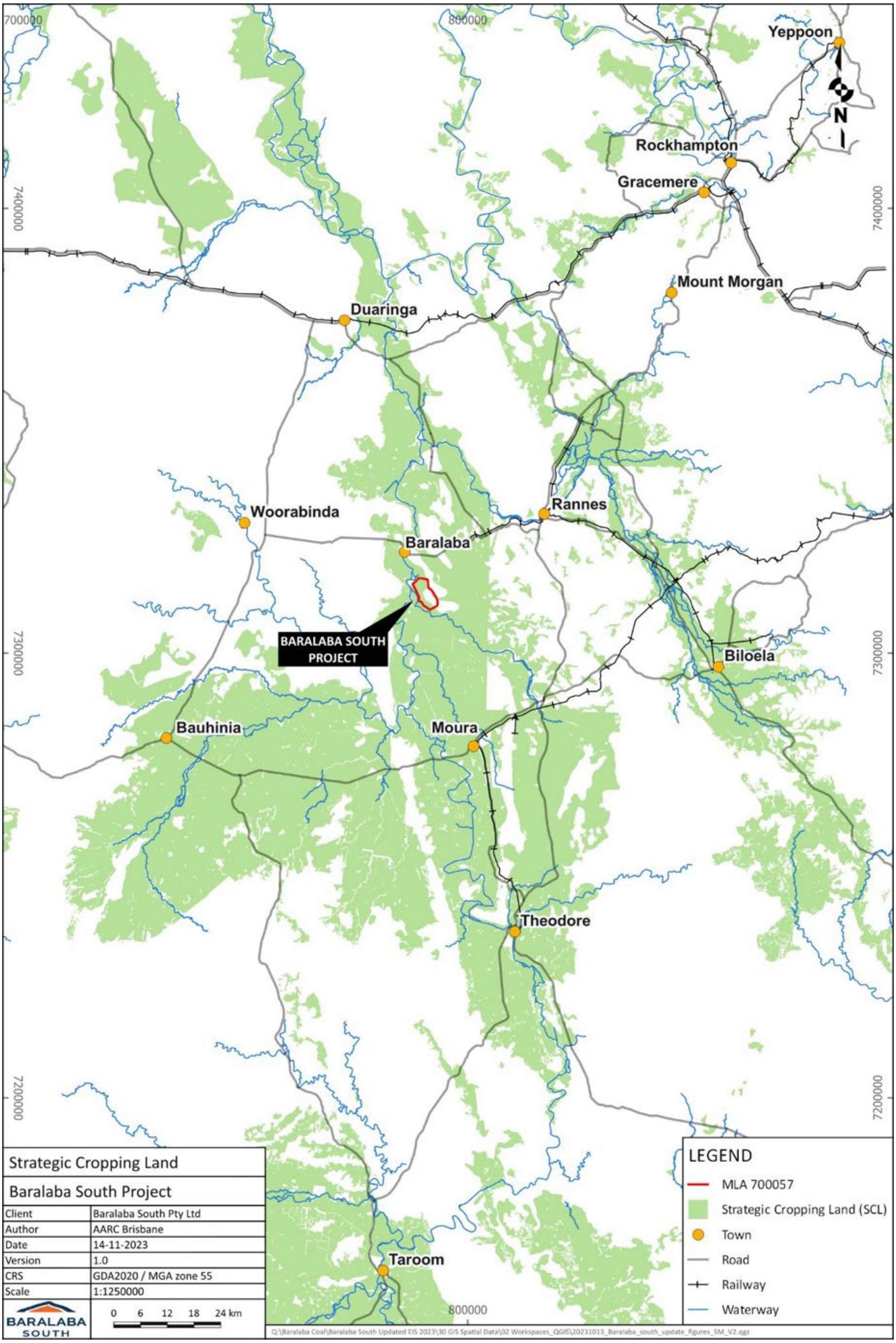

Figure 2.9: Strategic cropping land trigger area

Figure 2.10: Gaangalu Nation People native title claim area

2.1.8 Workforce

2.1.8.1 Construction workforce

The peak construction workforce of 268 personnel for the Project is estimated to occur within the first 12 months; then gradually reduce to 40 in the second year of construction. The main workforce categories include:

- civil works;
- CHPP construction;
- site buildings and Infrastructure construction;
- equipment assembly; and
- accommodation camp management.

Occupations represented in the construction workforce are likely to include:

- earthmoving plant operators;
- structural steel and welding trades workers;
- professionals including geologists, managers, safety officers, engineers and environmental scientists;
- painting, plumbing and electrical trades workers;
- concreters; and
- construction and mining labourers.

Given the specialised nature of the work to be completed during the construction phase and its temporary nature, it has been assumed that Rockhampton and Gladstone will provide 95% of the workforce due to being major centres near the Project. The remaining 5% will be sourced from towns within the study area. The accommodation camp will be expanded to cater specifically for the Project construction and operations workforce. The accommodation camp expansion requirements are anticipated to be up to 255 rooms prior to construction to provide for the maximum combined Baralaba North and South total workforce requiring temporary (on shift) accommodation.

2.1.8.2 Operational workforce

The peak operational workforce for the Project is estimated to be 521 workers. This number will only be reached during peak production periods during the mine life. Workforce numbers will decrease relative to actual mining and production rates over the Project life. The predicted schedule of operations under optimal mining conditions is described in section 2.5.1, including production tonnage per year over the life of mine.

Occupations required by the Project during operations are anticipated to include:

- machinery operators;
- truck operators;
- tradespeople including diesel fitters, boiler makers, electricians, plumbers, gasfitters and painters;
- engineers, surveyors, geologists;
- health, safety, environment, human resources, and mine management professionals;
- TLO operators; and
- administrative staff.

The workforce is forecast to fall into three groups:

1) mining staff and crew (89%);
2) processing plant staff and crew (5%); and
3) other staff and crew (6%).

It is expected that:

- approximately 5% of the staff will fly-in fly-out (FIFO) to the mine;
- approximately 70% will drive-in drive-out (DIDO); and
- approximately 25% will be local and will drive-in and out from the mine on a daily basis, with approximately 60% anticipated to travel to and from the mine from the south (e.g. Banana and Moura) and 40% anticipated to travel to and from the mine from the north (e.g. Baralaba).

2.1.8.3 Workforce management

Project workforce management practices will include:

- prioritising recruitment of workers from local and regional communities and workers who will live in regional communities;
- reducing the proportion of workers engaged in FIFO arrangements; and
- supporting the health and wellbeing of the Project workforce.

Local industry service providers and jobseekers will be provided with timely notification regarding potential Project employment opportunities. Employment opportunities will be promoted widely, which may include community and stakeholder engagements, major contractors' websites, employment agency listings and local/regional papers.

The Gaangalu Nation People, Gangalu Endorsed Parties, Woorabinda Aboriginal Shire Council, Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships–Central Region (Rockhampton office) and Queensland South Native Title Services (Rockhampton office) will be consulted in relation to employment and training opportunities for Indigenous people.

The Project will provide equal opportunities for employment and will recruit based on candidates' skills, skills requirements and job suitability without regard to gender, age, race or disability status.

As a component of its recruitment strategy, the Project's equal employment opportunity and local employment focus will be promoted to surrounding communities, including under-represented groups, to encourage local participation in the Project.

Training opportunities will be provided at the Project to attract unskilled and semi-skilled, local employees and may include traineeships, apprenticeships and/or general on-the-job training.

2.1.8.4 Rostering

The operational hours of the Project will be 24 hours a day, seven days a week. Operational employees will work industry standard 12-hour or 12.5-hour shifts (depending on shift change requirements), working seven days on and seven days off. Senior management will work on a five-day on (Monday to Friday), two-day off roster.

2.1.8.5 Accommodation

Baralaba Coal Company owns and operates an accommodation camp in Baralaba, approximately 8 km north of the Project. The camp currently has 156 single accommodation units, and recreation and dining facilities on-site for guests. The accommodation camp is fully utilised for the Baralaba North Mine.

- Baralaba Coal Company has a current approval from the Banana Shire Council to construct an additional 32 rooms at the accommodation camp to accommodate the Baralaba North Mine workforce, with only eight of these rooms currently constructed. Consultation with the Banana Shire Council indicated the accommodation camp in Baralaba is the preferred location to accommodate the Project's non-resident workforce. The accommodation camp will be expanded to cater specifically for the Project construction and operations workforce. The accommodation camp expansion requirements are anticipated to be up to 255 rooms prior to construction to provide for the peak for the maximum combined Baralaba North and South total workforce requiring temporary (on shift) accommodation.

Temporary accommodation is also available in Baralaba and surrounding towns.

2.1.9 Interested and affected persons

Under the EP Act, affected and interested persons (as defined by sections 38 and 41, respectively) must be identified for the Project. The identification of affected persons for the Project is shown in Table 2.2 and interested persons in Table 2.3.

Table 2.2: Affected persons – underlying and adjacent tenure

Name of affected person or organisation	Relationship to Project
Indigenous Groups	
Gaangalu Nation	Native Title (NT) application (QC2012/009) Previous NT application (QUD6144/98 – sub-group Gangulu People)
Gaangalu Nation People (Traditional Owners)	a representative Aboriginal/Torres Strait Islander body Cultural heritage significance
Gangulu Endorsed Parties (Signatories to the Baralaba South Cultural Heritage Investigation and Management Agreement)	a representative Aboriginal/Torres Strait Islander body Indigenous participation
Local Government	
Banana Shire Council (Mayor Neville Ferrier)	Relevant local government for the operational land Moura-Baralaba Road Stock route 910BANA
Resource Tenures	
Mitsui E&P Australia Pty Limited	ATP769
Westside ATP769P Pty Ltd	ATP769

Name of affected person or organisation	Relationship to Project
WestSide Mungi Pty Limited Mitsui E&P Australia Pty Limited Harcourt (Queensland) LLC	PL 1048, PL 1049 ATP2027
Anglo Coal (Dawson) Limited	ML 80146, ML 5596, ML 5656, ML 5593, ML 5644, ML 5593, ML 5606, ML 5591, ML 5597, ML 5598, ML 80034, ML 5600, ML 5644, ML 5599, ML 80142, ML 80032 Immediately south of MLA (extends southward to Moura)
Mining Lease, ETL and Road Realignment – Underlying and Adjacent Tenure	
Name withheld	Lot 135 on FN143 Lot 26 on FN153 Lot 2 on RP801031 Lot 1 on PER200304
Anglo Coal and Mitsui Moura Investment Pty Ltd	Lot 28 on FN154
Name withheld	Lot 101 on SP107139 Lot 102 on SP107139
Name withheld	Lot 4 on FN514
Banana Shire Council	Lot 1 on SP131479
Baralaba Coal Pty Ltd Baralaba South Pty Ltd	Lot 1 on SP266562
Name withheld	Lot 122 on FN148
BC Water Pty Ltd	Lot 13 on FN514
Name withheld	Lot 140 on FN503 Lot 141 on FN137 Lot 7 on KM220
Name withheld	Lot 157 on FN137
Cacatua Pastoral Pty Ltd (a related entity to the proponent)	Lot 77 on FN312 Lot 145 on FN502 Lot 79 on FN106 Lot 11 on FN153 Lot 78 on FN 153 Lot 105 on FN103
COCKATOO COAL LIMITED (Baralaba Coal Company)	Lot 12 on SP119255
Name withheld	Lot 132 on FN156
Name withheld	Lot 15 on FN95
Name withheld	Lot 27 on FN153
Name withheld	Lot 5 on RP856832
Name withheld	Lot 133 on FN143

Name of affected person or organisation	Relationship to Project
Powerlink (formerly Qld Electricity Transmission corporation)	Lot 152 on FN473 Lot 123 on FN148
Name withheld	Lot 124 on FN146 Lot 13 on FN95
Name withheld	Lot 6 on KM50 Lot 2 on SP266562 Lot 80 on SP131479
Name withheld	Lot 11 on SP131479
Sunwater Limited Pty Ltd	Lot 20 on FN503 Lot 21 on FN502
The State of Queensland (DTMR)	Lot 1 on FN109 Lot 2 on FN109 Lot 2 on FN121 Lot 3 on FN110 Lot 31 on SP119256
The State of Queensland (Department of Agriculture and Fisheries)	Lot 156 on FN504
Name withheld	Lot 1 on RP801031
Name withheld	Lot 126 on FN148
Name withheld	Lot 15 on FN217 Lot 35 on FN141 Lot 34 on FN217

Table 2.3: Interested persons

Name of interested person or organisation	Relationship to Project/interest
Shire Councils	
Central Highlands Regional Council	Indigenous participation (Woorabinda) Local employment and procurement
Woorabinda Aboriginal Shire Council	Indigenous participation
Local organisations or special interest groups	
Anglo Coal (Dawson) Ltd and Mitsui Vitrinite Coal Pty Ltd	Project infrastructure Management of environmental impacts
Aurizon	Rail transport provider, transport of product to port
Aurizon Operations	Rail transport provider, transport of product to port
Gladstone Ports	Port of Gladstone, export of PCI product

Name of interested person or organisation	Relationship to Project/interest
Baralaba Hotel	local Business
Banana Shire Local Disaster Management Group	Community organisation
Banana Shire Support Centre (Biloela)	Service provider
Baralaba Community Aged Care Association	Service provider
Baralaba and District Historical Group	Community organisation
Baralaba and District Progress Association	Community organisation
Baralaba Hospital and Multipurpose Health Service including;	Service provider
Baralaba Recreation and Fish Stocking Group	Community organisation
Baralaba Showgrounds	Community organisation
Baralaba State School	Local school
Benleith Water Board (Benleith Water Scheme)	Service Provider
Biloela Community Kindergarten	Local kindergarten
Biloela C&K Childcare Centre	Service Provider
Chambers of commerce (Callide Dawson, Moura, Theodore)	Industry organisation
Coal'n Cattle	Local business
Dawson Rural Fire Brigade	Community organisation
Ergon Energy	Service provider
First National Real Estate (Biloela)	Local business
Goldings	Industry organisation
Hourn and Bishop Real Estate (Moura) Hourn, F and G	Local business
Kalari (QUBE)	Industry organisation
Lock the Gate Alliance/Save the Dawson	Community organisation
Moura Chamber of Commerce Callide Dawson Chamber of Commerce (Biloela)	Industry organisation
Moura Real Estate	local business

Name of interested person or organisation	**Relationship to Project/interest**
Moura State School	Local Primary School
Moura State High School	Local High School
Myella Farm Stay	Local business
NBN and Telstra	Service Provider
Powerlink	Service Provider Baralaba substation
QUBE Holdings Ltd	Service provider
Ray White Biloela	Small business
St Joseph's Catholic Kindergarten (Biloela).	Service provider
Sunwater (Dawson Valley Water Supply Scheme)	Service provider Water allocations.
Telstra	Service Provider
Wadja Wadja High School (Woorabinda)	Service Provider
Woorabinda State School	Service Provider

2.2 Site description

2.2.1 Land tenure

The Project mining activity is defined by the bounds of MLA 700057, which overlies the lots listed in Table 2.4 and displayed in Figure 2.11. Native title has been extinguished over all land the subject of the MLA.

Table 2.4: Land and landholders underlying the Project

Landholders	Property Description	Tenure
Name withheld	Lot 11 on FN153	Freehold
	Lot 78 on FN153	Freehold
	Lot 79 on FN106	Freehold
	Lot 145 on FN502	Freehold
	Lot 77 on FN312	Freehold
Name withheld	Lot 26 on FN153	Freehold
	Lot 135 on FN143	Freehold
Name withheld	Lot 27 on FN153	Freehold
Name withheld	Lot 1 on RP801031	Freehold
Banana Shire Council	Moura-Baralaba Road	Road reserve
Banana Shire Council	Stock route 910BANA	Road reserve/Stock route
Banana Shire Council	Unnamed Road Reserve	Road reserve
The State of Queensland (DTMR)	Lot 1 on FN109	Perpetual Lease, previously subleased by Cockatoo Coal
	Lot 2 on FN109	
	Lot 2 on FN121	
	Lot 3 on FN110	

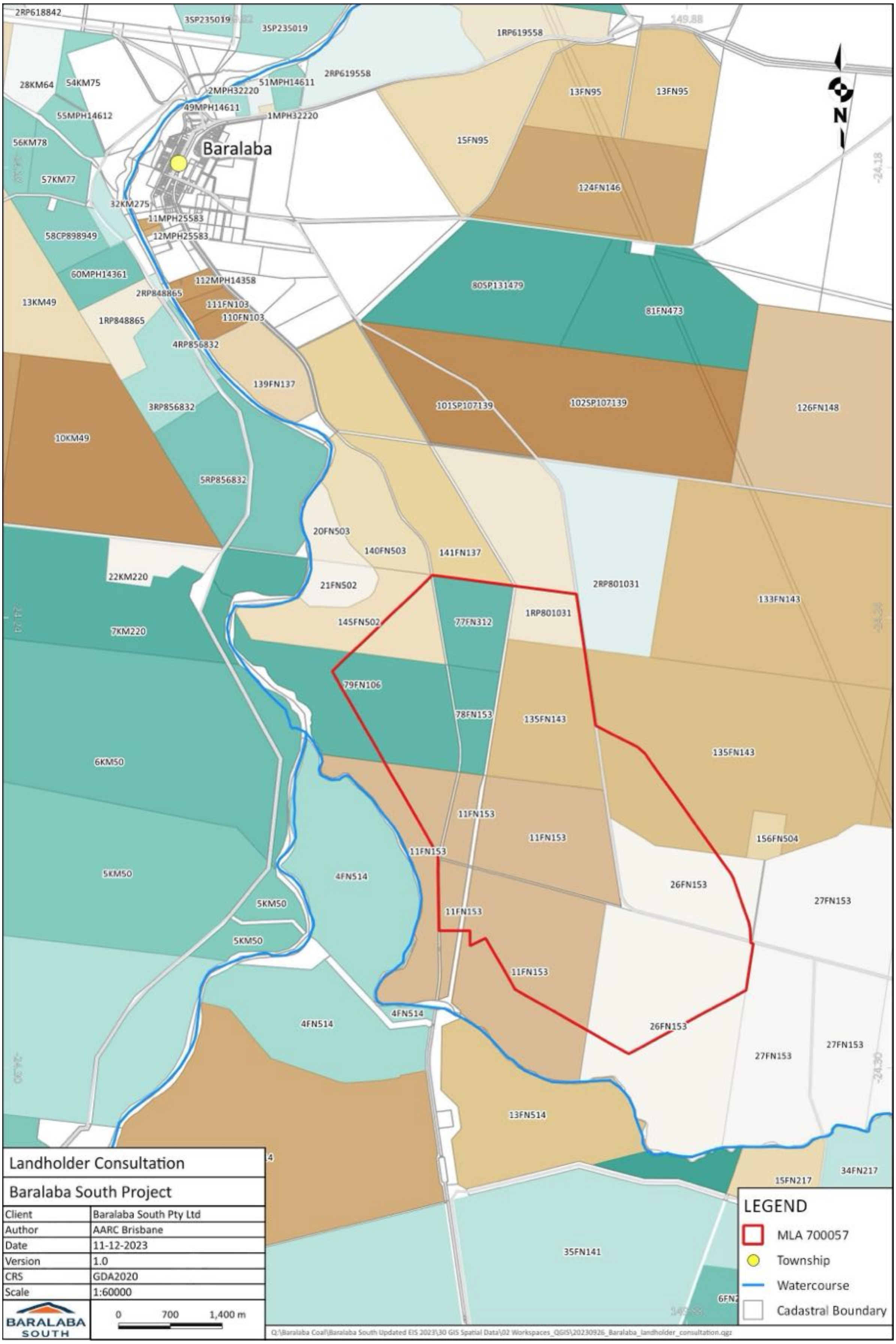

Figure 2.11: Properties underlying the Project

2.2.1.1 Dawson Valley Rail Branch

A section of the closed and dismantled Dawson Valley Rail Branch lies within MLA 700057 (Lot 1 on FN109, Lot 2 on FN109, Lot 2 on FN121 and Lot 3 on FN110) (Figure 2.12). The corridor consists of a lease in perpetuity (title reference 40008706), commencing 1 July 1995 for the purpose of 'Transport, Purposes Ancillary to Transport and Other Commercial Community Purposes'. The State of Queensland represented by the Department of Transport and Main Roads (DTMR) is the lessee.

The rail corridor is closed and not in a functional condition (dismantled). Compensation under the MR Act must be agreed with DTMR for the MLA to be granted over the land.

2.2.2 Reserve land

2.2.2.1 Moura-Baralaba Road

A 4.5 km section of the Moura-Baralaba Road reserve intersects MLA 700057 in a north–south direction (Figure 2.12). Banana Shire Council is the relevant road authority. The existing sealed road provides for road travel between the towns of Moura and Baralaba and access to multiple properties for local residents. This Council road also forms the existing haul route for product coal from the Baralaba North Mine. Subject to obtaining all relevant consents and approvals, the Moura-Baralaba Road will be realigned, with replacement access provided where appropriate. Compensation under the *Mineral Resources Act* (1989) (MR Act) must be agreed with Banana Shire Council for the ML to be granted over this road reserve, and to use the road as a haulage route.

2.2.2.2 Unnamed road reserve and stock route

An unnamed road reserve crosses MLA 700057 in a north–south direction (Figure 2.12). Banana Shire Council is the road authority for the reserve. There is no constructed road within the road reserve. The reserve is also designated as a stock route (ID 910BANA), which has been classed by Banana Shire Council as minor and unused. Compensation under the MR Act must be agreed with Banana Shire Council for the ML to be granted over this road reserve and stock route. Consents to closures and any requirement to maintain connectivity of the stock route must also be agreed with Banana Shire Council.

2.2.2.3 Unnamed road reserve

An unnamed road reserve crosses MLA 700057 in an east–west direction (Figure 2.12). Banana Shire Council is the road authority for the reserve. The road reserve connects the Moura-Baralaba Road to the Dawson Valley Rail Branch reserve. The reserve is partially undeveloped and partially includes a dirt track presumed to be utilised by the underlying landholder. Compensation under the MR Act must be agreed with Banana Shire Council for the ML to be granted over this road reserve. Consents to closures and any requirement to maintain connectivity of the road must also be agreed with Banana Shire Council.

2.2.3 Resource tenements

Wonbindi Coal Pty Limited holds the underlying EPC 1047 and MDL 352. Baralaba South Pty Ltd, (a wholly owned subsidiary of Wonbindi Coal) has applied for MLA 700057 over these prerequisite tenures with the consent of Wonbindi Coal.

The neighbouring and overlapping resource and exploration tenures (mineral, coal and petroleum) within the vicinity of the Project are listed in Table 2.5 and are shown in Figure 2.13 and Figure 2.14.

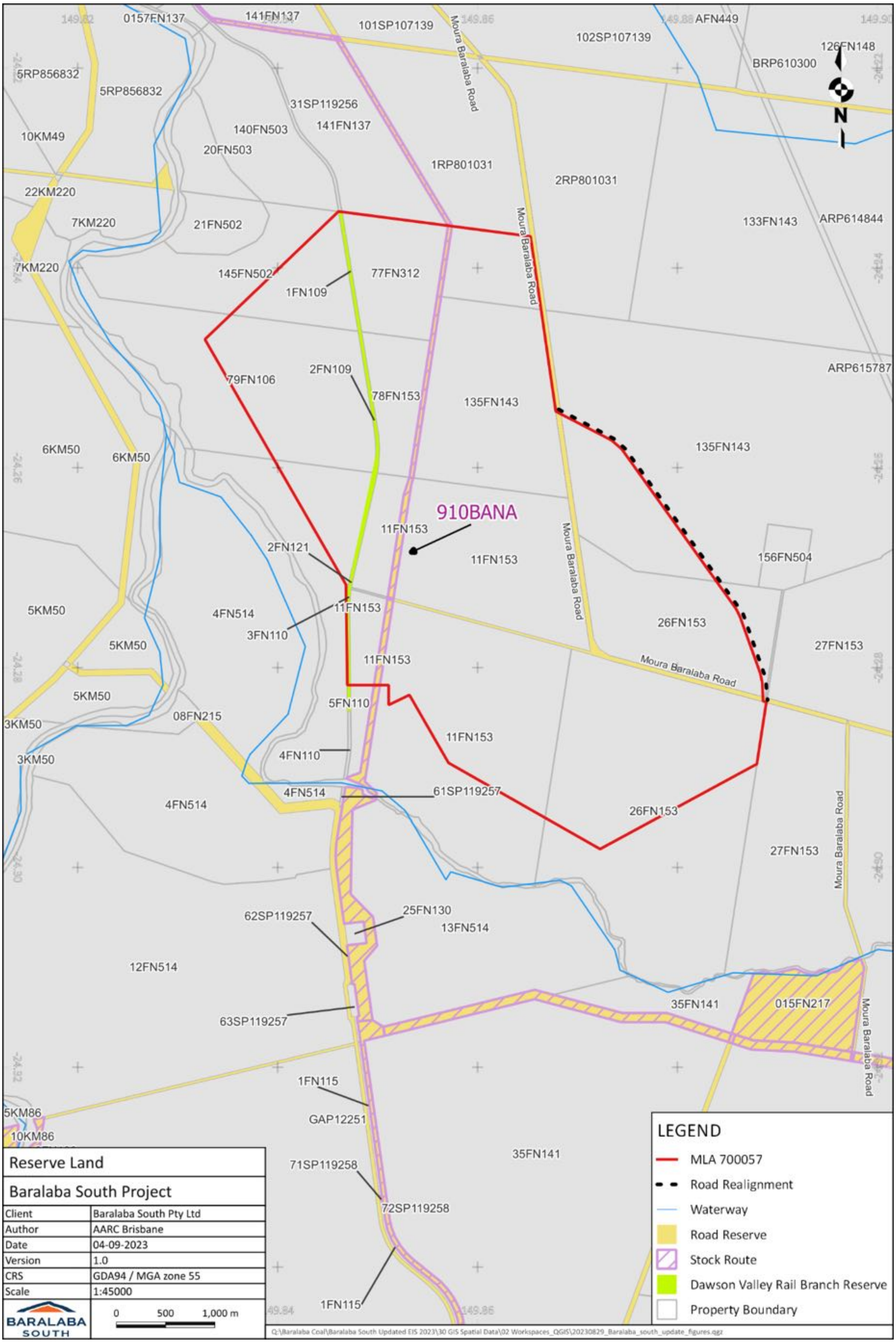

Figure 2.12: Reserve land

Table 2.5: Regional mineral, coal and petroleum tenements

Authorised holder name	Tenement number	Location description
Wonbindi Coal Pty Limited	ML 80201, ML 80170, ML 80169, ML 80200, ML80157, ML 5605, ML 5580, ML 700004, ML 5581, ML 5590	North of MLA
Wonbindi Coal Pty Limited	MDL 416	North of MLA
	MDL 352	Underlying the MLA
	EPC 2107	East of MLA
	EPC 1047	Underlying the MLA
Wandoo Tenements Pty Ltd	EPM 27983	Underlying the MLA
Pinnacle Gold Pty Ltd	EPM27289	East of MLA
Central Minerals Pty Ltd	EPM 25300	East of MLA
Baralaba Coal Pty Ltd	MDL 184	North of the MLA
Fairway Coal Pty Ltd	EPC 1073	North-east of MLA
Square Eastern Pty Ltd	EPC 2502, EPC 2054	West of MLA
Boardwalk Dingo Pty Limited	EPC 862	North of MLA
Scap Exploration Pty Ltd	EPC 2114	North of MLA
WestSide Mungi Pty Limited	PL 1048, PL 1049	South of MLA
	ATP 769 (PCA 196), ATP 2027	South of MLA
Vale Belvedere Pty Ltd	EPC 1035	South of MLA
	EPC 783	South-east of MLA
Anglo Coal (Dawson) Limited	ML 80146, ML 5596, ML 5656, ML 5593, ML 5644, ML 5593, ML 5606, ML 5591, ML 5597, ML 5598, ML 80034, ML 5600, ML 5644, ML 5599, ML 80142, ML 80032	Immediately south of MLA (extends southward to Moura)
	EPC 988, EPC 1086	South-east of MLA

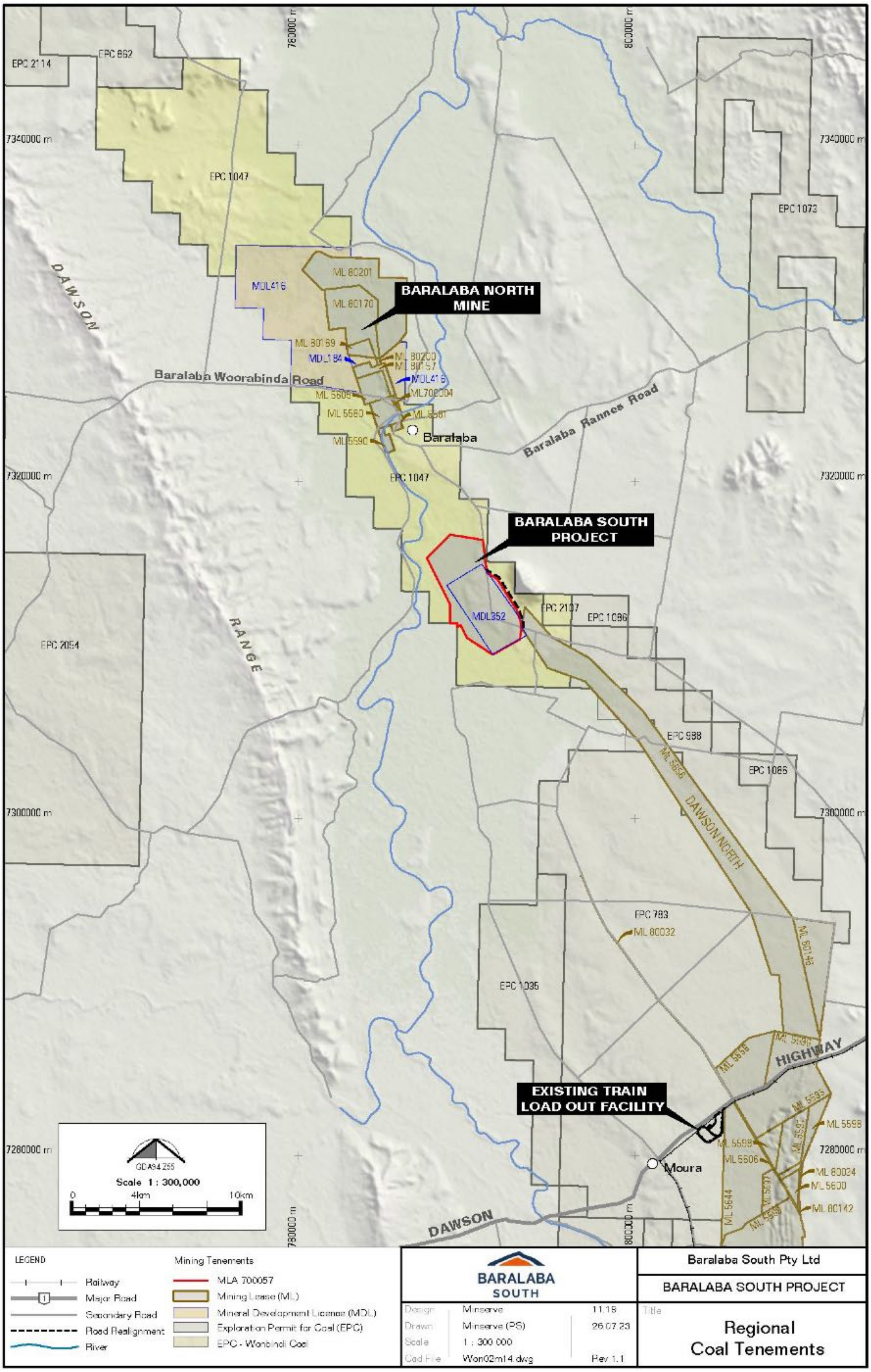

Figure 2.13: Adjacent and overlapping coal tenements

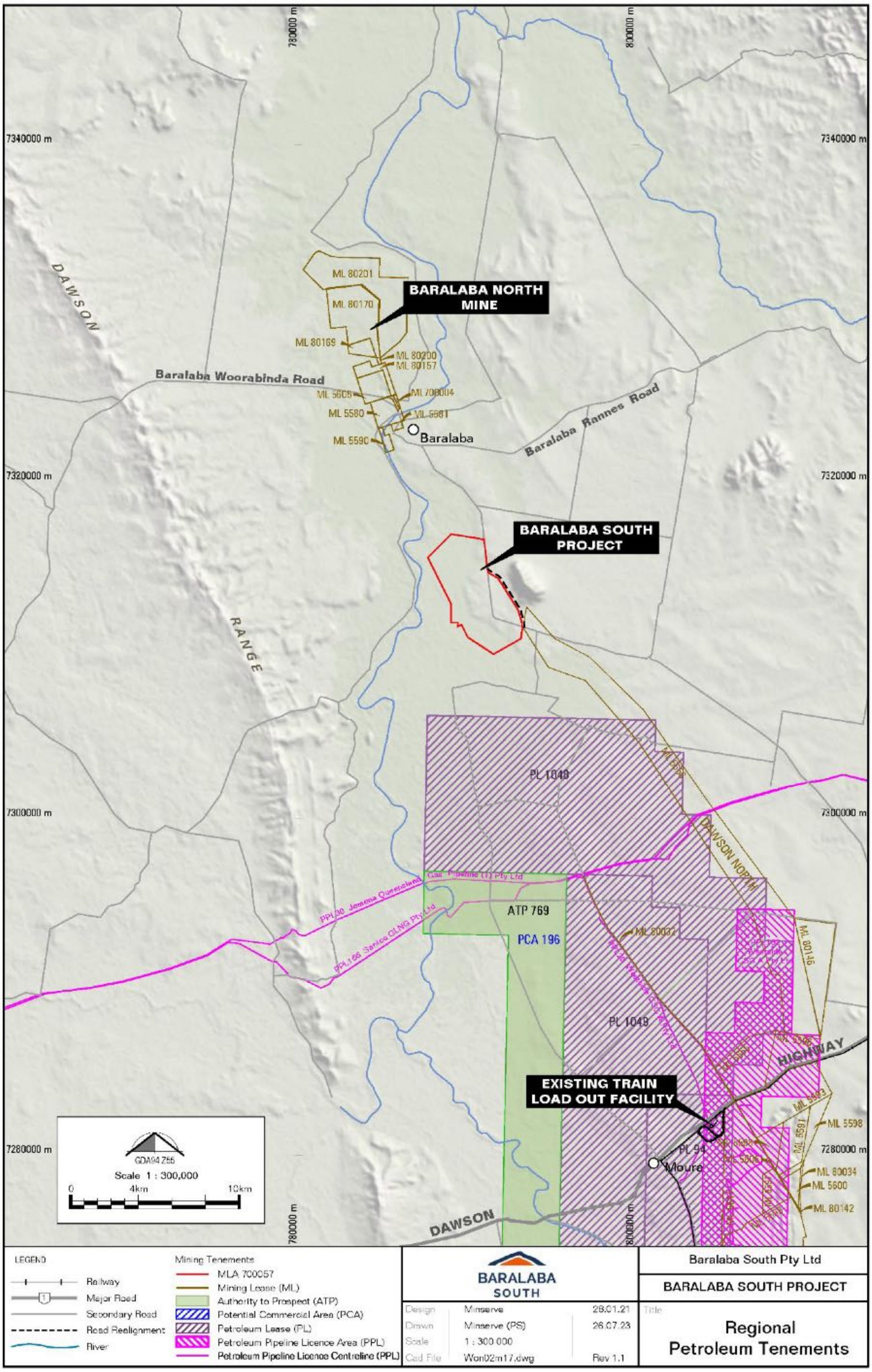

Figure 2.14: Adjacent petroleum tenements

2.2.4 Existing infrastructure

2.2.4.1 Road infrastructure

Public roads in the vicinity of the Project are listed in Table 2.6. Available traffic flow data on the road network surrounding the Project has been reviewed as part of the Traffic Assessment (Appendix P) with existing road traffic volumes assessed as being low.

Table 2.6: Key local road network

Road	Jurisdiction	Speed limit
Leichardt Highway	State	100 km/hr
Dawson Highway	State	100 km/hr
Baralaba-Rannes Road	State	60–100 km/hr
Baralaba-Kooemba Road	Council	100 km/hr
Baralaba-Woorabinda Road	Council	60–100 km/hr
Moura-Baralaba Road	Council	100 km/hr
Wooroonah Road	Council	60 km/hr

The Moura-Baralaba Road crosses the MLA in its current location (Figure 2.15). The road connects the towns of Moura and Baralaba and provides access to several local properties in between. The Moura-Baralaba Road is also the main haul road used by the existing Baralaba North Mine for the transport of coal product to the TLO facility east of Moura. The road has undergone substantial maintenance and upgrades to facilitate haulage of coal. A 4.5 km section of the Moura-Baralaba Road will require realignment to facilitate the mining activity. The alternate alignment will be subject to a separate permitting process under the Queensland *Planning Act 2016*, and the agreement of the Banana Shire Council. Access to all local properties will be maintained.

The Moura-Baralaba Road also connects to the Dawson Highway east of Moura, then to Moura and through to the east coast at Gladstone via the towns of Banana and Biloela.

2.2.4.2 Rail network

The Moura Short Line is a section of the Moura Rail System which is the smallest of the four major coal systems that form part of Aurizon's Central Queensland Coal Network and services the industrial and rural communities of the Dawson and Callide Valleys in central Queensland (Aurizon Ltd 2017). The Moura Short Line provides the connecting rail network from Moura to Barney Point and Auckland Point in Gladstone (Aurizon Ltd, 2017).

Product coal will be transferred from the existing TLO facility at Moura through agreement with Baralaba Coal Company. Product from the Project will be transported along the Moura Short Line to the Port of Gladstone for export. No new infrastructure is required to facilitate product transport. The Project will take advantage of existing rail capacity.

2.2.4.3 Port/sea infrastructure

The key export terminals that service the Moura System via the Central Queensland Coal Network are through the Port of Gladstone and include the Wiggins Island Coal Export Terminal, RG Tanna Coal Terminal and Barney Point Coal Terminal. The Project will access available capacity within existing port infrastructure at the Port of Gladstone.

2.2.4.4 Air infrastructure

Gladstone and Rockhampton airports are the nearest major airports servicing the Project area. Commercial flights to both airports will be utilised for the small number of employees and contractors that will travel to site from other areas.

Other regional airports in the vicinity of the Project include:

- Biloela (Thangool); and
- Emerald.

No new air infrastructure is required for the Project. Existing capacity is available for the small portion of air travel required by the Project.

2.2.4.5 Existing energy infrastructure

The Baralaba 132/22 kV Substation is in central Queensland, approximately 6 km east of the Baralaba township. The station forms part of the network that provides electricity supply for central Queensland and the surrounding local area. The Baralaba Substation consists of four 132 kV feeder bays, one bus coupler bay and two 132 kV bus bars.

The Ergon Energy Corporation Limited (Ergon) local network includes a 12.6 kV Electricity Transmission Line (ETL) connecting properties in the vicinity of the MLA and underlying the MLA, directly to the Baralaba Substation (Figure 2.16). A 22 kV line also traverses the MLA in the north-west, providing surrounding properties with a grid connection *via* Baralaba township (Figure 2.16).

Modifications to existing energy infrastructure are planned to provide power to enable development of the Project (refer section 2.6.1 and Figure 2.45). Changes to third-party infrastructure will be subject to consent. Necessary permitting and modifications to existing energy infrastructure will be undertaken as required by Ergon.

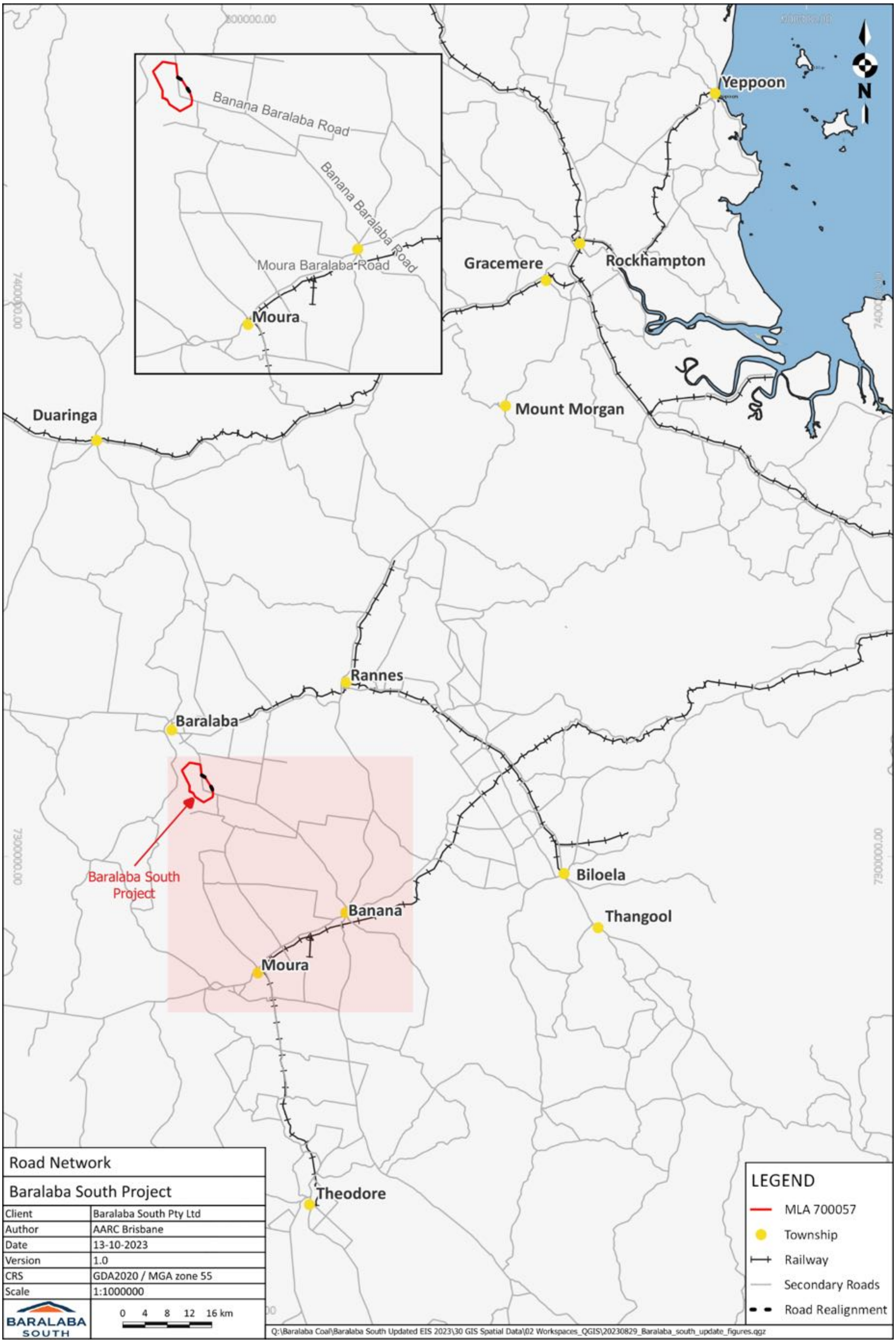

Figure 2.15: Main transport routes

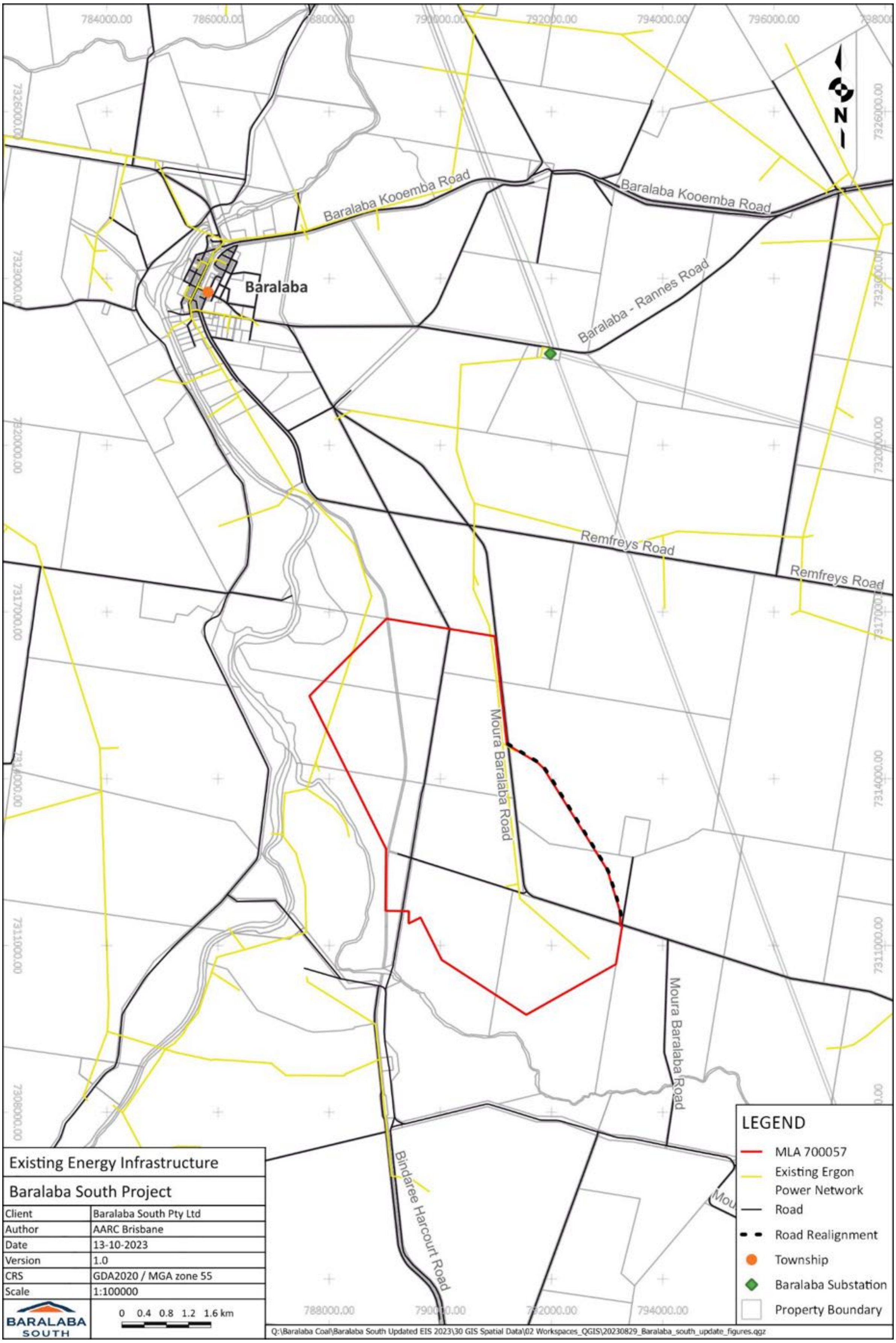

Figure 2.16: Existing energy infrastructure network

2.2.4.6 Water infrastructure

The Dawson Valley Scheme and Neville Hewitt Weir

Dawson Valley Scheme consists of a network of channels and weirs that extend along the Dawson River from upstream Theodore to downstream Boolburra. The scheme supplies farm irrigation crops, including cotton, fodder and cereals, urban water supply for Theodore, Moura, Baralaba and Duaringa and industrial water primarily for mining. The Neville Hewitt Weir is one of six weirs that supply the scheme. Sunwater manages the bulk assets including the weirs.

The Neville Hewitt Weir is a mass concrete weir in the Dawson River with a storage capacity of 10,646 ML. No modifications to the Neville Hewitt Weir are proposed.

The utilisation of licensed water allocations by the Project will not result in any additional impact to other existing licence holders, as the resource will be accessed in accordance with existing licence conditions. The potential impact on water take from the scheme as a result of the Project is addressed in Chapter 4, Surface Water.

Benleith Water Scheme

The Benleith Water Scheme supplies water from the Neville Hewitt Weir on the Dawson River to 23 rural properties for outdoor use—typically stock-watering. The scheme's infrastructure consists of a pump station on the bank of the river, 2 x 136 kL (30,000 gallon) storage tanks situated on Mount Ramsay, 1 x 91 kL (20,000 gallon) storage tank on Red Hill, 30-40 km of underground pipework and 25-35 metered offtakes.

The pipes are generally a mixture of original asbestos cement pipe from 15 cm to 8 cm (6" to 3") in diameter and newer sections of poly pipe. Telemetry has been installed to switch the pump station on and off depending on the water level in the storage tanks. In dry periods, the pump station can run up to 24 hours a day, and flow limiters have been installed on many offtakes to ensure an equitable distribution of water. Water is delivered to the Benleith Water pump station by Sunwater, and Benleith Water holds a 91 ML medium priority allocation from the Dawson Valley Water Supply Scheme.

The Benleith Water Scheme was implemented in 1969 as an initiative of the local landowners and was designed and implemented by the Irrigation and Water Supply Commission (now Sunwater). It is now fully owned by Benleith Water Pty Ltd on behalf of its users. The board members of Benleith Water administer the company, read the meters, and maintain the scheme's infrastructure.

The proximity of the mining lease to the Benleith Water Scheme pipelines is shown in Figure 2.17. The southern half of Line D is within approximately 500 m of the ML, with the very southern end of the pipeline right on the lease boundary. The main two storage tanks of the scheme, on Mount Ramsay, are approximately 1 km from the lease boundary. The board advised that there are several metered offtakes along Line D, with two right at the end either side of the road.

The detailed design of the Project will seek to avoid direct impacts to the Benleith Water Scheme. Potential indirect impacts include:

- risks to the viability of the scheme where existing land is acquired by the Project and allocations are no longer desired—to mitigate such circumstances, where property is acquired for the purpose of mining, Mount Ramsay Coal Company commits to ensure the ongoing viability and continuance of the scheme to maintain the same level of participation; and
- blasting associated with the Project activity resulting in ground vibration that may cause damage to some infrastructure at certain levels—the risk of vibration impacts on infrastructure is discussed in Chapter 12, Noise and Vibration.

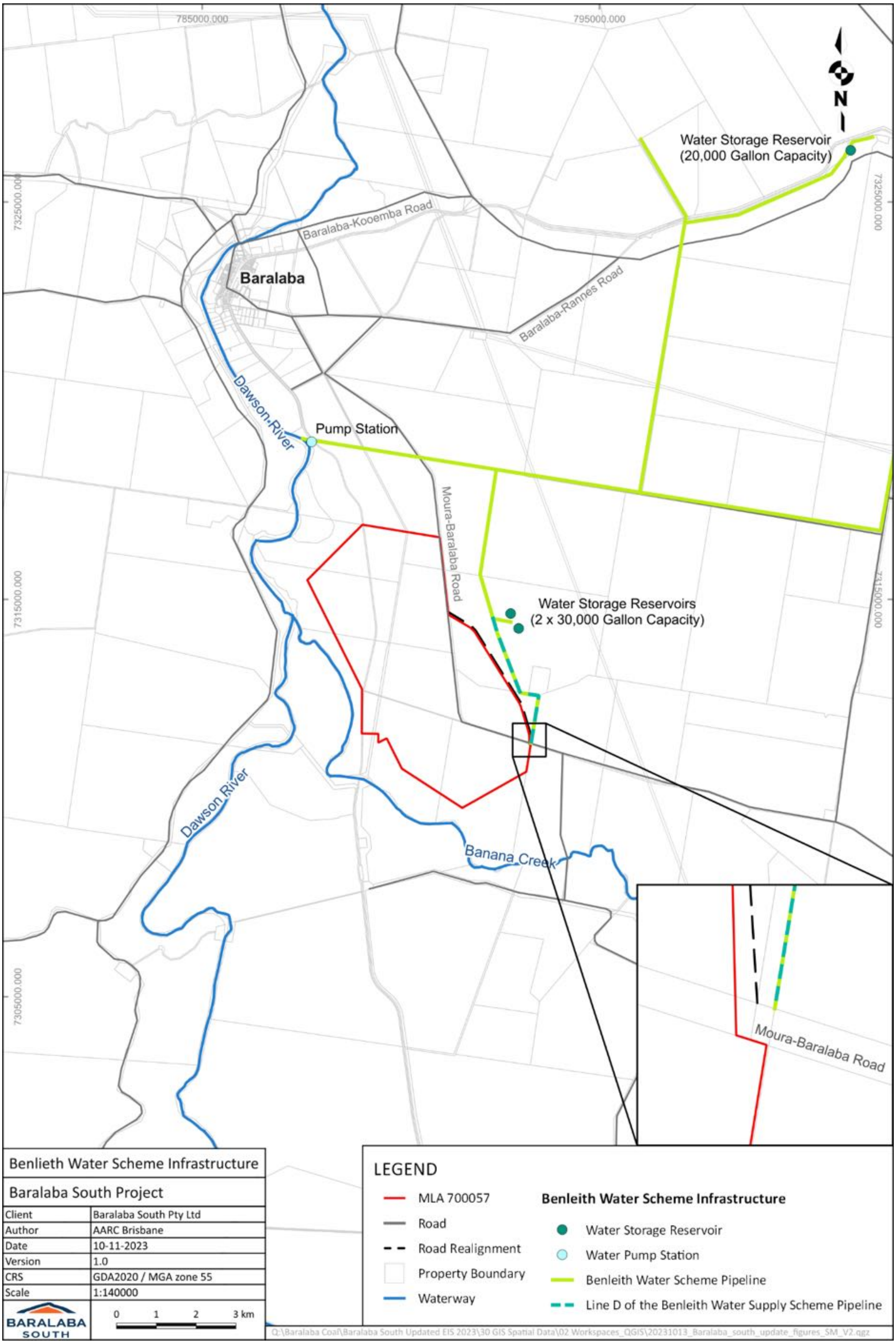

Figure 2.17: Benleith Water Scheme pipeline network

2.2.5 Topography and catchments

2.2.5.1 Topography

The topography of the Project area is dominated by the Dawson River floodplain and Mount Ramsay that is located approximately 400 m to the east (Figure 2.18). The land within the MLA is slightly undulating. Ground elevations range between 75 m and 110 m Australian Height Datum (mAHD), generally rising towards the east. Mount Ramsay, which lies to the east of the MLA is the most significant topographical feature near the Project, occurring as a single sharp rise to 430 mAHD.

2.2.5.2 Local and regional catchments

The headwaters of the Dawson River rise within the Carnarvon Range initially flowing in an easterly direction, and upon passage through Nathan Gorge, flows north into the McKenzie River near Duaringa before joining the Fitzroy River en route to the South Pacific Ocean at Keppel Bay within the Great Barrier Reef World Heritage Area, approximately 386 km downstream of the Project. It is the largest tributary to the Fitzroy River System, with a catchment of 50,760 km^2, representing 35% of the Fitzroy River basin.

The Dawson River valley is typified by a landscape of wide, flat floodplains of tertiary sediments with average grades of less than 5%. Evaporation rates throughout the Dawson River valley typically exceed rainfall by 2 to 3 times. Average daily evaporation is 5.3 mm and varies between 2.9 mm and 7.5 mm, depending on the season.

The Dawson River has a catchment of approximately 40,500 km^2 at the Baralaba township. It is a perennial watercourse subject to seasonal flooding. Local to the Project, the Dawson River can be characterised as having a main channel approximately 150 m wide, bordered by a lower floodplain extending 1.5-3 km on either side. It exhibits several anabranch channels, both upstream and downstream from the Project. The Dawson River experiences consistent flows throughout the year, supported by inflows from groundwater sources along its length. Water resources are managed in the Lower Dawson River through several water supply storages.

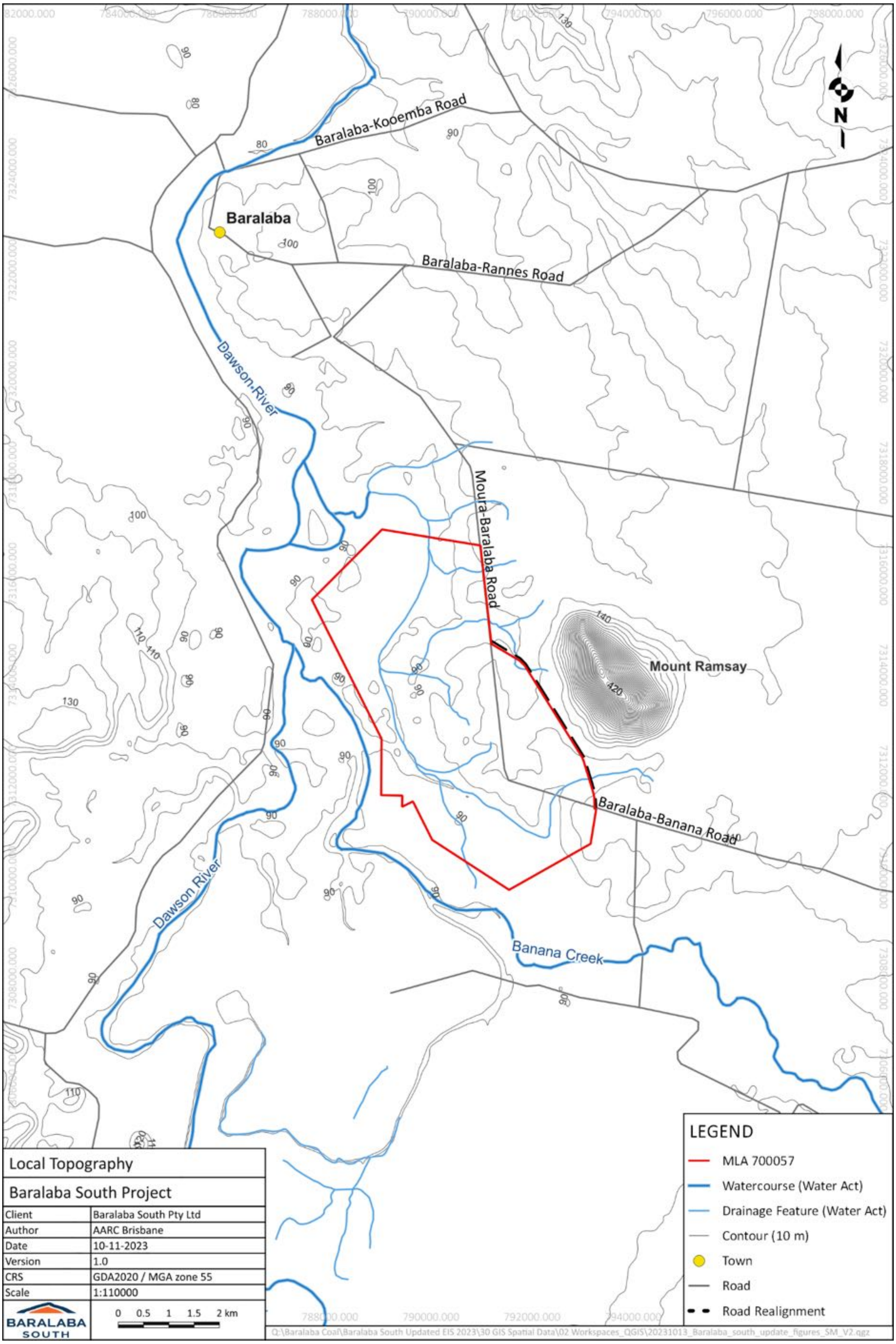

Figure 2.18: Local topography

Banana Creek is an ephemeral, fifth order tributary to the Dawson River. Banana Creek and the Dawson River confluence approximately 1 km to the west of the MLA.

Within the Project area, several first and second order drainage lines occur. These waterways are tributaries of an unnamed third order stream waterway that flows through the Project area, exiting at the north-eastern boundary of the Project's mining lease and meeting an anabranch of the Dawson River (referred to as the Dawson River Anabranch) approximately 1 km north-west of the Project area. The reach of this waterway closest to the confluence with the Dawson River Anabranch is informally referred to as Shirley's Gully.

2.2.6 Geology

2.2.6.1 Regional geology

The Project lies within the Permo–Triassic aged Bowen Basin. In the southern part of the Bowen Basin, the two significant basin structures are the Comet Ridge anticline in the west and the Mimosa Syncline in the east which formed during the early Permian extensional tectonic phase of the basin. The Project is situated in a structurally complex zone on the eastern limb of the Mimosa Syncline.

The economic coal seams lie in the Permian-age Baralaba Coal Measures that are the stratigraphic equivalent to the Rangal Coal Measures of the Blackwater Group in other parts of the Bowen Basin. The coal measures are overlain by the Triassic-age Rewan Formation that is comprised of massive sandstone strata interbedded with successions of laminated mudstone, siltstone and sandstone. The Rewan Formation is barren of coal bearing sequences, and its base marks the end of coal accumulation in the Bowen Basin. The Kaloola Member and Gyranda Formation conformably underlie the coal measures and comprise interbedded thin coal bands and sandstone units.

2.2.6.2 Local geology and coal seams

The Baralaba Coal Measures sub-crop along a north-north-westerly trending strike of 16 km within the Project area and the typical dip of the strata ranges between 25° to 60° to the west-southwest. The sub-crop of the coal measures continues north towards the Baralaba North Mine and south towards the Dawson Mine (Figure 2.19).

There are eight seams consistently present within the coal measures at the Baralaba South deposit (Figure 2.20) referred to as:

1) Reid;
2) Doubtful;
3) Dawson;
4) Dunstan;
5) Wright;
6) Double;
7) Coolum; and
8) Dirty.

Seam thickness is variable throughout the deposit, which appears to be due to the flexural slip and tectonic thickening along the axes of tight folds. Additional seams are known to occur but are more sporadic within the deposit. These are the Cameron, Sub-Dunstan and Sub-Dirty seams.

Quaternary sediments overlie the coal measures and other Permo–Triassic formations throughout the deposit area. The thickness of these sediments is typically between 10 m and 20 m. The depth of weathering ranges is between 20 m and 40 m and is relatively consistent in elevation (i.e., shallower in the Dawson River floodplain area and deeper in the topographically elevated areas of the deposit).

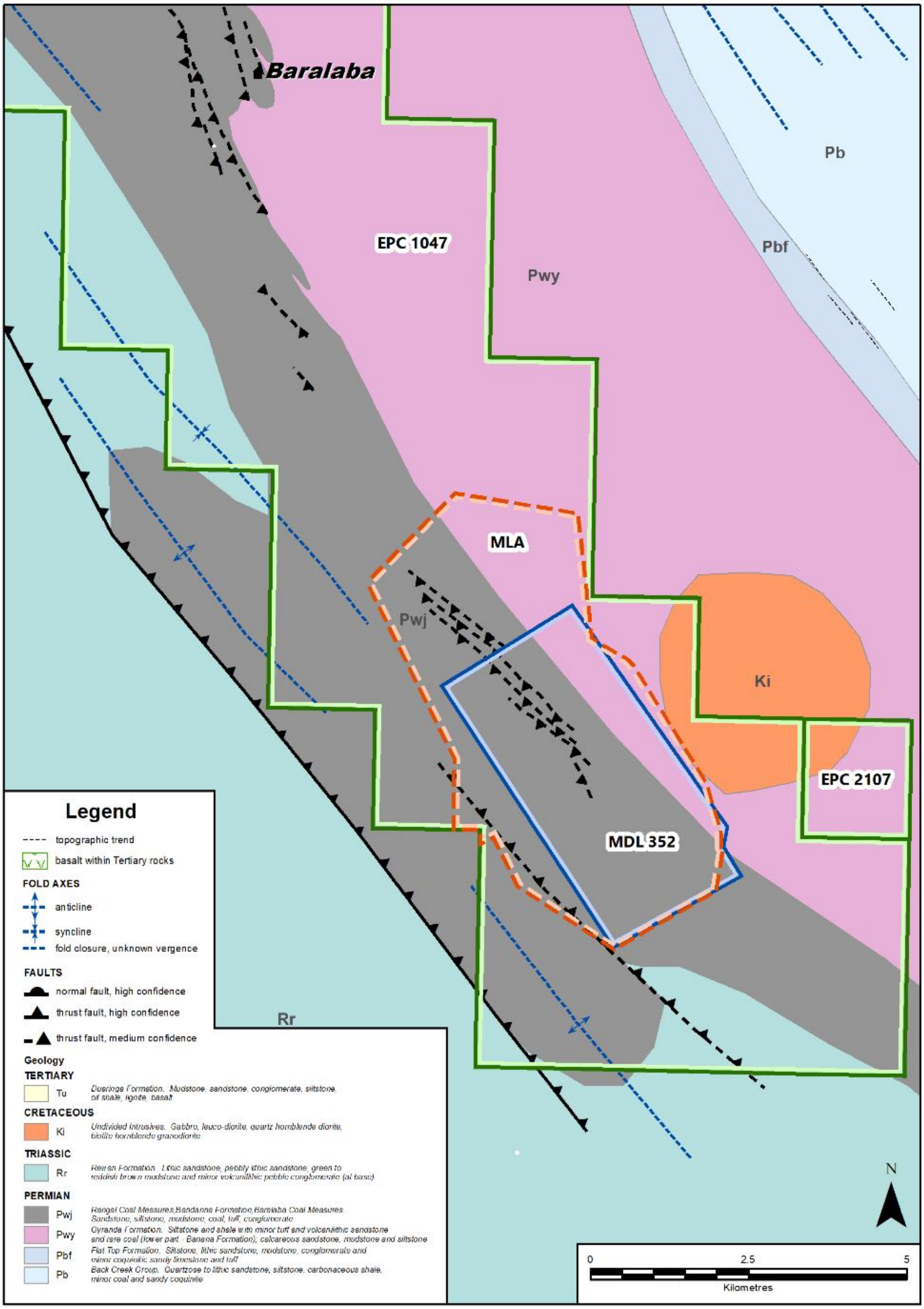

Figure 2.19: Solid geology of the Project area

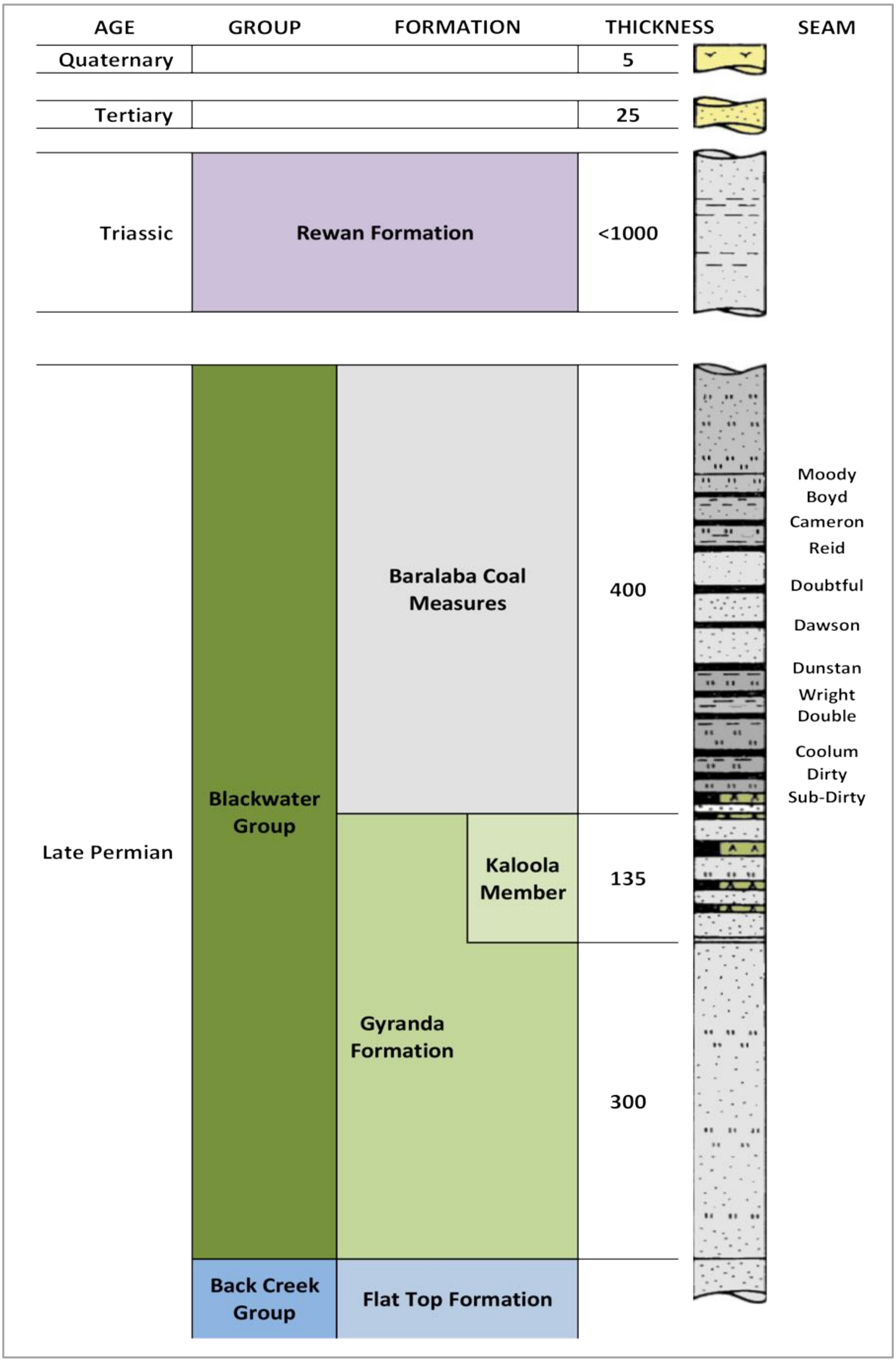

Figure 2.20: Typical stratigraphy of the Project

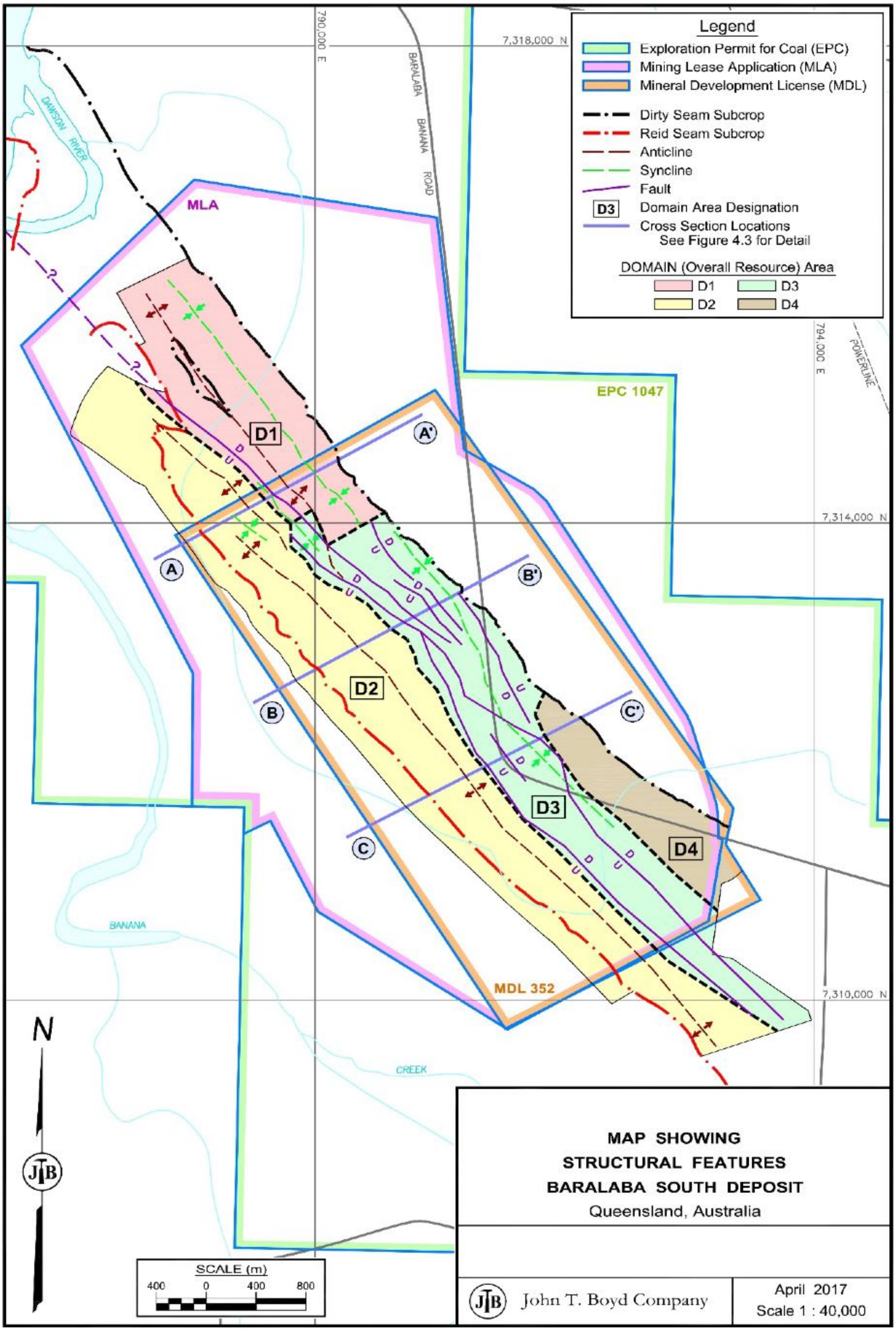

Figure 2.21: Seam sub-crop and section orientation plan for the Project

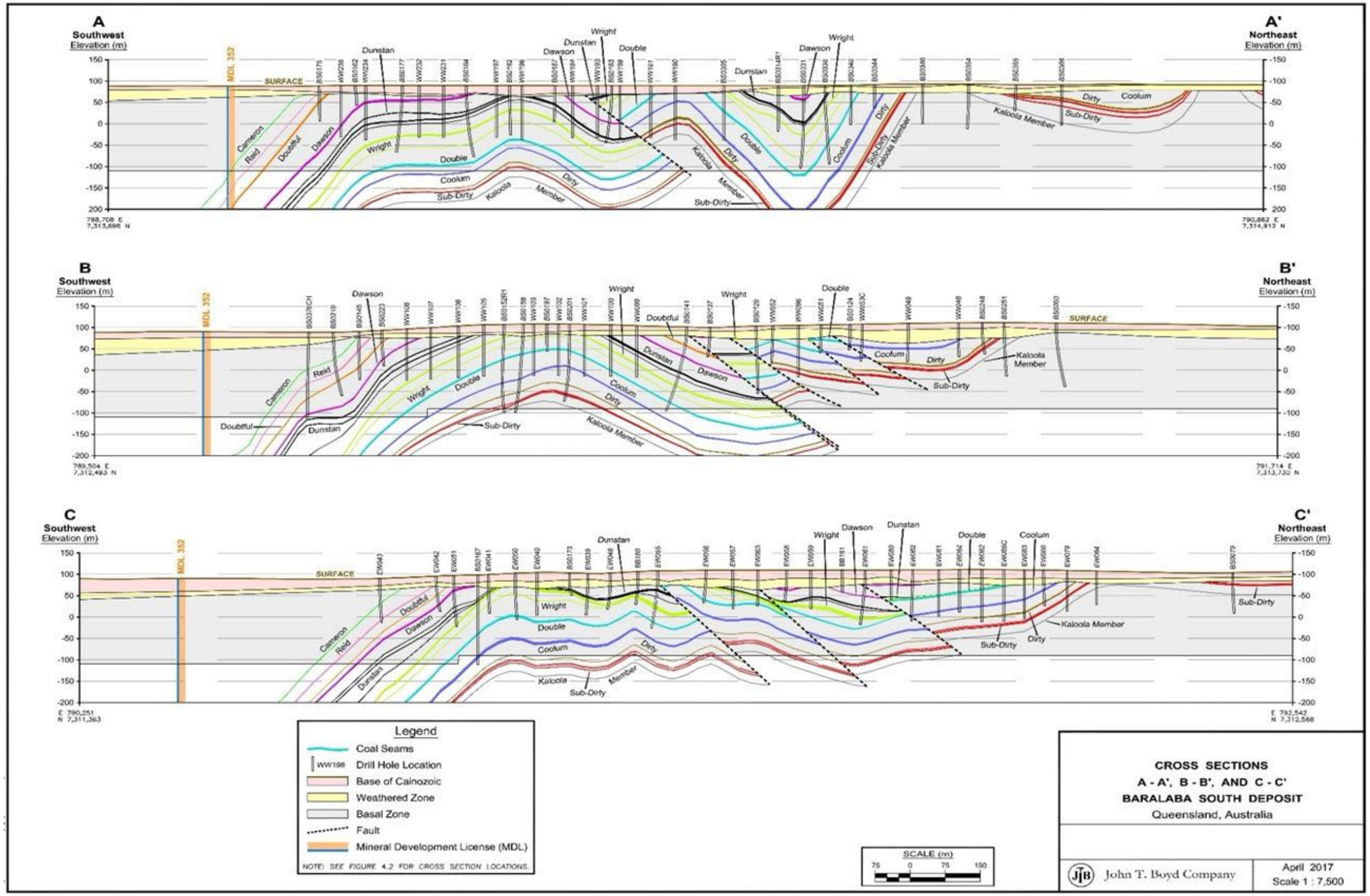

Figure 2.22: Typical cross-sections through the Project (refer Figure 2.1 for cross-section locations)

Mount Ramsay is composed of an Upper Cretaceous trachyte sill. There has been no recorded alteration or intrusion of this body into the coal seams despite the size of the sill and its proximity to the coal measures.

The coal measures have been subject to crustal shortening during the Late Permian and Triassic ages which has resulted in the generation of multiple fold and fault systems. Both the fold axes and faults trend in a north-westerly direction, and the folds typically plunge to the north-west (Figure 2.21 and Figure 2.22).

2.2.7 Soils

The Project area is dominated by cracking clays in the Dawson River floodplain and texture-contrast soils on the gently undulating rises. No acid sulphate soils have been identified within the Project area.

Soil mapping units for the Project area have been developed and characterised based on contiguous soils around which boundaries have been drawn. A total of seven soils on ten soil landscapes have been described from 125 ground observations. A summary of the Project soil mapping units is provided in Table 2.7.

Land suitability constraints within the Project area relate to salinity and sodicity of the subsoil (the 'B' horizon), including the effect of these constraints on soil water availability and rooting depth. Flood frequency is also a major constraint in the floodplain areas of the ML. Consequently, infrastructure, active mining areas and the majority of the waste rock emplacement (WRE) area are located outside the predicted 0.1% AEP design extent. Nutrient levels across the Project area are moderate to poor. Water erosion and surface condition of soils are significant restraints on cropping land suitability due to the slope of land, the dispersivity of surface soil and the size of soil peds.

The results of the Soil and Land Suitability Assessment are described in further detail in Chapter 10, Land and Visual Amenity, and the full assessment provided at Appendix K, Soils and Land Assessment.

Table 2.7: Soil landscapes and soils of the study area

Soil landscape Code	Soil landscape description	Soil name	Dominant vegetation
Soils derived from Quaternary alluvium (Qa)			
Active river channel of the Dawson River anabranches (includes banks and low-lying channel benches subject to frequent flooding)			
1 (Qa.rc1)	Firm to hard-setting, silty surfaced, black cracking clay on low-lying channel benches and banks	Isaac (Is)	Riparian Dawson Gum—Coolabah woodland or open forest
Active channelled lower floodplain of the Dawson River anabranches (relatively low-lying and subject to regular flooding)			
2a (Qa.lf1)	Hard-setting, silty surfaced, black cracking clay on active scroll plains and benches	Isaac (Is)	Dawson Gum, Brigalow, Sally Wattle
2b (Qa.lf2)	Strongly self-mulching black cracking clay on level floodplains	Langley (Lg)	Brigalow
2c (Qa.lf3)	Firm to moderately self-mulching, black cracking clay on lower floodplains	Tralee (Tl)	Brigalow
Flood channels within upper floodplain; subject to both local and river inundation			
3 (Qa.td1)	Hard-setting, poached, grey cracking clay within narrow terrace drainage lines	Bluchers (Bc)	Coolibah, Dawson Gum, Brigalow, Black Tea-tree

Soil landscape Code	Soil landscape description	Soil name	Dominant vegetation
Elevated upper floodplain; level and extensive backplains; commonly flooded			
4a (Qa.uf1)	Hard-setting to firm, silty, black non-cracking clay on indistinct levee deposits	Stephens (St)	Poplar Box, Sally Wattle
4b (Qa.uf2)	Strongly self-mulching, black cracking clay on level backplains	Langley (Lg)	Brigalow
4c (Qa.uf3)	Firm to moderately self-mulching, black cracking clay on level to gently sloping back plains	Tralee (Tl)	Brigalow
Soils derived from Cainozoic sediments (Cza)			
Elevated, level to gently undulating plains on unconsolidated tertiary sediments			
7a (Cz.gp1)	Moderately self-mulching, grey to brown cracking clay over mottled, grey saline subsoil Includes melonhole phase	Greycliffe (Gc)	Whipstick Brigalow
7b (Cz.gp2)	Hard-setting, moderately deep, sandy loam surfaced, sporadically bleached, grey to brown texture-contrast soil with prismatic to columnar structure on gently undulating rises	Thalberg (Tb)	Dawson Gum—Brigalow, with emergent Bottle Trees, Sally Wattle Extensively cleared

2.2.8 Land use

The predominant land use of the MLA is cattle grazing. The site has previously been extensively cleared for this purpose. This is reflective of the land suitability assessment that indicates most of the land is class 4 or 5, indicating its lack of suitability for cropping. The land use of areas surrounding the Project is generally similar (i.e., cattle breeding and fattening), although areas to the north and south of the proposed development are used for coal production: specifically, the Baralaba North Mine and the Dawson Coal Mine respectively. Cropping land exists to the west of the Project within the floodplain of the Dawson River.

The Project is located outside of the area mapped as PAA but does include areas mapped as 'strategic cropping land trigger area', therefore requiring validation and assessment under the Queensland *Regional Planning Interests Act 2014.* The results of a strategic cropping land assessment are discussed in Chapter 10, Land and Visual Amenity, and Appendix K, Soils and Land Assessment.

Past exploration land use has included drilling of approximately 850 holes, surface electro-magnetic surveys, geophysical logging and two seismic lines. Exploration disturbance has been progressively rehabilitated by operators, with minimal residual impact remaining to the landscape.

2.3 Climate

A review of long-term meteorological data has been undertaken to describe the local climate and forecasted predictions. Parameters include:

- rainfall;
- temperature;
- humidity;
- evaporation; and
- wind speed and wind direction.

Records have been obtained from the stations outlined in Table 2.8 and Figure 2.23.

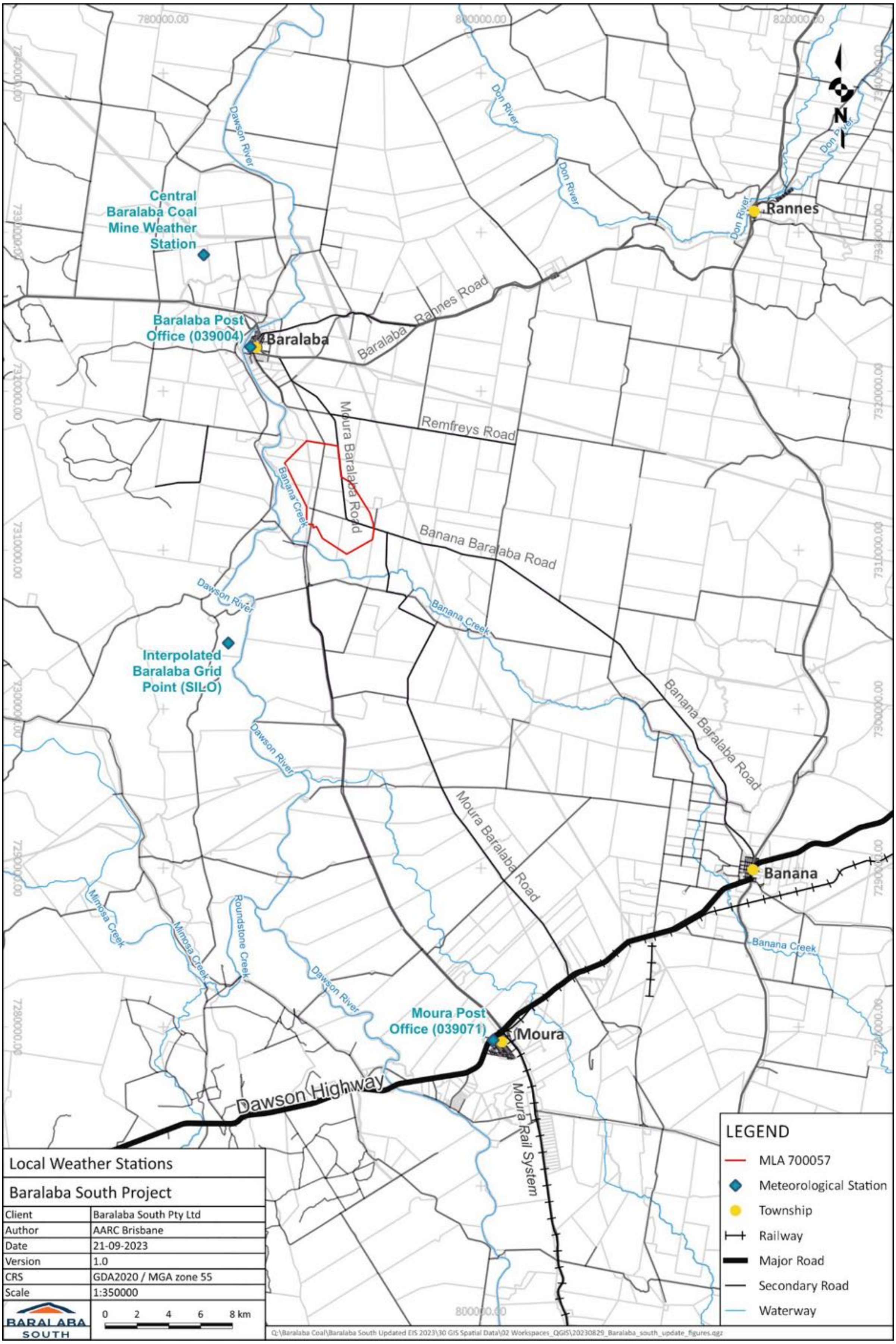

Figure 2.23: Local weather stations

Table 2.8: Meteorological weather stations

Database	Weather station	Latitude	Longitude	Approximate distance to Project
Bureau of Meteorology (BOM)	Baralaba Post Office (039004)	149.81°E	24.18°S	8 km north
	Moura Post Office (039071)	149.97°E	24.57°S	35 km south
Scientific Information for Landowners (SILO)	Interpolated Baralaba Grid Point	149.80°E	24.35°S	10 km south-west
On-site	Central Baralaba Coal Mine[1]	149.78°E	24.13°S	12 km north
	Baralaba South Project[2]	149.52° E	24.16°S	SW corner on Moura-Baralaba Road

Note [1] The Central Baralaba Mine weather station was damaged in 2019, rainfall data available for the period 2013–2019.

Note [2] The weather station for the Baralaba South Project was installed in July 2023.

Detailed summaries of long-term climate patterns pertaining to rainfall, evaporation, temperature and humidity are provided in Table 2.9 and Table 2.10.

2.3.1 Rainfall data

Rainfall records from 1889–2023 (Table 2.9) for the weather stations listed in Table 2.8, show that, for average annual rainfall:

- Baralaba Post Office recorded 696 mm;
- Scientific Information for Landowners (SILO) Baralaba Grid recorded 680 mm; and
- Moura Post Office recorded 664 mm.

The climate class nominated by the BOM (2023) for this area is sub-tropical with a distinctly dry winter. This is reflected in the monthly rainfall averages for the three weather stations within 12 km of the Project (Figure 2.24). An additional weather station was installed for the Project in July 2023.

Table 2.9: Meteorological long-term summary—average rainfall and evaporation

Period of record	Average monthly rainfall (mm)				Average monthly evaporation (mm)			
	Baralaba Post Office (039004)	SILO Baralaba Grid (-24.35, 149.80)	Moura Post Office (039071)	Baralaba Central on-site weather station	Baralaba South Project weather station	Baralaba Post Office (039004)	SILO Baralaba Grid (-24.35, 149.80)	Moura Post Office (039071)
	(1889–2023)	(1889–2023)	(1889–2016)	(2013–2019)	2023	(1889–2013)	(1889–2023)	(1889–2019)
January	102.4	101.9	102.1	128.9		232.3	232.8	233.2
February	108.1	103.9	90.4	81.5		188.5	188.5	188.7
March	76.2	72.0	69.4	89.2		191.6	191.6	191.0
April	39.7	38.3	37.8	23.8		151.9	151.6	149.7
May	36.1	35.3	34.1	13.0		116.0	115.6	113.0
June	36.8	36.1	33.9	37.2		91.6	91.0	88.1
July	28.8	29.0	27.9	32.1		99.4	98.5	95.6
August	21.8	21.4	22.0	22.5	12.4	128.4	128.2	125.3
September	27.2	26.3	29.0	47.7	1.0	168.6	168.6	166.2
October	51.6	51.2	53.7	60.6	0	209.9	210.0	208.2
November	69.9	69.0	70.2	74.5		223.2	223.0	221.6
December	97.2	96.1	93.2	104.5		239.2	239.2	238.6
Annual Average	696.0	680.4	663.6	715.4		2040.6	2038.7	2019.2

* Evaporation data prior to 1970 are long-term averages as per the SILO database.

Table 2.10: Meteorological long-term summary—average temperature and humidity

Period of record	**Average daily temperature (°C) (minimum-maximum)**				**Average monthly humidity (%) (9 am–3 pm)**	
	Baralaba Post Office (039004)	**SILO Baralaba Grid (-24.35, 149.80)**	**Moura Post Office (039071)**	**Baralaba South Project weather station**	**Baralaba Post Office (039004)**	**Baralaba South Project weather station**
	(1889–2013)	**(1889–2022)**	**(1889–2022)**	**2023**	**(1966–2010)**	**2023**
January	21.1–34.3	21.0–34.2	20.6–34.0		65–43	
February	20.9–33.4	20.9–33.4	20.4–33.1		69–46	
March	19.2–32.3	19.2–32.2	18.6–31.9		67–41	
April	15.6–29.9	15.5–29.8	14.8–29.5		67–42	
May	11.7–26.3	11.6–26.2	11.0–25.8		69–42	
June	8.4–23.3	8.3–23.2	7.6–22.8		74–46	
July	6.9–23.0	6.8–22.9	6.1–22.4		70–40	
August	8.0–25.0	7.8–24.9	7.1–24.4	9.3-27.3	66–38	59
September	11.3–28.2	11.2–28.1	10.5–27.7	12.0-30.0	62–34	54
October	15.3–31.1	15.2–31.0	14.6–30.6	15.1-32.5	60–35	51
November	18.1–32.9	18.0–32.8	17.5–32.5		60–38	
December	20.1–34.2	20.0–34.2	19.6–33.9		62–40	
Annual Average	14.7–29.5	14.6–29.4	14.0–29.1		66–40	

* Temperature data prior to 1957 are long-term averages as per the SILO database.

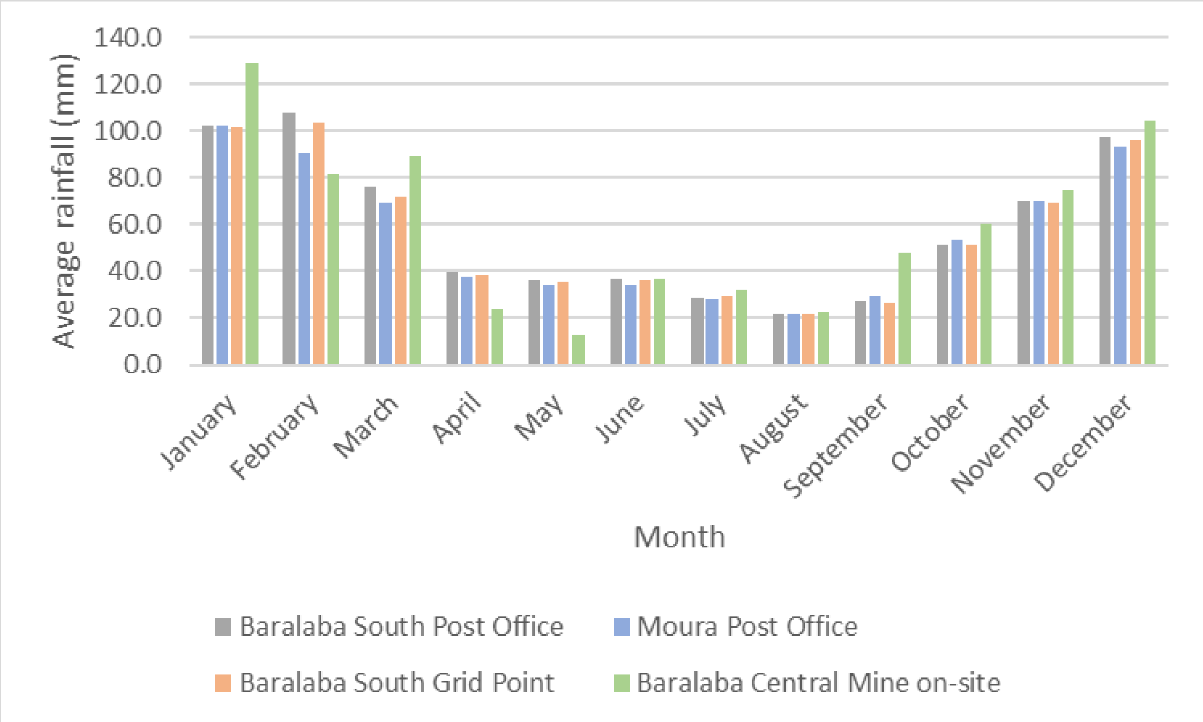

Figure 2.24: Project regional average monthly rainfall

2.3.2 Evaporation and evapotranspiration data

Evaporation records are available from the Moura Post Office (039071), the Baralaba Post Office (039004) and the SILO Baralaba Grid which have recorded a potential annual average evaporation (Class A pan) of approximately 2,019 mm, 2,041 mm and 2,039 mm, respectively (Table 2.9).

The BOM (2019a) has mapped an average annual evaporation (Class A pan) for Baralaba region using evaporimeters as between 1,600 mm and 2,400 mm. A total of 30% can be attributed to evapotranspiration, ranging between 600 mm and 700 mm per year.

Based on the available datasets, measured, monthly, average potential evaporation exceeds the measured monthly average rainfall all year round.

2.3.3 Temperature and humidity

Temperature records are available from the Moura Post Office (039071), the Baralaba Post Office (039004) and the SILO Baralaba Grid which have recorded annual (1889–2019) average temperatures of approximately 14.0°C (min.) to 29.1°C (max.), 14.7°C (min.) to 29.5°C (max.) and 14.6°C (min.) to 29.4°C (max.), respectively (Table 2.10). Average monthly minimum and maximum relative humidity has been measured at 9:00 am and 3:00 pm at the Baralaba Post Office (039004) with a range of 66% to 40%.

2.3.4 Wind speed and direction

Wind speeds at the Baralaba Post Office were measured at 9:00 am and 3:00 pm, observing an annual average of 7.5 km/hr and 8.0 km/hr, respectively (Table 2.11). Trends indicate a slight increase in wind speed during the latter part of the day.

Meteorological data from the Baralaba Mine station for the period 1 January 2015 to 31 December 2015 has been analysed by Trinity Consultants Pty Ltd (Trinity). A wind rose of the data is shown in Figure 2.25. The monitoring station shows a higher proportion of calm conditions and winds from the south-south-east.

Table 2.11: Regional average monthly (9.00 am and 3.00 pm) wind speed (km/hr)

Month	**Baralaba Post Office (039004) – station now closed**	
	Mean 9 am wind speed (km/h)	**Mean 3 pm wind speed (km/h)**
	(1966–2010)	**(1966–2010)**
January	7.0	7.7
February	6.9	7.8
March	7.1	7.6
April	7.5	7.6
May	7.2	7.4
June	7.1	8.2
July	7.2	8.5
August	6.9	8.0
September	8.2	8.6
October	8.5	8.5
November	7.9	7.8
December	7.9	8.1
Annual	7.5	8.0

Source: BOM climate and weather database

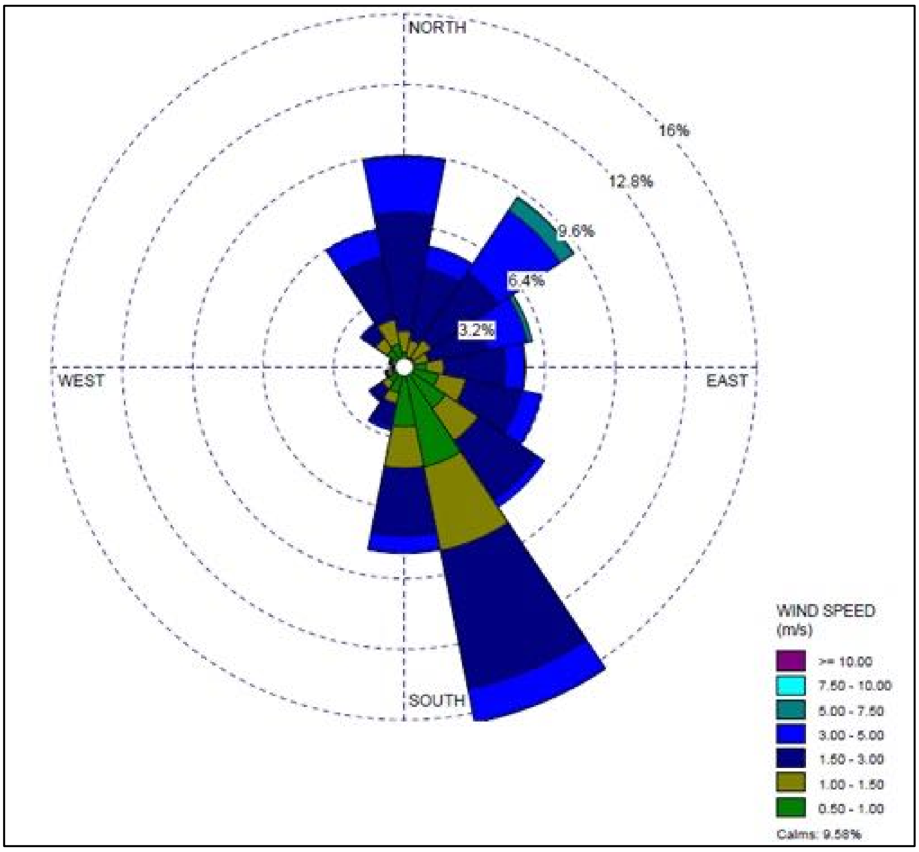

Figure 2.25: Wind rose: Baralaba Mine weather station data

2.3.5 Atmospheric stability

Atmospheric stability can affect dust and noise dispersion and is used as an input for both air dispersion and noise impact modelling. Six classes of atmospheric stability are commonly identified using the Pasquill-Turner Scheme as described in Table 2.12.

Table 2.12: Atmospheric stability classes

Class	Stability description
A	Extremely unstable conditions, clear skies, warmer temperatures
B	Moderately unstable conditions, clear skies, day-time temperatures
C	Slightly unstable conditions, moderate winds, slightly overcast and day-time temperatures
D	Neutral conditions, cloudy overcast, moderate winds during either day or night-time
E	Slightly stable conditions, overcast skies and night-time cooler temperatures
F	Moderately stable conditions, clear skies, very cold night temperatures

Day-time conditions range from neutral to unstable as a result of solar heating of the ground inducing atmospheric mixing. Night-time conditions at the Project are predominantly stable but range from stable to neutral (Figure 2.26).

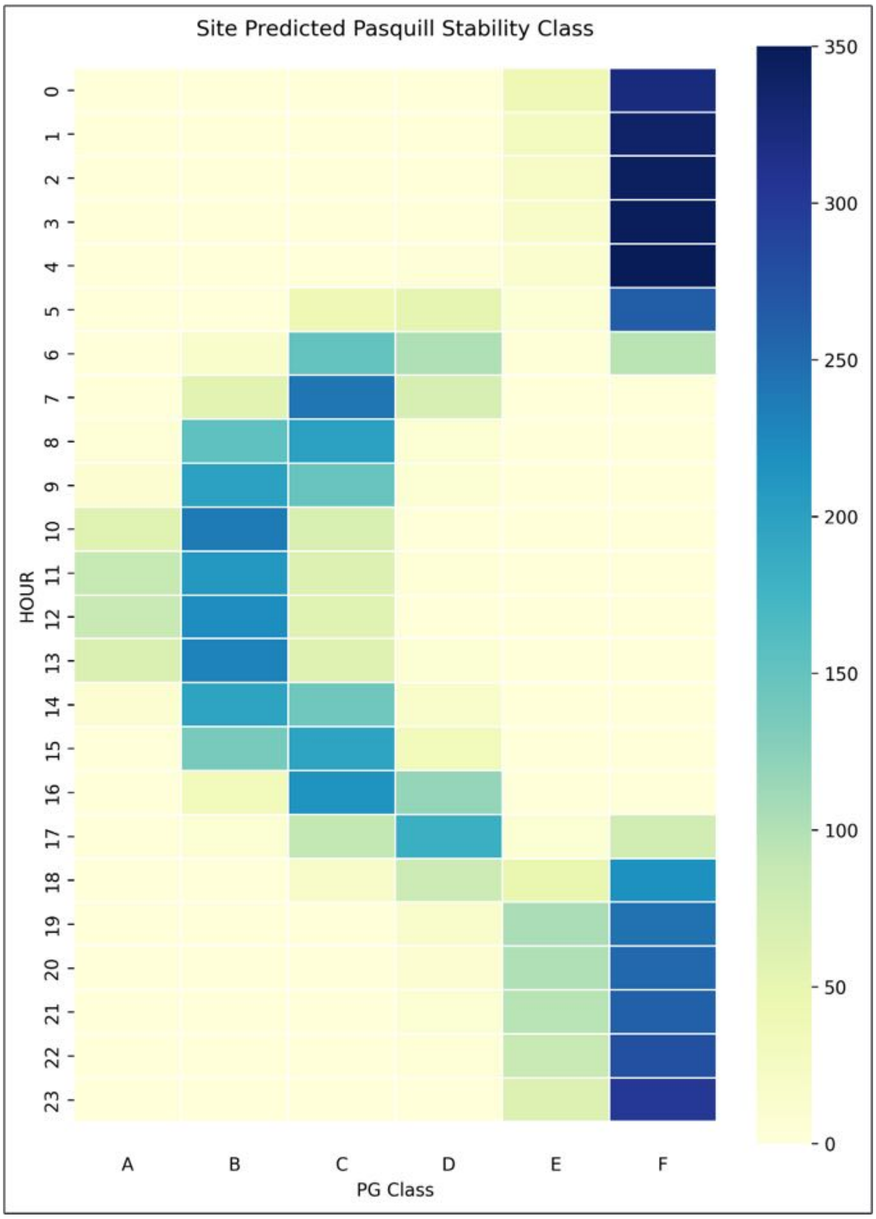

Figure 2.26: Stacked proportions of stability classes by time of day (Trinity, 2023)

2.3.6 Climate change projections

In Australia, climate change is generally expected to result in a shift towards more arid conditions, warmer temperatures and reduced rainfall. These climatic changes may have flow-on effects for the environmental values associated with water and temperature dependent features and services such as rivers, wetlands, groundwater dependent ecosystems, water supply for human consumption and agriculture. According to the Queensland Government (2019), rainfall in central Queensland is predicted to decrease due to climate change. By 2050, median annual rainfall is projected to decrease by:

- 2% under a lower emissions scenario (with emissions reduced from 'business as usual'); and
- 8% under a high emissions, or 'business as usual' scenario.

Climate projections for the Project have been obtained using the projection builder tool (Whetton et. al., 2012) provided on the 'Climate Change in Australia' website which was developed using the climate model evaluations detailed in the related CSIRO report (CSIRO and BOM, 2015). Projections have been obtained for the 'best' and 'worst' case scenarios:

- Best case—lower rainfall and higher evaporation, reducing rainfall runoff resulting in reduced spills from storages and reduced mine water release;
- Worst case—higher rainfall and lower evaporation, increasing rainfall runoff resulting in increased spills from storages and increased mine water releases; and
- Maximum consensus; which is the climate future projected by at least 33% of the climate models and which comprises at least 10% more models than any other. It is considered the most representative forecast of all the climate models.

When the impacts of the 2050 projection year are applied to the operational water balance model, the total runoff reporting to storages is reduced. This results in a reduction in controlled and uncontrolled releases and overall reduction in a risk of release to the receiving environment.

Further analysis of climate change impacts on water is provided in Chapter 6, Flooding and Regulated Dams, and Appendix C, Flood Impact Assessment, Appendix B, Groundwater Modelling and Assessment and Appendix L, Air Quality and Greenhouse Gas Assessment.

2.3.7 Bushfire risks

Fire season for Queensland's ranges is from summer through to autumn, which intensifies from September through to November (BOM, 2019c). Long periods of little to no rainfall, accompanied by El Nino-Southern Oscillation events can result in increased risk. Potential impacts to the Project associated with the increase in bushfire risk may result in:

- infrastructure damage;
- injury or fatality to workers or public; and
- failure of progressive rehabilitation.

Bushfire hazard areas (Bushfire prone areas) are detailed in Figure 2.27 using state-wide mapping developed by CSIRO in concurrence with the Queensland Fire and Emergency Service and Public Safety Business Agency. No potential bushfire prone areas exist within the Project's boundaries; however, certain pockets of vegetation west along the Dawson River present a medium risk. Further, Mount Ramsay, located near the MLA, represents a medium–high bushfire risk. Risk management measures will be established, and updates will be provided in accordance with regional climate patterns and the identified areas classified as medium–high risk. This will include the provision of firefighting equipment during construction and operations, as well as employee bushfire awareness training.

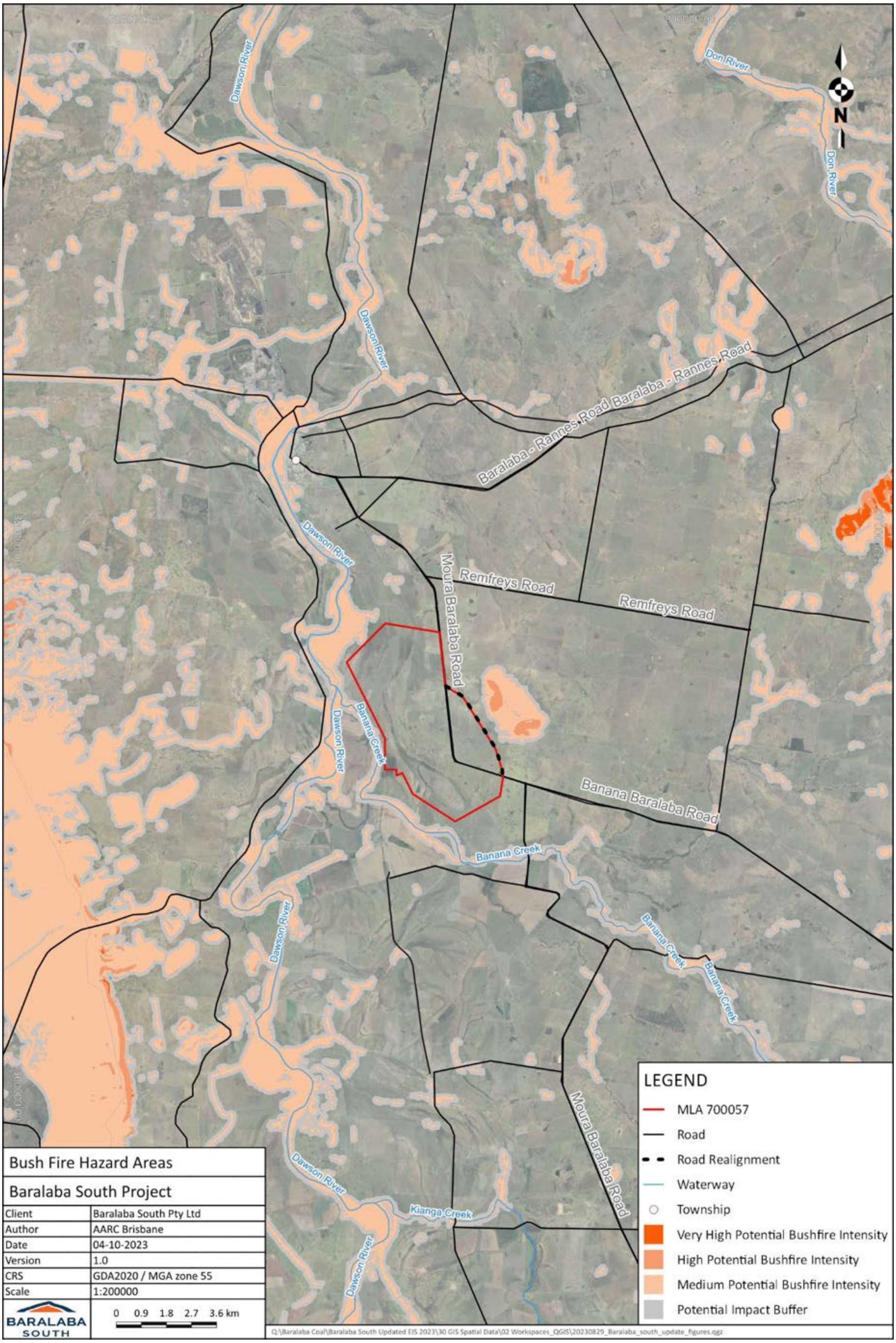

Figure 2.27: Bushfire hazard areas

2.4 Construction activities

Construction activities required to enable the commencement of an open cut mining operation are planned to occur over a period of approximately 24 months following the successful approval and granting of the MLA, EA, PRC Plan and other permits required for the Project to proceed.

The construction workforce is described in section 2.1.8.1. Construction activities will generally be undertaken during the day, seven days a week. The construction period will involve a civil and earthworks phase which will include the following activities within the mining lease:

- clearing the vegetation from the areas where infrastructure is to be constructed including:
  - MIA;
  - CHPP;
  - ROM and product stockpile pads;
  - dams, pipelines, pumps and other water management infrastructure;
  - the WRE;
  - road and other infrastructure;
- grubbing, with the grubbed material disposed of by mulching as required;
- stripping and stockpiling of topsoil for later use in rehabilitation;
- levelling the disturbance footprint if required to create a suitable landscape to construct infrastructure;
- excavating footings of infrastructure areas and laying concrete footings;
- constructing the mine water management system, including:
  - mine-affected water dam;
  - sediment dams;
  - raw water dams;
  - runoff and stormwater channels;
  - associated drainage structures; and
- constructing main access roads, site roads and the haul road.

Other off-lease development will also commence during the construction stage. However, the exact timing of the infrastructure development will be dependent on agreements with third-party participants. Infrastructure development includes:

- Construction of the Moura-Baralaba Road realignment; a 4.5 km section of the public road bisects the mining lease will be moved to a new location immediately to the east. The road will include an intersection to maintain access to and from the MLA. Details of the road relocation will be subject to approval from the Banana Shire Council.
- Upgrades and/or construction of electrical infrastructure; proposed to include:
  - Construction of a 132/22 kV transformer on land owned by a related entity to the Proponent, adjacent to the Baralaba Substation, located on Baralaba-Rannes Road, approximately 6 km east of Baralaba and 10 km north of the Project (refer section 2.6.1).
  - Associated upgrades to the Baralaba Substation infrastructure. Upgrades to infrastructure will be subject to agreement with Powerlink as owner of the Baralaba Substation infrastructure.
  - Upgrade and/or construction of a 22 kV ETL and associated substation to supply power to the mine site for operations. Two alternative ETL alignments and a wider ETL assessment zone have been

assessed, as described in section 2.6.1. The upgrades and/or construction of the infrastructure will be subject to agreement with Ergon as owner of the infrastructure.

- Expansion of the Baralaba accommodation camp; the existing Baralaba Mine accommodation camp is proposed to be expanded to accommodate the construction and operational workforce for the Project, who do not live locally or choose to live locally.

2.4.1 Construction materials

The majority of infrastructure components (e.g. CHPP, buildings, pipelines, etc.) will be manufactured off-site and transported to site for assembly and installation.

The estimated quarry material of 56,160 m^3 is required for the 2.5 Mtpa Project construction. If suitable material is identified on-site for road construction, the material will be won from borrow pits within the Project disturbance footprint. Suitable clay and rock materials (for embankments, bunds etc.) will be predominantly sourced from the box cut spoil.

If required, existing hard rock quarries located in the region may be used to meet Project construction requirements. The remainder of the anticipated construction loads include:

- bitumen;
- cement;
- pre-cast concrete structures;
- miscellaneous items;
- prefabricated buildings;
- structural steel and steel reinforcing; as well as
- oversized special items.

Table 2.13 shows the predicted transport movements for materials to the Project during the construction stage.

Table 2.13: Construction materials transport

Item	Origin	Destination	Typical vehicle	Average trips per day construction
Deliveries—parts, explosives, waste	Gladstone/Rockhampton	Mine	Class 9 truck	2
Oversized loads	Gladstone/Rockhampton	Mine	Low Loader	1
Other deliveries—small trucks	Gladstone/Rockhampton	Mine	Class 3 truck	5
Fuel	Gladstone/Rockhampton	Mine	B-Double	1

Equipment used during construction will include excavators, haul trucks, dozers, graders, front-end loaders and water trucks. The start-up mining fleet will also be delivered to the Project during the construction stage (refer Table 2.14). Some equipment models and numbers may change due to contractor and equipment availability.

Table 2.14: Construction equipment fleet

Category	Item	Number
Excavators	Komatsu PC5500-6	1
	Komatsu PC4000	1
	Komatsu PC600	1
	Cat 345D	1
Loader	Komatsu WA900	1
Haul Truck	Komatsu 830E	6
	Komatsu 930E	7
Dozer	Komatsu D475	1
	Komatsu D375	1
Grader	CAT 24M	2
Water Truck	CAT 777	2
Scraper	CAT 637K	6
Soil Compactor	CAT 825K	2

2.4.2 Moura-Baralaba Road realignment and MLA access

The 4.5 km section of the Moura-Baralaba Road located within the MLA is proposed to be replaced by a newly constructed section of road immediately to the east along the MLA boundary. The design of the new section of public road will be consistent with the upgraded sections of the Moura-Baralaba Road to the north and south of the MLA. The sealed carriageway will be a minimum of 10 m wide, with two 3.5 m wide lanes, a 1 m wide median strip and two 1 m wide shoulders.

Access to the Project will be via two new access roads intersecting with the new section of Moura-Baralaba Road. The northern access road will facilitate access for site personnel and the southern access will facilitate access for equipment, material deliveries and mine haulage vehicles. An intersection design will be incorporated into the road diversion and completed as part of the detailed Project design. A concept design cross-section of the new section of the Moura-Baralaba Road is provided in Figure 2.28. Modifications may be incorporated into the detailed design phase.

The Project access design will meet rural condition road criteria for the greater of current and projected future traffic volumes.

Approach sight distance and safe intersection sight distance are to be designed in accordance with 'Austroads Guide to Road Design 4A: Unsignalised and Signalised Intersections' (Austroads, 2023).

Left and Right turn treatments of the intersection are to be in accordance with Sections 7 and 8 of 'Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections' (Austroads, 2023).

A Traffic Management Plan will be adopted for the construction stage. Appropriate signage will be installed in accordance with Council requirements and guidelines. The construction of intersections will be staged to allow for a majority of the construction work to be undertaken offline of the operating road network. This methodology is designed to minimise disruption impacts on the road network.

Other permanent or temporary road closures within the MLA will be coordinated with Banana Shire Council. These roads are either unformed or are not required for access to properties—other than within the MLA. Figure 2.29 displays proposed public road closures and new road sections.

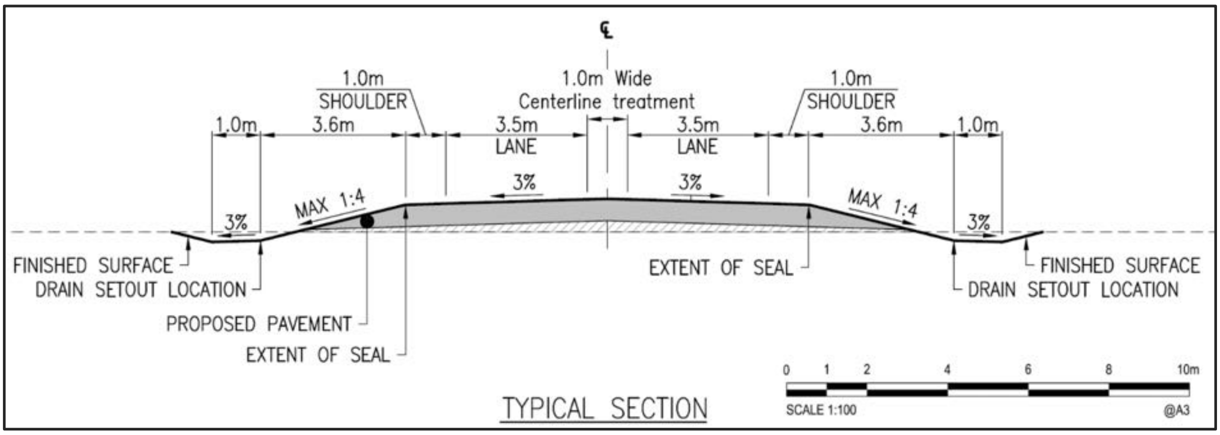

Figure 2.28: Moura-Baralaba Road—concept design of diverted section (Stantec, 2023)

2.4.3 Mine roads

Internal roads will be developed during the construction stage to provide for haulage of waste from the box cut and infrastructure areas, as well as access for heavy equipment and other authorised mine traffic to and from the Project site. The length of haul roads will be minimised to reduce noise and air emissions from the site. All internal roads will be unsealed. Haul roads will be approximately 28 m wide with earthen side bunds appropriate for haul truck specifications.

Other mine service roads will be developed during construction and located to provide access to the Project site and, where possible, separation of light and heavy vehicle traffic will be incorporated. Mine service roads will typically be 8–10 m wide. The mine service network will also include the access road from the intersection with the Moura-Baralaba public road.

2.4.4 Mine infrastructure

The MIA will form the main hub of construction activity from commencement. It will serve as offices for construction management staff and thereafter as central administration offices, muster areas for shift changes, training rooms, meeting rooms, crib facilities and bathhouse facilities. During the construction stage, the MIA will include:

- administration buildings and bathhouse;
- a workshop/maintenance area;
- storage areas and laydowns;
- fuels and oil storage;
- other hazardous chemical storage;
- heavy and light vehicle wash down bays;
- parking and pavement areas; and
- temporary septic tanks, followed by construction of a sewage treatment plant (STP).

Figure 2.30 provides a conceptual layout of the MIA. The MIA foundations will be formed by cut-and-fill methods to minimise earthworks.

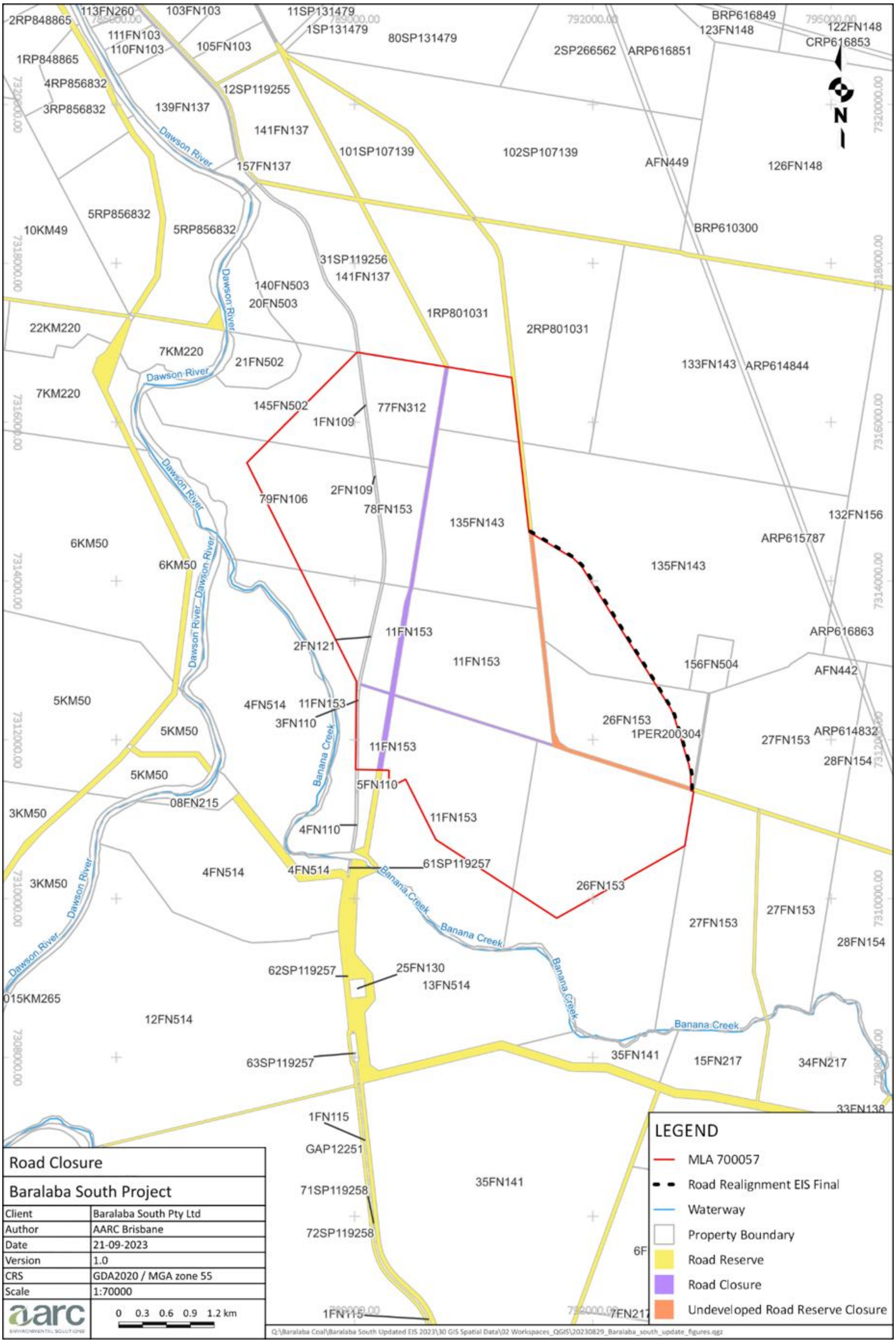

Figure 2.29: Map of road closures and realignments

Figure 2.30: MIA indicative layout

2.4.5 CHPP

A single 360 t/hr modularised process plant is proposed for the Project. The CHPP will be completed and commissioned by the end of the second construction year. The CHPP is planned for development in a single stage and will be ramped up to maximum production by Year 3 of operations.

The CHPP will comprise the following elements:

- a ROM stockpile area;
- crushing circuit;
- wet coal processing plant;
- washed product coal stockpile and loading areas for road trains;
- coarse rejects bin and/or hardstand for coarse rejects; and
- rejects holding, filtration, drying and transfer system.

A detailed description of the CHPP is provided in section 2.5.5.

2.5 Operations

2.5.1 Mine sequence and schedule

It is intended to commence a 2-year construction, pending approvals. Year 1 of coal production will commence in the second year of construction.

The resource supports a mine with an optimal life of approximately 23 years of coal production, though it is possible that factors, including engineering optimisation, market conditions and environmental factors, may result in an extended operational life.

Approximately 49 Mt of ROM coal is estimated to be mined in the mine schedule to produce approximately 36 Mt of product coal over the life of the Project. A mine schedule is presented in Table 2.15 that shows the maximum production case of up to 2.5 Mtpa of ROM coal production over the life of the mine.

The placement of the initial box cut and mine sequencing has been determined by the need to:

- locate the box cut in a low strip ratio coal area;
- locate the final void in a location best suited for protection from flooding; and
- minimise the haul distance to WRE, thus reducing noise and air emissions.

Once established, the initial operation will take approximately 24 months to ramp up to the maximum annual mine processing rate of approximately 2.5 Mtpa ROM coal. The sequence of mine development over the life of mine is depicted by the ‘period progress plot’ (Figure 2.31).

Table 2.15: Annual coal and waste production quantities

Year	ROM coal (t)	ROM waste (bcm)	Product (t)	CHPP rejects (t)
1	1,251,073	29,917,134	947,374	329,444
2	2,141,756	36,470,360	1,578,896	605,767
3	2,030,053	37,146,816	1,469,714	600,280
4	2,100,000	35,182,411	1,548,821	593,269
5	2,200,000	37,018,878	1,608,699	635,019
6	2,300,000	36,725,699	1,694,116	651,923
7	2,400,000	26,950,122	1,769,800	678,296
8	2,500,000	26,894,981	1,789,793	758,846
9	2,500,000	26,880,500	1,806,014	743,065
10	2,317,103	27,095,057	1,666,441	695,949
11	2,250,000	27,048,859	1,662,594	632,588
12	2,250,000	27,061,516	1,618,978	675,019
13	2,250,000	27,071,849	1,620,640	673,402
14	2,189,267	27,150,196	1,595,225	637,394
15	2,416,509	26,948,916	1,750,293	713,781
16	2,500,000	26,877,465	1,833,437	716,388
17	2,500,000	26,877,027	1,848,062	702,160
18	2,182,084	27,179,947	1,613,811	612,130
19	2,100,000	27,178,118	1,528,349	613,185
20	2,019,095	27,229,113	1,489,877	569,707
21	2,142,522	24,557,634	1,579,192	606,245
22	1,309,976	15,258,017	942,255	393,327
23	750,948	5,662,948	563,484	202,777

The staged progression of mining operations at the Project is shown in conceptual stage plans over the life of the mine (Figure 2.32 to Figure 2.38). These figures show:

- the physical extent of excavations;
- the location of stockpiles of overburden;
- proposed progressive backfilling of excavations;
- water management infrastructure; and
- the area disturbed at each major stage of the Project.

Key infrastructure development will be completed prior to the commencement of operations.

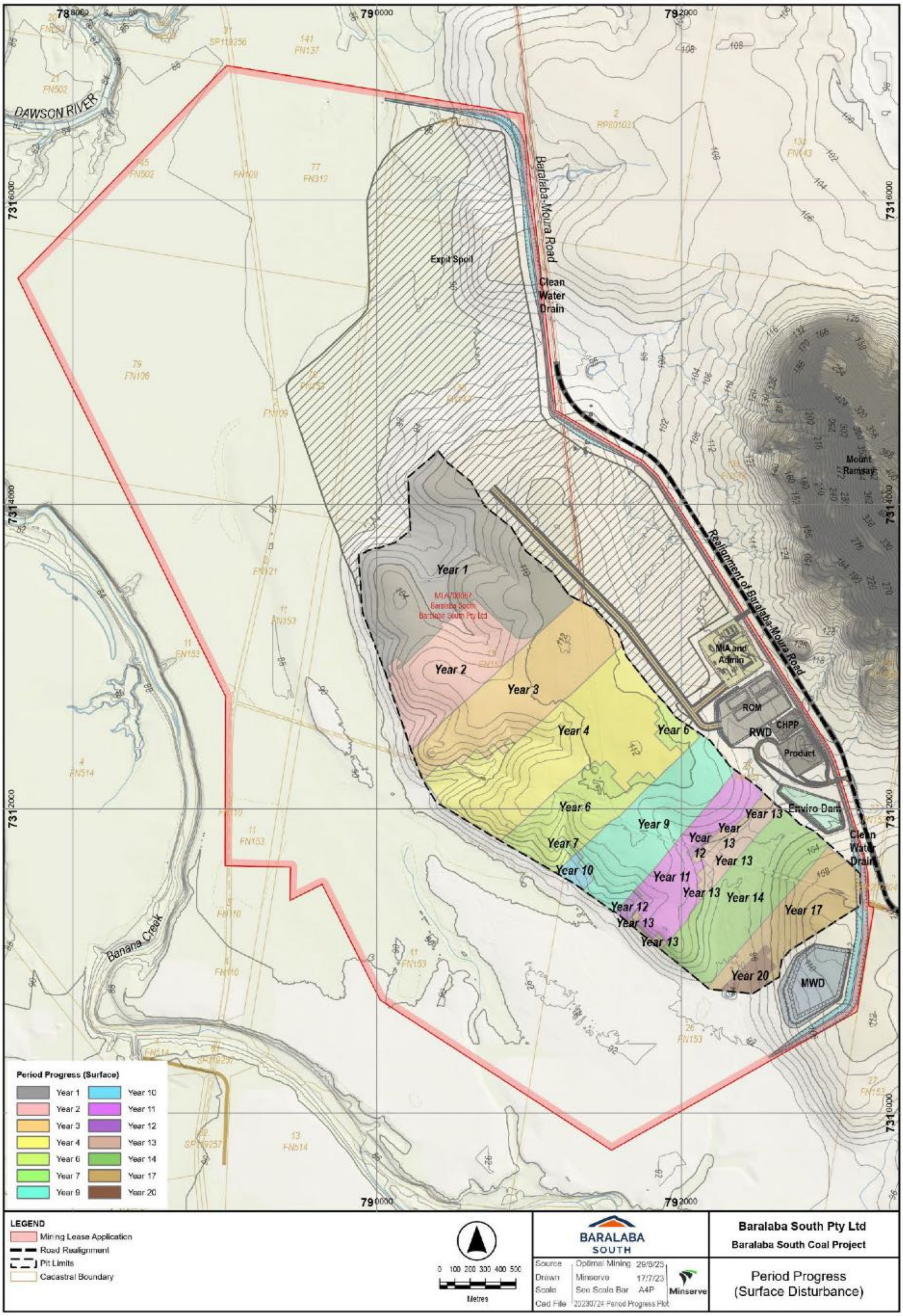

Figure 2.31: Indicative life of mine period progress plot

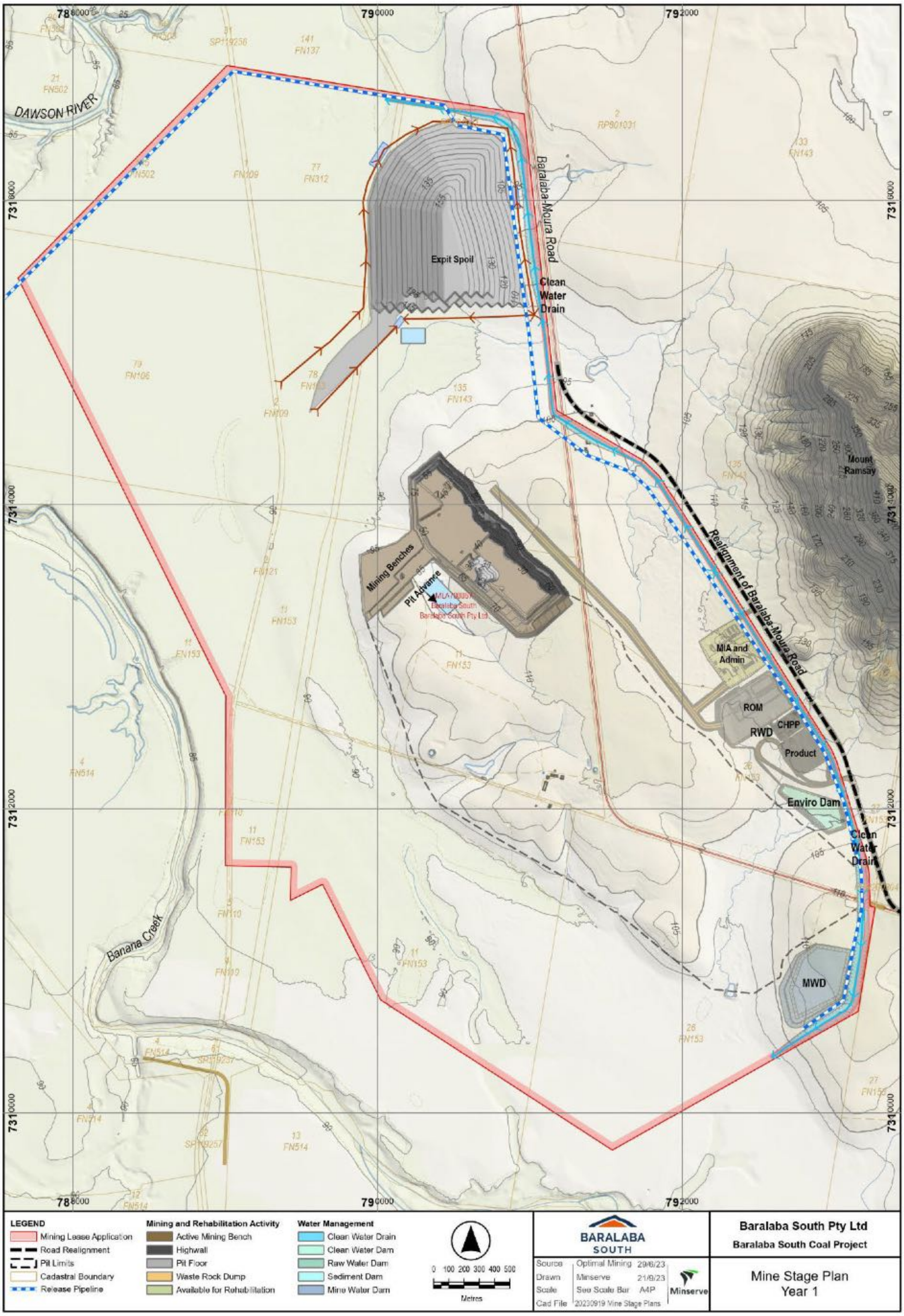

Figure 2.32: Mine stage plan—year 1

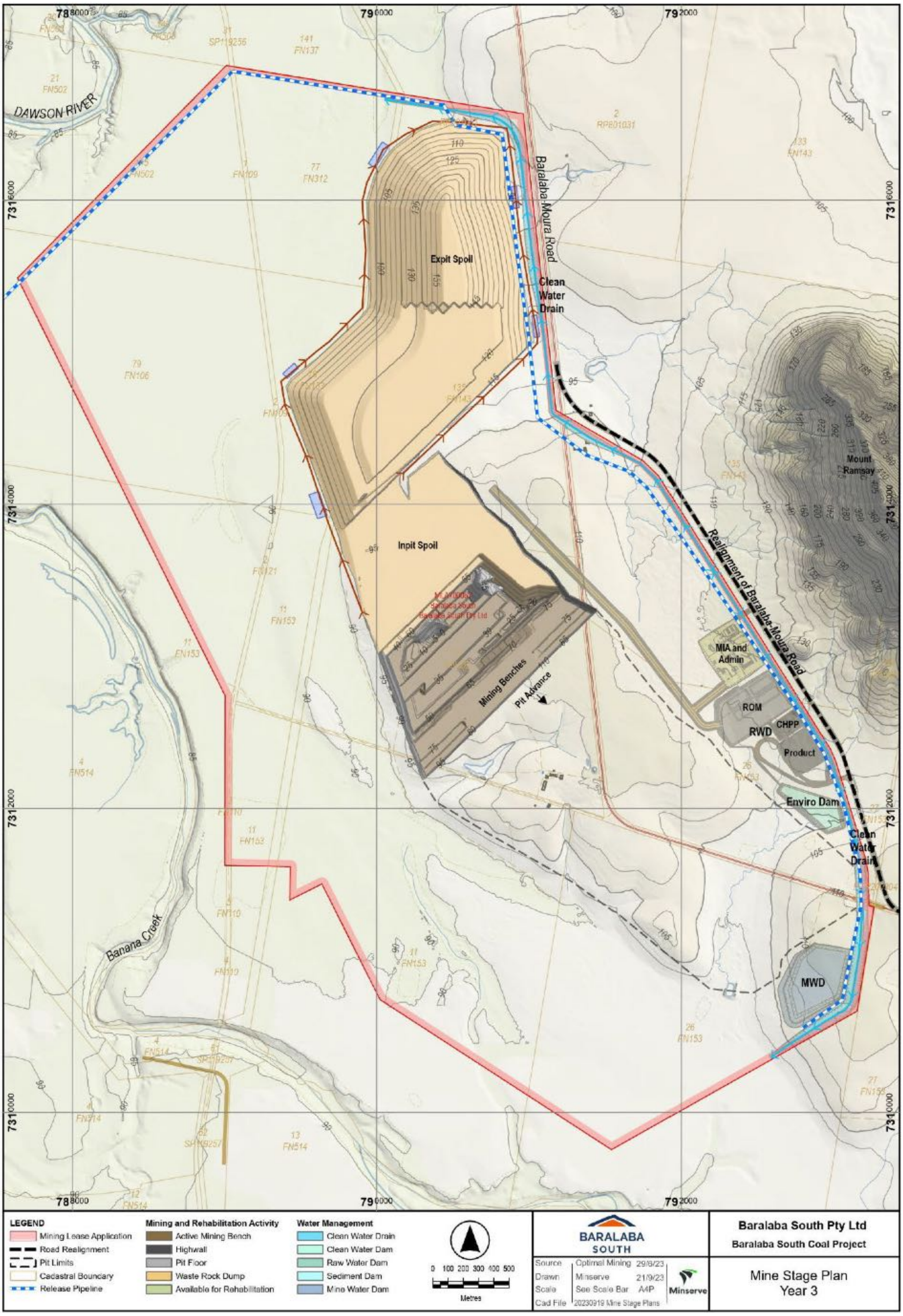

Figure 2.33: Mine stage plan – year 3

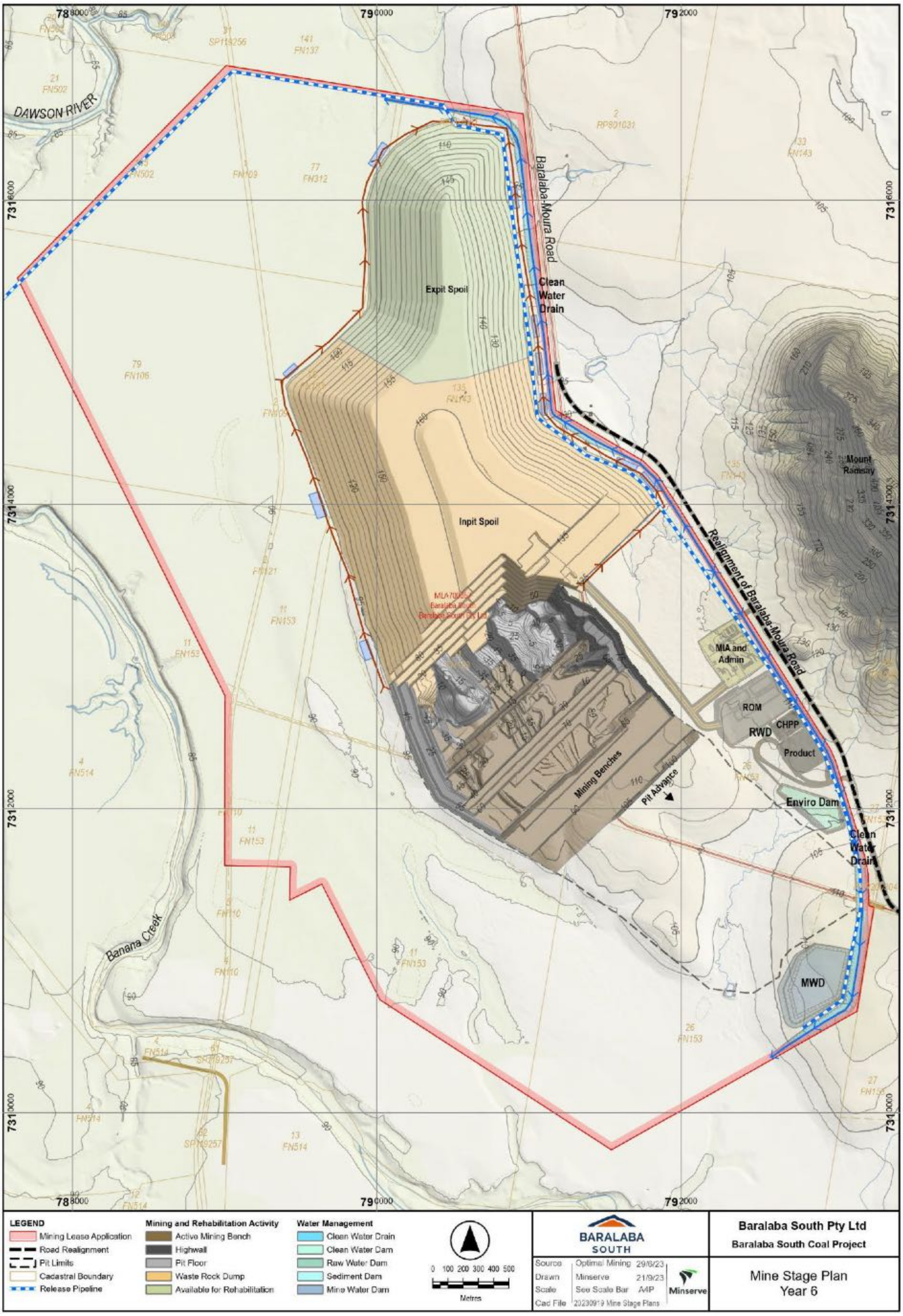

Figure 2.34: Mine stage plan—year 6

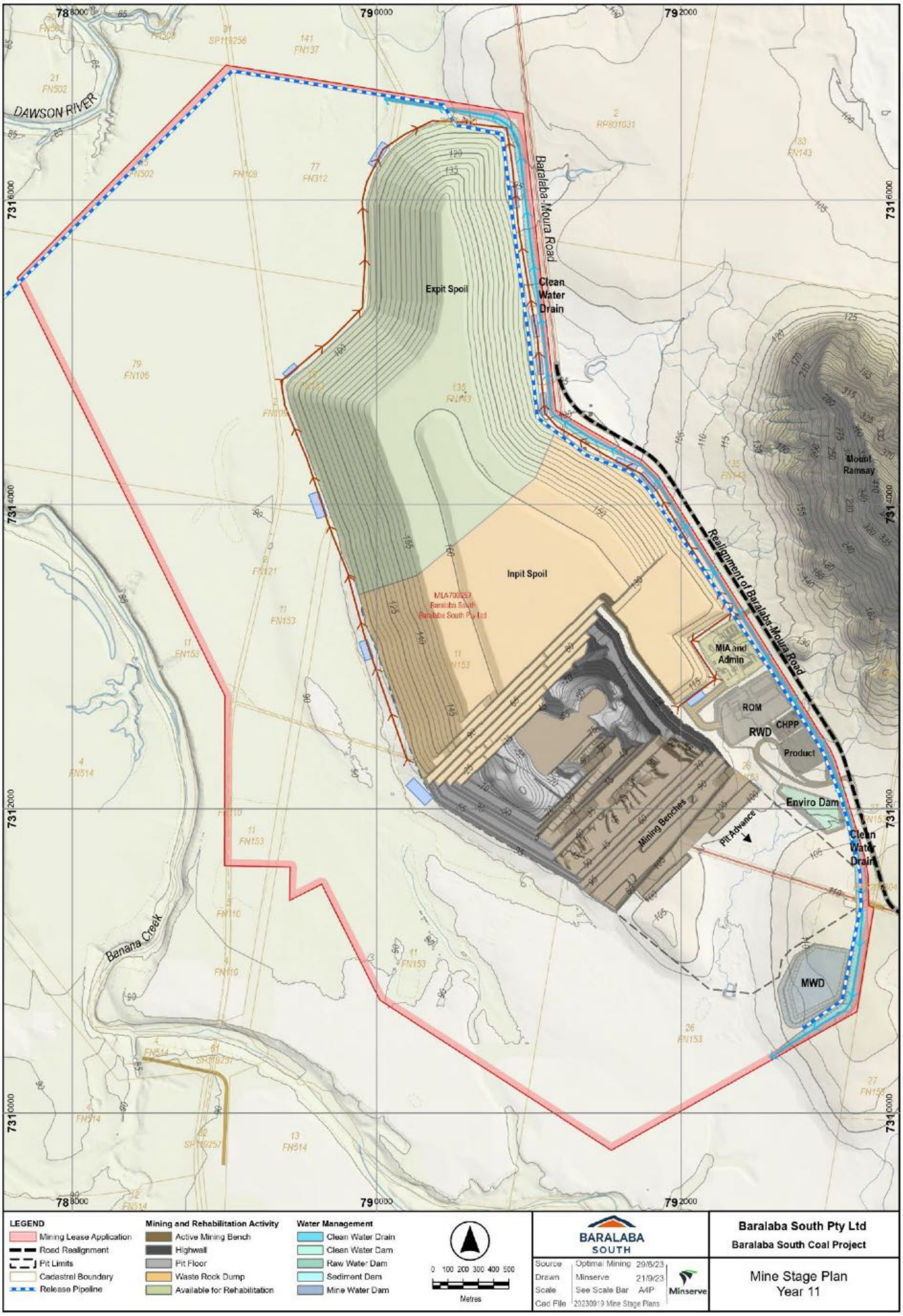

Figure 2.35: Mine stage plan—year 11

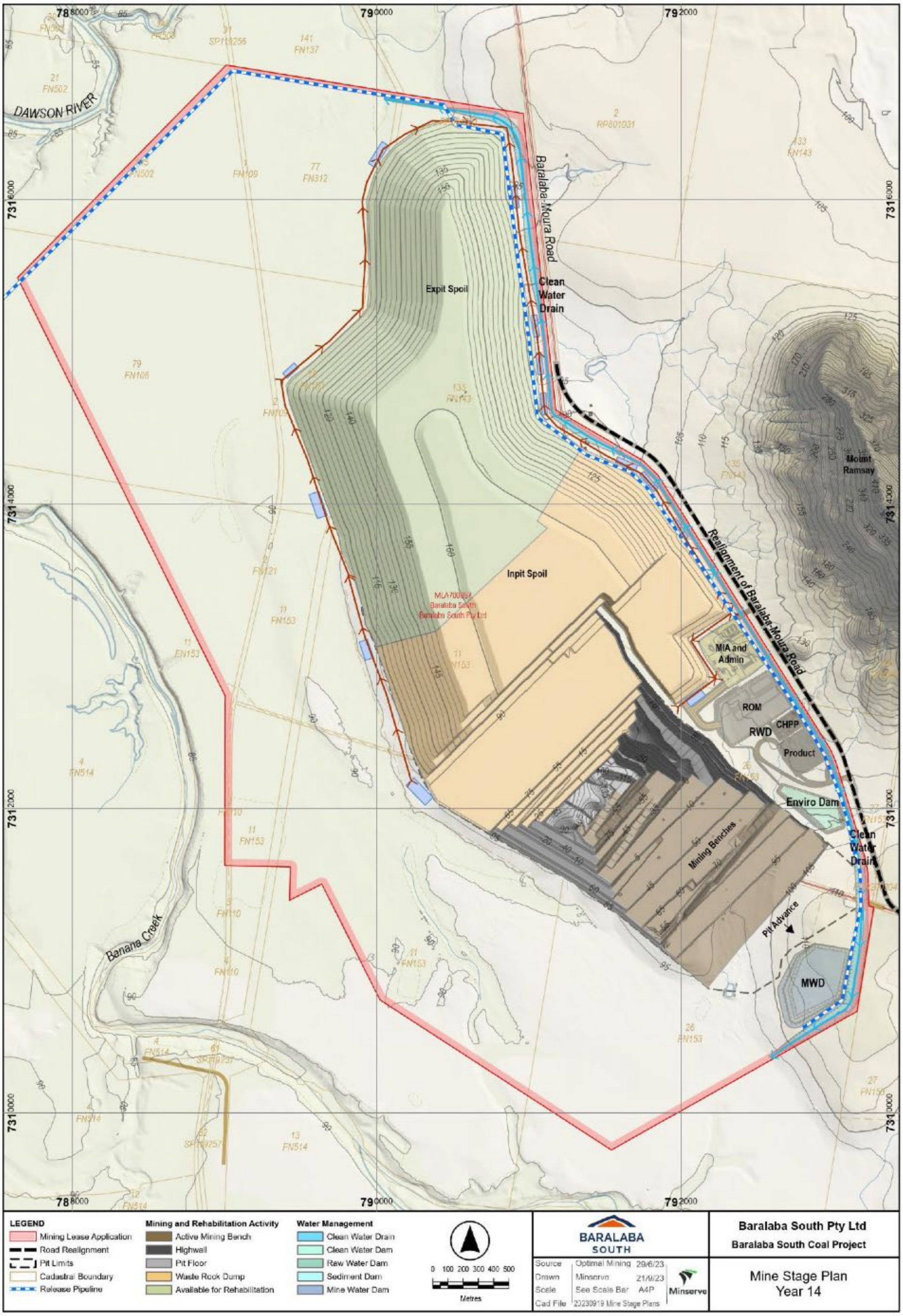

Figure 2.36: Mine stage plan—year 14

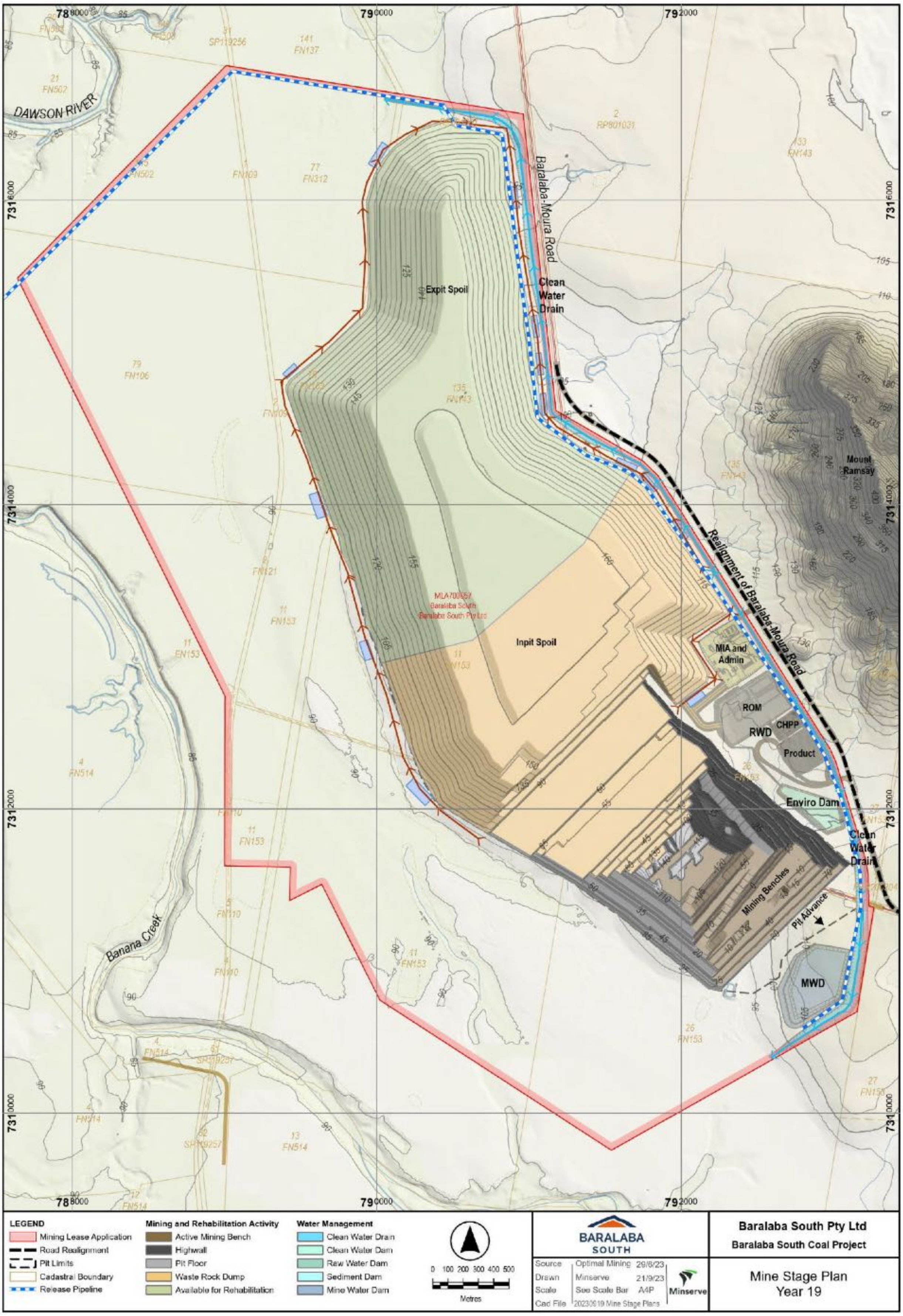

Figure 2.37: Mine stage plan—year 19

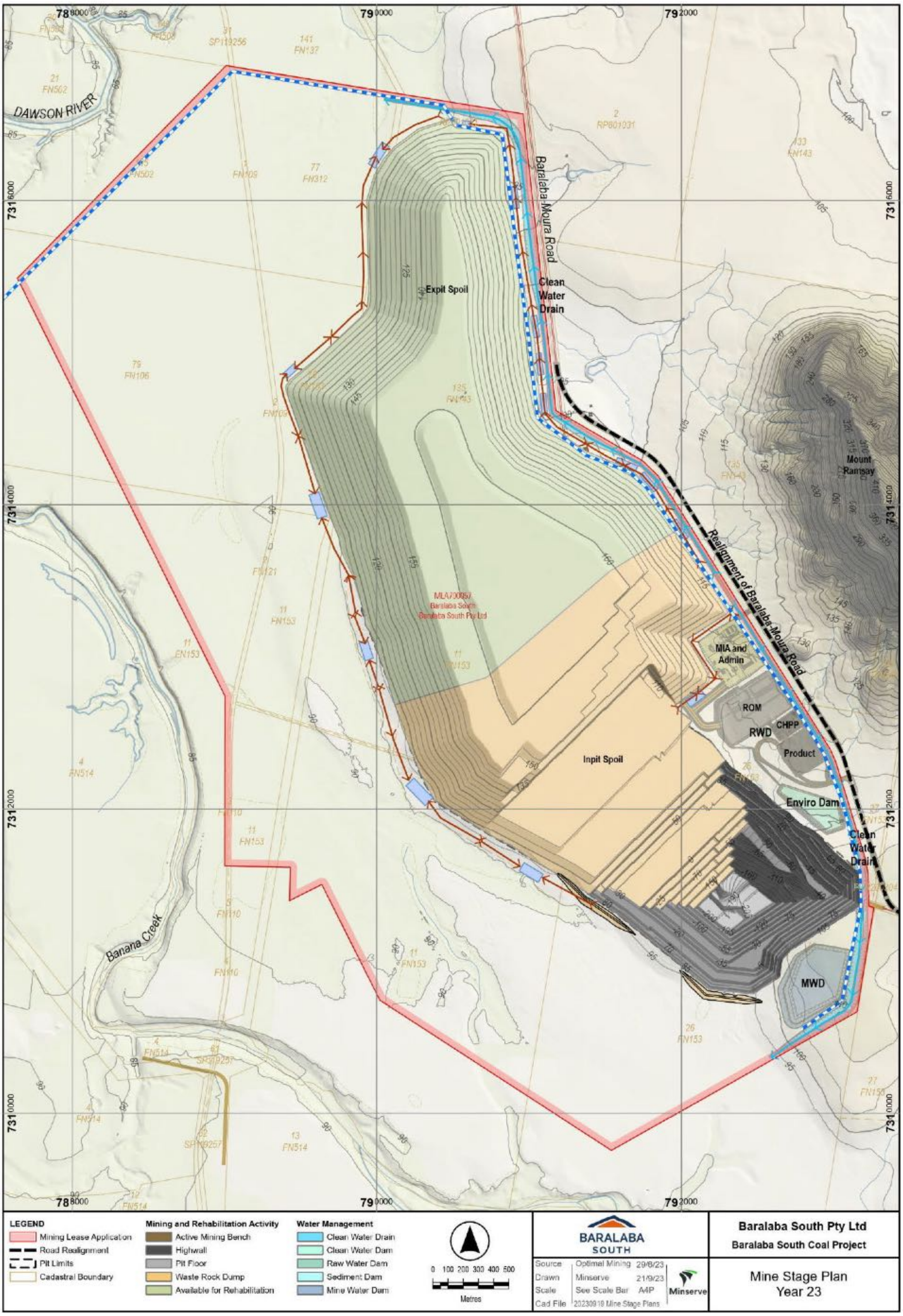

Figure 2.38: Mine stage plan – year 23

2.5.2 Mining method (coal and waste)

Due to the geology of the Project, conventional hydraulic excavators and rear dump trucks will be used in a terrace style mining operation. Terrace mining utilises horizontal mining benches (flitches) that are removed by excavator/truck fleets. Coal and waste are removed as they are encountered, with mining progressing down and across benches.

Mining operations will advance from north to south along the strike. The terrace mining method, with an advancing in-pit WRE, is an established mining method. Examples include the Baralaba North Mine, Jellinbah, Isaac Plains, Mount Owen Mine, Burton Mine and Clermont Mine.

The width of the proposed pit is up to approximately 1,600 m. Working terraces 200 m wide will provide room across the pit width to have multiple coal mining faces exposed at any one time. Two main 50 m wide end wall haul-back roads are proposed to be placed in the western wall at elevations of RL35 and RL55. Other haul-back roads will be on the floor of the deposit and along the natural surface level. The advancing wall ramping strategy and design is repeated every 200 m, with ramps to tie in with the end wall roads to provide continuous access to the pit bottom for coal and waste haulage.

The mining flitches are expected to be 3 m to 5 m deep. In the steeper areas, extra equipment, such as D10 sized dozers or small backhoes, will move material onto the floor to allow efficient excavation of the waste/coal interface and minimise coal loss.

Waste will be hauled to the WRE while coal will be hauled to the ROM. As space becomes available, waste will be returned to the in-pit WRE within the mined-out void. The in-pit WRE will similarly be connected to the sidewall access road and will contain a network of ramps constructed as required.

A summary of the typical open cut mining activities and sequence is provided below;

- Vegetation clearing: Vegetation will be progressively cleared over the life of the Project ahead of the active mining and WRE areas. Specific vegetation clearance procedures will be developed for the Project.
- Topsoil stripping and handling: Where stripped topsoils cannot be used directly for progressive rehabilitation, the topsoil will be stockpiled separately. Specific soil management, stockpiling and re-application procedures will be developed for the Project.
- Overburden removal: Overburden will primarily be removed by excavators and haul trucks along with supporting dozers and used for backfilling the void behind the advancing operations or placed in the out-of-pit WRE or noise attenuation bunds.
- Conventional drill and blast techniques, using standard rotary drills, will be used for the blasting of competent overburden and interburden material. Small quantities of underburden may also be drilled and blasted as required for geotechnical stability. Standard commercial products will be used, with the principal blasting agent being ammonium nitrate and fuel oil.
- Coal mining and ROM coal handling: Coal mining will involve excavators loading ROM coal into haul trucks for haulage to the ROM pad. On-site ROM coal handling and crushing facilities will be established and used at the ROM pad.

2.5.3 Waste

A Geochemical Assessment has been undertaken by Terrenus Earth Sciences (2023) (Appendix E). The assessment concluded:

- The total sulphur concentration of potential spoil is very low and almost all potential spoil samples (110 out of 113 samples) are classified as Non-Acid Forming (NAF).
- Total metal and metalloid concentrations in potential spoil samples are low and below the applied health-based investigation level for soils.
- Bulk spoil is expected to have a mixed sodicity and dispersion potential.

A single out-of-pit waste rock emplacement adjacent to the mining pit will be required to provide sufficient working space for operations to proceed. The WRE will have elevations approximately 60 m to 70 m above the existing surface. As operations progress, spoil will be able to be placed in-pit, commencing from the northern end of the pit and progressing southward.

Rehabilitated landforms are proposed to have elevations of approximately 160 mAHD, with a typical slope of equal to or less than 9º and maximum overall slope lengths of approximately 470 m. The in-pit waste rock emplacement will have a maximum elevation of 110 mAHD and a maximum slope of 10º. Where appropriate, contour banks will be utilised along slopes, resulting in maximum slope lengths of approximately 235 m when measured between contour banks.

2.5.4 Mining equipment

The major equipment types which have been selected for the mine are summarised in Table 2.16. The make and model of equipment is representative only of the classes and sizes of equipment proposed, and final selection of equipment suppliers will depend on financial analysis at the time of purchase. The selection has been based on the following principles:

- maintain a high rate of production;
- realise economies of scales;
- use equipment proven to be operationally effective in multi-seam terrace operations; and
- equipment having sound power levels such that noise emission requirements are met.

Table 2.16 provides equipment numbers for three stages of the mine development.

Table 2.16: Major mining equipment list

Unit type	Make/model	Capacity	Application	Equipment number		
				Year 1	Year3	Year 11
Excavator—600 t	Komatsu PC5500	34 m^3	Waste loading	2	2	1
Excavator—250 t	Komatsu PC4000	15 m^3	Waste and coal loading	3	3	3
Loader	Komatsu WA900	13 m^3	Waste and coal loading	2	2	2
Haul truck	Komatsu 830E	220 t	Waste haulage	16	21	23
Haul truck	Komatsu 930E	304 t	Waste and coal haulage	23	18	11
Bulldozer	Caterpillar D11T	850 HP	WRE maintenance, ripping	4	6	5
Bulldozer	Caterpillar D10T	646 HP	Face clean-up, WRE maintenance	2	3	3
Grader	Caterpillar 24	7.3 m,	Road maintenance	4	4	4
Watercart	Caterpillar 777 WT	100 kL	Dust suppression	3	3	3
Drill	SK45	165-220 mm dia.	Waste drilling	2	2	2
CHPP, crushers and conveyors	-	-	Mine processing	1	1	1

2.5.5 Processing and products

2.5.5.1 Crushing and screening

The crushing and screening plants will operate 24 hours a day, seven days a week. The current proposed plant process is described below.

ROM coal transported from the pit will be either dumped directly into a ROM hopper or stockpiled depending on CHPP availability. The hopper structure incorporates a feeder breaker to reduce coal from a nominal top size of 1,000 mm to a nominal 250 mm. The feeder breaker will discharge onto the raw coal conveyor to transport the nominal 250 mm raw coal to the secondary sizer station.

The raw coal will discharge from the primary-sized coal conveyor onto a roller screen sizing at 50 mm, with the oversize material (50-250 mm) reporting to a secondary sizer. The resulting minus 50 mm material will discharge onto the primary-sized coal conveyor and re-join the roller screen undersize. The primary-sized coal conveyor will be fitted with a weightometer for feed rate control and a cross belt sampler.

The primary-sized coal conveyor will discharge into a raw coal surge bin. A vibrating feeder operating at nominally 360 tph will draw material from the bin and discharge it onto the CHPP feed conveyor. A weightometer will be fitted to the CHPP feed conveyor and arranged in a control loop with the vibrating feeder to accurately control the feed rate to the CHPP. The module feed conveyor will discharge the sized raw coal onto the feed preparation screen within the plant module.

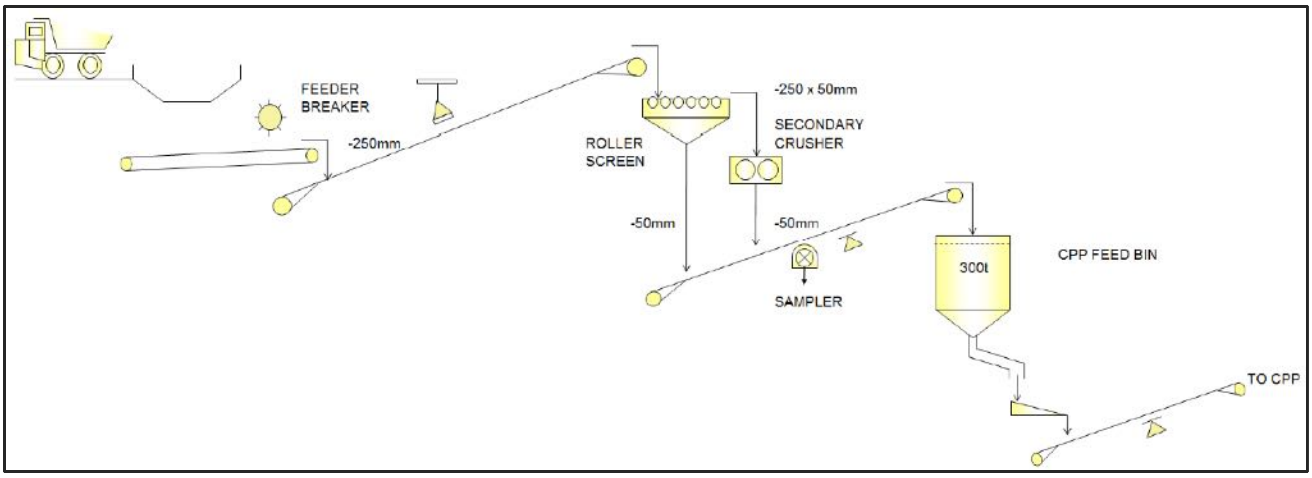

Figure 2.39: ROM and raw coal handling

2.5.5.2 Coal processing

A conventional Bowen Basin design (dense medium cyclones, spirals and flotation) with a nominal 360 tph capacity CHPP is planned to process up to 2.5 Mtpa of ROM coal. The CHPP processing specifications over the life of the mine are shown in Table 2.17.

Table 2.17: CHPP processing specifications

Description		**Value/statement**
Target annual CHPP product		2.5 Mtpa
ROM tonnes	Minimum	0.75 Mtpa (year 23)
	Maximum	2.5 Mtpa (year 8,9,16, 17)
Product tonnes	Minimum	0.57 Mtpa (year 23)
	Maximum	1.9 Mtpa (year 8,9,16, 17)
CHPP operation/shift roster		24 hrs a day, 7 days a week
Product coal handling		Radial stacker with a single stockpile. Product stockpile 100,000 t capacity

Dense medium circuit

Raw coal entering the CHPP will be first slurried with water and passed over a desliming screen. The overflow from the desliming screen will then report to the dense, medium circuit. This circuit will consist of a single high-capacity, high-efficiency cyclone. The product and rejects from the dense medium cyclone will be drained over separate banana screens.

Magnetite will be recovered by a single-drum magnetic separator. Product from the dense medium circuit will be dewatered in coarse coal centrifuges.

A process flow diagram of the dense, medium circuit is shown in Figure 2.40.

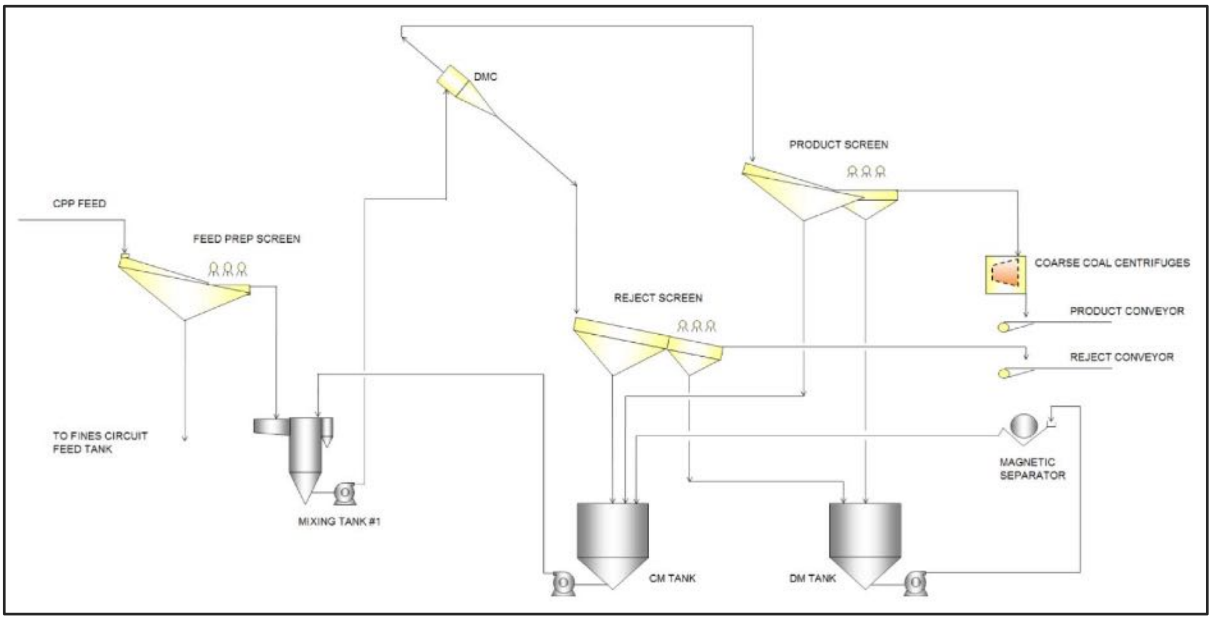

Figure 2.40: CHPP dense, medium circuits

Spirals circuit

The underflow from the desliming screen will be collected and pumped to a set of sieve bends. The underflow from these sieve bends will be collected and pumped to the flotation plant. The deslimed overflow will then flow by way of gravity to the spirals.

Spirals product will be collected and first dewatered by a linear cluster of cyclones, followed by further dewatering using a fine coal centrifuge. Spirals reject will be dewatered over a high frequency screen.

A process flow diagram of the spirals circuit is shown in Figure 2.41.

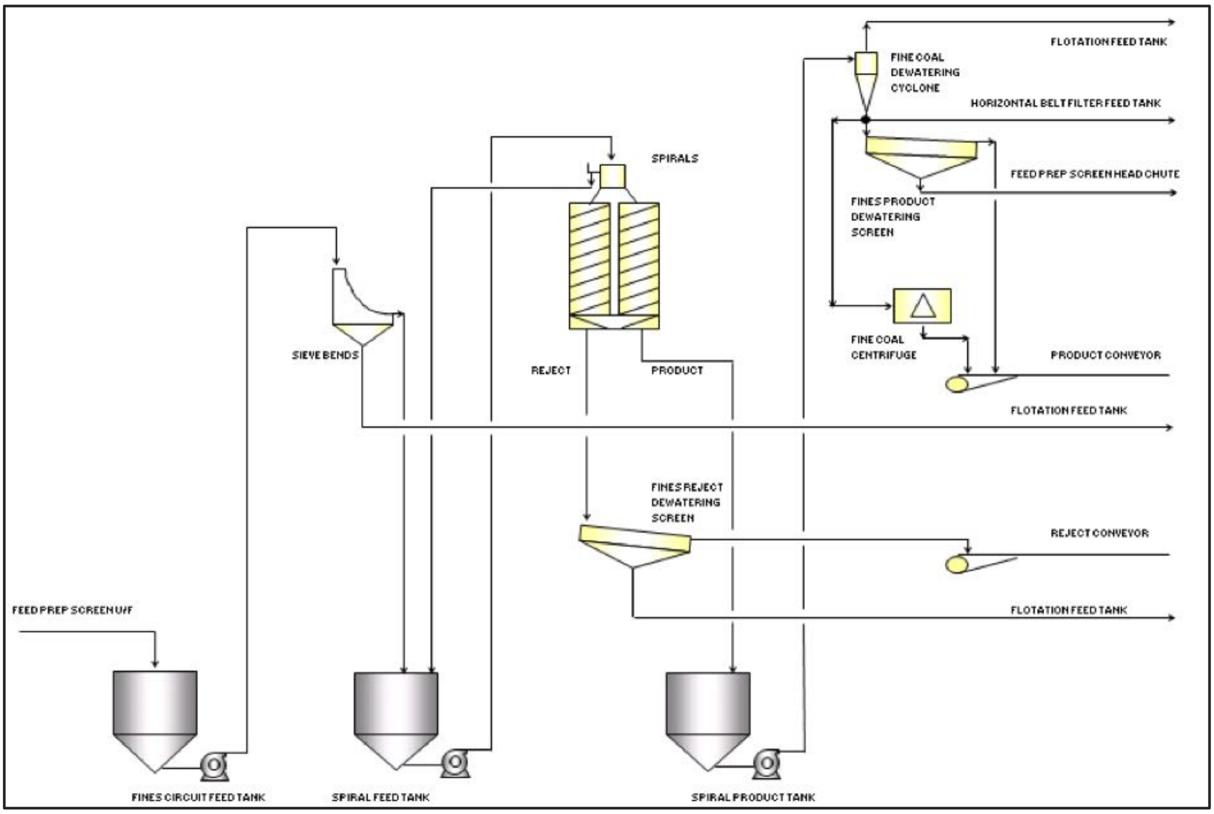

Figure 2.41: CHPP spiral circuits

Flotation and tailings circuits

The underflow from the sieve bends will be collected and pumped to one bank of mechanical flotation cells. The flotation tailings will report to two press filters and combined with the reject from the dense medium cyclone and spirals circuits.

Process flow diagrams for the flotation and tailings circuits are shown in Figure 2.42 and Figure 2.43.

2.5.5.3 Product coal

Product coal will be stacked out on the product stockpile through the use of a jet slinger with a dozer push and front-end loader reclaim. The product conveyor will also have a cross belt sampler and an online ash and moisture meter to monitor final product quality.

2.5.5.4 Rejects

The Project intends to use dry tailings disposal. The CHPP will utilise a belt filter press to dewater the CHPP waste material to enable disposal of the majority of the CHPP waste materials in-pit mixed with the overburden spoil material. The dry reject material from the CHPP will be stacked in a stockpile on the ROM pad. The front-end loader responsible for loading raw coal into the ROM hopper will also load dry reject into empty haul trucks for disposal in spoil.

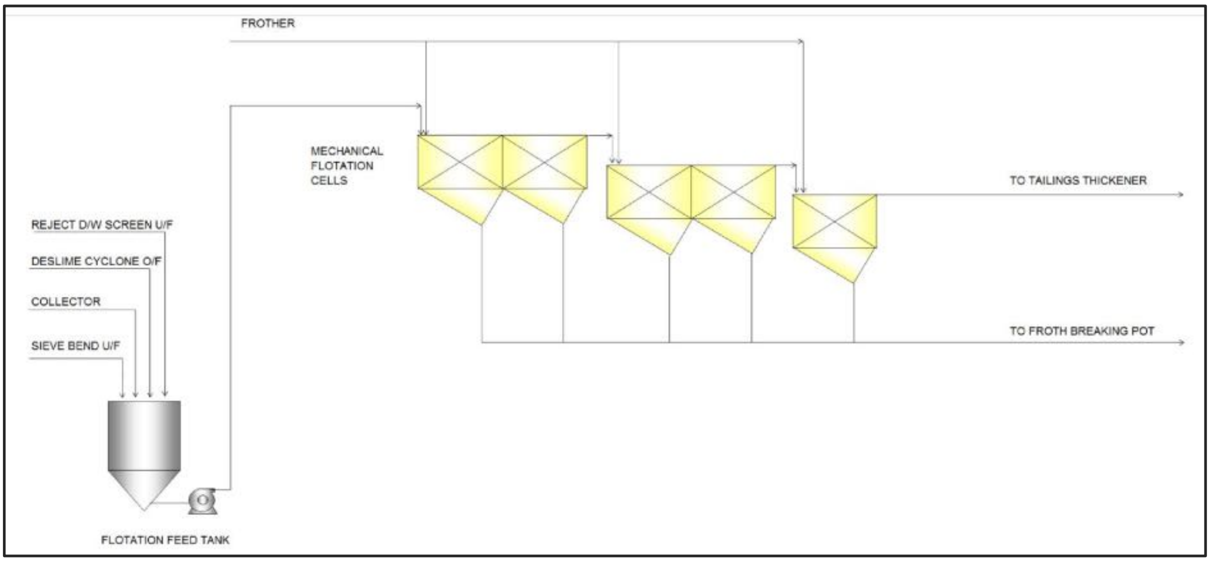

Figure 2.42: CHPP flotation circuit

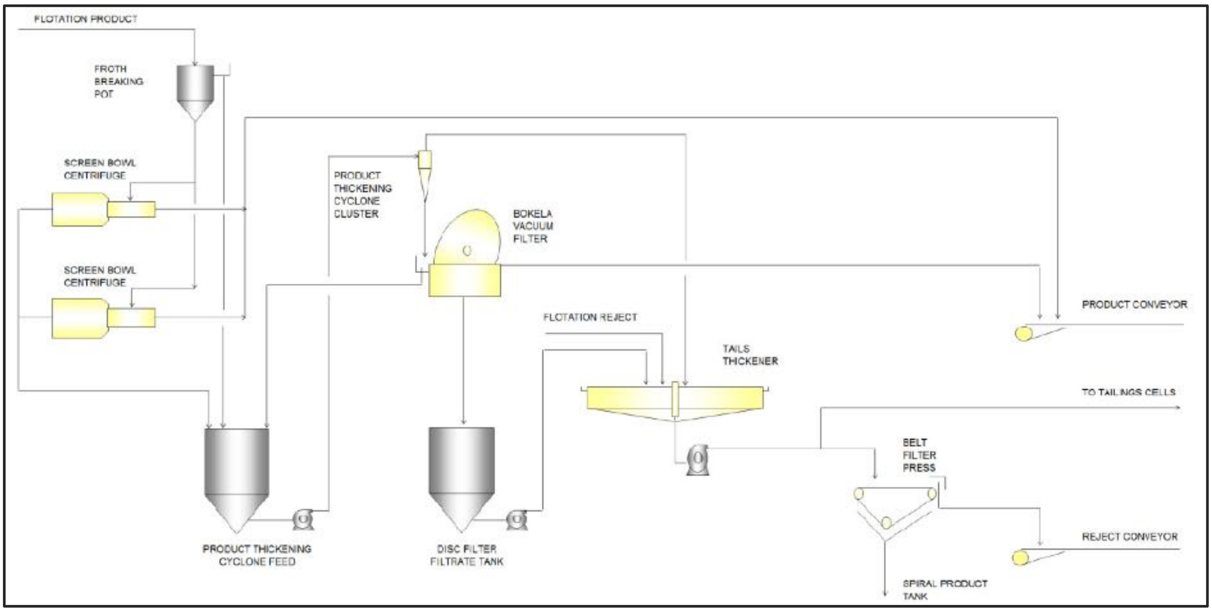

Figure 2.43: CHPP fine tailings circuit

A small proportion of the CHPP waste material with either a high ash content that will not be suitable for the belt filter press or will be collected when the belt filter press system is offline, will be deposited into drying cells within the MIA. Once the tailings material has sufficiently dried, it will be excavated and trucked for final disposal within final spoil within the WRE.

2.5.5.5 Rejects geochemistry

Some coal reject materials may have some, albeit low, degree of risk associated with potential acid generation; however, as a bulk material of relatively small total quantity (less than 1% by weight), coal reject is regarded as posing a low risk of environmental harm. This is primarily due to the generally low sulphur (and sulphide) concentration within this material (and also the low metals/metalloids concentrations). Therefore, when disposed with the alkaline NAF spoil the overall risk of environmental harm and health risk that emplaced coal reject poses is very low.

2.5.5.6 Process water circuit

Water recovered from the tailings thickener and the belt press filters will be recycled as general process water throughout the plant. Process water make-up will be from water supplied to the plant, if and when required.

2.5.6 Ongoing resource definition and technical drilling

During the construction and operation stages, ongoing exploration activities will continue within the MLA. Activities will include in-fill drilling and other common forms of exploration to better inform the mining method and improve coal quality definition as the mine progresses. Geotechnical drilling will also be undertaken to inform the design of highwalls, ensuring high levels of safety. Drilling of environmental monitoring bores may also be undertaken over the mine life.

Drilling and exploration disturbances which are not within the future mining footprint will be rehabilitated within 12 months, including capping of open holes.

2.5.7 Hazardous substances

A list of all expected hazardous materials and substances to be used or stored at the Project is outlined in Table 2.18. Waste management is discussed in detail in Chapter 14, Waste Management.

Table 2.18: Indicative list of hazardous substances

Hazardous substances	DG class[1]	UN Number [2]	Packing group[3]	Maximum quantity stored	Annual rate of use	Purpose/use
Ammonium nitrate	1.1D	0241	N/A	< 250 kg	< 100 kg	Mining activities (i.e. blasting)
Acetylene	2.1	1001	N/A	< 75 kg	< 300 kg	Welding and cutting
Liquified petroleum gas	2.1	1075	N/A	< 300 kg	< 1,500 kg	Fuel for forklifts
Diesel oil/fuels	3	1202	III	1,500 kL	100,000 kL	Fuel for vehicles and equipment and use at the CHPP
Lubricating oils, grease and waste oil	9	3082	III	130 kL	1,100 kL	Used to lubricate vehicle engine and hydraulic machines
Oils rags	4.22	1856	N/A	< 5 t	< 10 t	Waste product
Acetone	3	1090	II (if quantity stored is > 1 L)	< 30 kg	< 75 kg	Used as a solvent
Chlorine	2.3 (5.1, 8)	1017	N/A	< 150 L	< 15,000 L	Water treatment
Methyl isobutyl carbinol	3	2053	III	< 100,000 L	< 1,000 L	Required at the CHPP
Sodium hydroxide (caustic soda)	8	1823	II	< 1,000 kg	< 1,500 kg	Degreasing agent and sewage treatment

Hazardous substances	DG class[1]	UN Number [2]	Packing group[3]	Maximum quantity stored	Annual rate of use	Purpose/use
Solvents and thinners (acetone)	3	1090	II	< 500 L	< 1,000 L	Degreasing agent
Paints	3	1263	I	< 500 L	< 1,000 L	Paint during construction and operations

[1] **DG Class:** Dangerous Goods class means the hazard class of the dangerous goods as stated in the Australian Dangerous Goods Code.
[2] **UN numbers:** A number that identifies hazardous substances and articles (such as explosives, flammable liquids, toxic substances, etc.) in the framework of international transport. UN numbers are assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods.
[3] **Packaging Group:** Assigned to dangerous goods (other than Classes 1, 2 and 7) according to the degree of risk the goods present (I = great danger, II = medium danger and III = minor danger).

2.6 Infrastructure

Figure 2.44 provides a conceptual infrastructure layout of the Project.

A description of infrastructure, including roads, the MIA and the flood levee, is provided in section 2.4. Details of the proposed CHPP are provided in section 2.5.5. Other infrastructure described in this section includes:

- energy infrastructure;
- lighting;
- telecommunications;
- STP; and
- water management infrastructure.

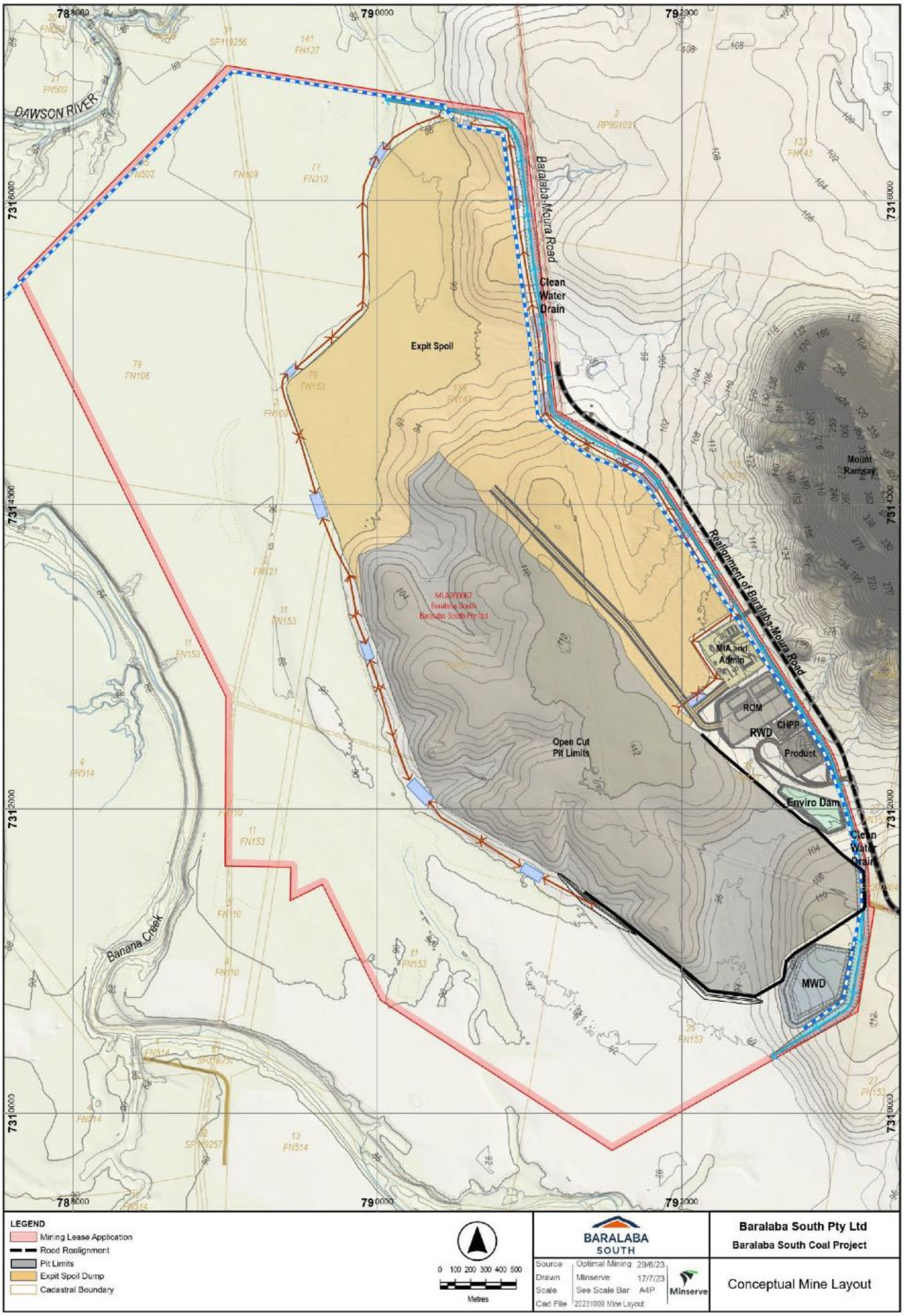

Figure 2.44: Conceptual mine layout

2.6.1 Energy requirements

Modifications to existing energy infrastructure are required to provide power to the Project. The anticipated power demand during the operational period will be approximately 3,900 kW.

Power supply to the mine will be via a connection to the local grid. Powerlink's Baralaba Substation is located on Baralaba-Rannes Road, approximately 6 km east of Baralaba and 10 km north of the Project. A 132/22 kV transformer is proposed to be constructed on land, owned by a related entity to the Proponent, adjacent to the Baralaba Substation. Associated upgrades to the Baralaba Substation infrastructure will be subject to approval from Powerlink as owner of the infrastructure.

A substation is proposed to be constructed to the east of the MLA 700057, from which the ETL would extend into the MLA to supply power to the mine.

A 22 kV ETL, approximately 8 km in length and 20 m wide, is required to supply power from the 132/22 kV transformer to the mine site. Two ETL alignment options contained within a wider ETL assessment zone have been assessed. The ETL alignment options include:

- **ETL option 1:** a preliminary assessment by Ergon and Powerlink in 2012 of power supply options for the Project identified ETL option 1 as a potential alignment route (Figure 2.45). This alignment is generally parallel to the existing 12.7 kV power line, which currently supplies properties to the south of the Baralaba Substation including those underlying the MLA.
- **ETL option 2:** comprising an upgrade of Ergon's existing 12.7 kV powerline (Figure 2.16) to a 22 kV ETL along the existing alignment to the north of the MLA, at which point the alignment would be modified to connect with the proposed substation to be situated to the east of the MLA (Figure 2.45).

The electricity network infrastructure upgrades and/or construction will be subject to agreement with Ergon as owner of the infrastructure and will be subject to separate approvals, for which the necessary permitting will be undertaken by Ergon. The wider ETL assessment zone has been assessed to inform final placement of the ETL and substation infrastructure.

It is anticipated that development of the required electricity infrastructure will commence during the construction stage. However, the exact timing of infrastructure development will be dependent on agreements with third-party participants. Temporary generators may be utilised to secure reliable power prior to the Ergon supply being available. These generators will comprise modular units and associated switchgear that can be progressively added as the Project develops and the power demand changes.

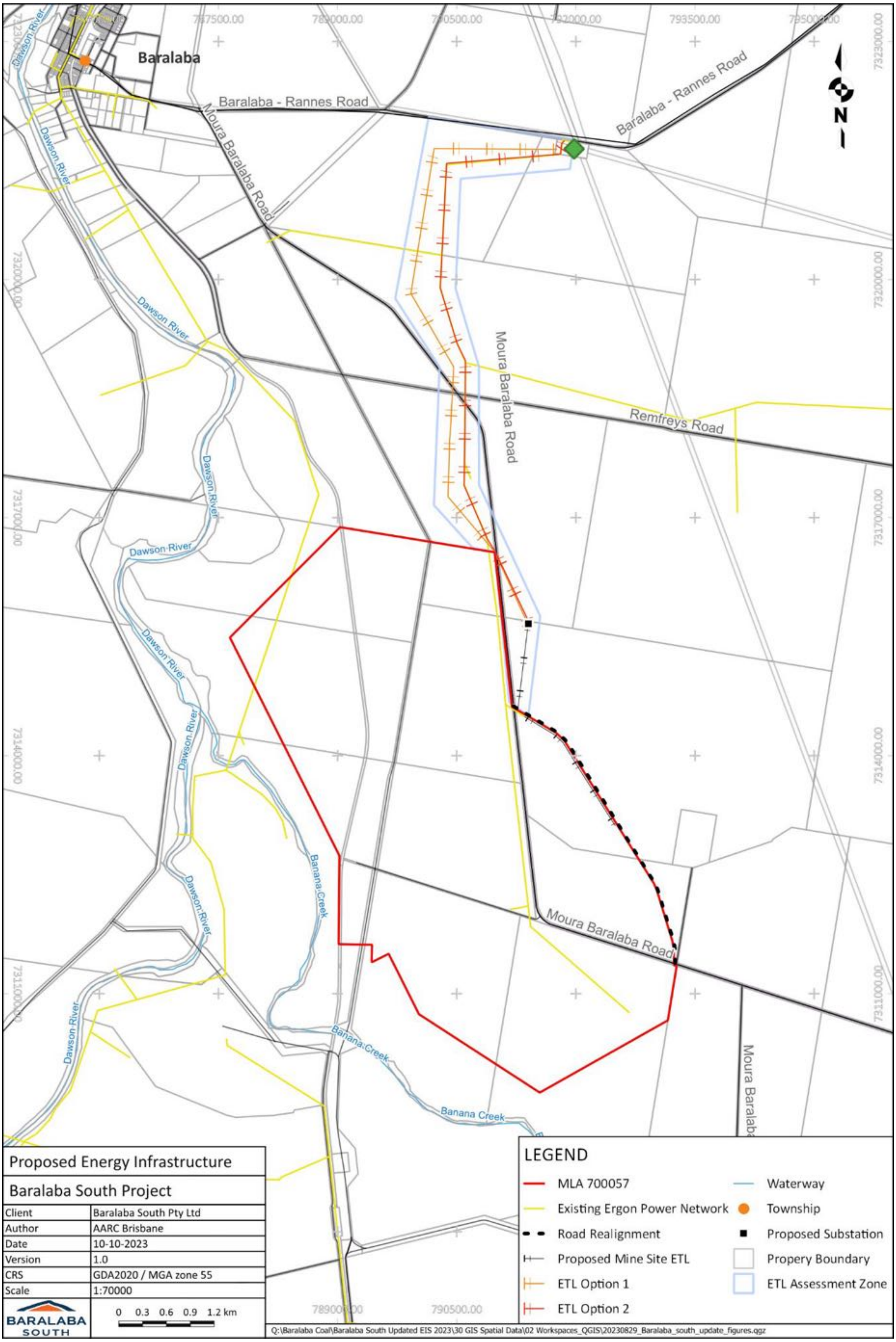

Figure 2.45: Proposed energy infrastructure

2.6.2 Lighting components

Artificial lighting will be designed, installed, operated and maintained in accordance with 'AS 4282:1997 Control of the obtrusive effects of outdoor lighting' (Standards Australia, 1997a), to minimise the amount of light spill.

Controls stipulated in this standard include consideration of the location and orientation of lighting with respect to surrounding sensitive receivers and environmental values, as well as the selection and maintenance of luminaries. Any further mitigation (e.g., shielding, further restriction on use of lighting) will be implemented on an as-needed basis. Lighting impacts and mitigation are discussed further in Chapter 10, Land and Visual Amenity.

2.6.3 Telecommunications

The communications strategy at the Project is to have both comprehensive on-site and off-site communications established in time for the beginning of the construction phase. The underlying basis for having a pre-established network is to ensure that good telecommunications are available for managing the Project health and safety aspects, incident management, reporting, and effective construction and operational information flow from the outset.

Baralaba North currently operates a data centre located at the Baralaba Town Caravan Park. The Proponent proposes to expand the existing communications systems to provide shared access to the Project.

2.6.4 Sewage treatment

Existing sewage treatment facilities are located in Biloela. During the construction phase, a primary sewage treatment process will be installed. Septic tanks will collect liquid and sludge waste products, which will be routinely transported off-site to Biloela for further processing and disposal.

During operations, either the primary sewage treatment process will continue to be utilised (for transport off-site for processing and disposal) or a package STP will be constructed within the MIA.

Should the second option be adopted, sewage generated at the MIA and CHPP will be pumped to a package STP by way of underground sewage pump stations and underground rising mains. The STP would be designed to treat 100% of the potable water (modelled at 200 L per person per day), assumed to become wastewater requiring treatment in the plant.

MEDLI software has been undertaken to assess the adequacy of a proposed irrigation area located to the west of the Moura-Baralaba Road in the southern half of the MLA. The modelling assessed treatment volumes for both the construction and operational phases to ensure the highest volume of effluent could be treated. Modelling results determined that an area of 1.5 ha would be sufficient for irrigation, given the soils and vegetation of the area assessed. The area nominated is suitable to ensure that drainage controls can be implemented. The waste sludge is expected to be removed every 12–18 months by a regulated waste contractor for disposal at a licensed facility.

The STP design recommended as an outcome of the MEDLI modelling is a low maintenance system with secondary treatment capability and the ability to produce at least Class C effluent. The collection system would utilise an appropriately sized pump station to minimise the retention of raw sewage and mitigate the potential for production of odour and volatile organic compounds. All equipment and control panels would be in a control room at the MIA. Wet weather storage would be located adjacent to the plant with a capacity determined by modelling to ensure irrigation of saturated soil is avoided during wet weather periods.

If an STP was installed, treated wastewater from the STP would be disposed of using low height sprays in the designated irrigation area. The effluent disposal system would incorporate a buffer of at least 50 m to comply with guideline requirements, and warning signs complying with Australian Standard AS 1319 would be installed. System operation will ensure no runoff from the disposal area occurs.

2.6.5 Water management infrastructure

A detailed water management system for the Project is described in Chapter 6, Water Resources, and Appendix A, Surface Water Impact Assessment. The water management system at for the Project has been designed to minimise environmental impacts on the receiving environment, as well as provide runoff containment and supply to water demands of the Project.

The water management system can be summarised by the following objectives:

- minimise capture of clean surface water from external catchments via catchment diversion;
- maximise recycle and reuse firstly of mine-affected water, and then other collected runoff water for site demands including processing and dust suppression;
- preferential supply from site water storages over external supply and surface water harvesting; and
- minimise and manage releases of water to receiving waterways.

Water management infrastructure has been proposed to achieve separation of water types by:

- drainage diversions of clean catchment runoff around mine infrastructure and other disturbed land;
- capture and treatment of disturbed runoff in sediment basins and other sediment control infrastructure;
- containment of mine-affected water in dedicated storages; and
- protection and mitigation of flood flows by relocation of mine infrastructure predominantly above the 0.1% AEP extent.

2.6.5.1 Mine water dams

Mine water storages will be used to contain surface water runoff and groundwater collected within the mining pit, recycled water from the CHPP, runoff from the MIA area and excess water in the tailings drying cells.

Site storages for the management of mine-affected water are summarised in Table 2.19. The mine-affected water storages have been designed to provide 95th percentile wet season containment as per the outcome of the preliminary consequence category assessment, 'Significant' (Appendix A, Surface Water Impact Assessment). Mine water storages are not located within the 0.1% AEP flood extent.

Water collected within the pits from rainfall events and groundwater ingress will be dewatered to the mine water dam (MWD). The MWD will be preferentially utilised to supply the CHPP and dust suppression demands. Controlled releases from mine-affected water storages, in the event they are required, will only coincide with medium to high flow events in the Dawson River, and in accordance with EA conditions. When required, there is the opportunity to supplement demands using site water allocations from the Dawson River Scheme.

The Enviro Dam has been sized to provide wet weather containment for the MIA. The Enviro Dam will be dewatered to MWD to maintain containment capacity. When required, the Enviro Dam can be used as a backup supply point for the CHPP.

Table 2.19: Mine water dams

ID	Description	Catchment area (ha)	Estimated embankment height (m)	Full supply volume (ML)
MWD	Embankment dam sized to maximum capacity allowing storage of dewatered inventory from pit and sediment dams. Dam used as intermediary storage for CHPP processed water allowing to capture recycled water from coal wash plant and mechanical dewatering.	76	~8	2,500
Enviro Dam	Storage to capture runoff from MIA area, ROM and rejects stockpile.	143	~4	250

2.6.5.2 Sediment dams

Sediment dams are required to ensure runoff from the WRE and disturbed areas, which may contain elevated concentrations of solids, is contained prior to overflows being directed to the receiving environment during rainfall events. Sediment dams form a key part of the erosion and sediment control management practices and will be managed in accordance with a site wide environment and sediment control plan.

Site storages for the management of sediment affected water are summarised in Table 2.20. Placement of sediment dams has been determined based on topographical low points, and the lifespan of each dam has been taken as the longest period any runoff requiring sediment management reports to that catchment outlet.

All sediment dams have been sized as per 'International Erosion Control Association Guidelines' methodology for 'Type F' sediment basins (IECA, 2018) to allow for a settling zone volume to contain a 5-day, 85th percentile rainfall event and a storage zone volume equal to 50% of the settling volume.

The sediment dams overflow off-site, except for sediment dam 5 which overflows to the mining pit. Sediment dams have been designed to have pumping infrastructure to ensure a maximum 5-day dewatering period after rainfall, allowing their continued effectiveness and availability to treat sediment affected runoff.

Table 2.20: Sediment dams

ID	Description	Catchment area (ha)	Full supply volume (ML)	Estimated embankment height (m)	Associated mine stages (Year)
Western Sedimentation Dam 1 (SDW01)	Manages sediment runoff generated from northwestern section of the northern spoil dump.	92.4	26.3	~1	1 – 23
Western Sedimentation Dam 2 (SDW02)	Manages sediment runoff generated from western section of the northern spoil dump	32.8	9.3	~1	3 – 23
Western Sedimentation Dam 3 (SDW03)	Manages sediment runoff generated from western section of the spoil dump	100.4	28.6	~1	3 – 23
Western Sedimentation Dam 4 (SDW04)	Manages sediment runoff generated from south-western section of the spoil dump	51.6	14.7	~1	6 – 23

ID	Description	Catchment area (ha)	Full supply volume (ML)	Estimated embankment height (m)	Associated mine stages (Year)
Western Sedimentation Dam 5 (SDW05)	Manages sediment runoff generated from south-western section of the spoil dump	98.2	27.9	~1	11 – 23
Western Sedimentation Dam 6 (SDW06)	Manages sediment runoff generated from southern section of the northern spoil dump.	72.6	20.7	~1	23
Eastern Sedimentation Dam 1 (SDE01)	Manages sediment runoff generated from northern section of the northern spoil dump.	10.0	2.8	~1	1 – 23
Eastern Sedimentation Dam 2 (SDE02)	Manages sediment runoff generated from north-eastern section of the northern spoil dump.	33.7	9.6	~1	1 – 23
Eastern Sedimentation Dam 3A (SDE03A)	Manages sediment runoff generated from north-eastern section of the spoil dump.	29.8	8.5	~1	3 – 23
Eastern Sedimentation Dam 3B (SDE03B)	Manages sediment runoff generated from north-eastern section of the spoil dump.	34.0	9.7	~1	6 – 23
Eastern Sedimentation Dam 3C (SDE03C)	Manages sediment runoff generated from eastern section of the spoil dump.	34.4	9.8	~1	6 – 23
Eastern Sedimentation Dam 4A (SDE04A)	Manages sediment runoff generated from eastern section of the spoil dump.	33.1	9.4	~1	6 – 23
Eastern Sedimentation Dam 4B (SDE04B)	Manages sediment runoff generated from eastern section of the spoil dump.	32.9	9.4	~1	6 – 23
Eastern Sedimentation Dam 4C (SDE04C)	Manages sediment runoff generated from eastern section of the spoil dump.	34.3	9.8	~1	11 – 23
Eastern Sedimentation Dam 5 (SDE05)	Manages sediment runoff generated from southern section of the spoil dump.	55.8	15.9	~1	11 – 23
Year 1 Sedimentation Dam 1 (SDY01_01)	Manages sediment runoff generated from eastern section of the initial northern spoil dump.	17.1	4.9	~1	1 – 3

2.6.5.3 Clean water structures

Diversion of clean catchment has been maximised to reduce the harvest of clean catchment into the mine water system. Where topography allows, clean catchment is diverted via drainage features which connect upstream clean catchment with receiving waterways.

Clean water dams located within the MLA are listed in Table 2.21 and will overflow into the mining pit with other clean water dams overflowing to natural waterways. Clean water dams have been designed to contain a nominal 2-year, 24-hour runoff volume. Pump rates have been proposed to enable 20-day dewatering.

There are two clean catchment diversions on the eastern side of the MLA which redirect runoff from Mount Ramsay around the Project. A third clean water drain involves the drainage diversion of a stream order 3 waterway (Tributary 8) around the proposed out-of-pit dump to ensure the drainage path is not impacted by the Project.

Table 2.21: Clean water structures

ID	Description	Catchment area (ha)	Size	Associated mine stages
Northern clean water drain	Diverts clean catchment runoff east of MLA from mining activities, diverting it south into the Dawson River	470	4.3 km drainage channel	Year 1-23
Southern clean water drain	Diverts clean catchment runoff east of MLA from mining activities, diverting it south into Banana Creek.	586	3.7 km drainage channel	Year 1-23
Tributary 8 diversion drain	Minor realignment of Tributary 8 around the proposed spoil dump toe and sediment collection drain at the northern extent of the MLA	3,180	0.39 km drainage channel	Year 1-23
Clean Water Dam 1 (CWD1)	Captures clean catchment runoff from south of the northern spoil dump.	181	88 ML	Year 1-3
Clean Water Dam 2 (CWD2)	Captures clean catchment runoff from south of mining pit.	66	32 ML	Year 1-3

2.6.5.4 Flood protection

A major study of the Dawson River flood parameters and probabilities has been conducted for the Project. Flood protection of mine workings is a major component of mine design, operation and rehabilitation. The study showed that the revised 2.5 Mtpa mine plan footprint is located above the 10% AEP flood extent; an operational flood protection levee is not required for this revised plan.

Post-mining, the final landform design, including a final void, will be a permanent feature of the landscape. The final landform footprint is above the 0.1% AEP flood extent and will have an additional final landform bund on the final void southern boundary. This will provide PMF protection to the final void, above the 0.1% AEP design event flood protection.

2.6.5.5 Water release and supply infrastructure

Water release infrastructure

The water management system for the Project will include infrastructure for the controlled release of excess water off-site. A high-capacity pump and pipeline will be used to release water from MWD directly to the Dawson River during medium and high flow conditions. The outlet pipe will extend over, and beyond the bank, of the Dawson River to minimise the risk of erosion. The location of the pipeline and release point are shown on Figure 2.44 and have been located to minimise potential impacts to environmental values. The pipeline will be located within a 10 m easement that will also be used for maintenance and access.

The pipeline will be buried beneath the access roads to the MIA and product coal stockpile, and thereafter will be above ground to the Dawson River. Ground supports will be used to raise the pipeline above the natural surface level on the floodplain so that overland flow is not obstructed.

The pipeline and its associated infrastructure will be inspected following flood events that result in inundation of the pipeline or its easement.

The controlled release strategy is described in Chapter 4, Surface Water.

Water supply infrastructure

Project water requirements will be supplied according to the following priority order (excluding potable water supplies):

1) mine water supplied from pit dewatering (including groundwater inflows);
2) recycled process water recovered from the CHPP tailings thickener and belt press filters;
3) surface runoff water captured and stored within water dams; and
4) water supply 'make-up' sourced from water allocations from the Dawson River as required via a licensed agreement. Related entities of the Proponent currently hold over 1,000 ML of water allocation from the Fitzroy Basin, Dawson River Zone D.

External supply of water to the mine is expected only in extended dry periods where demand of the net site water balance exceeds inputs from rainfall runoff and groundwater. Water supply infrastructure will include a pump and above ground poly pipe to extract and transfer water from the Dawson River to the Enviro Dam. The water supply pipeline is proposed to be located within the easement of, and adjacent to the water release pipeline (Figure 2.44). A detailed site water balance is outlined in Appendix A, Surface Water Impact Assessment and summarised in Chapter 4, Surface Water.

2.7 Environmentally relevant activities

ERAs include resource activities or other activities prescribed by the EP Act. Current prescribed ERAs and resource activities are defined in schedules 2 and 3, respectively of the EP Regulation. The Project will include the resource activity of 'Mining black coal', as well as the ancillary activities outlined in Table 2.22.

Table 2.22: Applicable ERAs for the Project

Environmentally relevant activity	Description
Schedule 2 (ancillary)	
8 (1) (c) Chemical storage	Chemical storage (the relevant activity) consists of storing more than 500 metres cubed (m^3) of class C1 or C2 combustible liquids under AS1940 or dangerous goods class 3.
31 (2) 2(b) Mineral processing	Processing in a year the following quantities of mineral products, other than coke (b) more than 100,000 t.
33 (1) Crushing, milling, grinding or screening	Crushing, milling, grinding or screening (the relevant activity) consists of crushing, grinding, milling or screening more than 5,000 t of material in a year.
60 (1) (b) (ii) Waste disposal	(h) more than 200,000 t.
63 1(b) Sewage treatment	Sewage treatment of more than 100 but not more than 1,500 equivalent persons.
Schedule 3	
13 Mining black coal	Mining black coal.

2.8 Notifiable activities

Notifiable activities are activities that have the potential to cause land contamination. Notifiable activities proposed to be carried out are outlined in Table 2.23.

Table 2.23: Notifiable activities for the Project

Notifiable activities	Description
Schedule 3	
1 Abrasive blasting	Carrying out abrasive blast cleaning (other than cleaning carried out in fully enclosed booths) or disposing of abrasive blasting material.
7 Chemical Storage	Storing more than 10 t of chemicals (other than compressed or liquefied gases) that are dangerous goods under the dangerous goods code.
15 Explosives production or storage	Operating an explosives factory under the Explosives Act 1999.
24 Mine wastes	Storing hazardous mine or exploration wastes, including, for example, tailing dams, overburden or WRE containing hazardous contaminants. Exploring for or mining or processing minerals in a way that exposes faces or releases groundwater containing hazardous contaminants.

Notifiable activities	Description
29 Petroleum product or oil storage	Storing petroleum products or oil: in underground tanks with more than 200 L capacity; or in above ground tanks for: petroleum products or oil in class 3 in packaging groups 1 and 2 of the dangerous goods code—more than 2,500 L capacity; or petroleum products or oil in class 3 in packaging group 3 of the dangerous goods code—more than 5,000 L capacity; or petroleum products that are combustible liquids in classes C1 or C2 in AS 1940, 'The storage and handling of flammable and combustible liquids' published by Standards Australia—more than 25,000 L capacity.
37 Waste storage, treatment of disposal	Storing, treating, reprocessing or disposing of waste prescribed under a regulation to be regulated waste for this item (other than at the place it is generated), including operating a nightsoil disposal site or STP where the site or plant has a design capacity that is more than the equivalent of 50,000 persons having sludge drying beds or on-site disposal facilities.

2.9 Project alternatives

A 5 Mtpa ROM mine operation was previously proposed and a corresponding EIS submitted to the regulator on 20 January 2020. Government adequacy reviews identified that additional information was required to meet the 'properly made' application requirements. An amended EIS was due to be submitted in April 2021 but did not proceed. Following a change in ownership, an extension request by Baralaba Coal Company was approved, with an EIS submission due 30 December 2022. Following further stakeholder consultation and with consideration of social and environmental impacts, opportunities were identified and assessed with the objective of achieving a material reduction in environmental impacts.

Two Project alternatives plus a 'do nothing' alternative were evaluated; resulting in the currently proposed 2.5 Mtpa ROM coal production Project. For each alternative, several key strategic decisions were evaluated, based on previous Project plans, feedback from regulators and responsible economic and resource stewardship options. The evaluation of alternative options is described in the following sections.

The evaluated Project alternatives, as depicted in Figure 2.46 and Figure 2.47, are:

Alternative 1 – Maximise resource: for this alternative, the highest priority is to extract all economically viable product within the mining lease.

Alternative 2 – Balanced moderate production: for this alternative, incorporating key stakeholder concerns regarding flood and environmental impacts are given equal priority to maximising resource extraction.

Alternative 3 – Do nothing: for this alternative, the mine does not proceed.

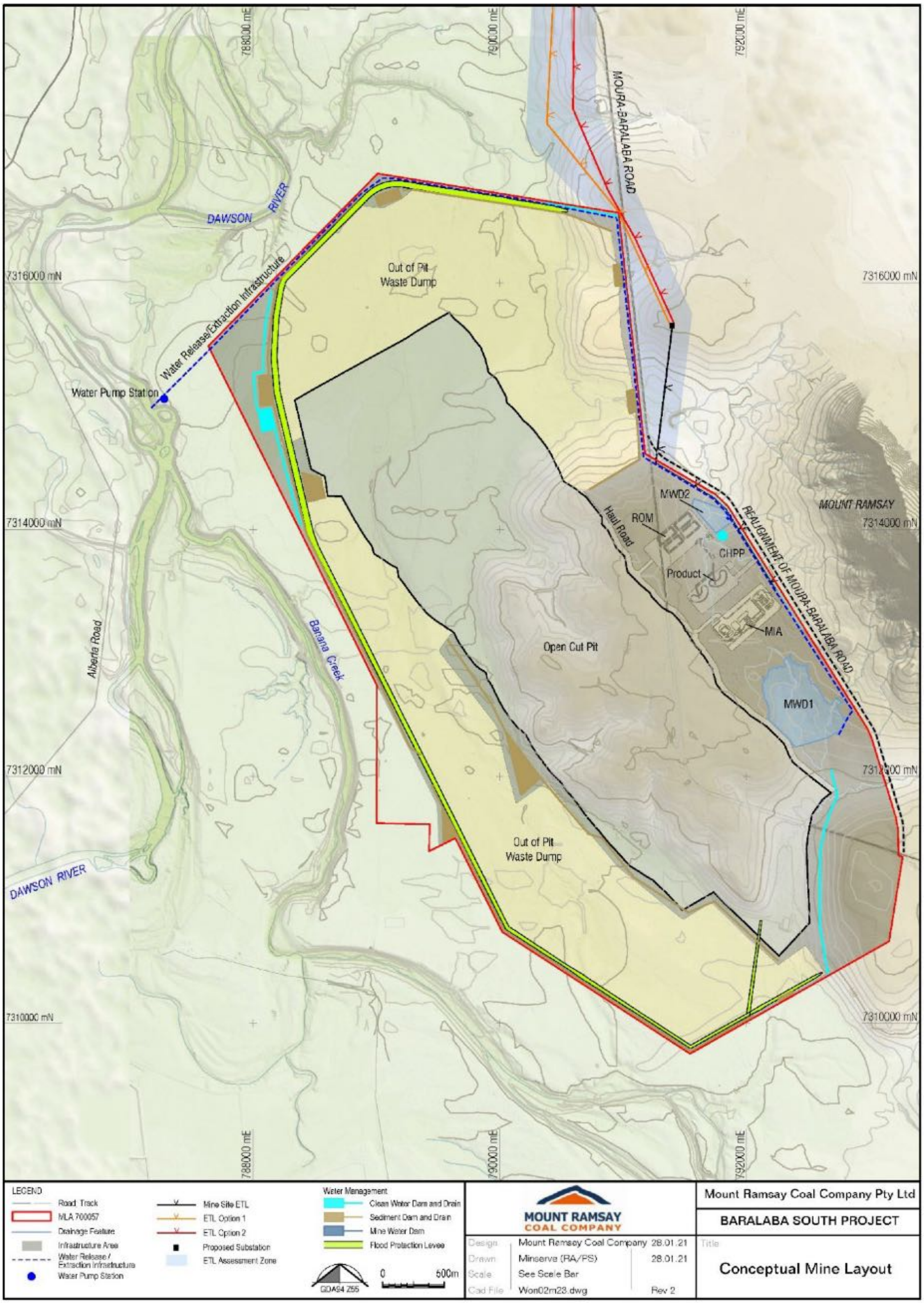

Figure 2.46: Alternative 1 - Conceptual mine layout 5 Mtpa mine operation

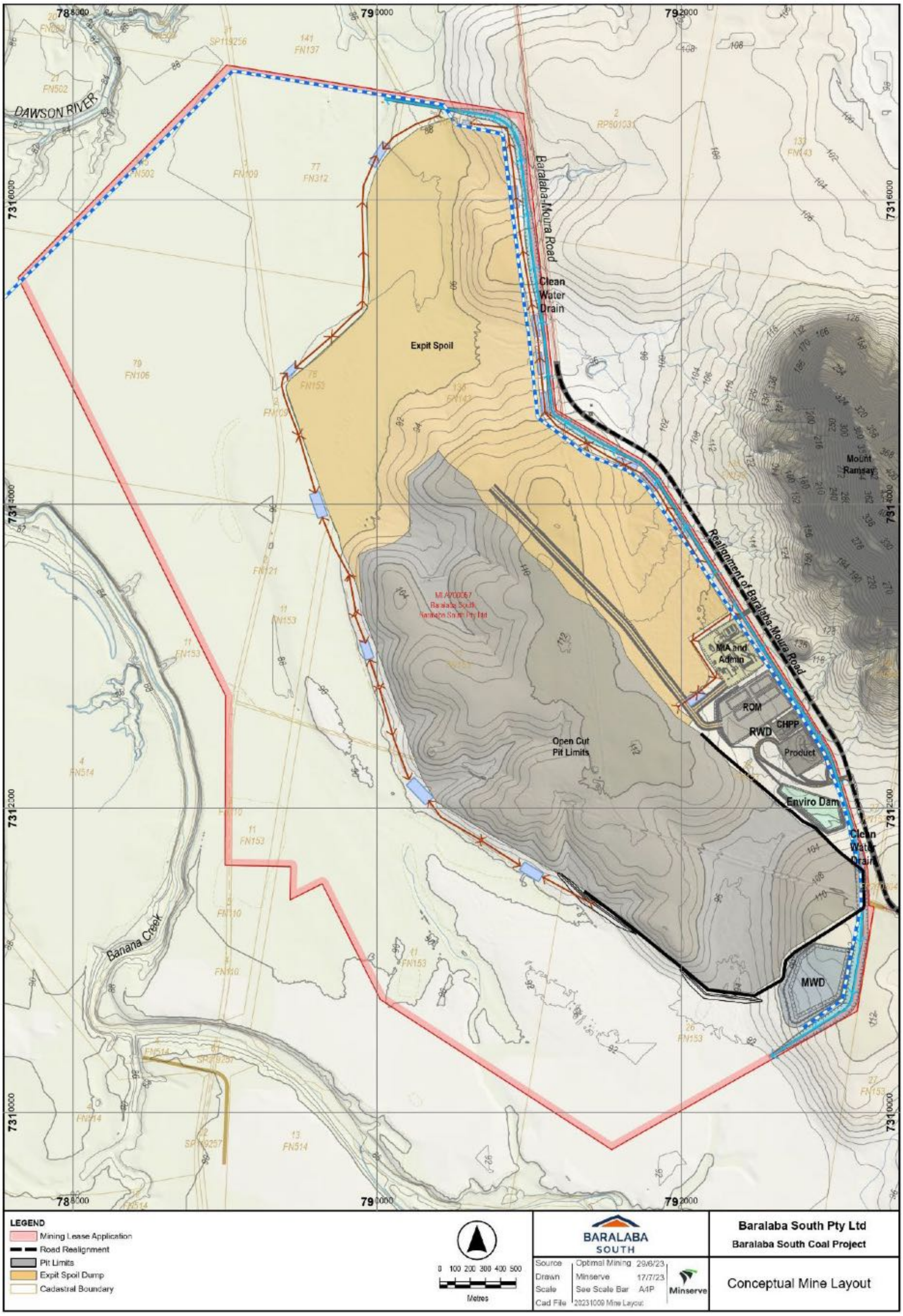

Figure 2.47: Alternative 2 - Conceptual mine layout 2.5 Mtpa mine operation

A number of strategic options were also evaluated for each of the alternatives to further optimise the proposed Project. The key decisions evaluated for each alternative were:

- What is the resulting impact on floodplain encroachment?
- What is the resulting scale of production?
- Where is the optimal location for the MIA?
- What processing method is to be used?
- How is product to be transported?

The outcomes of this evaluation are summarised in Table 2.24 and detailed in the following sections.

Table 2.24: Project alternatives assessment summary

	Alternative 1	**Alternative 2**	**Alternative 3**
Strategic decision	**Maximise resource**	**Balanced moderate production**	**Do nothing**
Flood plain encroachment	Build a levee	All disturbance outside flood area	n/a
Scale of operation	Mine all available resource in the MLA 5 Mtpa	Mine available resource off the flood plan 2.5 Mtpa	0 Mtpa
MIA location	Anywhere it fits (within flood levee)	Above 0.1% AEP	n/a
Processing method	Novel dry separation plant	Existing process (dense medium cyclones)	n/a
Product transport	New rail link or road corridor	Use existing haul road plus 4.5 km road realignment	No product haulage

2.9.1 Flood plain encroachment

The footprint of Alternative 1 (5 Mtpa operation) covers the entire MLA area including sections of the Dawson River floodplain. Mine operations are to be protected from flooding by an operational flood levee along the western boundary. Encroachment on the floodplain results in changes to flood behaviour and potential impact on neighbouring properties. These potential changes to flood regime were raised as an important concern by the community and regulators.

Alternative 2 (2.5 Mtpa operation) utilises only the eastern portion of the MLA with mine operations commencing in the north, progressing south; with the final void and all mine infrastructure located outside the 0.1% floodplain extents.

2.9.2 Scale of operation

As indicated at section 2.9.1, regulator feedback and stakeholder consultation identified concerns relating to environmental and social impacts arising from the changed flood behaviour associated with Alternative 1. Effectively addressing this necessitated a reduction in the scale of operations. Alternative 1 also seeks to maximise production with both Baralaba North and Baralaba South mines to operate in parallel.

A small, additional Mining Lease Application area located adjacent north - east of the MLA was considered as an option for Alternative 2 for spoil placement, to further reduce impacts within the 0.1% AEP floodplain. The area had been identified because it:

- does not directly impact any additional underlying properties;
- was not expected to increase impacts for any sensitive receptor;
- was not expected to increase adverse environmental impacts; and
- was expected to result in a significant reduction in the potential for surface water impacts within the 0.1% AEP floodplain.

The option to progress the additional mining lease for Alternative 2 was dismissed because it did not sufficiently reduce flooding and added complexities and time to the Project for little benefit.

Alternative 2 is a smaller scale of operation of up to approximately 2.5 Mtpa within the current MLA 700057, with a footprint limited to areas outside the 0.1% AEP floodplain extents; effectively minimising any potential changes to the flood regime. Alternative 2 also considers the operation being sequenced as a transition from Baralaba North Mine as it reaches its end of mine life. Alternative 2 is proposed to commence operations as Baralaba North production ramps down.

Alternative 2 was determined to be the preferred alternative by providing better environmental outcomes, as well as still providing ongoing social benefits to the local and regional community.

2.9.3 Mine infrastructure location

Alternative 2 (2.5Mtpa plan) was further optimised through an assessment of the location of infrastructure, including the CHPP, MIA, administration buildings and workshops. Possible infrastructure locations assessed included;

- An area to the south-west of the mining void, between the flood levee and the pit highwall; and
- An area to the north-east of the mining void.

The second location, north-east of the mining void was assessed to be the optimal infrastructure location in view of operational, economic and environmental factors. Other benefits identified were that:

- Infrastructure is positioned well outside the economic mining footprint and will not result in sterilisation of resource.
- The location is on high ground within the MLA and outside of the existing floodplain.
- The preferred route for the Moura-Baralaba Road realignment is directly to the east of the MLA boundary. The mine infrastructure is located between the mining void and the product haul route, minimising equipment travel distances during operations. This subsequently reduces noise and air emissions; fuel usage and water use for dust suppression.
- The location of infrastructure to the north-east of the pit enables the development of a permanent landform for long-term flood protection. The rehabilitated structure will remain in the post-mining landform.

This preferred location was therefore proposed for Alternative 2.

2.9.4 Processing method

Two processing options have been examined in detail to ±10% accuracy. These include:

1) a novel dry separation plant; and
2) a conventional wet CHPP.

Dry separation plant test work was undertaken in Germany but failed to replicate the data presented in research papers. Further to this, it was found that when simulated against a conventional wet CHPP, a total yield loss of 8.1% at a higher product ash was recorded against the dry separation plant. It was, therefore, considered inappropriate to examine dry coal separation further.

Wet jigs have been eliminated from process selection through the same process.

The preferred CHPP option utilises dense medium cyclones, spirals and flotation, and has formed the basis of the front-end engineering and design of the CHPP, as described in section 2.5.5.2.

This process was therefore proposed for Alternative 2.

2.9.5 Product transport

Alternatives to public road haulage include the development of a new private infrastructure corridor, such as a private haul road or rail link. The existing public haul route used by the Baralaba North Mine has already been upgraded to provide for the haulage of product coal via road trains. As described in Chapter 13, Transport, this road has available capacity to support coal transport from the Project.

The use of an existing public road for coal transport is the preferred option as:

- alternative transport options would require the construction of new infrastructure, potentially sterilising surrounding agricultural land and dividing properties; and
- alternative infrastructure options would result in additional land clearing and environmental impacts to soil, ecology and water.

Impacts of additional road traffic on the public road have been assessed in this EIS and are subject to separate Council approval and conditions.

2.9.6 Alternative evaluation summary and preferred alternative

Alternative 2, being the 2.5 Mtpa operation with a footprint restricted to being above the 0.1% AEP presents significantly reduced impacts to environmental values while still providing transitional benefits to the community.

The preferred alternative proposed in this EIS is based on Alternative 2, that is, a 2.5 Mtpa ROM coal operation with infrastructure and footprint located predominantly above the 0.1% AEP extent.

Further details on the comparable benefits of the proposed alternative are presented in the following sections.

Flooding

Alternative 1 requires a flood protection levee with 0.1% AEP design event flood protection to be constructed around the northern, western and southern perimeters of the mine. Post-mining, the flood protection levee is to be incorporated into the final landform design as a permanent feature of the landscape, providing PMF protection to the final landform. The placement of the flood levee would have significantly increased flood impacts to the community, with an increase in the number of landholders predicted to be impacted.

Flood flows were predicted to break out of the Dawson River and Banana Creek channel in events greater than the 10% AEP flood event and flow across the eastern floodplain at the Project site. The Project MLA area is partially inundated during a 2% AEP flood event but is not inundated in a 10% AEP flood event. The Dawson River floodplain has a flow width of approximately 5.5 km in flood events greater than 10% AEP adjacent to the Project. Flooding of the Dawson River at the Baralaba township is largely confined to the main river channel although minor flooding of the town results from a 1% AEP flood event.

For flood events rarer than the 10% AEP, Alternative 1 was predicted to reduce the extent of flooding on the eastern Dawson River floodplain and direct slightly more flood waters to the western floodplain and the Dawson River Anabranch which flows between the Baralaba Central and Baralaba North mining operations. In flood events up to and including the 10% AEP, some properties neighbouring the Project were anticipated to experience an increase in flood depth of up a maximum 0.5 m in the 1% AEP event.

An assessment of nine different levee locations for Alternative 1 was undertaken for the Project. Flood modelling was undertaken to assess the change in flood impacts at nearby dwellings (Engeny, 2020). The results of this analysis led to a review of mine plans and the option of a smaller mine plan to the east of the 0.1% AEP floodplain to mitigate resultant flood impacts (Alternative 2).

Subsequent mine planning confirmed that mining activities could be undertaken within the current MLA boundaries, with a significant reduction of the footprint on the 0.1% AEP floodplain. The Alternative 2 revised mine plan is smaller in scale and has been relocated predominantly outside the 0.1% AEP flood extent. As such it does not require an operational flood levee and has a much smaller impact on flooding.

Terrestrial ecology and Matters of National Environmental Significance

The impact on terrestrial ecology is significantly reduced from Alternative 2 compared with Alternative 1 as a result of the reduced footprint, and greater distance from the Dawson River floodplain. Terrestrial ecology field surveys indicated the Project area has previously been largely cleared of native vegetation through historic and ongoing agricultural practices. Larger continuous patches of remnant vegetation occur, both along the Dawson River, Banana Creek and Mount Ramsay.

Fauna habitats throughout the Project area were noted as typically being of poor to moderate condition, with poorer quality habitat associated with areas of historic clearing, cultivation and cattle grazing, resulting in limited habitat connectivity value.

Disturbance to terrestrial ecological values as a result of clearing activities are significantly increased under Alternative 1. Alternative 2 was assessed to have the following comparable impacts:

- Approximately 10 ha of remnant vegetation will potentially be cleared or disturbed by the Project for either Alternative 1 or 2. Approximately 51.6 ha of high value regrowth vegetation would potentially be cleared or disturbed for the Project for Alternative 1. Alternative 2, the 2.5 Mtpa plan potentially clears or disturbs 5.5 ha of high value regrowth vegetation, some of which provides suitable habitat for threatened species.
- Approximately 0.03% for Alternative 1 and 0.01% for Alternative 2 of Brigalow TEC would be cleared for Project operations.
- Approximately 55.8 ha for Alternative 1 Coolibah – Black box Woodlands TEC would be cleared for Project operations. For Alternative 2, all areas of Coolibah – Blackbox Woodlands TEC occur outside both the proposed disturbance footprint of the Project and ETL.
- Compared to Alternative 2, Alternative 1 results in an increase in clearing potential habitat for the Squatter Pigeon, Ornamental Snake, Australian Painted Snipe, Koala, Latham's Snipe and Glossy Ibis.
- Alternative 1 when compared with Alternative 2 showed;
  - up to 60% more clearing of habitat identified as potential habitat for the Ornamental Snake;
  - up to 60% more clearing of non-critical Koala habitat to 94.6 ha;
  - up to 60% more clearing of Squatter Pigeon (Southern) habitat to 68.3 ha; and

- up to 50% more clearing of potential Australian Painted Snipe habitat to 97.6 ha.

Aquatic ecology

Aquatic values of waterways within the Project area are typical of ephemeral areas, being highly disturbed by activities associated with the adjacent land use. The waterways within the Project area have poor habitat conditions, being ephemeral drainage lines having minimal instream habitat features.

The waterways within the MLA do not connect to any important breeding, feeding or refuge areas and fish passage is currently very limited due to their ephemeral nature.

One lacustrine (artificial) wetland and two palustrine wetlands occur within the MLA. Alternative 1 would result in the clearing of up to 10 ha of these wetlands while Alternative 2 would result in no clearing of the wetlands. However, these wetlands are poorly connected, with poor to fair habitat conditions based on diversity of instream features and disturbance levels. Dry wetlands provide minimal habitat, except for aquatic flora.

A Groundwater Dependent Ecosystem Assessment was undertaken for both alternatives to survey and assess potential groundwater dependent ecosystems (GDEs) within the study area in accordance with GDE guidelines. Under Alternative 1, vegetation clearing within the MLA will result in a direct impact of 7.2 ha to groundwater dependent vegetation (RE 11.3.3a), while under Alternative 2 no direct clearing of field verified GDE areas will occur during any stage of Project development. Groundwater drawdown associated with Project was not predicted to impact the ecological function of GDEs outside the MLA for either alternative.

Surface water

Both alternatives were predicted to result in a reduction of the Dawson River Catchment. The maximum catchment reduction for Alternative 1 equates to approximately 2,100 ha or approximately 0.05% of the contributing catchment of the Dawson River at Beckers (130322A) gauging station and 0.01% of the catchment at the Fitzroy River at Riverslea. Alternative 1 was also predicted to result in a 13% reduction in catchment to the HES wetland situated along the western MLA boundary. The reduction in HES wetland catchment would result in a maximum modelled decrease in water level of 0.05 m, with a reduction in water level at the wetland predicted on 5% of days.

The maximum catchment maximum catchment area captured by site storage for Alternative 2 is approximately 966 ha (9.66 km^2) which accounts for approximately 0.024% of contributing catchment at the Dawson River at Beckers gauging station (40,500 km^2). Alternative 2 was predicted to have no catchment impacts to HES wetlands.

Groundwater

Both alternatives result in some impact on ground water.

Predictions of groundwater drawdown for both alternatives show similar changes to groundwater systems over time. Impacts associated with Alternative 1 result from groundwater to be taken or interfered with from the exercise of underground water rights across Years 1 to 19, with drawdown largely contained within the Permian coal measures extending from the open cut pit extents to approximately 1.2–1.3 km to the north and north-west, 400–900 m to the south and south-west and 500–800 m to the east and south-east.

Alternative 2 results in a maximum drawdown of approximately 1 m within mapped alluvium, mainly within the reach of Banana Creek where it flows to the Dawson River alluvium as well as a small cone of depression (approximately 1 m drawdown) to the north-west.

Geomorphology

The footprint of Alternative 1 is located adjacent to the Dawson River and Banana Creek and extends into their respective floodplains; but is only expected to result in negligible changes to the geomorphic behaviour of the waterways and floodplain.

Alternative 2 will not result in any material geomorphological impacts to the Dawson River and Banana Creek channels and floodplains.

Land and visual amenity

The Project area is partially overlayed by trigger-mapped strategic cropping land (SCL) for both alternatives however, for Alternative 2 the disturbance footprint is reduced. An assessment of SCL criteria verified a total of 1,102 ha of land within the MLA as SCL that would be disturbed under Alternative 1. Given the smaller footprint of Alternative 2 only 495 ha of trigger-mapped SCL is disturbed.

Air quality

Dust emissions from the covered road haul trucks over sealed roads will be unsubstantial for either alternative. The closest residence to the haul route is approximately 100 m away, and the likelihood of impacts at sensitive receptors 100 m or more from the route has been assessed to be negligible.

The air quality assessment for Alternative 1 indicated a relatively moderate chance of exceedances of the 24-hour PM_{10} criterion, particularly at Year 2. Modelling results predicted one exceedance at one receptor and two at another, both located outside the MLA boundary.

The air quality assessment for Alternative 2 indicated a low to negligible chance of exceedances of all indicators (dust deposition, annual average TSP, 24-hour average PM_{10}, annual average PM_{10}, 24-hour average $PM_{2.5}$ and annual average $PM_{2.5}$) at receptors outside the MLA boundary.

Noise and vibration

For either alternative the Project will result in an increased amount of coal transported via the rail load out, and therefore an increased number of trains will use the facility. However, there is not proposed to be any significant changes to the operational hours, train types, mobile equipment or fixed equipment at the TLO. The proposed increase in train numbers will result in additional periods of noise emissions, however, based on worst-case 1-hour noise levels the level of noise occurring during these additional periods is not predicted to increase above current noise emission levels.

A noise and vibration assessment for Alternative 1 was conducted to identify key sources of noise and vibration emissions from the construction and operational activities associated with the Project by Ask Acoustics and Air Quality (now Trinity Consultants). Potential noise impacts were assessed for Years 2, 11 and 18. These scenarios were selected to represent the range of mine noise levels associated with operations over the entire mine life. Modelling indicated that no exceedances were predicted for sensitive receivers outside of the MLA.

The blasting assessment for Alternative 1 predicted that ground vibration would not exceed the objective of 5 mm/s at distances greater than 1 km. The air blast overpressure assessment predicted that air blast levels will meet the Project objective at distances greater than 3 km. Impacts from blasting are not anticipated to impact surrounding infrastructure such as that associated with the Benleith Water Scheme.

The noise assessment for Alternative 2 determined that cumulative noise was not expected to exceed compliance levels and was therefore considered acceptable (Appendix N, Noise and Vibration Assessment). Noting that some receptors are located on or would need to be acquired by the mine.

The changes in noise levels due to haulage operations associated with the Baralaba North Mine and the Project under peak operating conditions are predicted to comply with the objective of less than a 3 dB noise increase at all sensitive receivers. Noise modelling scenarios captured the worse-case traffic scenario, which includes both Baralaba North Mine and Baralaba South Mine simultaneously operating at peak production.

Transport

A Traffic Impact Assessment of Alternative 1 and Alternative 2 concluded that, with respect to road capacity, it is expected that the Level of Service for key roads will remain classified as ‘A’ under all modelled future scenarios and therefore, no additional overtaking lanes will be required. No intersection upgrades or additional mitigation measures are considered necessary for the Project.

The realignment of Moura-Baralaba Road is subject to separate approval from the Banana Shire Council.

The Project will have a minor increased demand on rail, air and sea transport. The Project will utilise the Moura Rail System and port infrastructure at the Port of Gladstone for the transportation of product coal.

Waste

The potential impacts identified that may arise from the inappropriate management of waste are applicable to both Alternative 1 and Alternative 2. Alternative 2, having a lower production rate, will produce less waste than Alternative 1. Potential impacts identified include:

- Increased pressure on local and regional commercial waste collection, treatment and disposal facilities.
- Land, surface water and groundwater contamination from:
  - leachate or run-off originating from unsealed waste collection and storage areas;
  - seepage from waste rock emplacements and coal rejects stockpiles; and
  - inappropriate and/or inadequate treatment and management of sewage effluent.
- Risks to workplace health and safety resulting from unsafe or inadequate storage, containment and/or handling of hazardous wastes.
- Health and hygiene issues resulting from the inadequate management of putrescible wastes.
- Litter in and around the Project site impacting local visual amenity, creating a fauna entrapment hazard, increasing fire risk or creating a health risk by providing a mosquito breeding habitat.
- Attraction of pest fauna species (e.g., feral pigs, black rats, feral cats, native rodents and scavenging bird species) arising from an inadequately managed waste collection area.
- Impacts to visual amenity due to the planned WREs of excavated waste.
- Resource inefficiencies arising from inadequate recycling and/or reuse of waste materials.

Cultural heritage

The non-indigenous cultural heritage assessment undertaken for Alternative 1 and Alternative 2 did not identify any significant differences. An assessment of non-indigenous cultural heritage (NICH) identified three potential NICH sites considered to have low local heritage significance (Dawson Valley Railway, Dovedale Homestead Complex, and a survey tree) and one site that is considered to have moderate local heritage significance (telephone line). No sites identified were considered to meet the threshold for state heritage listing. The recording of these sites was undertaken by the cultural heritage experts.

Social

The potential impacts of both Project alternatives on the social values of local and regional communities were identified through direct engagement with potentially affected stakeholders and an analysis of potential impacts against the attributes of the existing social environment. Stakeholder engagement and community consultation undertaken included both targeted consultation for the SIA, as well as extensive public consultation for the EIS by the Mount Ramsay Coal Company (Baralaba South Pty Ltd) for Alternative 1 and Baralaba Coal Company for Alternative 2.

The potential social impacts and benefits of the Project as identified by the community included:

- Population growth during construction and operation, with the potential to benefit community vitality and:
  - an increase in demand for social services (e.g. emergency services, health services, education, childcare and community services) and infrastructure (e.g. roads);
  - an increase in demand for rental properties;

  - an increase in property prices; and
  - an increase in the non-resident proportion of the population, that is the capacity of the region to meet the accommodation needs of the non-resident workforce is considered to be high.
- The creation of employment and training opportunities in the construction, operations and post-mining phases of the Project, including for Indigenous people.
- The potential for workplace health and safety incidents.
- The creation of opportunities for local and regional businesses and services through supply opportunities and expenditure.
- Potential impacts on the community's surroundings, health and wellbeing, such as potential Project impacts on water resources and flooding, agricultural land, amenity (e.g., dust, noise, blasting and lighting), road safety and the proposed post-mining land use.

The revised mine plan of 2.5 Mtpa and the associated reduction in potential impacts on the environment and flooding regime were generally well received. Engagement outcomes indicated a preference for Alternative 2.

Hazards and safety

A preliminary risk assessment workshop was undertaken to analyse and evaluate the risks and hazards identified for Alternative 1. Of the 48 risks identified and assessed, no Class IV (very high) risks were identified while two Class III (high) risks were identified. Identified Class III risks related to occupational health and safety hazards associated with a mine workplace and particulate matter impacts to neighbouring properties.

The revised risk assessment for Alternative 2 identified that many of these risks would be avoided or mitigated given the lower production rate, smaller footprint and footprint location outside the 0.1% AEP extent. Of the 48 risks identified and assessed, no Class IV (very high) risks were identified while three Class III (high) risks were identified. Identified Class III risks related to occupational health and safety hazards associated with a mine workplace and particulate matter impacts to neighbouring properties.

Mining methodology

Options for mining the Project are limited by the steeply dipping, multiple coal seam formation. Two options were considered in the planning phase included:

1) underground mining; and
2) open cut mining via strip or terrace methods.

The possibility of underground mining was discounted early in the planning and development phases of the Project. The complex nature of the faulted, steeply dipping seams at shallow depth within the MLA are not conducive for underground mining techniques. Such mining methods are more suited to thick and contiguous coal seams.

Open cut terrace mining has proven to be the optimal mining technique for the Baralaba South deposit. Strip mining using draglines or similar equipment is not practicable with the multiple steep dipping and faulted seams. Production rates between 1.5 Mtpa and 5 Mtpa have been considered. Terrace mining from the north of the sequence and a mining rate of 2.5 Mtpa is considered optimal within the context of Project viability, environmental impacts, impacts on stakeholders and the reinstatement of a safe and stable post-mining landform and land use.

This assessment is supported by:

- The defined coal resource has relatively low stripping ratios across the entire sequence.
- There is no known economic underground coal resource that will be sterilised by the development of the open cut mine.

- The mining method minimises potential for flooding of the void during operations and post-closure. This is achieved through the development of permanent landforms providing flood protection.
- The mining sequence has enabled the design of a final landform that supports a number of beneficial post-mining land uses for the site.

The selected mine plan also retains the ability to access coal seam gas which may be available downdip of open cut mining or in coal seams much deeper in the sequence than the seams which will be targeted by open cut mining.

2.9.7 Alternative 3 - Project not proceeding

Were the Project not to proceed, the following consequences are inferred:

- There will be a loss of employment opportunity including up to 521 jobs for a minimum of 23 years.
- Approximately 49 Mt of ROM coal will not be mined resulting in loss of mining royalties.
- There will be a loss of Federal tax revenue. The Project is estimated to increase the Australian Government aggregated tax revenue by a total of $512.4 million.
- There will be a loss of state tax revenue. The Project is estimated to provide additional tax revenues of approximately $62.6 million per annum to the Queensland Government.