DRAFT PROGRESSIVE REHABILITATION AND CLOSURE PLAN

BARALABA SOUTH PROJECT

PREPARED FOR
BARALABA SOUTH PTY LTD

19 DECEMBER 2023

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Table of Abbreviations

ALC	Agricultural Land Class
AHD	Australian Height Datum
AQP	Appropriately Qualified Person
Baralaba South	Baralaba South Pty Ltd
BoM	Bureau of Meteorology
CHPP	Coal handling and preparation plant
DES	Department of Environment and Science
DM	Dry matter
EA	Environmental Authority
EIS	Environmental Impact Statement
EP Act	*Environmental Protection Act 1994*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESP	Ecological Service Professionals Pty
ETL	Electricity transmission line
FVC	Fractional vegetation cover
GDE	Groundwater dependent ecosystem
MIA	Mine Infrastructure Area
ML / MLs	Mining lease / Mining leases
MLA	Mining lease application
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
NC Act	*Nature Conservation Act 1992*
NUMA	Non-use management area
PAF	Potentially acid forming
PMF	Probable maximum flood
PMLU	Post-mining land use
PRC Plan	Progressive Rehabilitation and Closure Plan
PRCP Guideline	Progressive Rehabilitation and Closure Plan Guideline
PRCP Schedule	Progressive Rehabilitation and Closure Plan Schedule
RA	Rehabilitation Area
RE	Regional Ecosystem
REDD	Regional Ecosystem Description Database
ROM	Run of Mine
RPI Act	*Regional Planning Interests Act 2014*
RUSLE	Revised Universal Soil Loss Equation
SILO	Scientific Information for Landowners
SMI	Soil Management Unit
TDS	Total Dissolve Solids
TEC	Threatened Ecological Communities
The Project	Baralaba South Project
UAV	Unmanned aerial vehicle
UMA	Unique mapping areas
VM Act	*Vegetation Management Act 1999*
VWP	Vibrating wire piezometers
WEPP	Watershed Erosion Prediction Project
WoNS	Weeds of National Significance
WQO	Water Quality Objective

1 Introduction

AARC Environmental Solutions Pty Ltd (AARC) has been commissioned by Baralaba South Pty Ltd (Baralaba South) to develop a draft Progressive Rehabilitation and Closure Plan (PRC Plan) for the Baralaba South Project (the Project) in accordance with the requirements of the *Environmental Protection Act 1994* (EP Act). The Proponent is a privately owned Australian metallurgical coal company and is a wholly owned subsidiary of Wonbindi Coal Pty Ltd (Wonbindi Coal). Wonbindi Coal is 100% owned by Baralaba Coal Company Pty Ltd (Baralaba Coal Company).

The Project is a proposed greenfield, metallurgical coal mine development located approximately 8 km south of Baralaba and 115 km west of Rockhampton in the lower Bowen Basin region of central Queensland. The Project location is shown in Figure 1.

This PRC PLAN is applicable to the Project proposed for Mining Lease Application (MLA) MLA 700057, where approximately 36 Mt of run of mine (ROM) coal is estimated to be mined over the anticipated 23-year mine life.

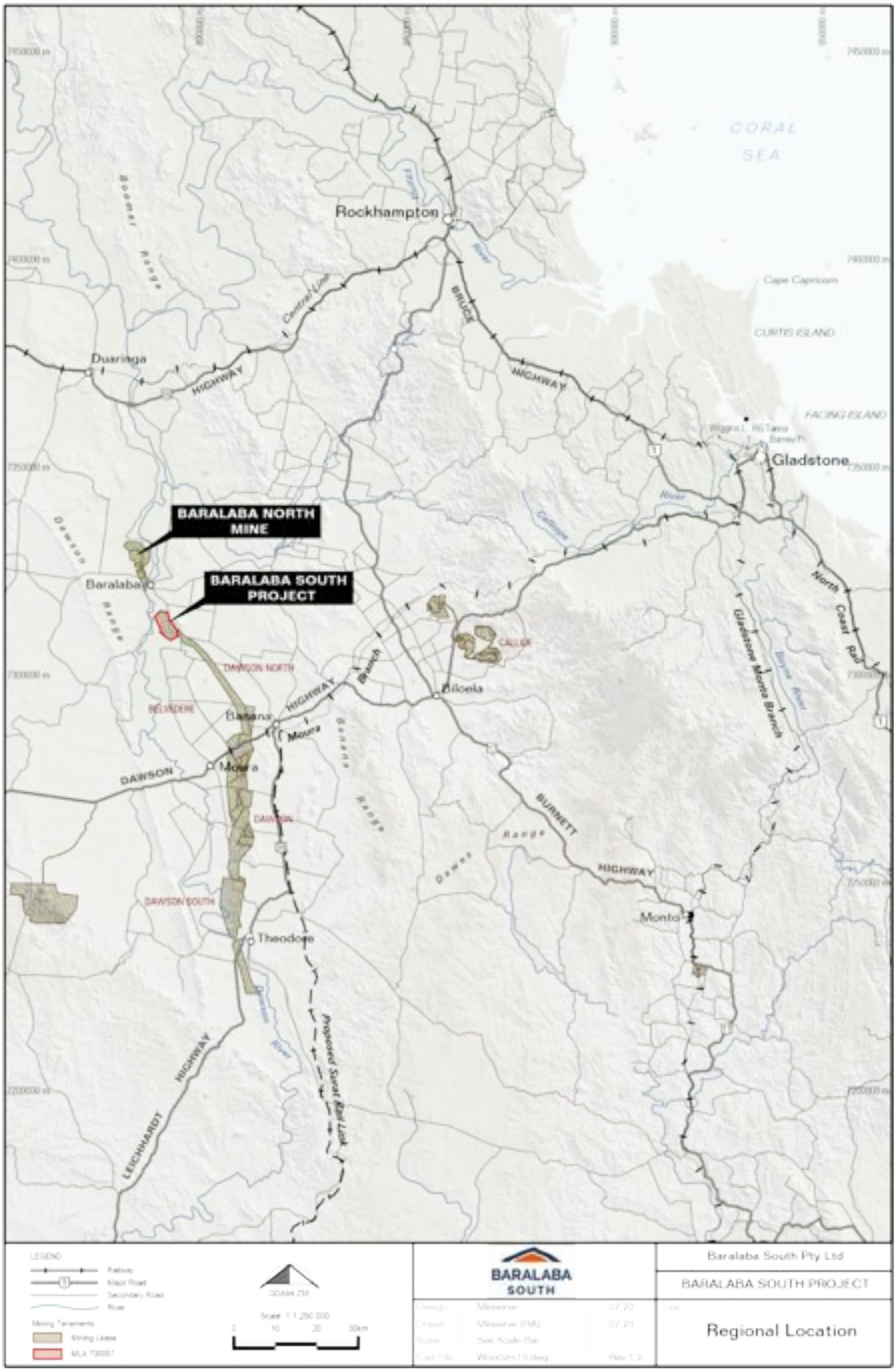

Figure 1: Regional Project location

2 Scope and objective

The purpose of this PRC Plan is to describe how progressive rehabilitation will be carried out at the Project. As the EA application for the Project was made prior to the commencement of the PRC Plan provisions of the EP Act, neither the EA application, nor the Environmental Impact Statement (EIS), is required to be accompanied by a draft PRC Plan. Instead, the proponent has agreed to separately prepare a draft PRC Plan for the Project to facilitate the approvals process.

This draft PRC Plan has been prepared to align with the requirements of the EP Act, the Progressive Rehabilitation and Closure Plan Guideline (DES 2021) (PRC Plan Guideline), and other relevant guidelines to provide a plan for how and where environmentally relevant activities will be carried out, in a way that maximises the progressive rehabilitation of the land to a stable condition; and to provide for the condition to which land must be rehabilitated before the EA may be surrendered. The PRC Plan Guideline states that the PRCP must include a rehabilitation planning part and a rehabilitation schedule part.

Rehabilitation Planning part:

The purpose of the rehabilitation planning part of a PRC Plan is to support and justify the development of a Progressive Rehabilitation and Closure Plan schedule (PRC Plan schedule). This part must detail how progressive rehabilitation and closure will be carried out over the entire Project site, on both a rehabilitation area basis and an improvement area basis. The key components of the rehabilitation planning part for the Project are:

- community consultation information (refer 3.2);
- post-mining land use (PMLU) and/or non-use management area (NUMA) determination (refer 3.3.3);
- rehabilitation and management methodology (refer 3.5);
- risk assessment (refer 3.5.10); and
- a monitoring and maintenance program (refer 3.7).

Rehabilitation Schedule part:

The rehabilitation schedule is a required element of a PRC Plan, the schedule must include:

- nomination of either a PMLU or NUMA for all land within the relevant resource tenures, including land uses for undisturbed land;
- identification of when land becomes available for rehabilitation or improvement;
- rehabilitation or management milestones to achieve the PMLU or NUMA outcomes;
- milestone criteria that demonstrate when each milestone has been completed;
- completion dates for each milestone to be achieved;
- any conditions considered necessary or desirable; and
- a final site design.

3 Project planning part

3.1 Project planning

3.1.1 Project description

The Project activities will be undertaken within MLA 700057, which covers a total area of 2,214 ha. Overburden and interburden will be disposed of in both in-pit and out-of-pit waste rock emplacements 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 point in time and consequent risks to the environment. A conventional coal handling and preparation plant (CHPP) will be constructed at the Project site for coal washing. Dry disposal of reject material is proposed within the waste rock emplacements. Processed wastewater will be recovered for recycling through the CHPP. Other associated infrastructure will include offices, crib rooms, warehouses, workshops, 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), 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). As defined in the *Environmental Protection Act 1994,* the PRC Plan relates to the land subject to the mining lease, therefore the PRC Plan addresses the rehabilitation of land within the MLA boundary only. The off lease components of the Project will be subject to further third party approvals

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 facility east of Moura (Figure 1 and Figure 2) for export by transport service providers *via* rail to the Port of Gladstone and then to international markets.

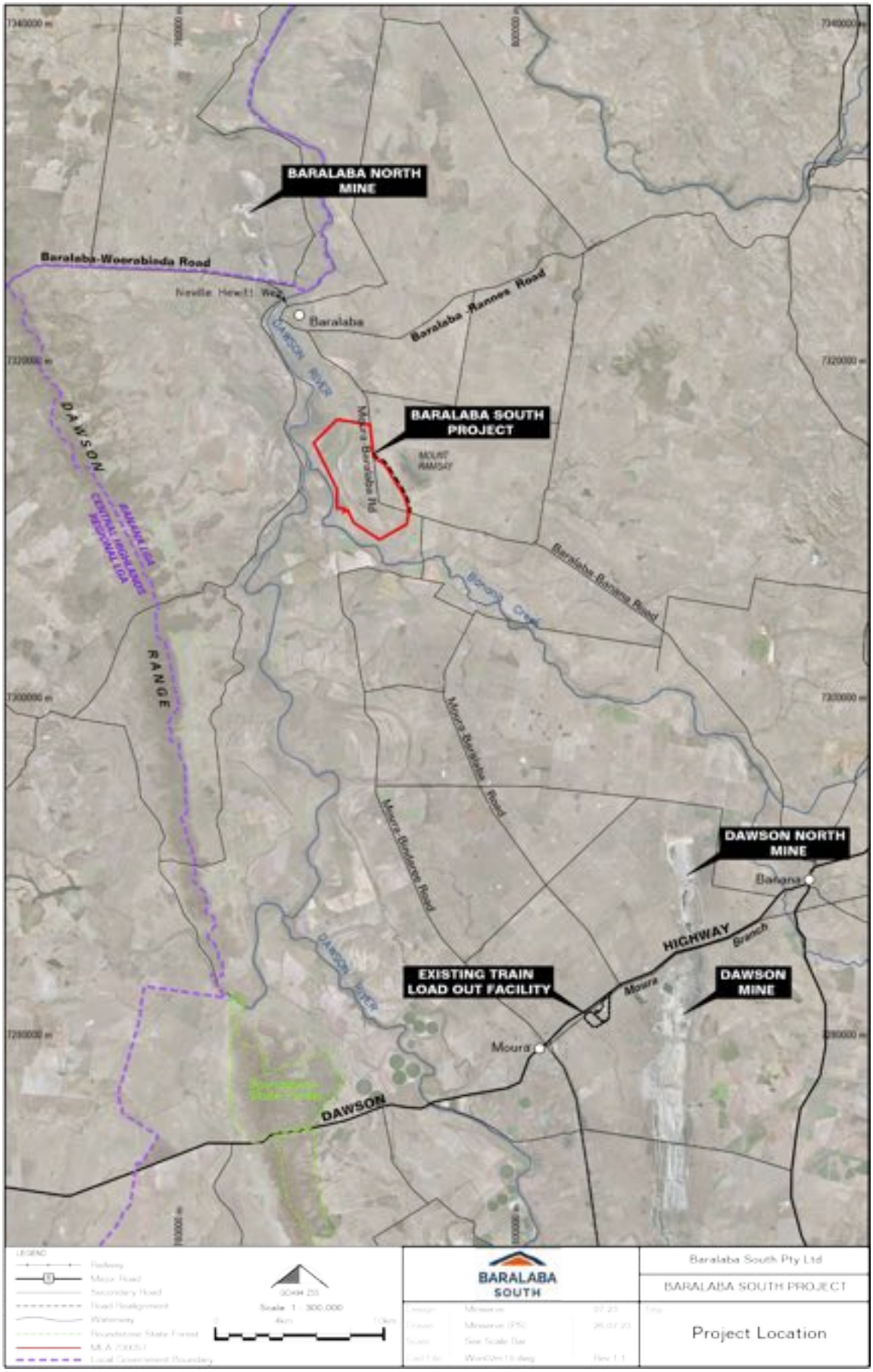

Figure 2: Project locality

3.1.1.1 Resource tenements

Mining activities will be undertaken within MLA 700057. Wonbindi Coal Pty Ltd (Wonbindi Coal) holds the underlying exploration permit for coal EPC 1047 and mineral development licence MDL 352. Baralaba South (a wholly owned subsidiary of Wonbindi Coal) has applied for MLA 700057 over these pre-existing tenures with the consent of Wonbindi Coal.

3.1.1.2 Mining operations and site layout

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 ML, EA, PRC Plan and other permits required for the Project to proceed. The construction period will involve a civil and earthworks phase which will involve land clearing, the construction of mine infrastructure, water management infrastructure and the off lease infrastructure components. The general arrangement of the Project is shown on Figure 3 and mine progress shown on Figure 4 to Figure 10.

The exact timing of infrastructure development will be dependent on agreements with third party participants.

Mining operations will commence following the construction period. The resource supports an optimal mine life of at least 23 years of coal production.

Operations involve terrace style, open cut mining activities using conventional hydraulic excavators and rear dump trucks. 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.

As space becomes available, waste will be returned to an in-pit waste rock emplacement (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.

Progressive rehabilitation will be carried out when the waste rock placement has been finalised for a given area and that area is no longer required for mining operations. At this point, the area will be classified as available for rehabilitation and a sequence of rehabilitation activities will commence (refer to section 3.5).

A final landform bund is proposed around the south-western corner of the final void and an earthen embankment adjacent. The bund and embankment will be constructed using non-dispersive, low permeable engineered fill from the box pit. A preliminary crest level of 98 mAHD and is based on the maximum probable maximum design flood level and includes a freeboard allowance and a sensitivity allowance.

The water management system for the Project will include infrastructure for the controlled release of excess water offsite. A high-capacity pump and pipeline will be used to release water from the mine water dam 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 locations of the pipeline and release point are shown on Figure 3 and have been located to minimise potential impacts to environmental values.

Water supply infrastructure will include a pump and above ground poly pipe to extract and transfer water from the Dawson River to the mine water dam. The water supply pipeline is proposed to be located within the easement of, and adjacent to the water release pipeline (Figure 3). Proposed energy supply infrastructure is depicted in Figure 11.

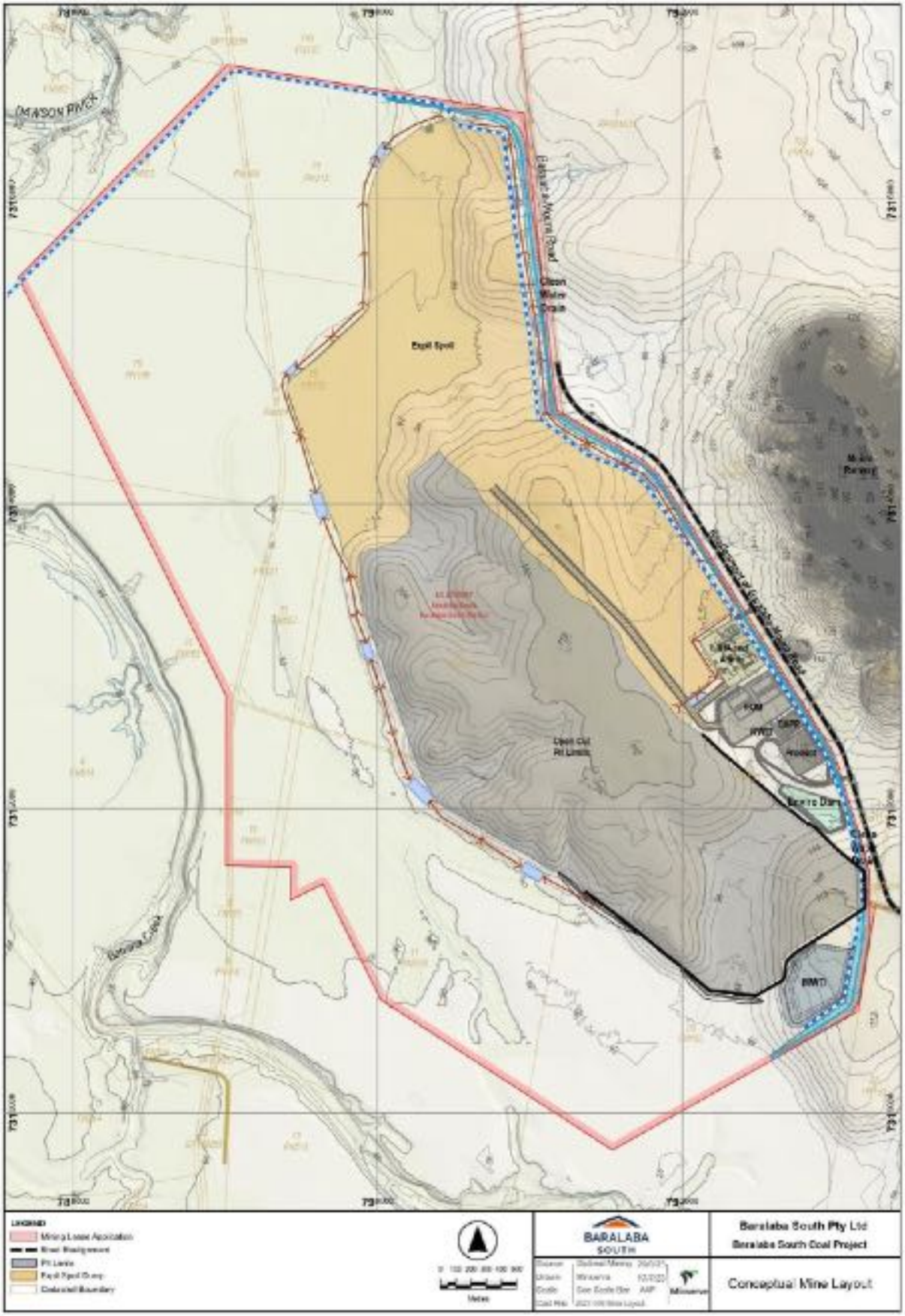

Figure 3: Conceptual mine layout

Figure 4: Mine progress - year 1

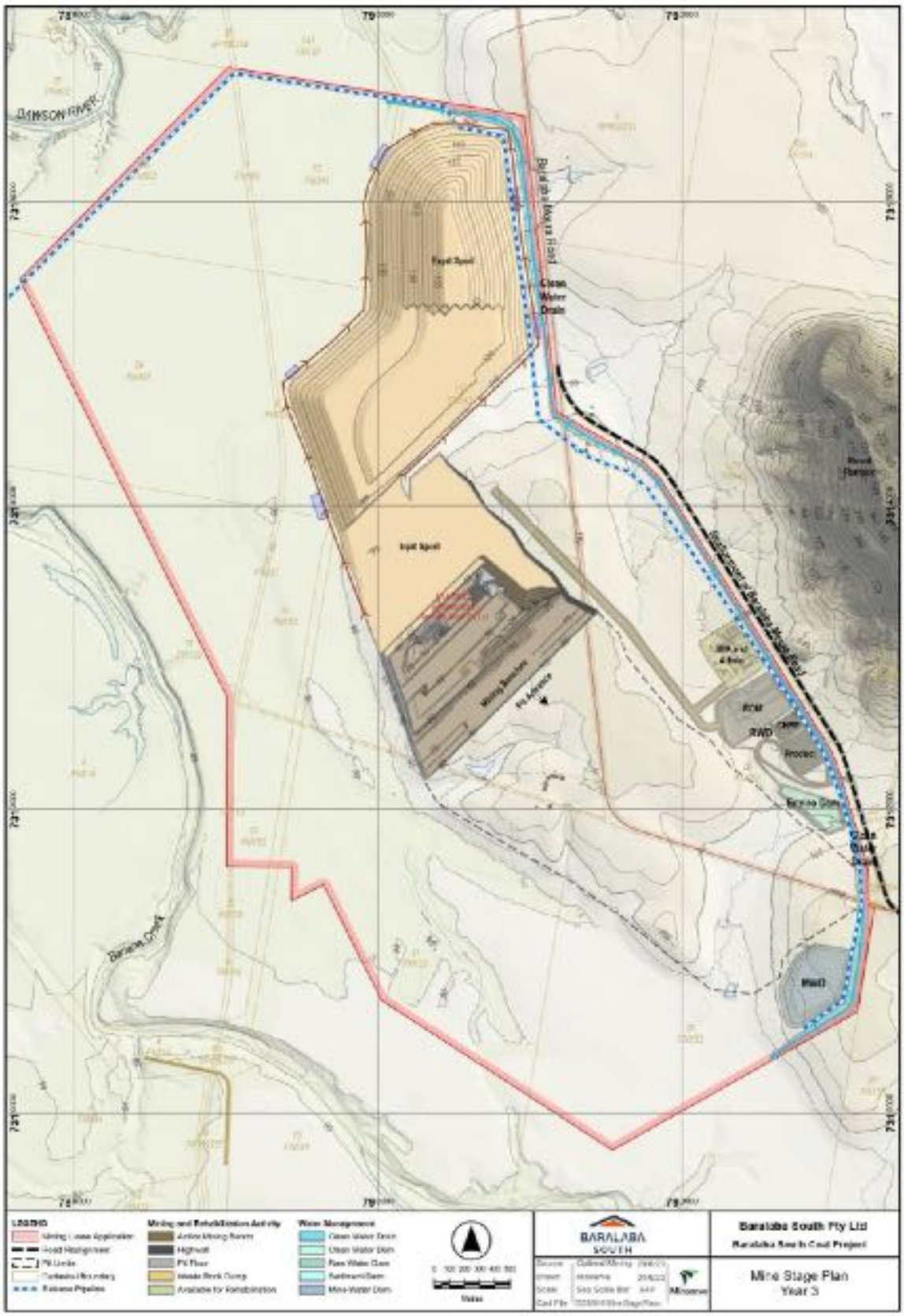

Figure 5: Mine progress - year 3

Figure 6: Mine progress - year 6

Figure 7: Mine progress - year 11

Figure 8: Mine progress - year 14

Figure 9: Mine progress - year 19

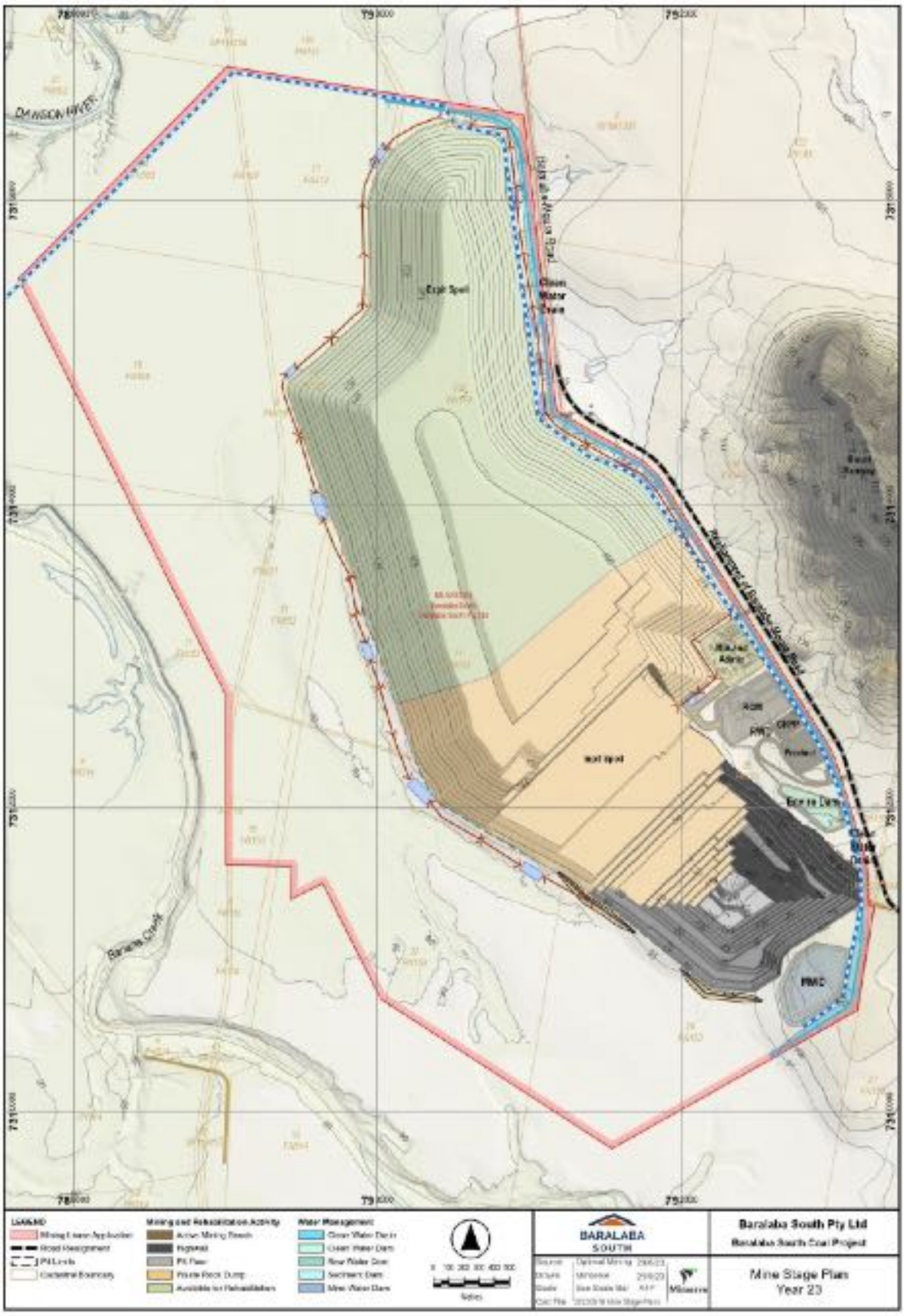

Figure 10: Mine progress - year 23

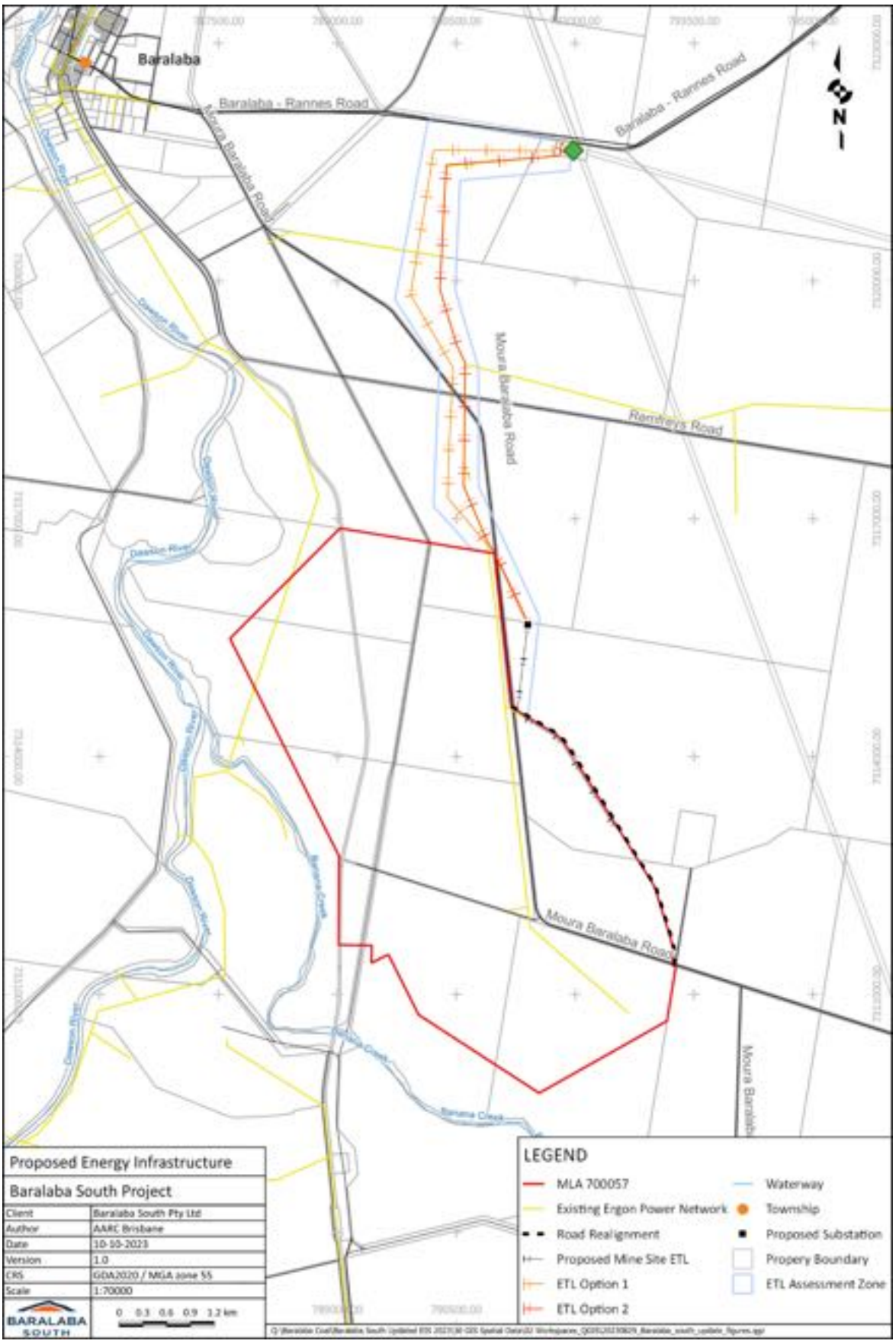

Figure 11: Proposed energy infrastructure

3.1.2 Climate

To describe the climatic conditions of the Project, long-term meteorological data has been obtained from weather stations proximal to the Project as listed in Table 1.

Table 1: Meteorological weather stations proximal to the Project

Database	Weather station	Latitude	Longitude	Approximate distance to Project
Bureau of Meteorology	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

1. The Central Baralaba Coal Mine weather station was damaged in 2019; data is only available from 2013-2019.

The climate of the Project region is subtropical with a distinctly dry winter. The wet season generally aligns with the November to March period which accounts for over 65% of the region's average rainfall (Figure 12). Annual rainfall records for the period 1889-2019, for the weather stations listed Table 1 are as follows;

- Baralaba Post Office: 696 mm;
- SILO Baralaba Grid: 680 mm; and
- Moura Post Office: 664 mm.

Mean monthly temperature is highest during December and January (34.2-34.3ºC), dropping to 6-7 ºC in July before rising in subsequent months. The mean monthly temperature ranges between 14-29.5 ºC throughout the year.

Evaporation records were available from the Baralaba Post Office (039004), the SILO Baralaba Grid and the Moura Post Office (039071), which have recorded average annual evaporation (Class A Pan) of between 2,019 mm (03907) - 2,041 mm (SILO Grid). Based on the available datasets, measured, monthly average evaporation is approximately three times higher than the average rainfall.

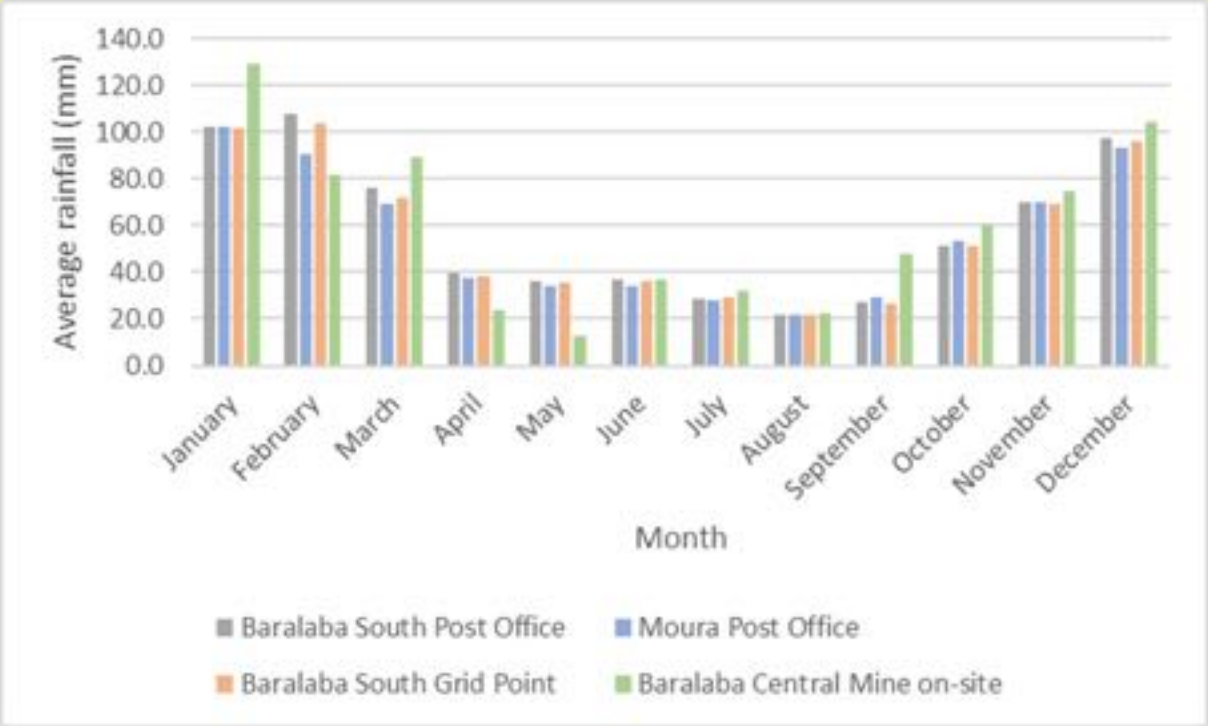

Figure 12: Project regional average monthly rainfall

3.1.3 Geological setting

The geological setting of the Project indicates the chemical and structural integrity of the material that will be used in the construction of the final landform. The Bowen Basin is divided into broad morphotectonic zones, which represent areas of maximum sediment accumulation and adjacent shelf areas. Subdivision of these areas is broadly north-northwest to south-southeast in the northern part of the basin and, typically, bounded by major faults. The Project lies within the Permo-Triassic aged southern Bowen Basin in a structurally complex zone, on the eastern limb of the Mimosa Syncline. The Mimosa Syncline is characterised by a complex pattern of northerly trending folds and thrust (reverse) faults.

The economic coal seams lie in the Permian Baralaba Coal Measures and correlate to the Rangal Coal Measures of the Blackwater Group, which are overlain by the Rewan formation. The Baralaba Coal Measures generally strike in a north-north-westerly direction (Figure 13). The coal bearing section of the Baralaba Coal Measures is variable in thickness across the Project but is up to 400 m thick in some areas. The Baralaba Coal Measures are almost entirely overlain by Quaternary sediments, with outcrops at the surface only observed along creeks and riverbanks.

Immediately underlying the Baralaba Coal Measures is the Gyranda Formation (Kaloola Member). The Kaloola Member is known to contain minor coal horizons. The Kaloola Member strata are comprised of fine sandstones and siltstones, with subordinate carbonaceous shale, tuffs and banded coal having some coking and thermal properties.

Surface geology of the Project includes Quaternary alluvium (Qa-Qld) and (Qr-Qld) dominated by volcanic and metamorphic rock comprised of clay, silt, sand, gravel, and soil (Figure 14). The thickness of these sediments is typically between 10 m and 20 m. The depth of weathering ranges 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). Mount Ramsay, located to the east of MLA 700057, is an isolated, igneous body trachyte.

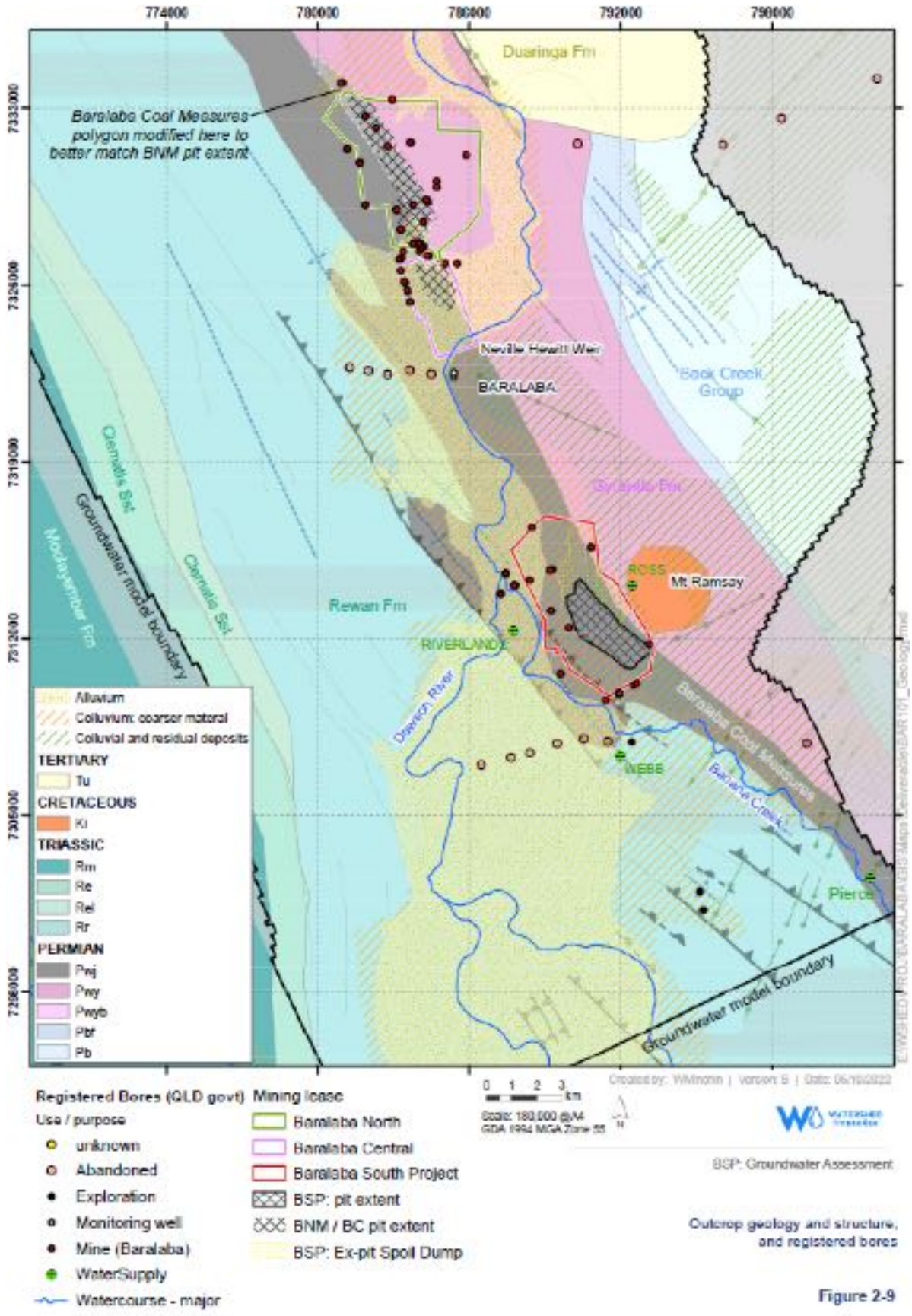

Figure 13: Solid geology of the Project and surrounding area

Figure 14: Detailed surface geology of the Project and surrounding area

3.1.4 Groundwater

The Project is not located within a groundwater management area under the Water Plan (Fitzroy Basin) 2011. Groundwater for the Project is in Groundwater Chemistry Zone 34 (Sodic Sequence – Saline NA, Cl), within the Lower Dawson Groundwaters of WQ1310 – Fitzroy Groundwater Zones (DEHP 2011). Schedule 1 of the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 outlines the environmental values and water quality objectives for waters of the Dawson River Sub-basin.

3.1.4.1 Hydrogeological domains

The Project is in the southern part of the Permo-Triassic aged Bowen Basin. The major groundwater bearing units in the region are the Quaternary alluvium sediments and the Permian Baralaba Coal Measures. A conceptual groundwater model has been developed as part of the Groundwater Modelling and Assessment (Appendix E) undertaken for the Project EIS and is shown in Figure 15.

Quaternary alluvium sediments

Alluvium is present within MLA 700057 and along the Dawson River and Banana Creek confluence. The Quaternary sediments consist of alluvial and colluvial sands and gravel, soil, and clay. Available information indicates that the alluvium is heterogeneously distributed but often comprises distinct layers of surficial clays, thick sands/gravels, and basal sandy clays.

Based on interpretation of available data, it is concluded that:

- the sediments thicken beneath and immediately adjacent to the Dawson River and are, typically, about 15 m thick (HydroSimulations 2021);
- the thickness of Quaternary sediments along Banana Creek are expected to be less than those along the Dawson River, with an even lesser veneer of alluvium/colluvium across parts of the Project site; and
- the weathered rock profile (or regolith) has an average depth of weathering of approximately 28 m (HydroSimulations 2021).

Permian Baralaba Coal Measures

The Permian Baralaba Coal Measures are overlaid by the Triassic aged, Rewan formation. The following major strata of the Blackwater Group are present, increasing with depth and order:

- the Baralaba Coal Measures; and
- the Gyranda Formation.

The Permian Baralaba Coal Measures sub-crop runs along a narrow corridor up to 3.5 km wide, that trends north-northwest. Within the Project area, the Permian Baralaba Coal Measures are buried under a veneer of Quaternary alluvium and Tertiary-Quaternary colluvium. The Baralaba Coal Measures are 400 m thick and include 12 coal seams (Hydrosimulations 2021). In the Permian strata, groundwater is encountered in areas of lower permeability, including the coal seams, and in the sandstone/siltstone strata. The dominant interburden strata consist of siltstones and fine sandstones and is generally considered an aquitard (3D Environmental 2023). Finer- grained strata, such as mudstones, are also present throughout the coal measures and are typically found adjacent to the roof and floor of the coal seams.

The Permian Baralaba Coal Measures have been subject to crustal shortening during the Late Permian and Triassic 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.

3.1.4.2 Groundwater recharge and discharge

Groundwater recharge in the Baralaba area could occur as a result of three key processes (KCB 2023):

1) Recharge occurrence via leakage from surface water features including rivers (such as the Dawson River during high flows), and potentially from unconsolidated sediments such as alluvium.

2) Infiltration along preferential pathways such as faults, joints, bedding planes, and higher permeability horizons or zones within individual formations.

3) Diffuse infiltration of rainfall that falls directly on outcropping hydrostratigraphic units.

The hydraulic properties of the alluviums within the Project area vary due to the heterogeneous distribution of sediments. Recharge of the surficial sediments is from direct rainfall and infiltration (loss) from streams, particularly where surficial clays are absent. This has been demonstrated by the isotope sampling results which indicate an alluvial bore closer to the Dawson River (A-OB2) is more readily recharged by rainfall, while bores sampled away from the river (A-OB4 and A-OB8) have more distinct signatures (Watershed 2023). Groundwater within the alluvium is characterised by sporadic, disconnected sandy lenses, perched above the regional groundwater table, throughout the heavy, clay soils on the floodplain. Recharge of these lenses of groundwater occurs seasonally from surface infiltration associated with overbank flow and intense rainfall events (Watershed 2023).

The Neville-Hewitt Weir, which has a full storage at approximately 79 mAHD, maintains the Dawson River stage at a higher elevation than the majority of the groundwater levels observed around Baralaba.

Recharge to the Permian Baralaba Coal Measures is likely to be from rainfall recharge, where it occurs at outcrop as well as from downward leakage from the overlying alluvium, if and where saturated (Watershed 2023). During pumping tests, no boundary effects were observed within the interburden, despite being within 500 m of the Dawson River, indicating that there is limited connectivity between the Permian coal measures and the Dawson River.

3.1.4.3 Groundwater levels

Groundwater level data was collected from a network of 18 groundwater monitoring bores and an additional five vibrating wire piezometers (VWP) within and immediately adjacent the Project area (Figure 16). Groundwater monitoring bores are spatially distributed across the site along two main transects. A summary of the monitoring network is as follows:

- a northern transect at the confluence between the Dawson River and Banana Creek;
- a southern transect adjacent Banana Creek;
- ten monitoring bores that target the alluvium (A-0B1-A0B4, A0B6-A0B8, A0B10-A0B12);
- three monitoring bores targeting the coal seams of the Baralaba Coal Measures (P-0B1, P-0B4 and P-0B5);
- one monitoring bore that targets the interburden of the Baralaba Coal Measures (P-0B3);
- one monitoring bore that targets the Gyranda Formation (P-0B2);
- two production bores targeting the alluvium (A-PB1 and A-PB2) and one targeting the interburden of the Baralaba Coal Measures (P-B1); and
- five VWPs targeting the Rewan formation, Baralaba Coal Measures, and the Gyranda Formation.

Groundwater level data shows that groundwater levels increase in depth at increasing distance from the Dawson River, where groundwater to the west of the Project exhibits depths of typically between 15-20 mbgl compared to depths of greater than 20 mbgl observed to the east of the Project. Groundwater levels were observed to typically range from 10-15 mbgl to the north and 5-10 mbgl/ 10-15 mbgl near the confluence of Banana Creek with the Dawson River.

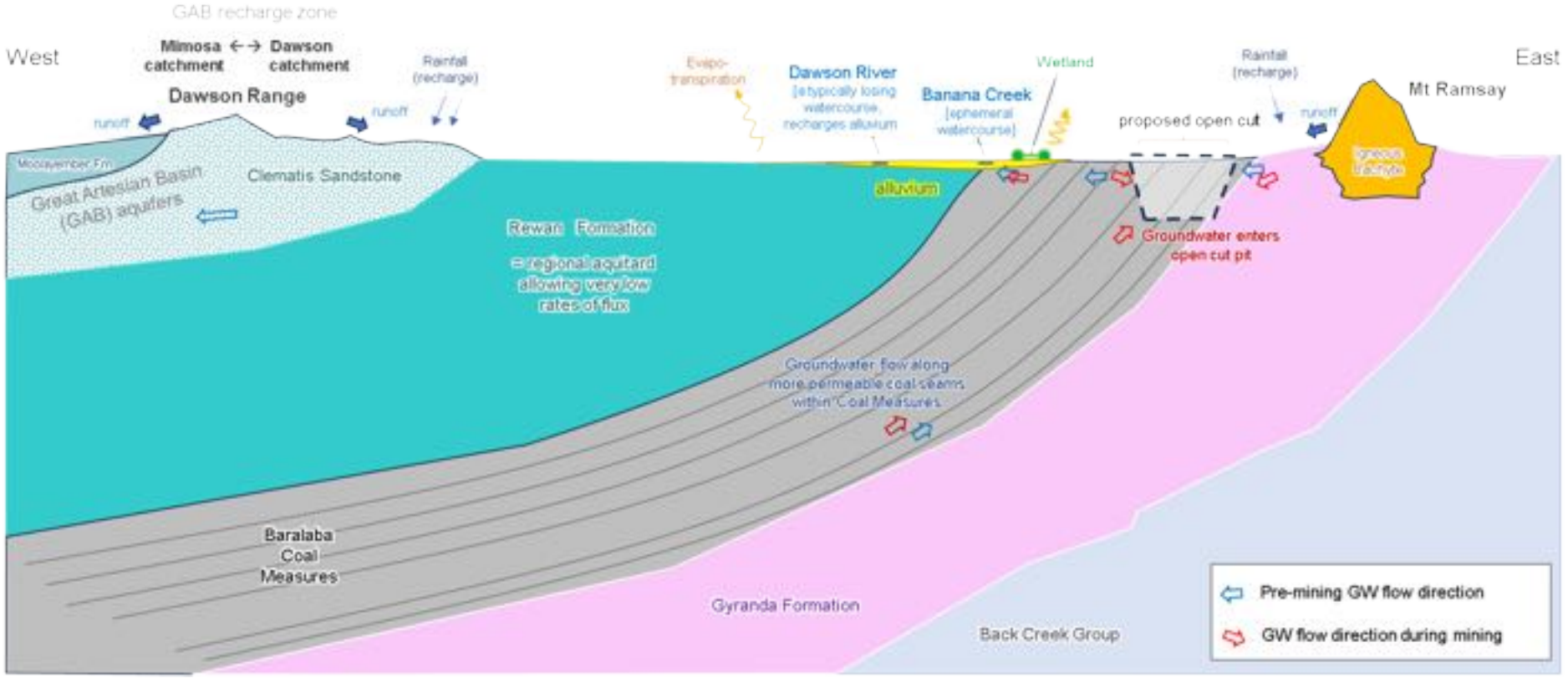

Figure 15: Conceptual groundwater model for the Project

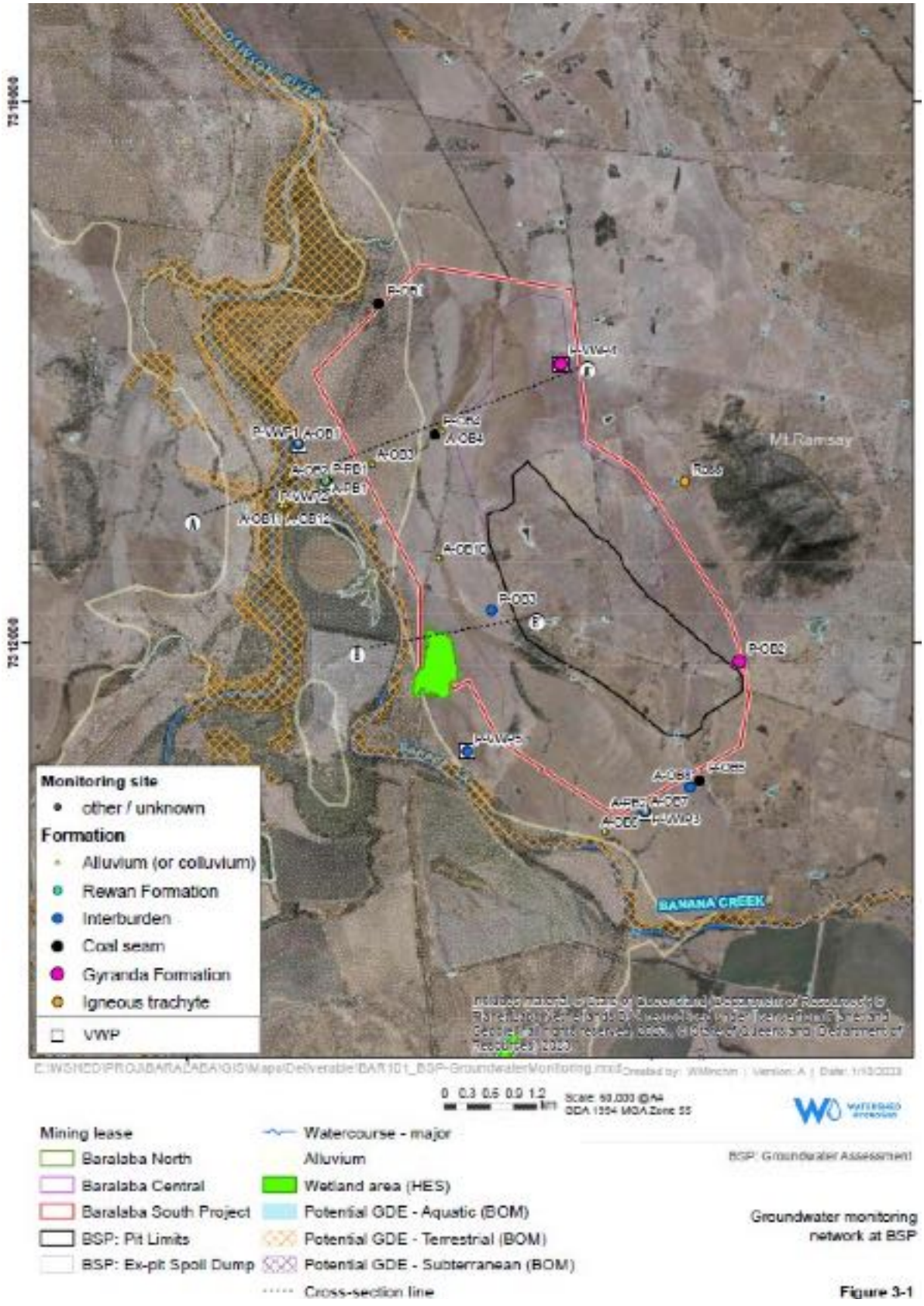

Figure 16: The Project groundwater monitoring bores

3.1.4.4 Groundwater quality

Targeted baseline groundwater sampling indicates that alluvium groundwater varies depending on proximity to the Dawson River, with freshest water nearest the Dawson River (e.g., approximately 300 µS/cm to 700 µS/cm). Salinity is elevated along the local drainage line within MLA 700057, which is consistent with the conceptualisation of lesser rainfall/river recharge and is likely to be reflective of the underlying Permian coal measures and evapo-concentration effects of salts (i.e., elevated Na:Cl).

Groundwater quality characteristics for the period between December 2018 and August 2022 for each hydrogeological domain are summarised below:

- Groundwater in the alluvial sediment is fresh nearest to the Dawson River (typically 300 µS/cm to 1,000 µS/cm and approximately 140 mg/L to 622 mg/L total dissolved solids [TDS]), and more saline furthest from the Dawson River (approximately 21,000 µS/cm to 40,000 µS/cm and approximately 12,600 mg/L to 38,000 mg/L TDS); and is neutral/slightly acidic with an average pH of 6.07.
- Groundwater in the Baralaba Coal Measures is saline, increasing in salinity with increasing distance from the Dawson River. EC has been observed at approximately 13,700 µS/cm to 18,400 µS/cm (approximately 9,000 mg/L – 12,000 mg/L TDS) closest to the Dawson River and approximately 23,000 µS/cm to 34,000 µS/cm (approximately 13,000 mg/L – 24,000 mg/L TDS) at its furthest distance. Groundwater is neutral/slightly acidic with an average pH of 6.51.
- Groundwater in the Gyranda formation is saline with EC ranging from approximately 16,000 µS/cm to 21,075 µS/cm and slightly acidic with an average pH of 6.32.
- The concentration of trace metals in groundwater is low, at concentrations suitable for stock drinking.

According to livestock drinking water guidelines (ANZG 2018), beef cattle are expected to tolerate and adapt to EC levels of less than 7,463 µS/cm (medium risk), while EC levels greater than 7,463 µS/cm (high risk) are considered unsuitable as livestock drinking water long-term due to impacts on animal health and production. EC values of approximately 28,000 µS/cm to 40,000 µS/cm within the alluvial sediments (with the exception of bore A-0B3 which recorded EC under 600 µS/cm but has been blocked since 2019) and approximately 16,000 µS/cm to 38,000 µS/cm within the Permian Coal Measures of MLA 700057 have been recorded. Groundwater within MLA 700057 is considered highly saline and unsuitable for stock drinking.

3.1.4.5 Regional groundwater use

Groundwater within and surrounding the Project area is generally considered unsuitable for stock watering and irrigation. Groundwater appears to have had limited use as stock water supply historically. Water supply for agriculture is generally sourced directly from Dawson River allocations in the region.

Groundwater in the Project area is highly saline and not considered suitable for human consumption.

3.1.4.6 Groundwater dependent ecosystems

Groundwater dependence within MLA 700057 and adjacent areas associated with the Dawson River flood plain is contingent on small, sporadic, disconnected sandy lenses throughout the heavy clay soils of the flood plain (3D Environmental 2023, Appendix E). The sandy lenses support seasonal, shallow, fresh groundwater resources that are perched above the regional groundwater table. One GDE was identified within MLA 700057, located to the south-west of the MLA along a linear area of riparian vegetation (approximately 7.2 ha), classified and ground-truthed as RE 11.3.3 (high value regrowth). Two additional GDEs were identified to the west of the MLA, along the Dawson River. All GDEs identified are associated with overland flow paths on the floodplain or the main Dawson River channel, which would act to increase infiltration into the soil profile due to prolonged ponding of surface water.

Stygofauna were present in the unconfined alluvial aquifers of the Dawson River alluvium associated with the river channel (Stygoecologia 2019). Stygofauna present includes phreatobites from the family Naididae (aquatic worms). The fine-grained sands and clays present at the Project, limit, or prohibit the occurrence of stygofauna.

No threatened stygofauna species were present.

3.1.5 Surface water

The Project is located within the Dawson River sub-catchment, an area encompassing 50,800 km^2 or 35% of the Fitzroy Basin catchment (Figure 17). The Dawson River is the main watercourse proximate to the Project. The Project is located on the eastern floodplain of the Dawson River near the confluence of Banana Creek and the Dawson River. The Dawson River flows northwards past the western boundary of the Project through a flat, alluvial floodplain before taking an easterly course towards the Baralaba township and then joining the Mackenzie River just north of Duaringa. The Dawson River has a lower floodplain extending approximately 1.5–3 km either side of a 150 m wide main river channel. An anabranch of the Dawson River lies to the north of the Project, re-joining the main channel 5 km downstream of the Neville-Hewitt Weir.

Banana creek is an ephemeral, fifth order tributary joining the Dawson River approximately 1 km to the west of the MLA (Figure 18). The MLA boundary closely follows the Banana Creek channel, remaining within 2 km of the channel over the length of the western boundary.

A number of first and second order drainage lines occur within the Project area (Figure 18). These waterways are tributaries of an unnamed third order stream that flows through the Project area, exiting at the north-eastern boundary of the MLA 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.

Waterways for fish passage

Based on the August 2023 Aquatic Ecology Assessment (ESP, Appendix E), there are no waterways providing for fish passage within the proposed mine disturbance area, except for some reaches of the mapped red (high risk) tributary within the disturbance footprint (Tributary 8). Discrepancies between government mapping and ground truthing were identified during the 2023 field assessment by ESP (2023) and mapping has been updated to reflect on-ground conditions (Figure 19).

The headwaters of Tributary 8 are within the proposed mine disturbance area and are a mapped green (low risk of impact) waterway. Downstream reaches mapped as red (high risk of impacts) and amber (moderate risk of impacts) are mostly outside of the proposed disturbance area. Evidence of the potential use for fish passage was observed at times during the 2023 field survey Appendix E, with the presence of a yabby claw detected in the bed of the tributary.

No water was present within any of the tributaries surveyed within the disturbance footprint during the 2023 sampling event. Additionally, there was no presence of fish recorded during field surveys carried out between 2019 to 2023 (Appendix E, ESP 2023).

Figure 17: Dawson River sub-catchment of the Fitzroy Basin

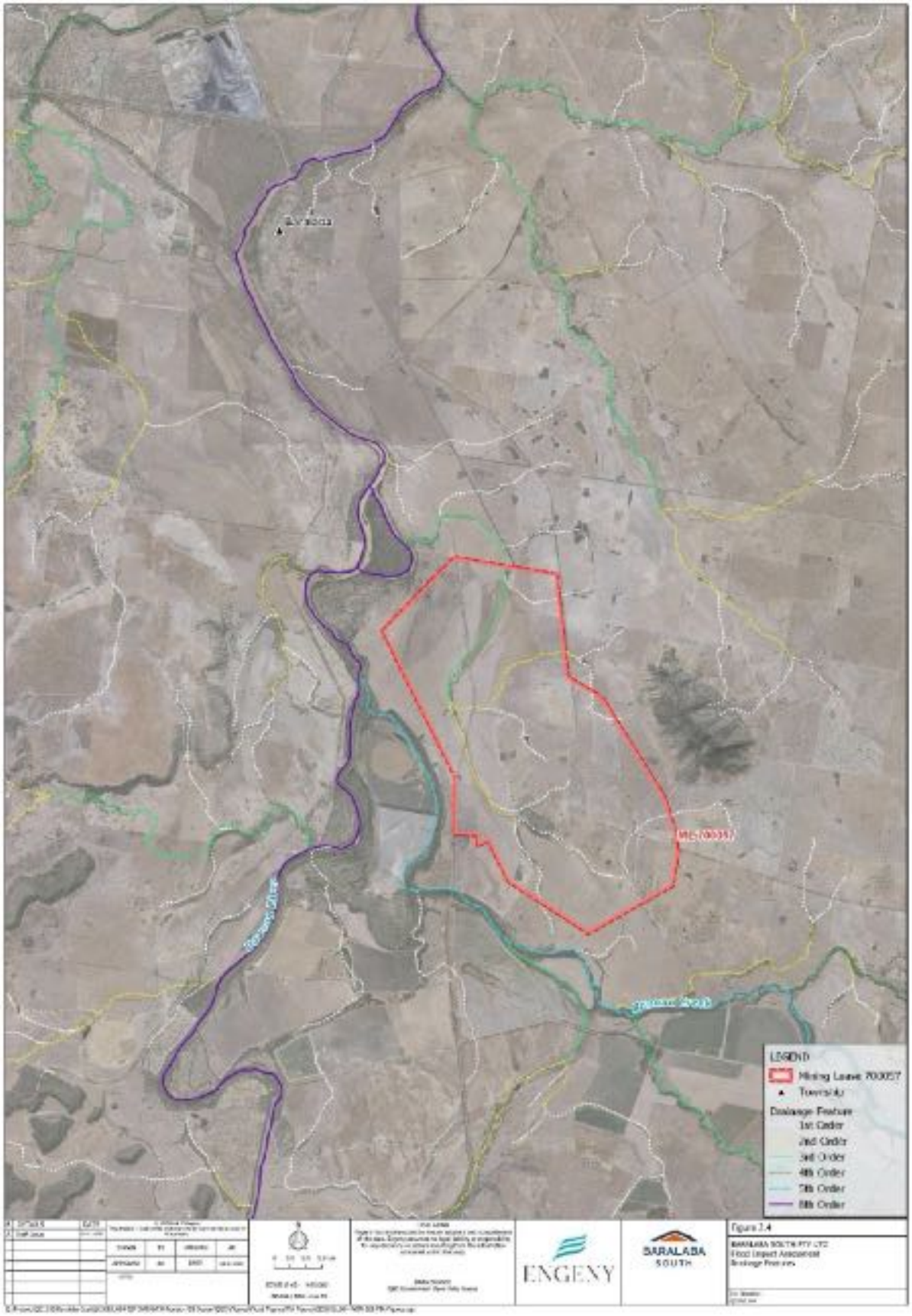

Figure 18: Local watercourses by Strahler stream order

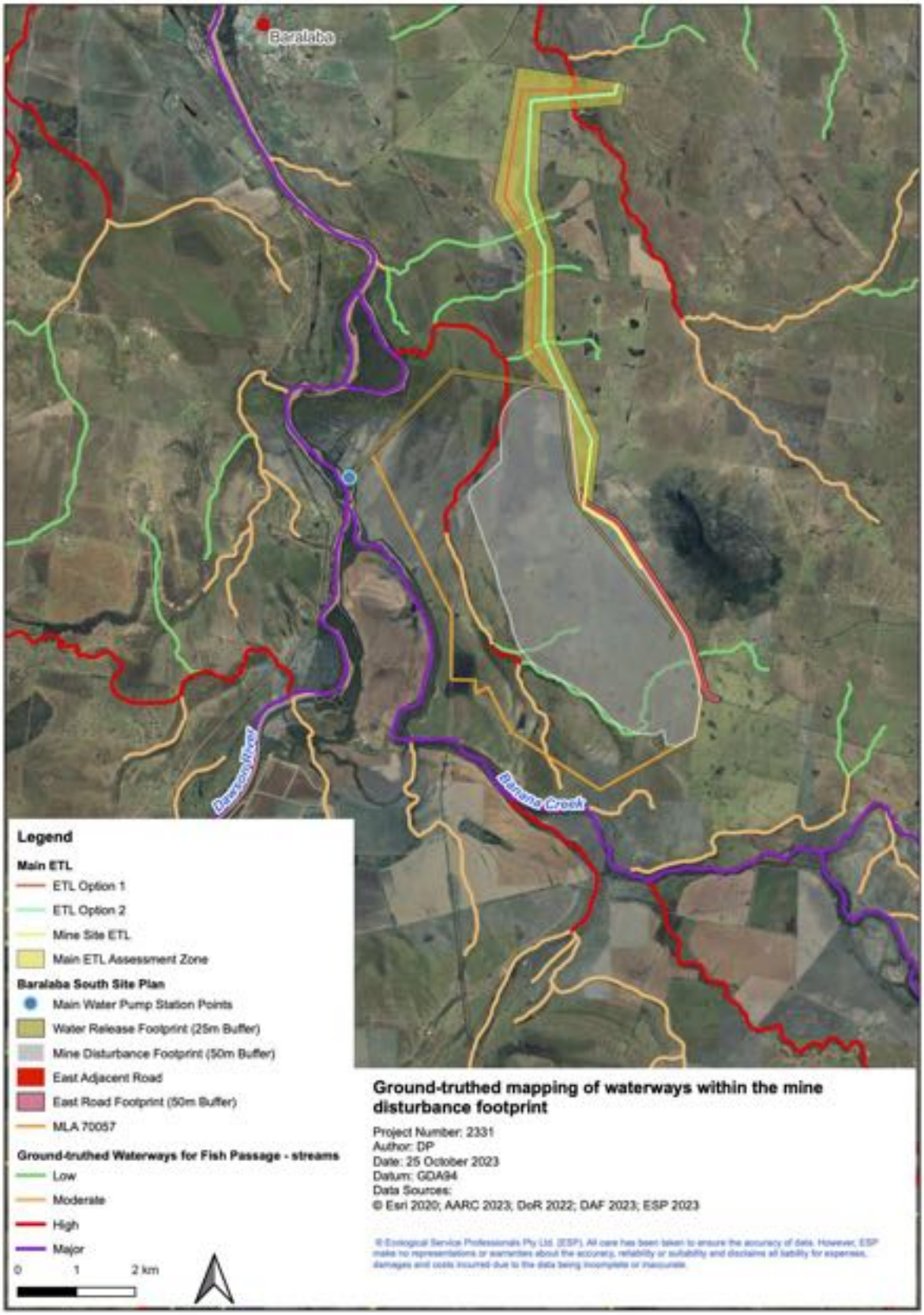

Figure 19: Ground-truthed waterways for fish passage

3.1.5.1 Water quality

A surface water monitoring program has been developed and established in accordance with the Queensland Water Quality Guidelines (DEHP, 2009) and the National Water Quality Management Strategy Guideline (ANZG 2018), with the intent of collecting baseline water quality data representative of the local receiving environment. Reference sites for the surface water monitoring program have been selected to capture spatial and temporal variations in water quality due to natural variations and surrounding land uses.

The water quality results are typical of the region and indicate that the waterways and wetlands of the Project area are already moderately disturbed and influenced by surrounding land uses, particularly agriculture. Water quality of the Project area can be generally characterised as having:

- neutral to alkaline pH;
- low EC;
- low dissolved oxygen typically below the water quality objective (WQO) range for aquatic ecosystems;
- high turbidity and concentrations of suspended solids typically above the WQOs for aquatic ecosystems;
- low concentrations of ions;
- high concentrations of nutrients (nitrogen and phosphorous) with the bioavailable fractions of nutrients also generally higher than relevant WQOs; and
- low dissolved concentrations for all metals and metalloids, with the exception of aluminium, copper, and iron, at most sites.

The baseline water quality monitoring program for the Project has shown exceedances of WQOs for the following parameters:

- pH was slightly exceeded at the downstream Dawson River monitoring location:
- ECs at all sites for all samples were recorded to be below 500 µS/cm;
- laboratory readings of turbidity showed exceedances compared with the WQO for aquatic ecosystems at all sites in most samples undertaken; and
- sampling in all locations at all sampling dates showed consistent exceedances for aluminium and iron compared to the aquatic ecosystems WQOs.

3.1.6 Land and soil

3.1.6.1 Underlying landholders

The Project is located over eight freehold properties, three local road reserves and four state land leases. Native title has been extinguished over lands within MLA 700057 (Table 2). Current landownership for the Project and immediate surrounds is shown on Figure 20. No State Forests, National Parks or conservation tenure are located within MLA 700057.

Table 2: Land and landholders underlying the Project

Landholders	Property Description	Tenure
Cacatua Pastoral Pty Ltd (a related entity to the proponent)	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
JR McLaughlin and V McLaughlin	Lot 26 on FN153	Freehold
	Lot 135 on FN143	Freehold
RL Thomas and V McLaughlin	Lot 1 on RP801031	Freehold
Banana Shire Council	Moura-Baralaba Road	Road reserve
Banana Shire Council	Sock route 910BANA	Road reserve/Stock route
Banana Shire Council	Unnamed road reserve	Road reserve
The State of Queensland [Department of Transport and Main Roads (DTMR)]	Lot 1 on FN109	Perpetual Lease, subleased by Cockatoo Coal
The State of Queensland (DTMR)	Lot 2 on FN109	
The State of Queensland (DTMR)	Lot 2 on FN121	
The State of Queensland (DTMR)	Lot 3 on FN110	

Figure 20: Land ownership

3.1.6.2 Current land use

The current land use of the Project area is predominately cattle grazing and the Project area has been extensively cleared for this purpose. Other land uses include stud farming, dryland and irrigated cropping and improved pastures for grazing are also carried out within the Project site. Crops grown are predominantly forage crops with cotton and wheat produced opportunistically.

The land use of areas surrounding the Project is generally similar (i.e., cattle breeding and fattening). 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.

Built infrastructure in the local area consists of stock fencing, unsealed access tracks, local council roads and stock watering dams. Three local road reserves and a single stock route are located within MLA 700057, including;

- A 4.5 km section of the Moura-Baralaba Road reserve intersects MLA 700057 in a north–south direction. The existing sealed road provides for road travel between the towns of Moura and Baralaba and access to multiple properties for local residents. This road also forms the existing haul route for product coal from the Baralaba North Mine.
- An unnamed road reserve crosses MLA 700057 in a north–south direction. 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.
- An unnamed road reserve crosses MLA 700057 in an east–west direction. 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.

Three private landholder bores / paired bores exist within 5 km of the Project. 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, two 136 kL (30,000 gallon) storage tanks situated on Mount Ramsay, one 91 kL (20,000 gallon) storage tank on Red Hill, 30–40 km of underground pipework and 25–35 metered offtakes.

3.1.6.3 Areas of regional interest

There are no Priority Agricultural Areas, Strategic Environmental Areas or Priority Living Areas identified within the Project area or land associated with off lease infrastructure.

As part of the Land Suitability Assessment undertaken for the EIS (Appendix E, EES 2023), the Project area was assessed for strategic cropping land and verified in accordance with the RPI Act Statutory Guideline 'How to demonstrate that land in the strategic cropping area does not meet the criteria for strategic cropping land' (DILGP 2017). Six (1.06, 1.07, 1.08, 1.10, 1.16 and 1.19) of the 13 UMAs overlaid by SCL mapping failed to meet the criteria with respect to one or all of slope, rockiness, drainage, salinity, and soil water storage.

3.1.6.4 Topography

The Project site and immediate proximal area is dominated by two distinct topographical profiles; the lower Dawson River floodplain to the west and the higher, prominent landform of Mount Ramsay to the east. Mount Ramsay is located approximately 1.2 km east of the MLA 700057 boundary and is a key topographical feature of the region. The topography of the area can be described as predominately flat with slight undulations with ground elevations across the site ranging between 75 mAHD and 110 mAHD (Figure 21).

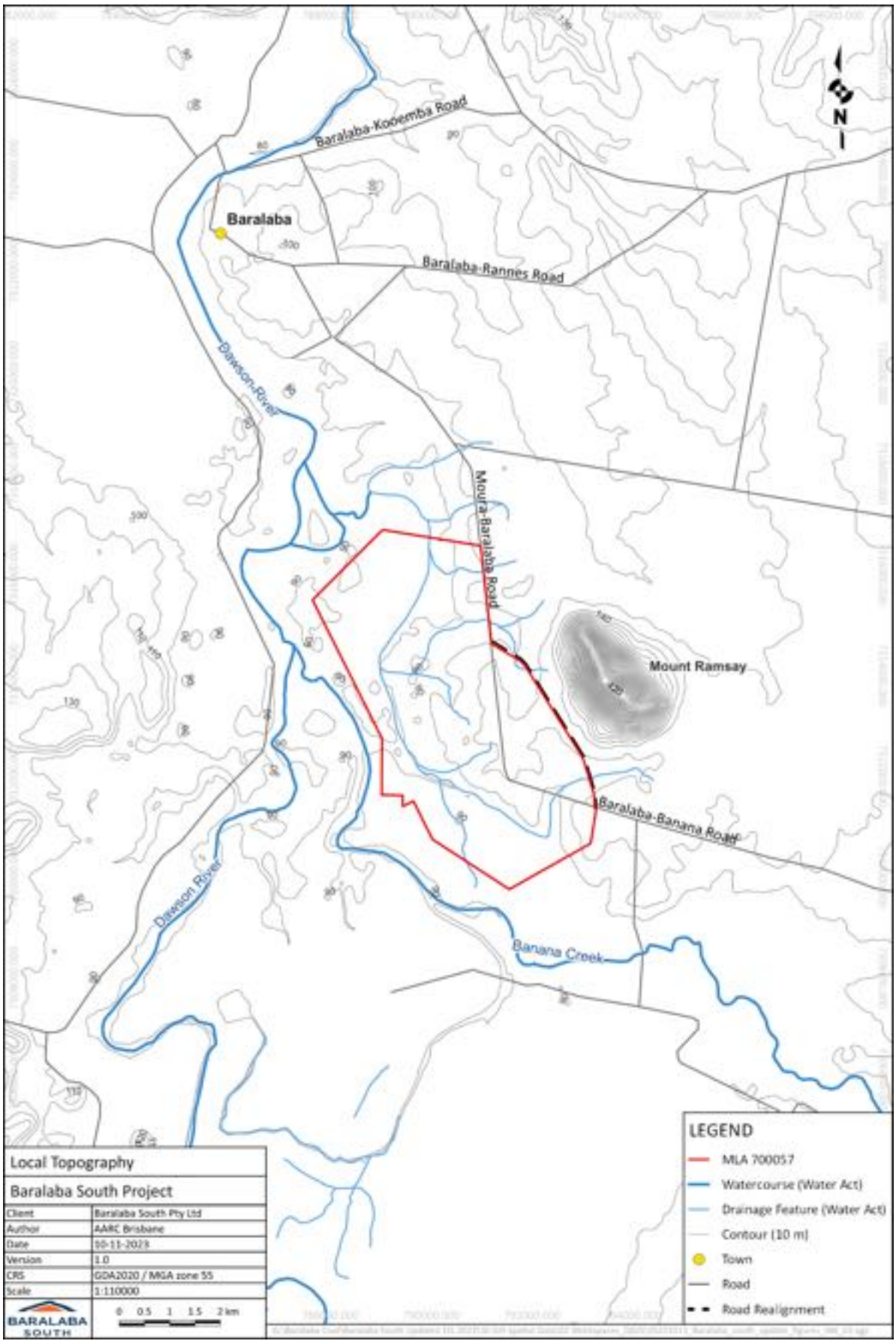

Figure 21: Topography of the Project and surrounding area

3.1.6.5 Land systems

The land systems of the Project area have been described by reference to the terms of the CSIRO Land Systems Series and the 'Land Management Manual for the Dawson/Callide Districts' (Gillespie *et al.* 1991; Shields and Gillespie 1991; Shields 1989).

The Project is located in a region dominated by the Dawson River Valley, which is characterised by undulating to level plains and low rolling hills that are located between the main river valleys. The land systems that surround the Project area constitute the alluvial plains land resource areas, and are comprised of:

- the Coolibah land system, characterised by unstable recent alluvium of deep cracking clays and fine textured alluvia in the more active channel zones; and
- the Juandah land system, characterised by more stable older alluvium of the anabranches and low terraces with loamier soil, often in texture-contrast forms.

Away from these alluvial plains, the landforms are dominated by the undulating plains and low rolling hills of the Mixed Brigalow Plains land resources areas. Those land systems that occur through the Project area are:

- the Dakenba land system, comprising low colluvial/alluvial slopes and plains of older, higher, flood alluvia mixed with colluvial local sedimentary materials; and
- the Thomby land system, comprising colluvial, erosional slopes displaying both loamy, texture-contrast soils and cracking clays in localised patterns.

3.1.6.6 Soil types, soil properties and stability

A Soil and Land Suitability Assessment for the MLA and Moura-Baralaba Road realignment disturbance areas has been conducted for the Project EIS (Appendix E, EES 2023). Soil mapping units have been developed and characterised based on contiguous soils around which boundaries are drawn. These soil mapping units are composed of a dominant soil but may include other sub-dominant soils, often of a different soil type and Australian Soil Classification class, or they may be unspecified minor soils.

Based on 125 ground observations across the Project site, a total of seven soils on eight soil landscapes and 18 unique mapping areas (UMAs) were identified across the Project. The spatial distribution of these soils and the corresponding UMAs are shown in Figure 22. A summary of the Project soils and the soil landscape mapping units of the Project area, developed using Burgess (2010) and McClurg (2011), is also provided in Table 3.

Table 3: Summary of the soil landscape and soils of the Project area

Soil landscape (SL code)	Soil landscape description	Soil name[1]
Soils derived from Quaternary alluvium (Qa)		
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)
2b (Qa.lf2)	Strongly self-mulching, black, cracking clay on level floodplains.	Langley (Lg)
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)
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)
4b (Qa.uf2)	Strongly self-mulching, black, cracking clay on level backplains.	Langley (Lg)
4c (Qa.uf3)	Firm to moderately self-mulching, black, cracking clay on level to gently sloping backplains.	Tralee (Tl)
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)
7b (Cz.gp2)	Hard setting, moderately deep, sandy loam surface, sporadically bleached, grey to brown texture-contrast soil with prismatic or columnar structure on gently undulating rises.	Thalberg (Tb)

1. Soil regional names have been adopted from Burgess (2003) and Muller (2008).

3.1.6.7 Land stability and topsoil resources

Soil erodibility and the dispersion potential of soils were assessed for each soil profile using key soil characteristics including erodibility (K-factor), exchangeable sodium percentage, Ca:Mg ratio, Emerson aggregate test and salinity rating (Appendix E, EES 2023). Soil erodibility, the susceptibility of soil to become detached and transported by erosive agents such as wind and water, is dependent on the mechanical, chemical, and physical characteristics of the soil and is independent of the other factors influencing soil erosion such as topography and land use (DSITI 2015).

Topsoils from the Project site are of high pH, low salinity, are non-sodic and have varying potential to supply nutrients and range from moderate to high erodibility. The majority of topsoil to be reclaimed for use in rehabilitation activities will be from the Langley group, which was assessed as the highest quality topsoil on-site. Subsoils from the Project site vary across soil landscapes and soil depth. A summary of soil properties is provided in Table 4.

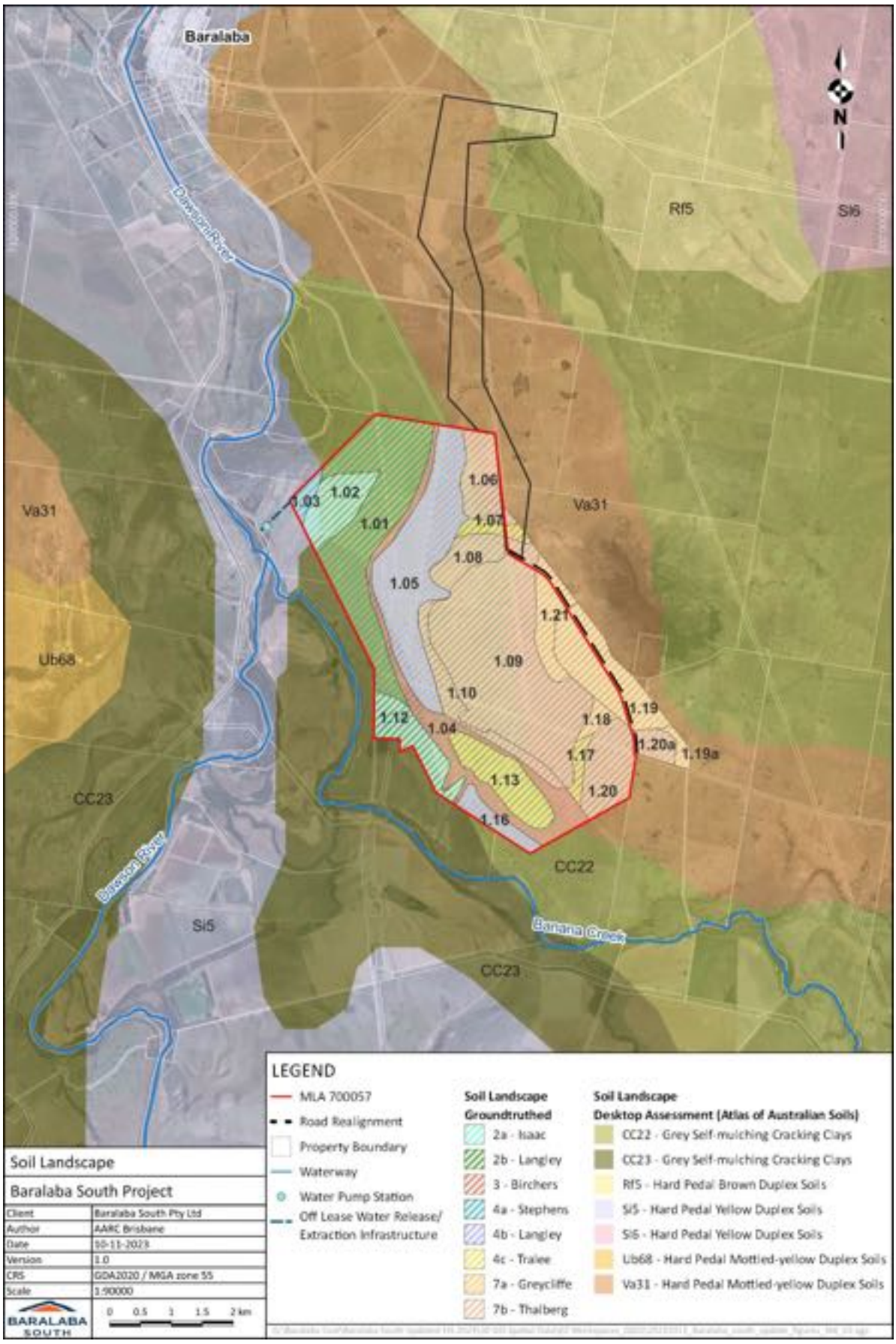

Figure 22: Soil landscape

Table 4: Soil properties across soil types

Soil name	Geology / lithology	Landform	Description of soil properties	Australian soil classification
Bluchers	Quaternary alluvium / alluvium	Floodplain	• Topsoil - high erodibility, non-sodic, slight dispersibility if mechanically disturbed. • Upper subsoil - moderate erodibility, sodic, moderate dispersibility if mechanically disturbed. • Lower subsoil - high erodibility, strongly sodic, negligible dispersibility but likely to become dispersive if salts are leached • Neutral to strongly alkaline pH. • Non-saline in the upper profile to highly saline from 0.8 m. • Uniform cracking clay, medium to heavy clay, sometimes silty. • Cracking and coarse self-mulching surface, strong lenticular structure through the profile.	Grey Vertosol
Isaac	Quaternary alluvium / alluvium	Low-laying channel benches, lower floodplains	• Topsoil - high erodibility, non-sodic, moderate dispersibility if mechanically disturbed. • Upper subsoil - high erodibility, sodic, moderate dispersibility if mechanically disturbed. • Lower subsoil with high erodibility, sodic, moderate dispersibility if mechanically disturbed. • Neutral to moderately alkaline, increasing with depth. • Uniform cracking clay, medium to heavy clay. • Firm pedal surface with strong lenticular structure throughout the profile.	Black Vertosol, Black Dermosol
Greycliffe*	Cainozoic alluvial sediments / alluvium	Level to gently undulating plains	• Topsoil - high erodibility, non-sodic, slight dispersibility if mechanically disturbed. • Upper subsoil - moderate erodibility, non-sodic, high to moderate dispersibility. • pH alkaline or strongly alkaline in the root zone, strongly acidic at depth. • High potential to supply nutrients. • Uniform cracking clay, medium to heavy clay. • Cracking to coarse self-mulching surface, strong lenticular structure through the profile.	Grey or Brown Vertosol

Soil name	Geology / lithology	Landform	Description of soil properties	Australian soil classification
Langley	Quaternary alluvium / alluvium	Low-lying, extensive river floodplains	• Topsoil - high erodibility, non-sodic, negligible dispersibility. • Upper subsoil – high erodibility, sodic, negligible dispersibility. • Lower subsoil – high to very high erodibility, strongly sodic, moderate dispersibility if mechanically disturbed, likely to become dispersive if salts are leached. • pH moderately to strongly alkaline, increasing with depth. • Non-saline soil surface, with salinity increasing with depth. • High potential to supply nutrients. • Uniform cracking clay, medium to heavy clay. • Coarse self-mulching surface, strong lenticular structure throughout the profile.	Grey / Black Vertosol
Stephens	Quaternary alluvium / alluvium	Slightly elevated levees and backplains	• Topsoil - high erodibility, non-sodic, high to moderate dispersibility. • Upper subsoil - high erodibility, strongly sodic, high dispersibility. • Lower subsoil - high erodibility, strongly sodic, high dispersibility. • pH neutral to strongly alkaline, increasing with depth. • Non-saline to highly saline, increasing with depth. • High potential to supply nutrients. • Uniform or gradational non-cracking clay, silty clay loam or light clay, grading to silty light or medium clay. • Hard setting surface, weak blocky structured topsoil, moderate blocky to prismatic subsoil.	Black Dermosol

Soil name	Geology / lithology	Landform	Description of soil properties	Australian soil classification
Thalberg	Unconsolidated Cainozoic alluvial – colluvial sediments: calcareous	Gently undulating rises	• Topsoil – sandy topsoil material is non-sodic and non-saline, high erodibility due to silt content. • Upper subsoil – low to moderate sodicity, non-saline, moderate erodibility due to silt content, moderate dispersibility if mechanically disturbed. • Lower subsoil - moderate erodibility, sodic, very high dispersibility. • pH neutral at the surface, increasing to strongly alkaline with depth. • Low to moderate potential to supply nutrients. • Sandy loam to fine sandy loam topsoil and medium to heavy clay subsoil. • Topsoil depth of 0.1-0.65 m, columnar or prismatic structure in upper subsoil, with blocky structure in lower subsoil.	Brown Chromosol / Brown Sodosols
Tralee	Quaternary alluvium / alluvium	Level to slightly elevated floodplains	• Topsoil - high erodibility, non-sodic, non-saline negligible dispersibility. • Upper subsoil - high erodibility, strongly sodic, low to moderate salinity, high to moderate dispersibility. • Lower subsoil - high erodibility, strongly sodic, highly saline, slight dispersibility if mechanically disturbed, likely to become dispersive if salts are leached. • pH neutral to strongly alkaline, increasing with depth. • High potential to supply nutrients. • Uniform cracking clay, medium to medium/heavy clay throughout. • Coarse self-mulch or hard setting surface, strong subangular blocky structured topsoil, strong lenticular subsoil.	Black, Grey or Brown Vertosol

Notes: *The soil erodibility factors for Greycliffe were assessed for a sample location outside the final disturbance area

3.1.6.8 Land capability assessment

A Land Suitability Assessment was undertaken for the Project (EES 2023). Land suitability for various cropping purposes has been assessed in accordance with the methodology in 'Land suitability assessment techniques for the central Queensland coast area' (DNRM and DSITIA 2013). All land within the Project disturbance area was assessed as Class 4 or 5 land, where:

- Class 4 land is unsuitable land for cropping, with severe limitations where sustainable use of the land in the proposed manner is precluded. In some circumstances, the limitations may be surmountable with changes to knowledge, economics, or technology.
- Class 5 land is unsuitable land for cropping, with extreme limitations that preclude any possibility of successful and sustained use of the land in the proposed manner.

The Agricultural Land Class (ALC) classification system can be used to assess land suitability for specific types of agricultural production (DSITI and DNRM 2015). The ALC for land within the Project disturbance area is Class C, pastureland that is suitable for grazing. Key land suitability constraints include the salinity and sodicity of the subsoil and the impact this has on plant water availability.

A summary of the land use suitability and ALC for the soil landscapes within the MLA is provided in Table 5.

Table 5: Summary of land use suitability for the Project disturbance area

Soil landscape	Soil	Limiting factor/s	Land Suitability Class	Agricultural Land Class
2a (Qa.If1)	IS	Soil water availability, wetness	5	C
2b (Qa.If2)	Lg	Soil water availability, wetness	4	C
3 Qa.td1	Bc	Soil water availability, water erosion	5	C
4a Qa.uf1	St	Soil water availability, water erosion	5	C
4b Qa.uf2	Lg	Soil water availability, surface condition	4	C
7a Cz.gp1	Gc	Soil water availability, surface condition, wetness	5	C
7b Cz.gp2	Tb	Soil water availability, water erosion	5	C

3.1.7 Flora and fauna

3.1.7.1 Field surveys

Terrestrial surveys (Appendix E, EcoSM 2023) were undertaken between 2017 and 2020 and were conducted in accordance with standard ecological survey methodology (Appendix E, EcoSM 2023). The following surveys were undertaken to inform the Project EIS:

- A 2017 post-wet season (16–20 May 2017) survey;
- A 2017 dry season (16–20 December 2017) survey;
- A targeted flora survey, restricted to a patch of non-remnant vegetation (RE 11.4.8) where threatened flora species were recorded during the dry season survey; carried out on 9 March 2018;

- A 2020 post-wet season (6-14 May) targeted survey on land in the immediate vicinity of the Project, including the Dawson River, Banana Creek, flood plain, Mt Ramsay and water release/extraction infrastructure area (referred to as the additional investigation area); and
- A 2020 dry season flora and fauna survey (23-25 September) of the ETL assessment zone.

Aquatic surveys were undertaken by Ecological Service Professionals Pty Ltd (ESP) to inform the Project EIS. Two seasonal aquatic ecology surveys have been completed by suitably qualified ecologists in accordance with all required permits and approvals: one dry season survey (5–9 June 2017) and one wet season survey (13–19 March 2018). Surveys were undertaken at ten sites located on the Dawson River, Banana Creek, Shirley's Gully, minor unnamed waterways/drainage lines and mapped wetlands within the MLA. Surveys were undertaken in accordance with standard ecological survey methodology (Appendix E, ESP 2023).

A supplementary survey was undertaken on 1–4 August 2023 to verify any changes in habitat condition and availability and to ground truth the location and characteristics of waterways providing for fish passage to be disturbed by the Project since 2018 (Appendix E, ESP 2023).

3.1.7.2 Flora

The Project is heavily cleared and degraded due to historic clearing for cattle grazing and exploration activities and the presence of weeds. Small areas of regrowth vegetation at various stages of recovery are also present.

Vegetation communities

A total of 14 vegetation communities associated with remnant or high value regrowth vegetation were identified throughout the field surveys (Figure 23, Figure 24 and Figure 25). Land within MLA 700057 and the ETL assessment zone has predominately been cleared and is mapped as supporting non-remnant vegetation (Appendix E, EcoSM 2023). Two TECs, listed as endangered under the EPBC Act, were identified during the terrestrial field surveys, including Brigalow (*Acacia harpophylla* dominant and codominant) (Brigalow TEC) and Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (Coolibah TEC) (Figure 24).

Two patches of remnant vegetation were field validated within the central southern portion of the Project area (Figure 23), namely:

- RE 11.5.9—*Eucalyptus crebra* and other *Eucalyptus spp*. and *Corymbia spp.* woodland on Cainozoic sand plains and/or remnant surfaces.
- RE 11.5.15—Semi-evergreen vine thicket on Cainozoic sand plains and/or remnant surfaces.

High value regrowth RE 11.3.3/a is present to the south of the patch of remnant eucalypt woodland (RE 11.5.9). This community is moderately to highly fragmented by historic clearing and was associated with a drainage basin that holds water for extended periods.

A patch of Coolibah woodland (RE 11.3.3) is present in the south-western corner of the Project area and extends south into the additional investigation area (Figure 23). Ground truthing indicates this patch has the height and cover requirements to be mapped as remnant vegetation. Several additional small patches of regrowth vegetation are scattered throughout the Project area and ETL assessment zone and correspond with several different RE types.

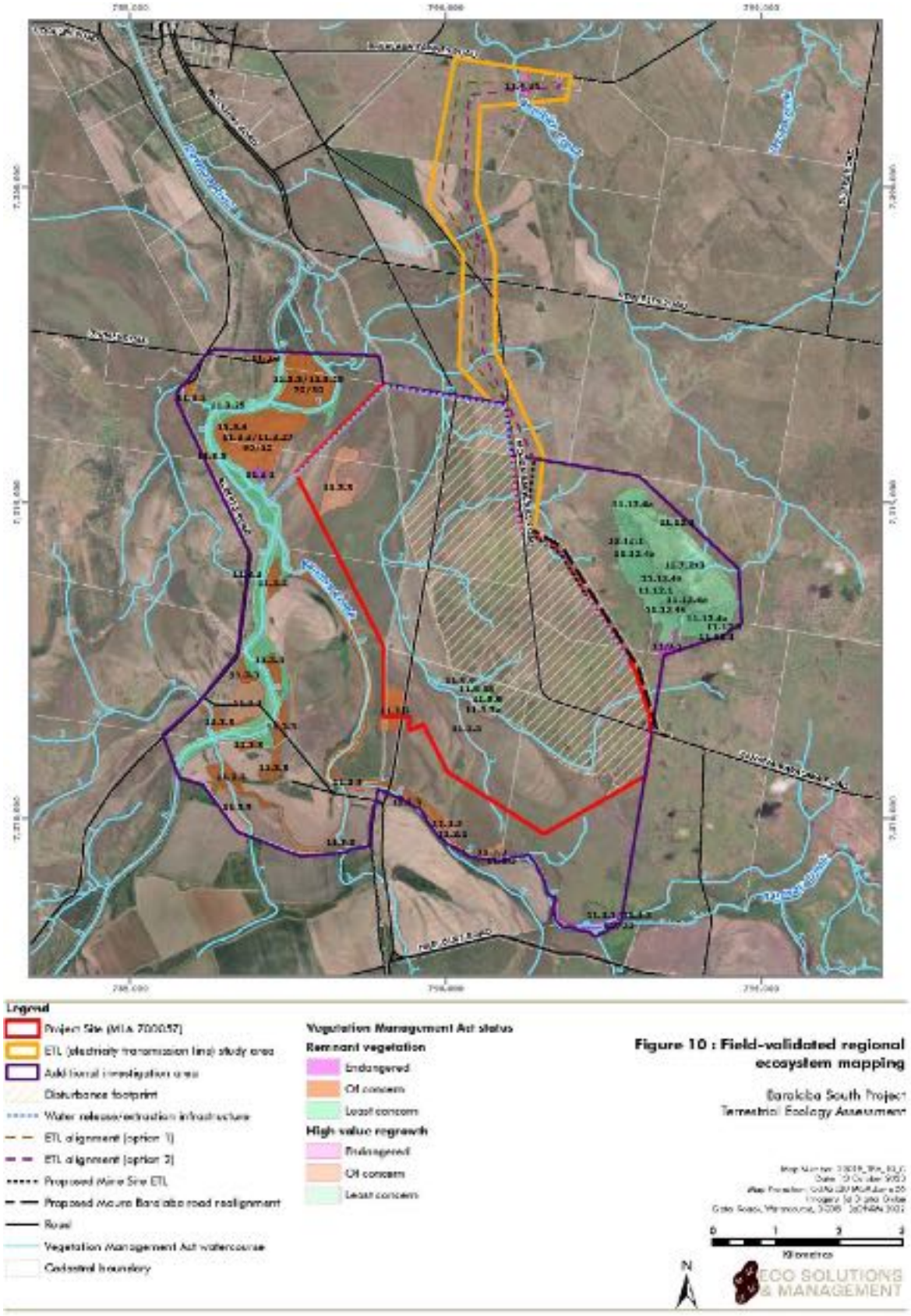

Figure 23: Field validated regional ecosystem mapping for the Project and surrounding area

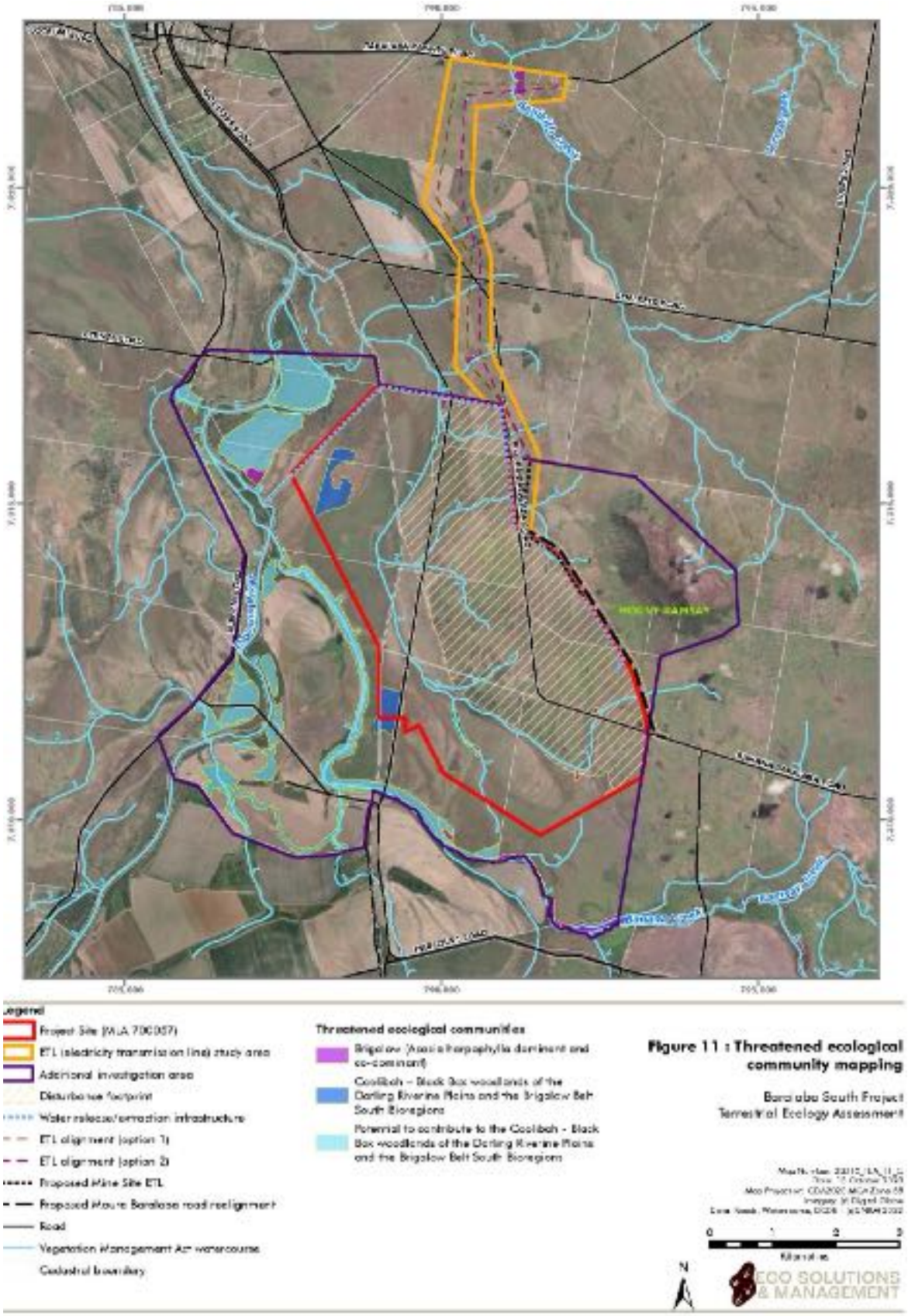

Figure 24: Threatened ecological community mapping for the Project and surrounding area

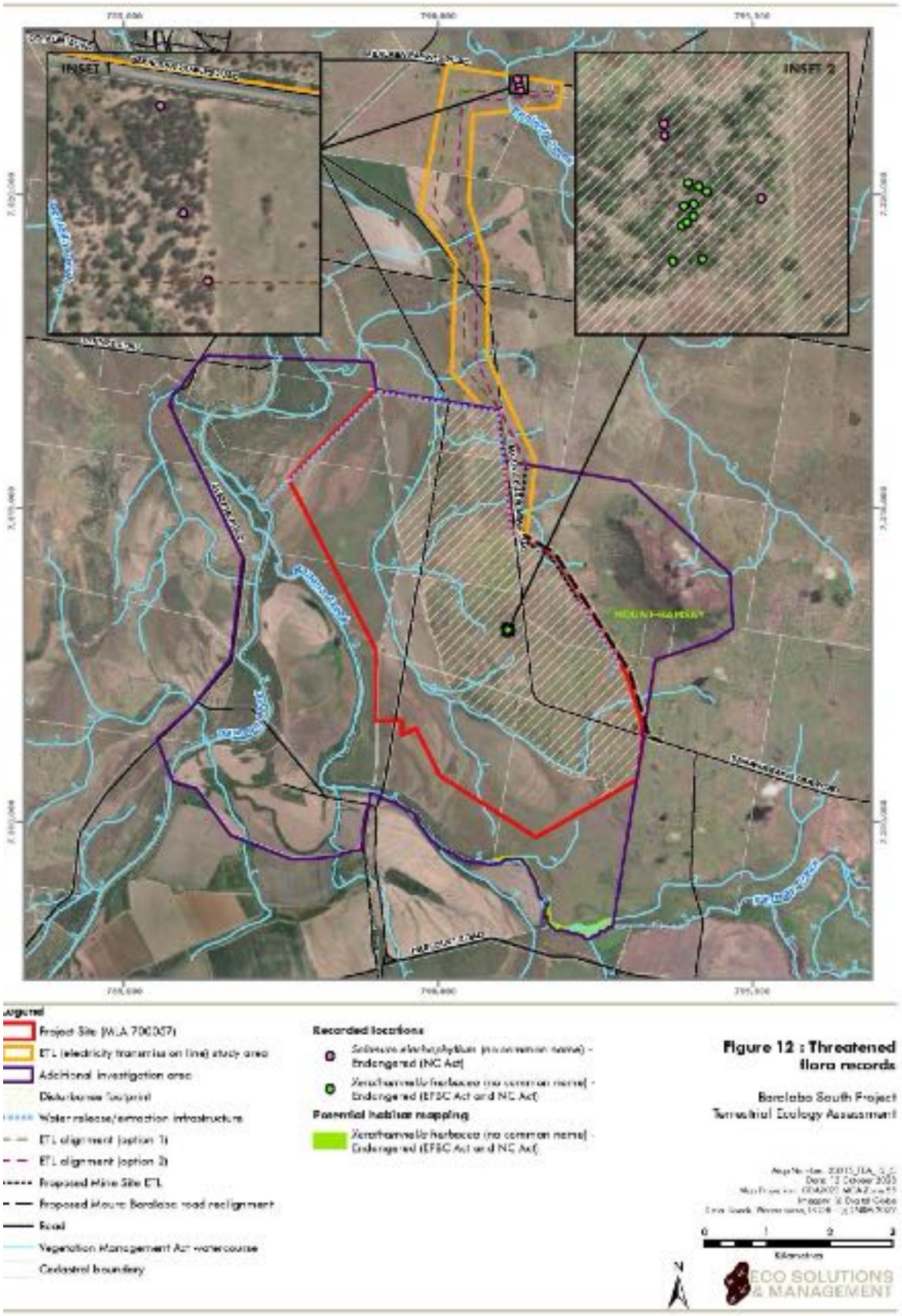

Figure 25: Threatened terrestrial flora species recorded during terrestrial ecology field surveys

The vegetation associated with the Dawson River and Banana Creek consists predominantly of RE 11.3.3 and supports larger continuous patches of remnant vegetation. Vegetation on Mount Ramsay differs to that present in the Project, ETL study area and along the Dawson River and Banana Creek. The vegetation on Mount Ramsay includes a large area of vegetation that does not currently align with an RE listed in the REDD (Queensland Herbarium 2019). Remnant regional ecosystems on Mount Ramsay include:

- RE 11.7.2x3 – *Acacia rhodoxylon* tall shrubland to scrub on Cretaceous igneous rocks;
- 11.9.1– *E. cambageana* woodland to open forest with *Acacia harpophylla* on fine-grained sedimentary rocks;
- 11.12.1 – *E. crebra* woodland on igneous rocks; and
- 11.12.4a – Semi-evergreen vine thicket with open patches of *A. fasciculifera*, *Archidendropsis thozetiana*, *Pleigynium timorense* and various other species.

A summary of the field validated regional ecosystems is provided in Table 6 and distribution shown on Figure 23.

Terrestrial Flora species

A total of 362 flora species were recorded during terrestrial surveys, representing 87 families and 234 genera, including 56 introduced species. Two significant flora species were recorded, including *Xerothamnella herbacea* and *Solanum elachophyllum.*

Xerothamnella herbacea is listed as an endangered species under both the EPBC Act and the NC Act. This species was recorded in ten locations within a fragmented and considerably degraded patch of RE 11.4.8 in the central eastern portion of the Project site (Figure 25). The number of individuals present at each location was low, ranging from 1 to 20 individuals, totalling approximately 90 specimens recorded.

Solanum elachophyllum is listed as endangered under the NC Act. This species was recorded at three locations within the same patch on non-remnant Dawson River Gum woodland (RE 11.9.1) as *X. herbacea* (Figure 25). The maximum number of individuals, during the March 2018 survey, recorded was 117.

A population of *S. elachophyllum* was also identified in the ETL study assessment zone, in regrowth Brigalow woodland (RE 11.4.9a). Approximately 42 individuals were counted across three sub-populations at this location, each occupying very small areas of between 1 and 10 m^2.

Four of the 56 introduced flora species recorded during field surveys are recognised as Weeds of National Significance, including Tiger Pear (*Opuntia aurantiaca*), Common Prickly Pear (*Opuntia stricta*), Velvet Prickly Pear (*Opuntia tomentosa*) and Parthenium Weed (*Parthenium hysterophorus*). Water Lettuce (*Psitita stratiotes*) and Harrisia Cactus (*Harrisia martinii*), Category 3 Restricted flora species, were also identified during field surveys.

Table 6: Summary of the field validated Regional Ecosystems mapped within the study area

RE code	Short descriptions (Queensland Herbarium 2019)	VM Act status	Biodiversity status	EPBC Act status	Remnant (high value regrowth) area (ha)
Project site					
11.2.2/a	*Eucalyptus coolabah* woodland on alluvial plains	Of concern	Of concern	Endangered – Portions of vegetation within the Project area represent the Coolibah - Black Box Woodlands TEC.	16.6 (45.9)
11.5.9	*Eucalyptus crebra* and other *Eucalyptus spp*. and *Corymbia spp*. woodland on Cainozoic sand plains and/or remnant surfaces	Least concern	No concern at present	Not listed.	8.7 (5.3)
11.5.15	Semi-evergreen vine thicket on Cainozoic sand plains and/or remnant surfaces	Least concern	Endangered	Not listed - Vegetation within the Project area does not represent the Semi-evergreen Vine thicket TEC.	1.1 (0.0)
Water release/extraction infrastructure					
11.3.25	*Eucalyptus tereticornis* or *Eucalyptus camaldulensis* woodland fringing drainage lines	Least concern	No concern at present	Not listed.	0.4 (0.0)
ETL assessment zone					
11.4.9.a	*Acacia harpophylla, Lysiphyllum carronii* +/- *Casuarina cristata* open forest to woodland	Endangered	Endangered	Endangered – Patches of this RE represent the Brigalow (*Acacia harpophylla* dominant and codominant) TEC.	0.0 (7.6)
Additional investigation area					
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	Endangered	Endangered	Endangered – Patches of this RE represent the Brigalow (*Acacia harpophylla* dominant and codominant) TEC.	23.5 (1.5)
11.3.3	*Eucalyptus coolabah* woodland on alluvial plains	Of concern	Of concern	Endangered – a number of patches potentially contribute to the Coolibah - Black Box Woodlands TEC.	344.6 (71.7)

RE code	Short descriptions (Queensland Herbarium 2019)	VM Act status	Biodiversity status	EPBC Act status	Remnant (high value regrowth) area (ha)
11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus spp*. woodland on alluvial plains	Of concern	Of concern	Not listed.	15.5 (0.0)
11.3.25	*Eucalyptus tereticornis or Eucalyptus camaldulensis* woodland fringing drainage lines	Least concern	No concern at present	Not listed.	286.5 (0.0)
11.3.27	Freshwater wetlands	Least concern	Of concern	Not listed.	7.9 (0.0)
11.7.2x3*	*Acacia rhodoxylon* tall shrubland to scrub on Cretaceous igneous rocks	Least concern	No concern at present	Not listed.	107.0 (0.0)
11.9.1	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* on fine-grained sedimentary rocks	Endangered	Endangered	Not listed - Vegetation within the additional investigation area does not represent the Brigalow TEC.	5.7 (0.0)
11.12.1	*Eucalyptus crebra* woodland on igneous rocks	Least concern	No concern at present	Not listed.	81.2 (0.0)
11.12.4a	Semi-evergreen vine thicket with open patches of *Acacia fasciculifera, Archidendropsis thozetiana, Pleigynium timorense* and various other species	Least concern	No concern at present	Not listed.	96.5 (0.0)

Note: *This RE does not currently align with an RE listed in the REDD (Queensland Herbarium 2019) and has been recommended by the Brigalow Belt Bioregion mapping coordinator (Queensland Herbarium) as an interim descriptor for the corresponding vegetation that was recorded at Mount Ramsay.

Aquatic habitat and wetlands

Aquatic habitat condition at sites within the Project area was poor to fair due to riparian zone clearing and cattle use. The wetlands within the Project are varied in their condition; habitat condition in lacustrine wetlands recorded as poor with minimal in-stream habitat features and a high level of disturbance, while the habitat condition of the palustrine wetlands was considered fair, with more diverse available in-stream habitat features and lower disturbance from surrounding land uses.

Aquatic flora

A total of 68 species of aquatic flora, was recorded during field surveys. Aquatic flora recorded are typical of the region, with most native species recognised as wetland indicator species. No listed threatened aquatic species were recorded and there are no published records of threatened aquatic flora within 10 km of the Project.

Most waterways had low coverage of in-stream aquatic plants with low diversity and coverage of floating and submerged species recorded, except at the palustrine wetlands of general ecological significance. The low abundance and diversity present are suggestive of the impacts due to surrounding land uses (cattle grazing, trampling and broad acre cropping) in combination with harsh physical conditions (i.e., drought and erosion).

No aquatic weeds were recorded within MLA 700057. Two species of aquatic weeds listed as restricted invasive species under the *Biosecurity Act 2014* (Qld) were recorded on the Dawson River and Shirley's Gully. These species included Olive Hymenachne (*Hymenachne amplexicaulis*) (also listed as WoNS) and Water Lettuce (*Pistia stratiotes*).

3.1.7.3 Fauna

Terrestrial fauna

A total of 193 species of terrestrial vertebrate fauna was recorded during the field surveys, including six introduced species. Native species richness included 13 amphibians, 17 reptiles, 129 birds and 28 mammals.

Four threatened fauna species listed as vulnerable under the EPBC Act and NC Act were identified during field surveys, namely, the Ornamental Snake (*Denisonia maculata*), Squatter Pigeon (Southern) (*Geophaps scripta scripta*), Greater Glider (Central) (*Petauroides armillatus)* and Koala (*Phascolarctos cinereus*).

The EPBC Act and NC Act listings for the Koala changed to endangered in 2022 after the controlled action decision for the proposed Project was made. The EPBC Act and NC Act listings for the Greater Glider (Central) changed to endangered in 2022 and 2021, respectively. However, the Terrestrial Ecology Report (Appendix E, EcoSM 2023) produced for the Project EIS considers the impacts to the Koala and the Greater Glider (Central) as an EPBC Act Vulnerable listed species in accordance with its listing at the time of the controlled action decision for the Project.

The Short-beaked Echidna is listed as special least concern under the NC Act and was identified during field surveys. The Australian Painted Snipe listed as threatened under the EPBC Act was considered to have a moderate likelihood of occurring within the terrestrial ecology survey area.

No listed migratory species were identified in the terrestrial field surveys. Two migratory species listed under the EPBC Act have been determined to have a moderate potential to occur in the Project area: Glossy Ibis (*Plegadis falcinellus*) and Latham's Snipe (*Gallinago hardwickii*).

Six introduced pest fauna species listed under the *Biosecurity Act 2014* (Qld) have been recorded during the terrestrial field surveys, including the Cane Toad (*Rhinella marina*), Wild Dog (*Canis familiaris*), Common Myna (*Sturnus tristis*), European Rabbit (*Oryctolagus cuniculus*), Feral Cat (*Felis catus*), and Feral Pig (*Sus scrofa*).

Aquatic fauna

No listed threatened macroinvertebrate or macrocrustacean species were recorded during field surveys for the Project. A total of 52 taxa (June 2017) and 56 taxa (March 2018) were recorded in the aquatic ecology surveys. In both surveys, taxonomic richness was greater in edge samples (48 and 47 taxa) than in bed samples (32 and 41 taxa). The most common and widespread major groups and taxa in both edge and bed habitat were all typical of the region and classified as tolerant to very tolerant (where sensitivity ratings were available).

A total of 21 fish species were identified within the aquatic ecology field survey area, including three species, endemic to the Dawson River sub-basin: Southern Saratoga (*Scleropages leichardti*), Leathery Grunter (*Scortum hillii*) and Golden Perch (*Macquaria ambigua*).

Two species of turtles considered widespread and common throughout waterways in Queensland were recorded in the Project area including Krefft's River Turtle (*Emydura krefftii*) and Saw Shelled Turtle (*Wollumbina latisternum*).

No listed threatened aquatic fauna species have been identified during aquatic field surveys. Five listed aquatic fauna species under the EPBC Act and/or the NC Act, were identified during a desktop assessment as known or having potential to occur within the region of the Project including the Fitzroy River Turtle (*Rheodytes leukops*), Murray Cod (*Maccullochella peelii*), Platypus (*Ornithorhynchus anatinus*), Silver Perch (*Bidyanus bidyanus*), and White-throated Snapping Turtle (*Elseya albagula*). However, due to lack of habitat and connectivity, these species have been determined to have a low likelihood of occurrence within the waterways of the Project area.

Two pest species of fish were recorded during the aquatic ecology surveys, namely Mosquitofish (*Gambusia holbrooki*) and Goldfish (*Carassius auratus*). Mosquitofish are listed as a restricted biosecurity matter and as a noxious fish species under the *Biosecurity Act 2014* (Qld).

3.1.7.4 Environmental offsets requirements

Matters of National Environmental Significance

Under the EPBC Act, environmental offsets are required if residual impacts to Matters of National Environmental Significance (MNES) are significant (DSEWPC 2012). The assessment of significance for the Project undertaken by EcoSM (2023) indicate that the Project is likely to have a significant impact on the following MNES and offsets will be required in accordance with the 'Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy' (DSEWPaC 2012):

- *Xerothamnella herbacea*; and
- Ornamental Snake (*Denisonia maculata*).

A Biodiversity Offset Strategy has been prepared for the Project under the EPBC Act (Appendix E, EcoSM 2023). The strategy includes habitat quality information for the proposed disturbance areas and habitat quality information for the proposed offset sites located on six properties in the vicinity of the Project. The Biodiversity Offset Strategy identifies properties comprising large areas of regrowth and regenerating Brigalow woodland (REs 11.3.1, 11.4.9a and 11.9.1) and Silver-leaved Ironbark (*Eucalyptus melanophloia*) woodland (RE 11.5.5c), within which an offset site(s) is proposed to be established to offset impacts to Ornamental Snake habitat (Appendix E, EcoSM 2023).

Matters of State Environmental Significance

The Queensland environmental offsets framework requires environmental offsets be delivered where an activity is likely to result in significant residual impact on a prescribed environmental matter. Assessments of significance for Matters of State Environmental Significance (MSES) (Appendix E, EcoSM 2023) indicate that the Project will have significant residual impacts and require offsets landscape connectivity. The impacts to 10.1 ha of remnant vegetation within the Project area will require offsets.

The two MNES that are proposed to be offset (*Xerothamnella herbacea* and Ornamental Snake), are considered to result in the same or substantially the same impact as a corresponding MSES. The properties identified suitable to offset MNES contain large areas of regrowth and regenerating Brigalow woodland (Res 11.3.1, 11.4.9a and 11.9.1) and Silver-leaved Ironbark (*Eucalyptus melanophloia*) woodland (RE 11.5.5c) (Appendix E, EcoSM 2023). These areas account for approximately 263 ha and it is proposed that the offset site located within these non-remnant regenerating areas will also provide offsets for Project impacts to 10.0 ha of connectivity areas.

3.2 Community consultation

3.2.1 Previous stakeholder and community engagement activities

Community consultation activities have been undertaken for the Project to inform the preparation of the EIS, the Social Impact Assessment (Appendix E) and the development of draft social impact management plans. These consultation activities have provided opportunity to engage with stakeholders on PMLU and mine closure activities. Community and stakeholder engagement activities have been undertaken through a variety of mechanisms including:

- face to face or telephone interviews;
- community workshops;
- online survey;
- meetings with Traditional Owners and Indigenous groups;
- email and telephone correspondence;
- responses to community enquiries;
- publication of application materials on the DES website;
- briefings to and consultation with local, State and Commonwealth governments;
- community drop-in information sessions; and
- Project newsletters, fact sheets and question-and-answer brochures, provided to the community and stakeholders via email or at meetings, and made available on the Baralaba Coal Company website.

Local community members and landholders would like to see the land rehabilitated to an agricultural land use post-mining.

Further information on community engagement activities and the outcomes of the Social Impact Assessment are provided in the public consultation report prepared for the Project EIS; provided in Appendix E.

3.2.2 Community and stakeholder engagement plan

Further community consultation will be undertaken to inform the development of the final PRC Plan.

To meet the requirements of section 126C(1)(iv) of the EP Act a Draft Community and Stakeholder Engagement Plan has been prepared for the Project and is provided in Appendix D. The Draft Community and Stakeholder Engagement Plan is intended as a framework to facilitate engagement, consultation, and collaboration with stakeholders on, among other things, rehabilitation and closure matters relating to the Project.

The Draft Community and Stakeholder Engagement Plan sets out roles and responsibilities, the plan objectives and proposed engagement activities. The key objectives of the plan are to achieve the following:

- strengthen relationships with local communities and stakeholders;
- understand community and stakeholder priorities to best mitigate any Project impacts and to ensure the PMLU is consistent with community expectations;
- develop effective communication tools to disseminate information to, and receive feedback from stakeholders, ensuring that Project planning and delivery are informed by stakeholder views; and
- build a positive presence in the Banana Local Government Area, as well as in the adjacent Central Highlands Regional Council and Woorabinda Aboriginal Shire

The Community and Stakeholder Engagement Plan will be continually reviewed and revised, where appropriate to allow for continual refinement and to adequately address the mine life stage (e.g., construction activities, mining operations, rehabilitation, and closure).

3.2.3 Community consultation register

In accordance with section 126C(1)(c)(iv) of the EP Act, Baralaba South has developed a community consultation register. This register will be used to record consultation date(s), engaged community member(s), consultation type, information provided, key issues raised, response actions and/or outcomes and any commitments made by Baralaba South. All complaints received will also be included in the community consultation register. The community consultation register will also inform ongoing development of this PRC Plan. Following approval of the EIS, the register will continue to be maintained to document each stakeholder consultation event, including meetings, presentations, feedback, phone calls and written submissions.

Table 7: Summary of past community consultation relating to rehabilitation

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
19 Oct 2018	Department of State Development, Manufacturing, Infrastructure and Planning-Office of the Coordinator General (DSDILGP-OCG)	Baralaba Coal Company and AARC	Meeting	EIS preparation	Project information and status.	Consultation regarding the proposed Project undertaken.
15 Mar 2019	Department of Environment and Science (DES)	Baralaba Coal Company and AARC	Meeting	EIS preparation	Project information and status.	Consultation regarding the proposed Project undertaken.
18 Mar 2019	DSDILGP-OCG	Baralaba Coal Company and AARC	Meeting	EIS preparation	Project information and status.	Consultation regarding the proposed Project undertaken.
20 May 2019	DSDILGP-OCG	Baralaba Coal Company and AARC	Meeting	EIS preparation	Project information and status.	Consultation regarding the proposed Project undertaken.
13 Jun 2019	DES and DSDILGP-OCG	Baralaba Coal Company and AARC	Meeting	EIS preparation	Project information and status.	Consultation regarding the proposed Project undertaken.
6 Aug 2019	Landholder	AARC	Telephone	EIS preparation	Project information and status.	Consultation regarding the proposed Project undertaken.
12 and 15 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meetings	EIS preparation	Project information and status.	Consultation regarding the proposed Project undertaken.
12 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status.	Consultation regarding the proposed Project undertaken.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
12 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status.	Consultation regarding the proposed Project undertaken.
12 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status.	Consultation regarding the proposed Project undertaken.
13 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status.	Consultation regarding the proposed Project undertaken.
13 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status.	Consultation regarding the proposed Project undertaken.
13 Aug 2019	Banana Shire Council	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status.	Consultation regarding the proposed Project undertaken.
14 Aug 2019	Landholder and community resident (Banana)	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
14 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.
14 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.
14 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
14 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.
14 Aug 2019	Landholder	AARC	Telephone	EIS preparation	Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.
15 Aug 2019	Benleith Water Board	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
15 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.
16 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.
16 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meeting	EIS preparation	Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
16 Aug 2019	Landholder	Sustainable Mining Strategies and AARC	Meeting		Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.
16 Aug 2019	Local resident	AARC	Telephone		Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.
21 Aug 2019	Landholder	AARC	Telephone		Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
Aug 2019	Local resident	AARC	Provided with letter from resident		Project information and status. Description of the environmental assessment process and timeline. Description of the environmental issues being assessed by the EIS. Advising of the opportunity to consult with the SIA team.	Consultation regarding the proposed Project undertaken.
2 Sep 2019	Banana Shire Council	EMM	Meeting	EIS preparation	Project information.	SIA consultation undertaken.
2 Sep 2019	Biloela community	EMM	Workshop	EIS preparation	Project information.	SIA consultation undertaken.
3 Sep 2019	Biloela community	EMM	Workshop	EIS preparation	Project information.	SIA consultation undertaken.
3 Sep 2019	Moura community	EMM	Workshop	EIS preparation	Project information.	SIA consultation undertaken.
4 Sep 2019	Baralaba community	EMM	Workshop	EIS preparation	Project information.	SIA consultation undertaken.
4 and 5 Sep 2019	Landholder	EMM	Meeting	EIS preparation	Project information.	SIA consultation undertaken.
4 Sep 2019	Landholder	EMM	Meeting	EIS preparation	Project information.	SIA consultation undertaken.
4 Sep 2019	Local resident	EMM	Meeting	EIS preparation	Project information.	SIA consultation undertaken.
5 Sep 2019	Landholder	EMM	Meeting	EIS preparation	Project information.	SIA consultation undertaken.
5 Sep 2019	Landholder	EMM	Meeting	EIS preparation	Project information.	SIA consultation undertaken.
5 Sep 2019	Landholder	EMM	Meeting	EIS preparation	Project information.	SIA consultation undertaken.
5 Sep 2019	Benleith Water Board	EMM	Meeting	EIS preparation	Project information.	SIA consultation undertaken.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
6 Sep 2019	Landholder	EMM	Meeting	EIS preparation	Project information.	SIA consultation undertaken.
6 and 7 Sep 2019	Landholder	EMM	Meeting	EIS preparation	Project information.	SIA consultation undertaken.
12 Sep 2019	Queensland Fire and Emergency Services, Moura	EMM	Telephone	EIS preparation	Project information.	SIA consultation undertaken.
30 Sep 2019	Woorabinda Aboriginal Shire Council	EMM	Telephone	EIS preparation	Project information.	SIA consultation undertaken.
4 Oct 2019	Landholder	Baralaba Coal Company	Telephone and email	Mineral and Energy Resources (Financial Provisioning) Act 2018 (MERFP Act)	-	Issues raised included but not limited to the change in rehabilitation laws with regards to voids on floodplains and the impacts of the flood levee on the environment. Emailed response to concerns.
4 Oct 2019 and 9 Oct 2019	Landholder	Baralaba Coal Company	Email	MERFP Act	-	Issues raised included but not limited to the change in rehabilitation laws with regards to voids on floodplains and the impacts of the flood levee on the environment. Emailed response to concerns.
11 Oct 2019	Landholder	Baralaba Coal Company	Email	MERFP Act	-	Issues raised included but not limited to the change in rehabilitation laws with regards to voids on floodplains and standard of rehabilitation.
13/10/2019	Landholder	Baralaba Coal Company	Email	MERFP Act	-	Issues raised included but not limited to the change in rehabilitation laws with regards to voids on floodplains and standard of rehabilitation.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
31 Oct 2019	DES	Baralaba Coal Company and AARC	Meeting	EIS preparation	Project information.	Project briefing. Project status update.
7 Jan 2020	DES	Baralaba Coal Company and AARC	Project briefing	EIS preparation	-	Project briefing
10 Jan 2020	Banana Shire Council	Baralaba Coal Company and AARC	Meeting	EIS preparation	-	Consultation regarding the proposed Project undertaken. Issues discussed include the proposed management and mitigation measures, additional discussion regarding proposed expansion of accommodation camp to accommodate workforce.
9 Nov 2020	Banana Shire Council	Baralaba Coal Company, AARC and Think Business Solutions	Meeting	EIS preparation	Presentation on EIS process, key stakeholder concerns and EIS assessment findings.	Consultation regarding the key stakeholder concerns and EIS findings undertaken. Proponent advised need to determine location the EIS can be displayed.
9 Nov 2020	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	-	Consultation regarding findings of the EIS assessment. Updates to flood mapping required for property infrastructure and 2010 flood information. Discussion of proposed management and mitigation measures.
12 Nov 2020	Woorabinda Aboriginal Shire Council	Baralaba Coal Company and Think Business Solutions	Meeting	EIS preparation	Presentation on EIS process, key stakeholder concerns and EIS assessment findings.	Consultation regarding the key stakeholder concerns and EIS findings undertaken.
23 Nov 2020	Landholder	Baralaba Coal Company and AARC	Meeting. Follow up emails 18 & 29 Jan 2021.	EIS preparation	Property flood impact maps.	Consultation regarding findings of the EIS assessment. Updates to flood mapping required for property infrastructure and 2010 flood information. Discussion of proposed management and mitigation measures.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
23 Nov 2020	Benleith Water Board	Baralaba Coal Company and AARC	Meeting. Follow up email 18 Jan 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment relating to specific property impacts and the Project on water quality, water allocations, Benleith Scheme, scheme infrastructure and the proposed road realignment. Discussion of proposed management and mitigation measures.
23 Nov 2020	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Discussion of proposed management and mitigation measures.
24 Nov 2020	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Discussion of proposed management and mitigation measures.
24 Nov 2020	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Discussion of proposed management and mitigation measures.
24 Nov 2020	Landholder	Baralaba Coal Company	Telephone call	EIS preparation	Flood impact maps.	Landholder did not wish to meet, however, communicated key concern regarding the levee impacts on the environment on call.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
24 and 27 Nov 2020	Landholder	Baralaba Coal Company and AARC	Meetings. Follow up email 18 Jan 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment relating to specific property impacts and the Project on water quality, water allocations, flooding, dust and noise and visual amenity. Discussion of proposed management and mitigation measures.
24 Nov 2020	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Issues relating to water quality, water allocations, flooding, Benleith Water Scheme, dust and noise and visual amenity. Discussion of proposed management and mitigation measures.
24 Nov 2020	Sharefarmer of landholder	Baralaba Coal Company and AARC	Meeting. Follow up email 18 Jan 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Discussion of proposed management and mitigation measures. Information relating to floods and infrastructure to be provided to water consultants.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
26 Nov 2020	Landholder	Baralaba Coal Company and AARC	Meeting. Follow up email 18 Jan 2021.	EIS preparation	Property flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Issues relating to water quality, water allocations, flooding, crops grown on property, dust and noise and visual amenity. Discussion of proposed management and mitigation measures. Information relating to floods to be provided to water consultants.
26 Nov 2020	Landholder	Baralaba Coal Company and AARC Environmental Solutions	Meeting. Follow up email 18 Jan 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property.
26 Nov 2020	Landholder	Baralaba Coal Company and AARC	Meeting. Follow up email 18 Jan 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Issues relating to water quality, water allocations, flooding, dust and noise, coal dust and cattle, surveys undertaken and visual amenity. Discussion of proposed management and mitigation measures. Information relating to floods to be provided to water consultants. Review monitoring measures relating to dust.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
27 Nov 2020	Landholder	Baralaba Coal Company and AARC	Meeting. Follow up email 18 Jan 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Issues relating to water quality, water allocations, flooding, dust and noise, coal dust and cattle and crops, surveys undertaken and visual amenity. Discussion of proposed management and mitigation measures. Information relating to floods to be provided to water consultants.
16 Dec 2020	Landholder	Baralaba Coal Company and AARC	Meeting. Follow up email 18 Jan 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Issues relating to water quality, water allocations, flooding, dust and noise and visual amenity. Discussion on requirements under the *Mineral and Energy Resources (Financial Provisioning) Act 2018 (MERFP Act*) and progressive rehabilitation. Discussion of proposed management and mitigation measures. Information relating to floods and infrastructure to be provided to water consultants.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
16 Dec 2020	Landholder	Baralaba Coal Company and AARC	Meeting. Follow up email 18 Jan 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Issues relating to water quality, water allocations, flooding, dust and noise and visual amenity. Discussion on requirements under the *Mineral and Energy Resources (Financial Provisioning) Act 2018 (MERFP Act*) and progressive rehabilitation. Discussion of proposed management and mitigation measures. Information relating to 2003/2009 floods to be provided to water consultants.
17 Dec 2020	Landholder	Baralaba Coal Company and AARC	Meeting. Follow up email 18 Jan 2021.	EIS preparation	Property flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Issues relating to water quality, water allocations, flooding, dust and noise and visual amenity. Discussion of proposed management and mitigation measures. Information relating to floods to be provided to water consultants.
17 Dec 2020	Property manager for landholder	Baralaba Coal Company and AARC	Meeting. Follow up email 18 Jan 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Issues relating to water quality, water allocations, flooding, dust and noise and visual amenity. Discussion of proposed management and mitigation measures.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
3 Mar 2021	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Issues relating to flooding and water allocations discussed. Discussion of proposed management and mitigation measures.
3 Mar 2021	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Issues relating to flooding and water allocations discussed. Discussion of proposed management and mitigation measures.
3 Mar 2021	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Issues relating to flooding and water allocations discussed. Discussion of proposed management and mitigation measures.
4 Mar 2021	Landholder	Baralaba Coal Company and AARC	Meeting. Follow up email 15 Mar 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Discussion of proposed management and mitigation measures.
4 Mar 2021	Landholder	Baralaba Coal Company and AARC	Meeting. Follow up email 12 Mar 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Discussion of proposed management and mitigation measures.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
5 Mar 2021	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Discussion of proposed management and mitigation measures.
5 Mar 2021	Landholder	Baralaba Coal Company and AARC	Meeting. Follow up email 16 Mar 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Discussion of proposed management and mitigation measures.
5 Mar 2021	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Discussion of proposed management and mitigation measures.
7 Mar 2021	Gaangalu Nation People and Gangulu Endorsed Parties	Baralaba Coal Company and AARC	Meeting. Follow up letter 12 Apr 2021.	EIS preparation	Presentation on Project, timing and findings of the EIS.	Consultation regarding the Project and EIS assessment findings.
23 Mar 2021	Landholder	Baralaba Coal Company and AARC	Videoconference. Follow up email 1 Apr 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Discussion of proposed management and mitigation measures.
25 Mar 2021	Sunwater (landholder)	Baralaba Coal Company and AARC	Videoconference. Follow up email 1 Apr 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Discussion of proposed management and mitigation measures.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
25 Mar 2021	Woorabinda Aboriginal Shire Council	Baralaba Coal Company and AARC	Videoconference. Follow up email 1 Apr 2021.	EIS preparation	Presentation on Project, timing and findings of the EIS.	Consultation regarding the Project and EIS assessment findings and proposed management and mitigation measures. Follow up discussion in relation to social impact management plan development.
29 Mar 2021	Landholder	Baralaba Coal Company and AARC	Videoconference. Follow up email 1 Apr 2021.	EIS preparation	Flood impact maps.	Consultation regarding findings of the EIS assessment for the Project generally and specific to landholder's property. Discussion of proposed management and mitigation measures.
17 Jan 2022	DES	Baralaba Coal Company and AARC	Videoconference	EIS preparation	-	EA application status and PRC Plan application.
17 Feb 2022	Baralaba community	Baralaba Coal Company	Community day	EIS preparation	-	Update on Baralaba North and Baralaba South Opportunity for stakeholders to engage with new proponent.
17 Feb 2022	Save the Dawson	Baralaba Coal Company	Meeting	EIS preparation	-	Update on Baralaba North and Baralaba South Opportunity for stakeholders to engage with new proponent.
18 Apr 2022	Landholder	Baralaba Coal Company	Email	EIS preparation	-	EIS process.
8 Jun 2022	Baralaba community	Baralaba Coal Company	Mine tour	EIS preparation	-	Community engagement.
10 Jul 2022	Gaangalu Nation People and Gangulu Endorsed Parties	Baralaba Coal Company	Meeting and videoconference	EIS preparation	-	Project update.
15 Sep 2022	DES	Baralaba Coal Company and AARC	Videoconference	EIS preparation	-	Project update and request for guidance on obtaining approvals for the smaller mine.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
27 Sep 2022	Save the Dawson (landholder)	Baralaba Coal Company	Meeting	EIS preparation	-	EIS process.
14 Oct 2022	DES	Baralaba Coal Company and AARC	Videoconference	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain.
24 Oct 2022	Banana Shire Council	Baralaba Coal Company	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain.
24 Oct 2022	Landholder	Baralaba Coal Company	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain.
25 Oct 2022	Landholder	Baralaba Coal Company	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain.
26 Oct 2022	Baralaba community	Baralaba Coal Company	Community drop-in session	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain.
26 Oct 2022	Save the Dawson (landholders)	Baralaba Coal Company	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
15 Nov 2022	Landholder	Baralaba Coal Company	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain.
15 Nov 2022	Landholder	Baralaba Coal Company	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain.
12 Dec 2022	Gaangalu Nation People and Gangulu Endorsed Parties	Baralaba Coal Company	Meeting and videoconference	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain. Proposed exploration program and cultural clearance request
8 May 2023	Landholders (four)	Baralaba Coal Company	Drop-in sessions	EIS preparation	-	Proposed exploration program and cultural clearance request
9 May 2023	Gaangalu Nation People and Gangulu Endorsed Parties	Baralaba Coal Company	Meeting	EIS preparation	-	On-country meeting for Wandoo Mountain (Mount Ramsay) story telling Gangulu Endorsed Parties sharing the significance of the mountain to them Request to change proponent name from Mount Ramsay Coal Company. Action: Proponent to change company name to Baralaba South Pty Ltd.
3 Oct 2023	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain. Discussion regarding the preliminary EIS findings including reduced impacts to properties and inclusion of a draft PRC Plan with the EIS submission.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
3 Oct 2023	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain. Discussion regarding the preliminary EIS findings including reduced impacts to properties and inclusion of a draft PRC Plan with the EIS submission.
3 Oct 2023	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain. Discussion regarding the preliminary EIS findings including reduced impacts to properties and inclusion of a draft PRC Plan with the EIS submission.
4 Oct 2023	Baralaba community	Baralaba Coal Company, AARC and Think Business Solutions	Community day	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain. Discussion regarding the preliminary EIS findings including reduced impacts to properties and inclusion of a draft PRC Plan with the EIS submission.
4 Oct 2023	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain. Discussion regarding the preliminary EIS findings including reduced impacts to properties and inclusion of a draft PRC Plan with the EIS submission.

Consultation Date	Stakeholder	Consultation by	Consultation method	Event	Information provided	Issues raised, outcomes and commitments
5 Oct 2023	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain. Discussion regarding the preliminary EIS findings including reduced impacts to properties and inclusion of a draft PRC Plan with the EIS submission.
5 Oct 2023	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain. Discussion regarding the preliminary EIS findings including reduced impacts to properties and inclusion of a draft PRC Plan with the EIS submission.
5 Oct 2023	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain. Discussion regarding the preliminary EIS findings including reduced impacts to properties and inclusion of a draft PRC Plan with the EIS submission.
5 Oct 2023	Landholder	Baralaba Coal Company and AARC	Meeting	EIS preparation	-	Consultation regarding Project update and the benefits of a revised smaller mine plan with a focus on minimising impacts on the Q1,000 floodplain. Discussion regarding the preliminary EIS findings including reduced impacts to properties and inclusion of a draft PRC Plan with the EIS submission.

3.3 Post-mining land use

This section of the PRC Plan describes and discusses the PMLUs proposed for the Project. In accordance with the policy objectives defined in the 'Mined land rehabilitation policy' (Queensland Government 2018), the general rehabilitation goals for the Project are to leave an area that is safe and stable, does not cause environmental harm, and is able to sustain an agreed PMLU.

Further site-specific goals for the Project include:

- minimising the loss of pre-existing agricultural land value by reinstating, where possible, grazing lands at a similar suitability to that existing prior to mining;
- where this cannot be achieved, identifying alternative uses that provide a similar value to the value able to be generated from the land prior to mining or an alternative land use, or uses, able to provide long-term ecological value to the region; and
- minimising or avoiding the potential for post-mining lands having no or little value to the area or region.

3.3.1 Existing land uses

The Project site supports large expanses of heavily disturbed and/or cleared areas. The current land use of the Project area is predominately cattle grazing on improved pastures, with other land uses including stud farming, dryland, and irrigated cropping (forage crops and cotton/wheat produced opportunistically) and improved pastures for grazing. Existing land use suitability for cropping within the Project disturbance footprint is defined as 'Class 4, agricultural land suitability (marginal land with severe limitations)' through to 'Class 5, agricultural land suitability (unsuitable land with extreme limitations)'.

The Project area is zoned as rural land use under the Banana Town Planning Scheme (Banana Shire Council 2022), which allows for uses consistent with mining where the specific outcomes, including environmental considerations, amenity, and separation distances, can be met.

A large proportion of the prime agricultural land in the region surrounding the study area is located on the floodplain of the Dawson River and its tributaries, and the area to the west of the river is mapped as a Priority Agricultural Area under the RPI Act. The floodplain areas are used for irrigated and rain-fed cropping and beef cattle grazing on improved pasture. Away from the floodplain, cattle are grazed on native or improved dryland pasture.

3.3.2 Rehabilitated landforms

Land disturbance associated with the Project will result from land clearing associated with open cut mining operations. Progressive rehabilitation of disturbed land will commence as soon as practicable following areas becoming available for rehabilitation (refer to section 3.5.3 for rehabilitation timeframe justification and Appendix A for the Milestone Schedule). The key disturbance areas and associated final landforms are described in the following subsections.

Rehabilitated landforms are proposed to have elevations of approximately 160 mAHD, with a typical slope of equal to or less than 9^{o} 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 10^{o}. Where appropriate, contour banks will be utilised along slopes, resulting in maximum slope lengths of approximately 235 m when measured between contour banks.

A final void will remain at the cessation of mining activities. Here, the final void refers to the residual open-excavated area that is expected to fill with water, and comprises high walls and a portion of the low wall adjacent to the water containment area (refer Figure 26). The final void design is described in section 3.5.4.5.

Mine infrastructure areas will be decommissioned, unless otherwise agreed with the underlying landholder(s) and Ministerial consent is obtained under the *Mineral Resources Act 1989.* Ergon is the owner

of the electricity network infrastructure upgrades and/or construction works, as such they are not considered any further in this PRC Plan.

3.3.3 Post-mining land use options

As part of the EIS process, a feasibility assessment of the following three proposed PMLUs was undertaken:

1) PMLU alternative 1: Improved pasture grazing with pit lake and highwall natural ecosystems. Land to be reinstated to improved pasture grazing activities with the residual highwalls and a final void to become a novel native ecosystem, providing habitat and ecosystem services to local flora and fauna.

2) PMLU alternative 2: Improved pasture grazing and backfilled mining void. The mining void to be completely backfilled and entire disturbance area to be reinstated to improved pasture for grazing activities.

3) PMLU alternative 3: Pumped-storage, hydro-electric scheme, and solar power station. The development of a solar photovoltaic farm and pumped-storage hydro-electric scheme, complementary to improved pasture grazing use and retention of the final void.

The results of the analysis indicate that PMLU alternative 1 is the most desirable and feasible outcome; aligning with community values, local planning instruments and with regard to the rehabilitation hierarchy outlined in 'Rehabilitation requirements for mining resource activities' (DES 2018). However, adoption of this alternative will be subject to feedback from the EIS approval processes and further community consultation. Each of these options is discussed in detail in the following subsections.

3.3.3.1 Improved pasture grazing with pit lake and high wall 'natural' ecosystems

Improved pasture grazing

The current land use for the Project site is predominately cattle grazing on improved pastures. The Social Impact Assessment identified potential impacts on soils and mine rehabilitation as key issues raised by stakeholders, with grazing land/agricultural purposes nominated as the most appropriate land use for the Project site post-mining. This PMLU was indicated as having long-term and substantial value to the community.

The PMLU of improved pasture for grazing aligns with the outcomes of the soil and land suitability assessment (Appendix E, EES 2023). All soils have been assessed as ALC C – pastureland, suitable for grazing land where soil moisture is the most limiting factor. The rehabilitated landform with a PMLU of improved pasture for grazing will target the achievement at least Class 4 agricultural land suitability (i.e. marginal land with severe limitations), similar to the pre-mining classification.

The open cut pit will be partially backfilled and revegetated with pasture species suitable for the target PMLU. Areas cleared of vegetation for the mine and supporting infrastructure areas are proposed to be reinstated to a PMLU of improved pasture for grazing.

Natural ecosystem (habitat and ecosystem services) and pit lake

Reinstatement of an improved pasture grazing land use is considered to be a feasible PMLU for the majority of the Project site. A natural ecosystem PMLU for the final void (pit lake) and surrounding highwall is proposed as these areas are not suited to a grazing land use. This PMLU arrangement is shown in Figure 27.

Retained highwall slopes will be reshaped using drill and blast methods designed to achieve final slopes with a minimum of mobile plant rework required. Interspersed parcels of native vegetation are proposed to provide food sources and shade for native fauna and to improve carbon input into the pit lake natural ecosystem to support the ecological progression of the pit lake over time.

Figure 26: Final landform

Figure 27: PMLU alternative 1: Improved pasture for grazing with natural ecosystem

The pit lake formed as part of the final landform is anticipated to have an area of approximately 86 ha. Pit lakes have demonstrated capacity for the development of ecosystems able to behave similarly to natural wetlands (Lund and Blanchette 2014) and have the potential to provide ecological value (Lund and Blanchette 2021). The underlying biophysical processes facilitating primary production are critical in allowing pit lakes to evolve into valuable ecosystems (Luek and Rasmussen 2017; Marszelewski *et al.* 2017; Lund and Blanchette 2014). Variables that influence primary production include bankside vegetation, nutrient concentrations in the water column (nitrogen, phosphorus, and carbon), hydrology and bathymetry (Lund and Blanchette 2014; Lund and Blanchette 2021). Primary production processes can be assisted through rehabilitation activities such as planting vegetation below the final void water level, increasing the input of nutrients from leaf litter and improving the systems biodiversity (Blanchette *et al.* 2020).

Typically, pit lakes will become increasingly saline over time. Water quality modelling for the Project conducted by Engeny (2023a) indicates that under the clean catchment inflow modelled scenario, the salinity of the pit void will gradually increase from approximately 1,500 mg/L to 5,650 mg/L in the first 100 years following mining and increasing slightly to 5,850 mg/L at equilibrium, 500 years post-mining. That is, the pit lake is likely to remain brackish for approximately the first 500 years. Biodiversity is often assumed to decrease as salinity increases, however, salinities of up to 10,000 µs/cm (equivalent to a TDS of approximately 6,400 mg/L) can support robust ecological systems and provide a valuable refuge for a range of species (pers comms. M. Lund December 2019).

Research indicates that pit lakes in the earlier stages of ecological development (TDS up to approximately 4,500 mg/L) can provide ecological value for regional species in central Queensland (Proctor and Grigg 2006). Further, pit lakes may act as a water refuge during periods of low rainfall for mobile species such as the Grey Teal Duck (Hart 1991) which was recorded within the Project site (Appendix E, EcoSM 2023). Species of ducks and swans are regularly observed in saline pit lakes of open cut coal mines in central Queensland (pers comms. C. Cote, March 2020).

Macroinvertebrates are well-adapted to brackish and brackish-saline conditions however, species diversity typically decreases with higher rates of salinity. A study of pit lakes aged from 1-22 years and ranging from 330 µs/cm to 4,416 µs/cm, associated with a nearby open cut coal mine in Moura, indicated that the diversity of aquatic invertebrates was similar to nearby natural waterbodies (Proctor and Grigg 2006). The pit lakes studied by Proctor and Grigg (2006) were reported to support orders of macroinvertebrates that have been recorded on the Project site, including Diptera, Hemiptera, Odonata, Coleoptera and Mollusca (Appendix E, ESP 2023).

Brackish to saline pit lakes with similar groundwater quality and geological settings, as anticipated/modelled for in the Project have been observed to support communities of macroinvertebrates, as well as small fish, bird life and turtles (pers comms. J. Fittler March 2020). In an open cut coal mine located within the Fitzroy Basin, native fish including Western Carp Gudgeon, Spangled Perch and Firetail Gudgeon have been documented to have pioneered pit lakes with TDS of up to 7,600 µs/cm (pers comms. J. Fittler March 2020); these species of fish were recorded by the aquatic ecology survey conducted for the Project (Appendix E, ESP 2023).

Proctor and Grigg (2006) concluded that, in central Queensland, final void waterbodies have the potential to provide habitat for many invertebrate taxa typical of still inland water bodies. The ability for macroinvertebrates in freshwater systems to adapt to changes in salinity is dependent on the period of acclimation where the ability to adapt to new conditions improves when changes are incremental over time (Hart *et al.* 1991).

In periods of low rainfall, birds, including the Grey Teal, have been recorded using saline waters as refuges over both short- and long-term periods by drinking freshwater elsewhere (Lavery 1972). Several species of birds prefer to breed in saline conditions (Goodsell 1990). For example, the Grey Teal, Pacific Black Duck, White Faced Heron, Little Black Cormorant and Little Pied Cormorant were found by Goodsell (1990) to breed in saline conditions with TDS values of up to between 14,600 mg/L (Pacific Black Duck) and 37,600 mg/L (Grey Teal). All of these species have been recorded within the Project site (Appendix E, EcoSM 2023). Further, the Black Swan, a species known to inhabit the wider Project surrounds, was reported by Goodsell (1990) to breed in saline water with a TDS of up to 43,500 mg/L.

The highwalls associated with pit lakes can also provide suitable refuge and brooding habitat for several fauna species. The residual highwall provides steeper slope habitat that can be used by native nesting birds. For example, a resident Peregrine Falcon pair has been recorded successfully breeding in nests created in the highwalls of an open cut mining pit in the Northern Territory (Potts and Donato 2008). Additional Peregrine Falcons were observed utilising the various open pit highwalls for roosting. Birds documented to nest on inland, flat land or slopes may utilise the highwall pit slopes as nesting habitat (O'Donnell and Debus 2012). The White-bellied Sea-eagle (*Haliaeetus leucogaster*) is one example of a species that nests on inland, flat land or slopes and has been recorded in the Project region (Appendix E, EcoSM 2023). Anecdotally, birds of prey have been reported to utilise the highwall as refuges in an open cut coal mine located in central Queensland; the Wedgetail Eagle, a species that has been recorded on the Project site is one example of such species of birds of prey (pers comms. J. Fittler March 2020). Over time, an increase in bird life has been observed in response to an increase in fish abundance within the pit lake (pers comms. J Fittler March 2020).

Insectivorous bats have been documented feeding on insects in the airspace above pit lakes in both Western Australia and central New South Wales (Griffiths *et al*. 2014a; Griffiths *et al*. 2014b). A number of insectivorous bats have been identified on the Project site by ANABAT surveys including the Chocolate Wattled Bat, Eastern Bent-winged Bat, Eastern Cave Bat, Eastern Freetailed Bat, Goulds Wattled Bat, Inland Broad-nosed Bat, Inland Forest Bat, Little Broad-nosed Bat, Little Pied Bat, Long-eared Bat, Northern Freetail Bat, Troughton's Sheathtail Bat, White-striped Freetailed Bat and the Yellow-bellied Sheathtail Bat (Appendix E, EcoSM 2023). Two additional species, the Gould's Long-eared Bat and the Eastern Horseshoe Bat have been recorded within the wider surrounds (Appendix E, EcoSM 2023).

The rock fissures and crevices present in the highwall pit slopes may provide potential roosting habitat for various microbats identified within the Project site (e.g. Little Broad-nosed Bat) which roosts in hollows but which has been found in fence posts and under the metal caps of telegraph poles (Churchill 2008), Gould's Wattled Bat which has been found roosting in stumps, hollow trees and urban settings such as ceilings (ALA 2020) and the Troughton's Sheathtail Bat which has been recorded in cracks and crevices in rocky escarpments (DES 2011), as well as species previously recorded within the Project region (e.g. the Eastern Horseshoe Bat which is known to roost in caves but also in holes and cracks in rocks [Australian Museum 2020]).

Native vegetation proposed to rehabilitate the low wall slopes will provide additional refuge for ground-dwelling fauna, including small mammals and reptiles. For example, the Delicate Mouse (*Pseudomys delicatulus*) feeds on native grass seeds and uses grass tussocks as refuges (Diete *et al.* 2015). Similarly, grass tussocks provide refuge for a number of mammals and reptile species found on the Project site during the fauna survey, including the Delicate Mouse, Common Planigale, Northern Brown Bandicoot, Bynoes Gecko and the Elegant Snake-Eyed Skink and the Open-litter Rainbow-skink (Appendix E, EcoSM 2023). The use of low wall vegetation by goats, cattle, small mammals, and reptiles has been observed in opencut mines of Queensland (pers comms. C. Cote March 2020).

The ecological value of pit lakes and adjacent highwall features can be facilitated through effective rehabilitation of the pit walls. For example, in a review of the ecological processes associated with nutrient webs of natural lakes, wetlands and pit lakes, van Etten (2011) concluded that rehabilitating vegetation along the low walls can assist with improving water quality, primary production and provide suitable habitat for aquatic and terrestrial fauna. Similarly, a study conducted on the pit lake district in Collie, Western Australia indicated the input of nutrients from vegetation supports and facilitates ecosystems within pit lakes (Blanchette *et al.* 2020). In Queensland, littoral fringe aquatic plants have been reported to inhabit areas with consistent water levels in-pit lakes with salinities less than 10,000 µs/cm, (pers comms. J. Fittler, March 2020). Further, habitat complexity including the development of microclimates (van Etten 2011) and additional habitat could be created through the addition of cleared vegetation (i.e., tree trunks) to both the low walls and the waterbody (Luek and Rassmussen 2017).

A number of species which have been found on the Project site have been documented to inhabit rehabilitated areas of an open cut coal mine site, including pit voids, within Queensland. These species include:

- Birds: Little Black Cormorant, Australian Pelican, White Faced Heron, Brown Quail, Grey Teal Duck, Pacific Black Duck, Wandering Whistling Duck, Plumed Whistling Duck, Wedgetail Eagle, Brown Falcon and Little Pied Cormorant.

- Reptiles: Broad Palmed Rocket Frog, Green Tree Frog, Salmon Striped Marsh Frog, Krefts River Turtle, Open-Litter Rainbow-skink and Bynoe's Gecko.
- Mammals: Common Planigale, Northern Brown Bandicoot and The Eastern Grey Kangaroo.
- Fish: Western Carp Gudgeon, Spangled Perch, Firetail Gudgeon, and Rainbowfish species.
- Macroinvertebrates of the orders Diptera, Hemiptera, Odonata, Coleoptera and Mollusca (Proctar and Grigg 2006) (pers comms. J. Fittler March 2020).

Given that salinity is predicted to remain below 10,000 mg/L during the first 100-years of post-mining operations, the pit lake and surrounding highwall features are anticipated to provide suitable habitat for a range of native fauna, including a number of species recorded within the Project site and surrounds.

3.3.3.2 Backfilled void

The second alternative for the final landform involves backfilling the final mine void to a level slightly higher than the original topography to allow for settlement over time (Figure 28). Once a sufficient period has been allowed for settlement, the area would be reshaped to an undulating landform, topsoiled, and revegetated to the target PMLU of improved grazing pasture. This alternative involves significant cost of approximately $910 million due to rehandling significant volumes of waste rock, approximately 186,000,000 $m^{3,}$ at the end of mine life; rendering the Project unviable. Rehabilitation activities of most areas would be delayed until mine closure, as the WRE would comprise the source of backfill material required.

3.3.3.3 Pumped-storage, hydro-electric scheme, and solar power station

The third alternative for the final landform has the potential to utilise the inherent value of some retained features and existing mining infrastructure development, through the development of a pumped-storage hydro-electric scheme and utility-sized solar power station. Improved pasture for a grazing PMLU would be interspersed throughout the site.

A pumped-storage hydro-electric scheme works by using solar-powered electric pumps to transfer water from a lower reservoir to a higher reservoir during periods of low energy demand. The water in the upper reservoir acts as a bulk electricity storage unit able to generate electricity on demand via a turbine and alternator.

For the Project, the pit lake could serve as the lower reservoir. The mine water dam located on the eastern highwall may be suitable to operate as an upper reservoir, although a preliminary assessment indicates this may need to be increased in size to support this as a PMLU. Alternatively, a fit-for-purpose upper reservoir could be constructed within the final landform. Based on the estimated equilibrium water level, the height difference, or 'head', between the lower (pit lake) and upper reservoir would need to be 80 m, with potential to operate at significantly greater heads, given the depth of the pit lake. Key infrastructure, including the power station and piping, could be constructed either above or below ground, with the existing transmission line and parts of the mine infrastructure area being converted for switchyards, transmission infrastructure and offices.

A range of factors towards the end of the mine life including; electricity demand, as-constructed site suitability and market conditions would dictate the outcomes of a pre-feasibility assessment into a pumped-storage hydro-electric scheme and solar power station alternative. It would be appropriate to determine the need for and content of a pre-feasibility assessment of this option no sooner than 10 years before the end of mine life.

This alternative also reduces the area of land available to improved pastures for grazing, in comparison to alternative 1.

Mine Domain	Area (Ha)	Volume (m3)	Earthworks $	Surface Treatment $	Total $	ERC Cost (inc Oh)
Final Void Backfill to AOC	156.00	186,022,000.00	$ 723,696,938.82	$ 829,402.94	$ 724,525,711.76	$ 905,657,139.70
Low Wall Ingit Spoil Rehab	589.00		$ 1,267,120.59	$ 2,669,431.59	$ 3,867,552.18	$ 4,834,440.23
Total	745.00	186,022,000.00	$ 724,963,429.41	$ 3,469,834.53	$ 728,393,263.94	$ 910,491,579.93

Note: Calculation from DES ERC Calculator, Pits Tab (Ver 5.02)

Figure 28: PMLU alternative 2: Backfilled void

3.3.4 Post-mining land use outcomes

The proposed PMLUs have been developed with consideration for the existing local and regional land use, the Banana Shire Planning Scheme (Banana Shire Council 2021), local ecological values and site characteristics. The proposed PMLUs aim to maintain the existing land use of low intensity grazing by returning the land to a similar suitability to that existing prior to mine disturbance and delivering a beneficial environmental outcome.

A summary of the proposed post-mining land outcomes is provided Table 8. The proposed PMLUs:

- are considered viable, having regard to the use of land in the surrounding region;
- are consistent with how the land was used before a mining activity was carried out and community consultation outcomes; and
- will deliver, or aim to deliver, a beneficial environmental outcome.

3.3.4.1 Regional planning integration

Baralaba Coal Mine is located in the 'rural zone' under the Central Highlands Regional Council Planning Scheme (CHRC 2022). The rural zone is intended to:

- provide rural uses including cropping, intensive horticulture, intensive animal industries, animal husbandry, animal keeping and other primary production activities.
- provide opportunities for non-rural uses that are compatible with agriculture, the environmental features, and landscape character of the rural area where the uses do not compromise the long-term use of the land for rural purposes; and
- protect or manage significant natural resources and processes to maintain capacity for primary production.

While also mimicking the existing neighbouring land uses of grazing, the nominated PMLUs for the Project are consistent with the intention of this rural zone as outlined in the planning scheme.

The PMLUs also aligns with the regional outcomes under the Central Queensland Regional Plan 2013, which is intended to allow agriculture, within central Queensland, to expand collectively with the resource industries.

3.3.4.2 Community consultation

Extensive community consultation for the Project has been undertaken and is outlined in section 3.2. Consultation identified the preference for mining land to be returned to a grazing landscape. Additionally, community consultation relating to permanent impacts to environmental values was considered and the initial 5 Mtpa mine operation was consequently revised to a 2.5 Mtpa mine plan, where mining operations would occur predominately outside the Dawson River floodplain.

Table 8: Post-mining land outcomes

Disturbance type		Rehabilitation areas	Pre-mining land use	Post-mining land use	Post-mining land description	Post-mining land suitability (grazing)
Open cut disturbance area and ex-pit waste rock	In-pit and out-of-pit waste rock emplacements including low walls outside of the water containment area of the final void	RA1	Low intensity cattle grazing, with limited stud farming	Improved pasture for grazing	Improved grazing pasture – low intensity cattle grazing slopes maximum <10^{o}	Class 4
	Highwall	RA2a		Highwall 'natural' ecosystem - Habitat and ecosystem services	Natural highwall ecosystem capable of providing food sources and habitats for fauna	N/A
	Final void water containment area and section of low wall adjacent the water containment area	RA2b		Pit lake	Ecosystem providing ecological value for regional species including food source, water refuge and supporting early stages of ecological succession	N/A
Water management infrastructure	Dams, diversion drains, off lease water release/extraction pipeline (rehabilitated to improve pasture for grazing)	RA3		Improved pasture for grazing	Improved grazing pasture – low intensity cattle grazing	Class 4
	Dams and diversion drain to be retained (all to be decommissioned unless agreement made with underlying landowner subject to MR Act)	RA6		Retained infrastructure	Retained infrastructure consistent with surrounding PMLUs, for which landholder agreement is in place	N/A

Disturbance type		Rehabilitation areas	Pre-mining land use	Post-mining land use	Post-mining land description	Post-mining land suitability (grazing)
	Final landform bund	RA1		Improved pasture for grazing	Final landform bund to provide PMF protection to the final void. Improved grazing pasture - low intensity cattle grazing with slopes maximum <10^{o}	Class 4
Mine infrastructure and access roads	Surface disturbance associated with mine infrastructure areas, haul roads and internal access road	RA4		Improved pasture for grazing	Improved grazing pasture – low intensity cattle grazing	Class 4
		RA6		Retained infrastructure	Retained infrastructure consistent with surrounding PMLUs, for which landholder agreement is in place	N/A
Minor disturbance areas	Minor disturbance associated with topsoil stockpiles on natural ground and from other approved disturbance activities resulting in compacted land requiring rehabilitation	RA5		Improved pasture for grazing	Improved grazing pasture – low intensity cattle grazing	Class 4
Drainage Channel	Drainage channel to maintain water flow for fish passage for Tributary 8 an unnamed waterway that traverses the MLA and is intersected by the north-western corner of the out-of-pit waste rock emplacement	RA6		Retained drainage channel	Retained channel to provide connectivity for fish passage with the reaches of Tributary 8.	N/A

3.4 Non-use management areas

A non-use management area is an area of land that cannot be rehabilitated to a stable condition after all rehabilitation activities have been carried out (DES 2020c). There are no non-use management areas proposed for the Project.

3.5 Rehabilitation management methodology

3.5.1 Rehabilitation objectives

In Queensland, mine rehabilitation is required under the EP Act. Amendments to the EP Act in late 2018 implemented key elements of the State Government's Mined Land Rehabilitation Policy (Queensland Government 2018) which intends to ensure that, for land disturbed by mining activities:

- the land is safe and structurally stable;
- there is no environmental harm being caused by anything on or in the land; and
- the land can sustain a post-mining land use (section 111A of the EP Act).

These three objectives are the general rehabilitation goals for all areas disturbed by mining in Queensland.

3.5.2 Rehabilitation areas

Discrete rehabilitation areas (RAs) have been defined to support the development of a PRCP schedule that satisfies the requirements of the PRC Plan Guideline. An RA is defined in the Environmental Protection Regulation 2019 as an area of land to which a rehabilitation milestone for the PMLU relates. The RAs for the Project have been nominated for defined areas of disturbance having either or both different rehabilitation or PMLU requirements; RAs are outlined in Table 9 and shown in Figure 29.

Table 9: Identified rehabilitation areas

Rehabilitation area reference	Rehabilitation area	Description	PMLU
RA1	In-pit and out-of-pit waste rock emplacements, earthen embankments and final landform bund	• Open cut disturbance including the in-pit and out-of-pit waste rock emplacement including the portion of the haul road located within the waste rock footprint and earthen embankment that will be incorporated into the final landform. • Final landform bund	Improved grazing pasture – low intensity cattle grazing
RA2a	Final Void: Highwall	• Highwall of the final void remaining from open cut disturbance after reshaping to the final landform.	Highwall 'natural' ecosystem - Habitat and ecosystem services
RA2b	Final void: Pit lake	• Water containment area at equilibrium, portion of regraded low wall adjacent the water containment area	Pit lake -- Habitat and ecosystem services
RA3	Water management infrastructure - decommissioned	• Mine water dams, raw water dams, sediment dams rehabilitated to pasture • Diversion drains • Off lease water release/extraction infrastructure	Improved grazing pasture – low intensity cattle grazing
RA4	Mine infrastructure areas	• Mine infrastructure area • Internal access roads including haul roads on natural ground	Improved grazing pasture – low intensity cattle grazing

Rehabilitation area reference	Rehabilitation area	Description	PMLU
RA5	Other minor disturbance	• Disturbance associated with topsoil stockpiles on natural ground • Minor disturbance from other approved disturbance activities resulting in compacted land requiring rehabilitation	Improved grazing pasture – low intensity cattle grazing
RA6	Drainage channel	• Drainage channel to maintain water flow for fish passage for Tributary 8 - an unnamed waterway that traverses the MLA	Permanent drainage channel
RA7	Retained infrastructure[1]	• Retained infrastructure consistent with surrounding PMLUs, for which landholder agreement is in place	Retained infrastructure

[1.] Currently there are no landholder agreements for retained infrastructure. This RA has been proposed to address retained dams, diversion drains, roads and buildings within the MIA, as it is anticipated future landholders may request to retain these structures.

Figure 29: Rehabilitation area reference map

3.5.3 Rehabilitation milestones and completion criteria

Rehabilitation milestones are defined as each significant event or step necessary to rehabilitate an area of land to a stable condition (section 112, EP Act). Key to assessing the success of rehabilitation is the definition of milestone criteria. Milestone criteria must be consistent with the SMART principles (specific, measurable, achievable, realistic and timely). They should:

- be outcome-based (linked to the end land use);
- be flexible to adapt to changing circumstances;
- be able to evolve as the mine life progresses;
- include metrics suitable to demonstrate that rehabilitation is trending positively;
- undergo periodic review; and
- include a measurement approach that details how the criterion will have been met (CoA 2016, ANZMEC and MCA 2000).

A set of milestone criteria has been identified for the Project to provide a clear definition of milestone completion and successful rehabilitation for each rehabilitation area. The milestone criteria demonstrate the completion of progressive rehabilitation steps and events. The completion criteria for each PMLU will be used as the milestone criteria for the final milestone in the proposed schedule, which shows achievement of the PMLU to a stable condition at surrender.

Rehabilitation is required to be commenced as soon as practicable after land becomes available for rehabilitation. Land is considered to be available for rehabilitation at the completion of mining, unless –

1) the land is being used for operating infrastructure or machinery for mining, including, for example, a dam or water storage facility; or

2) contains a probable or proved ore reserve that is to be mined within 10 years after the land would otherwise have become available for rehabilitation; or

3) the land is required for the mining of a probable or proved ore reserve mentioned in paragraph (2); or

4) the land contains permanent infrastructure identified in the proposed PRCP schedule as remaining on the land for a PMLU.

Rehabilitation milestone timeframes have been developed with consideration of:

- the size of the rehabilitation area;
- the availability of equipment;
- the activities applicable to the milestone; and
- interim rehabilitation activities that are scheduled to occur or anticipated to be required prior to the area becoming available for rehabilitation.

The nominated rehabilitation milestones considered relevant to the Project, justification for proposed milestone criteria and performance indicators are detailed in Table 10. It should be noted that not all rehabilitation milestones are applicable to all RAs. The nominated rehabilitation timeframes considered for scheduling the rehabilitation milestones are outlined in Table 11.

Table 10: Milestones, applicability to rehabilitation areas and milestone completion criteria

Milestone reference	Rehabilitation milestone description	Applicable RAs	Milestone completion criteria	Justification for proposed criteria
RM1	Infrastructure decommissioning and removal	RA3 RA4 RA5	• All non-required services disconnected and removed. • All concrete, bitumen and gravel removed. • All pipelines drained and removed. • All fencing that is not part of the PMLU removed • All buildings demolished and/or removed. • All machinery and equipment removed. • All surface water drainage infrastructure that is not retained in the final landform removed. • All rubbish removed and scrap metal collected. All infrastructure that is to remain will be subject to a written agreement transferring ownership and liability.	Demonstrate that no non-required infrastructure remains in the final landform.
RM2	Management of contaminated land status	RA3 RA4 RA5 RA7	• Contaminated land assessment for all areas that are identified as containing a source of contamination, undertaken by a suitably qualified person (AQP)[2], have been carried out. • Contaminated material (e.g. affected by hydrocarbons) either remediated in-situ[1] or removed/transported to an approved landfill for disposal. • Validation testing confirms that contaminated soils have been removed or remediated. • If required, a site suitability statement from an AQP[2] confirms the uses or activities for which the land is suitable, aligned to the approved PMLUs for the site.	Standard contamination assessment procedures will be followed, wherever a risk of land contamination exists.

Milestone reference	Rehabilitation milestone description	Applicable RAs	Milestone completion criteria	Justification for proposed criteria
RM3	Landform development (reshaping/push to void/ profiling/ cleaning/ clearing)	RA1 RA2a RA2b RA3	**Landform development works** • Bulk earthworks completed and either ground survey or Lidar demonstrates the finished slopes conform to the final landform design and drainage plan for each sub-area. • Clean water dams and mine affected dams to be decommissioned and back filled. No ponding of water after rainfall or excess moisture retention observed during rehabilitation monitoring activities. • Geotechnical assessment by an AQP[2] confirming that long-term geotechnical stability has been achieved for each relevant landform. • Temporary/permanent perimeter fencing, signage etc. to make the working pit safe. • Final void and bunding is assessed by an AQP[2] to be geotechnically stable. **Landform constructed to the following design parameters, where relevant:** • RA1 slopes ≤ 9°; • Contour banks installed as required; • Final landform bund has a crest elevation equal to the PMF flood height plus a design freeboard allowance. • Final void highwalls (RA2a and RA2b) have slope gradients ≤ 40°; and • Final void low wall (RA2a) has slope gradients ≤ 32°.	To establish a stable condition for land, the final site design specifications must be met to demonstrate final landform stability Certification must be provided by a suitably qualified geotechnical engineer that the final landform is geotechnically stable post-reshaping / reprofiling the landform, meaning that there is low risk of mass failure. Records to demonstrate that the final landform provides flood immunity to the voids.
RM4	Surface preparation (topdressing, contour ripping, soil amelioration)	RA1 RA3 RA4 RA5	• Prior to each rehabilitation event, soil health and suitability assessed by an AQP[2] and either: o confirmed suitable for vegetation establishment; or o recommendation(s) made for ameliorants to ensure sodicity, salinity, pH and fertility levels are suitable to achieve a grazing PMLU. • If applicable, records demonstrate that ameliorants and mitigation measures have been undertaken as per agronomist recommendations • Records of topsoil placement, and evidence indicating achievement of a target depth of 0.2 m (+/- 0.05 m). • Ripping undertaken to approximately 0.4 m.	Criteria are proposed to ensure topsoils are assessed as suitable or ameliorated to ensure vegetation growth can occur; and that topsoil placement occurs to an appropriate depth and surface preparation involving contour ripping has been undertaken.

Milestone reference	Rehabilitation milestone description	Applicable RAs	Milestone completion criteria	Justification for proposed criteria
RM5	Revegetation (seeding and / or planting)	RA1 RA3 RA4 RA5	• Seeding of rehabilitation areas using a selection of the recommended species from the following lists. • **Grazing PMLU** (comprising a minimum of 25% (by weight) native species; a minimum of 3 x 3P species and a total minimum sowing rate 10 kg/ha): o Buffel grass (Cenchrus ciliaris) o Purpletop Rhodes grass (*Chloris inflata*) o Green Panic (Megathyrus maximus var.publigumis) o Mitchell Grass (*Astrebla species*) o Forest Bluegrass (Bothriochloa bladhii) o Green couch (Cynodon dactylon) o Queensland Bluegrass (*Dichanthium sericeum*) o Native Sensitive Plant (*Neptunia gracilis*) o Rhyncho (Rhynchosia minima) o Woolly Glycine (Glycine tomentella) o Desmanthus (Desmanthus spp) o Phasey Bean (Macroptilium lathyroides) o Cover crop (e.g., *Sorghum arudinaceum*) • **Natural ecosystem** – habitat and ecosystem services PMLU - shrubs o Red Ash (Alphitonia excelsa) o Quinine Bush (Petalostigma pubescens) o False Sandalwood (Eremophila mitchellii) o Currant Bush (*Carissa ovata*) o Ironwood (Acacia excelsa) o Whitewood (Atalaya hemiglauca) o Coffee Bush (Breynia oblongifolia) o Bitterbark (Alstonia constricta) o Pale Spike-sedge (*Eleocharis pallens*) • **Natural ecosystem** – habitat and ecosystem services PMLU – groundcover (minimum of four species): o Kangaroo Grass (*Themeda triandra*) o Black Speargrass (Heteropogon contortus) o Pitted Bluegrass (Bothriochloa decipiens) o Couch Grass (Cynodon dactylon var. dactylon) o Many-flowered Mat Rush (*Lomandra multiflora*)	Ensure appropriate species selection for the relevant PMLUs

Milestone reference	Rehabilitation milestone description	Applicable RAs	Milestone completion criteria	Justification for proposed criteria
			○ Wattle Mat Rush (Lomandra filiformis) ○ Native Sensitive Plant (*Neptunia gracilis*)	
RM6	Achievement of surface requirements (grazing PMLU) to a stable and sustainable condition	RA1 RA3 RA4 RA5	• For slopes ≤ 5°, rehabilitation polygons have a median fractional vegetation cover greater than the first quartile of reference polygons for at least 85% of all sample times, as determined using the satellite-derived fractional vegetation cover method[4]. • Weed cover is ≤ 10% live groundcover (excluding exotic pasture grasses). • Soil health assessment confirms no significant soil chemical impediments to vegetation growth • Grazing land meets Class 4 land suitability for grazing. • No evidence of erosion classified as 'Severe'[2]. • No active erosion present as demonstrated by no increase in erosion ratings for three consecutive monitoring events. • Water quality from direct rainfall runoff from rehabilitated waste rock (RA1 only) has a pH in the range 6.5–9.0 (median), and acceptable EC. • Landform is assessed by an AQP[2] as being geotechnically stable defined as a low likelihood of mass failure impacting surrounding rehabilitation areas. • Hazard and Safety Assessment completed by an AQP[2] demonstrates hazards in rehabilitation areas are consistent with the type and severity of hazards typical of neighbouring equivalent land use. Remaining hazards are low risk with no significant increase in risk expected over time.	FVC provides an assessment of both live and dead vegetation cover (functional cover) as well as bare ground and provides a comparison with reference sites to be determined. Erosion criteria based on what are now generally accepted as standard criteria. Weed cover criteria link to appropriate land management practices and topsoil development. Soil health assessment to identify any potential vegetation sustainability issues. Land suitability assessment nominated to demonstrate that land suitability is similar to the pre-mining landscape.
RM7	Achievement of surface requirements (high wall 'natural ecosystem' – habitat and ecosystem services PMLU) to stable and sustainable condition	RA2a	• A geotechnical assessment has been completed by an AQP[2] stating that the final void is safe and stable and meets design criteria. • Safety bund setback distance is in accordance with calculated geotechnical factor of safety. • Safety bund constructed of competent rock and to a geometry that prevents traversing by vehicles. • Perimeter fencing and signage erected to prevent access to humans and cattle. • Demonstration by an AQP[2] that the final landform provides PMF flood immunity to the final void.	Demonstration that the final void is safe, stable and meets design criteria.

Milestone reference	Rehabilitation milestone description	Applicable RAs	Milestone completion criteria	Justification for proposed criteria
RM8	Achievement of surface requirements (pit lake PMLU) to stable and sustainable condition	RA2b	• Predictive modelling undertaken by an AQP[2], confirming that the voids will remain as a groundwater sink and that there is no risk of contaminant release to surface or groundwaters post-mining. • Water quality monitoring of the pit lake demonstrates that measured salinity is consistent with predictive modelling undertaken by AQP[2,] where salinity is ≤ 10,000 µs/cm. • Evidence of fauna usage from the environmental monitoring program	Demonstration that the final void pit lake is not causing any offsite environmental impact and functioning as predicted.
RM9	Drainage channel achievement of final PMLU to stable and sustainable condition	RA6	• Construction of the drainage channel meets design specifications in particular: o Drain longitudinal grade of approximately 0.05%. o Maximum drain depth of 0.2 m. o Maximum channel width of 10 m. • Observational data from monitoring indicates that the drainage channel is not a barrier to stream flow during a high flow event.	Tributary 8 is an ephemeral stream, providing passage for fish flow during high flow events. Monitoring needs to ensure the drain is able to function in this capacity.

Milestone reference	Rehabilitation milestone description	Applicable RAs	Milestone completion criteria	Justification for proposed criteria
RM10	The infrastructure to be retained meets the conditions of the signed agreement with Baralaba South	RA7	• Monitoring has been undertaken in accordance with the signed agreement and all retained infrastructure is in accordance with the signed agreement; and • Final landholder accepts responsibility for infrastructure in accordance with a formal written agreement.	Landholder agreement, transferring ownership and liability of the site agreed and signed by all relevant parties.

1. In situ remediation involves removal of the affected soil, which is then buried in the pit. Underlying soil is tested with contaminants to ensure all contaminated soil has been removed. The location of contaminated soil and remediation activities are recorded internally.
2. AQP means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relating to the subject matter using the relevant protocols, standards, methods, or literature.
3. Department of Science, Information Technology and Innovation and Department of Natural Resources and Mines (2015) Guidelines for Agricultural Land Evaluation in Queensland (Second edition), State of Queensland or later version. https://www.publications.qld.gov.au/dataset/qld-agricultural-land-evaluation-guidelines/resource/d6591386-08e2-453f-a6fa-dff2a756215f.
4. The method for satellite-derived fractional vegetation cover is outlined in Section 3.7.3.3.
5. Erosion classification framework:

Erosion classification	Minor	Moderate	Severe
Sheet erosion	Shallow soil deposits downslope	Partial exposure of roots; moderate soil deposits downslope, etc.	Loss of surface horizon; root exposure, etc.
Rill/gully erosion	<15 rills and <0.3 m deep	15-30 rills and < 0.3 m deep	> 30 rills and/or any > 0.3 m deep.
Tunnel erosion	Absent	Absent	Present
Mass movement	Absent	Absent	Present

Table 11: Justification of timeframes for achievement of each milestone

Rehabilitation milestones	Applicable RA	Summary of rehabilitation / monitoring methodology	Associate risks to achievement of PMLU	Risk level assigned	Assigned timeframe (years)	Justification for assigned timeframe
RM1: Infrastructure decommissioning and removal	RA3 RA4 RA5	Infrastructure decommissioning and disposal	No risks were associated with infrastructure decommissioning	Class I	1	Some mine infrastructure (e.g., haul road) will be required to facilitate rehabilitation activities and will therefore not become available for rehabilitation for several years post-closure. Landholder consultation will take place to identify any infrastructure to be retained. Decommissioning activities are considered low risk; therefore, decommissioning is expected to take less than 1 year.
RM2: Management of contaminated land status	RA3 RA4 RA5 RA7	Remediation or removal of contaminated material (where applicable). Determination of contaminated land status by appropriately qualified person.	Contaminated land	Class I	1	A contaminated land assessment will be undertaken. If contaminated land is identified, remediation works will be undertaken promptly. Given the low risk classification associated with this activity, the timeframe assigned is 1 year.
RM3: Landform development (reshaping/ push to void/ profiling/ cleaning/ clearing)	RA1 RA2a RA2b RA3	Earthworks and reprofiling. Geotechnical assessment.	Erosion	Class I-II	2	As land becomes available, all bulk earthworks and installation of drainage features will be completed to design specifications and assessed as geotechnically stable by an AQP. Given the size of some areas as they become available and the medium risk associated with slope failure, a timeframe of 2 years is assigned to allow for earthworks, assessments and remediation measures that may be required.
			Slope failure	Class III		
			Excessive slope	Class I		

Rehabilitation milestones	Applicable RA	Summary of rehabilitation / monitoring methodology	Associate risks to achievement of PMLU	Risk level assigned	Assigned timeframe (years)	Justification for assigned timeframe
RM4: Surface preparation (topdressing, contour ripping, soil amelioration)	RA1 RA3 RA4 RA5	Surface preparation (topdressing, contour ripping, soil amelioration). Soils health assessment.	Insufficient topsoil resources	Class II	1	Following bulk all bulk earthworks, application of cover material (as required). Given the requirement for a soils health assessment, and the need to coordinate works with climatic seasons and the moderate risk associated with this milestone, the timeframe assigned is a year.
RM5: Revegetation (seeding and / or planting)	RA1 RA3 RA4 RA5	Revegetation with seed and / or tube stock consistent with the PMLU. Rehabilitation monitoring 12 months from planting.	Insufficient density of/ diversity of vegetation for target PMLU Erosion	Class I	2	The seeding and / or planting of suitable target species is classified as low risk, however, there is an inherent risk associated with the impact of natural weather events. The assigned timeframe of 2 years allows time for vegetation establishment and monitoring of maintenance works/ repair that may be required following rehabilitation monitoring conducted 1-year post-seeding.
RM6: Achievement of surface requirements (grazing PMLU) to a stable and sustainable condition	RA1 RA3 RA4 RA5	Vegetation monitoring and maintenance, as required. Water quality monitoring. Erosion and stability analysis. Pasture productivity assessment. Soils and land suitability assessment. Health and Safety Assessment.	Insufficient vegetative cover required to achieve landform stability or sustain PMLU. Initial/ongoing erosion resulting in dispersive soils, long-term stability and downstream water quality impacts. Presence of pests and weeds above what is expected for the PMLU.	Class II Class II Class I	10	Achievement of target revegetation criteria is dependent on good climatic conditions and soil preparation. The target ground foliage cover of ≥ 70% is expected to take approximately 5 years considering the soil and climatic conditions of the site. Target ground foliage cover is required for a period of four consecutive years. Allowance is made for poor growing seasons and extreme events such as droughts or storms that will negatively impact vegetation establishment, and consequent maintenance actions that may be required. Achievement of a sustainable and non-polluting target PMLU is dependent on establishment of mature, self-

Rehabilitation milestones	Applicable RA	Summary of rehabilitation / monitoring methodology	Associate risks to achievement of PMLU	Risk level assigned	Assigned timeframe (years)	Justification for assigned timeframe
			Downstream water quality impacts resulting from insufficient vegetation cover.	Class I		sustaining vegetation demonstrated through multiple seasons of growth and water quality demonstrating achievement of completion criteria. The timeframe of 10 years from revegetation considers the moderate risk and the time necessary for establishment of mature, self-sustaining vegetation.
			Remaining hazards are assessed above 'low risk'.	Class II		
			Failure to achieve Land Suitability Class IV classification.	Class II		
RM7: Achievement of surface requirements (high wall 'natural ecosystem' – habitat and ecosystem services PMLU) to stable and sustainable condition	RA2a	Water quality monitoring. Flora and fauna monitoring. Safety and geotechnical studies. Erosion analysis.	Access to the void due to insufficient / failure of safety measures	Class III	10	A timeframe of 10 years has been assigned due to the inherent risk associated with the highwalls and to allow for groundwater inflows into the void. Completion criteria require the demonstrate the presence of fauna use, which will also be reliant on the progress of RA2b.
			Pit wall collapse	Class II		
			Extreme erosion potential from batters or exposed faces (tertiary)	Class II		
			Insufficient usage of the highwall as fauna habitat	Class I		
RM8: Achievement of surface requirements (pit lake PMLU) to stable and sustainable condition	RA2b	Water quality monitoring. Flora and fauna monitoring. Safety and geotechnical studies. Erosion analysis.	Access to the void due to insufficient / failure of safety measures	Class III	25	A timeframe of 25 years is assigned to allow for groundwater inflow into the final void and associated monitoring to be undertaken as water levels increase. Ecological succession is a timely process, and an increased timeframe is assigned to allow for uncertainty and moderate risk associated with trends indicating the system is self-sustaining.
			Pit wall collapse	Class II		
			Extreme erosion potential from batters or exposed faces (tertiary)	Class II		

Rehabilitation milestones	Applicable RA	Summary of rehabilitation / monitoring methodology	Associate risks to achievement of PMLU	Risk level assigned	Assigned timeframe (years)	Justification for assigned timeframe
			Insufficient usage of the void as fauna habitat	Class I		
			Poor water quality	Class II		
			Release of void water to the environment	Class II		
RM9: Drainage channel achievement of final PMLU to stable and sustainable condition	RA6	Construction of drainage channel as per certified design. Constructed as per design certification. Geotechnical assessment determining long-term stability. Monitoring of drainage channel to demonstrate channel is performing as designed.	Risk of barriers to fish passage	Class III	4	A timeframe of four years has been assigned due to the medium risk associated with design failure, the requirement to observe the operational functionality of the drainage channel and allow for subsequent reparation activities as required. High flow events are dependent on significant rainfall events, where the timing of rainfall can be unpredictable in the long-term.
			Erosional risk due to flow velocities higher than predicted			
			Inadequate design			
RM10: The infrastructure to be retained meets the conditions of the signed agreement with Baralaba South	RA7	Infrastructure agreement.	-	-	1	Not assessed at this time as currently there are no landholder agreements for retained infrastructure. The RA has been developed to cover retained dams, diversion drains, roads and buildings within the MIA, as it is anticipated future landholders may request to retain these structures

3.5.4 Final landform design

The final landform design and the sequencing of landform development (and hence the resultant rehabilitation milestone schedules) are influenced by the nature of the mining practices proposed, including the use of infrastructure and the proposed mine progression. The final landform has been designed with consideration for the pre-mining landscape, proposed PMLUs and post-mining visual amenity. The final landform design was determined from:

- analysis of the existing topography of undisturbed areas;
- flood modelling;
- in-pit and out-of-pit waste rock emplacement planning; and
- landform shaping and rehabilitation post-mining.

The final landform has been designed to be consistent with the requirements for ALC 3, with similar topography, where possible, to the surrounding area.

The final landform will be shaped to support the PMLUs of improved pasture grazing and natural ecosystem. The specific methods of construction and design parameters are described in the following subsections. Waste rock emplacements will be recontoured to form maximum slopes of less or equal to 9^{o}. The final void will be left in a geotechnically safe condition with high wall slopes of 40^{o} and will support a natural ecosystem. Bunds/fencing will be constructed around the crest of the void to prevent access by cattle, vehicles, and humans. The proposed final landform will support slopes of the surrounding environment; a visualisation of the final landform is provided in Figure 30.

3.5.4.1 Waste rock emplacement design

A single out-of-pit waste rock emplacement adjacent to the mining pit with elevations of 60 m above the existing landform, and typical slopes of less than or equal to 9° will be remain in the final landform. As operations progress, waste rock will be progressively placed in-pit, commencing from the northern end of the pit, and progressing to the south. Overall slope lengths are typically less than 470 m with contour banks installed to improve landform stability. Slopes in between contour banks are not expected to exceed approximately 235 m.

The in-pit WRE has been designed to maximise usable area and is comprised of relatively level areas and occasional short, stepped slopes of up to 10°.

The detailed landform design will be similar to that utilised for Baralaba Central Mine, incorporating the following components:

- maximum slope gradient of approximately 9° for elevated landforms;
- installation of contour banks at a maximum of 235 m intervals to reduce the slope length; and
- terraced profiles to reduce the requirement for contour banks and engineered drains.

Figure 30: Final landform 3D visualisation – looking south, if MIA pad retained (Minserve)

3.5.4.2 Landform long-term stability

Landform stability is achieved by utilising an appropriate slope length and angle, suitable material selection to support the PMLU and early establishment of ground cover for erosion mitigation. The final landform is expected to be stable and suitable for the proposed PMLUs of improved pasture for grazing and natural ecosystem.

An erosion analysis using the Watershed Erosion Prediction Project (WEPP) was undertaken for the waste rock emplacements to inform final landform stability. WEPP modelling considers four key data points: climate information, soil profile, land use management and slope design. Climate parameters were modelled from the area using CLIGEN 5.3, with input data sourced from SILO (daily rainfall, maximum and minimum temperature, solar radiation, and maximum relative humidity) at coordinates 149.85, -24.25; alongside on-site weather station (rainfall intensity) data. The following three soil management units comprising the majority of recoverable topsoil resources (refer section 3.5.8) were assessed:

- Langley SMU;
- Greycliffe SMU; and
- Thalberg SMU.

Six soil samples from the key SMUs were selected for analysis based on the detailed compositional analysis provided in Table 22 of the Soil and Land Suitability Assessment (Appendix E) along with those which failed the SCL site criteria as per Table 8 of the Soil and Land Suitability Assessment (Appendix E) to represent worst case scenarios. The following samples were selected for analysis:

- Langley Sample 114;
- Langley Sample 132;
- Langley Sample 139;
- Greycliffe Sample 175;
- Thalberg 158; and
- Thalberg 150.

In creating the land use management parameters for WEPP modelling, cover classes were established at 5% intervals ranging from 0% to 100%. Vegetation cover was fixed at these percentages throughout the WEPP simulations, such that consistent cover was maintained across the 100-year simulation period without growth or decay.

Slope design specifications used in the analysis were sourced from the proposed final landform design, as shown in Figure 31. The slope selected for analysis represents the maximum slope design in the final landform, where the top of the slope is approximately 159 mAHD, the bottom of the slope approximately 89 mAHD, equating to a vertical height of 70 m. The slope is a continuous decline over approximately 470 m, resulting in an approximate slope gradient of 1:7 (15%).

Initial WEPP analysis identified that 90% vegetation cover would be required to achieve a tolerable erosion rate of 10 t/ha/yr (Figure 32). As a result, additional analyses were undertaken to simulate the use of contour banks along the slope, reducing the overall slope length by 50% and 25%, equivalent to slope lengths of 117 m and 234 m respectively.

Figure 31: WEPP analysis, modelled slope location

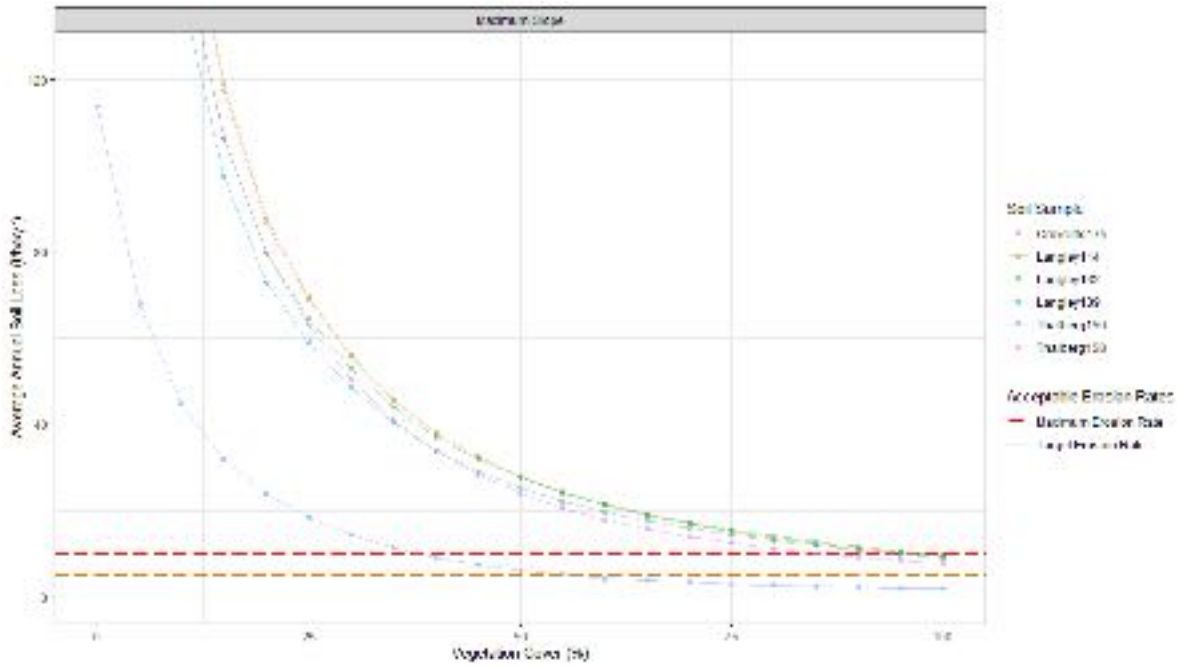

Figure 32: Average annual soil loss (t/ha/yr) and vegetation cover, maximum slope

882 100-year WEPP iterations were run, covering the range of soil samples and land use management profiles identified above. To determine the worst case, maximum potential erosivity of the slope, the average annual soil loss, expressed in tonnes per hectare per year, for each iteration was calculated and assessed against a target and maximum erosion rate. For mining rehabilitation, a maximum tolerable erosion rate of 10 t/ha/yr is generally considered acceptable (Lu 2001) and was adopted for this analysis. The results of the analysis are shown in Figure 32, Figure 33 and Figure 34.

Target erosion rates of less than 10 t/ha/yr can be achieved at the following minimum ground cover percentages under the conditions indicated:

- 75% vegetation cover is required for a slope length of 234 m (50% of the maximum slope length) (Figure 33); and
- 60% vegetation cover for slopes of 117 m (25% of the maximum slope length) (Figure 34).

Results of the WEPP analysis indicate that long-term erosional stability can be achieved when utilising contour banks to minimise slope length coupled with a vegetation cover of greater than 60%, considered to be a conservative outcome.

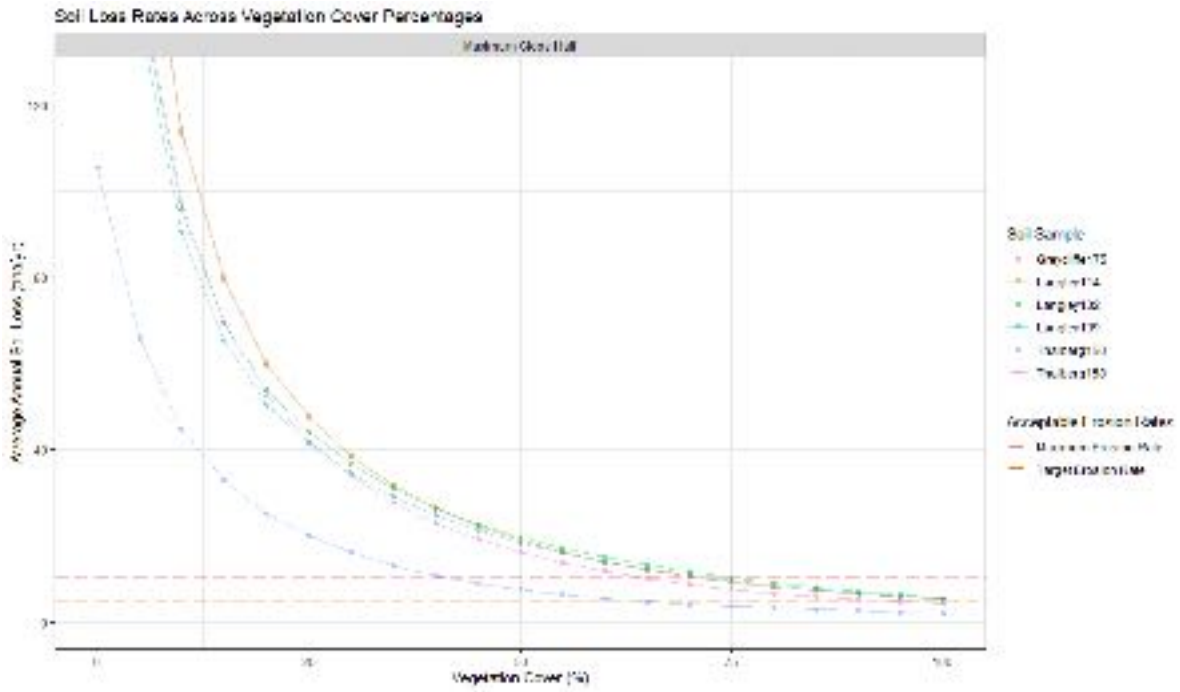

Figure 33: Average annual soil loss rates (t/ha/year) with vegetation cover, 234 m slope

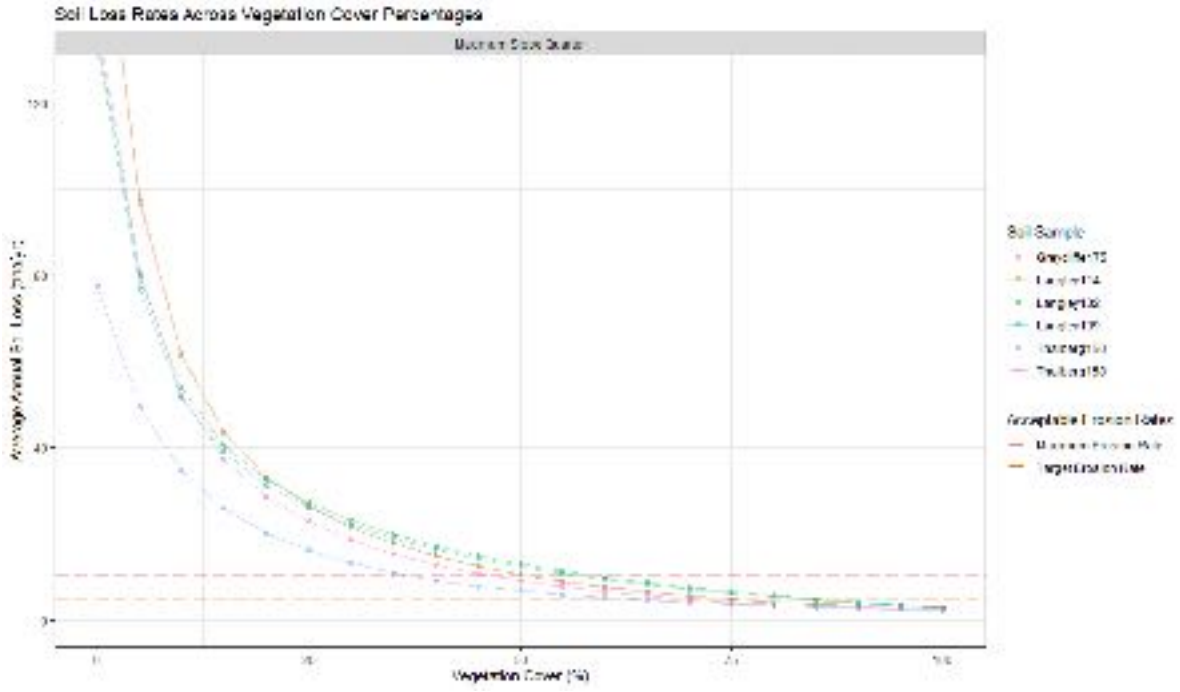

Figure 34: Average annual soil loss rates (t/ha/year) with vegetation cover, 117 m slope

3.5.4.3 Cover design

The geochemical characterisation of waste rock material demonstrates that there is negligible risk of acid mine drainage or saline mine drainage from rehabilitated landforms containing waste rock material. Consequently, a low permeability cover system is not required to successfully rehabilitate waste rock materials to create a safe, stable, and non-polluting landform. Topsoil will be utilised as a growth medium to facilitate vegetation establishment and growth able to minimise erosion risk.

Surface water runoff from rehabilitated waste rock emplacements will be monitored as described in section 3.7.8 to enable the detection of potential acid or saline mine drainage impacts to water quality.

3.5.4.4 Water management

Clean water drains

Two clean water diversion drains to the east of the Project are to remain post-mining and will divert clean water around the south-eastern extent of the void. Details of the drainage infrastructure are provided in Table 12.

Table 12: Clean water drains

Feature	Description	Catchment area (ha)	Size
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
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

Drainage channel

A small drainage channel will be installed at the beginning of operations and will be retained in the final landform to maintain fish passage in the unmapped waterway, herein referred to as 'Tributary 8'. The existing location, that will be disturbed by mining activities, is flat with a poorly defined channel (Appendix E, ESP 2023). The drainage channel will replicate the existing channel grade and channel width at the tie-in locations. The drainage channel will meet the following design criteria:

- A drain length of 390 m.
- Drain longitudinal grade of 0.05%.
- Maximum drain depth of 0.2 m.
- Maximum channel width of 10 m.

Final landform bund

A final landform bund will be constructed around the western, southern and eastern extents of the final void for safety and to provide PMF flood protection to the void. The bund will be constructed with crest elevation equal to the PMF flood height plus a design freeboard allowance. The conceptual design includes foundation stripping and key trench to cut-off high permeable soils. The embankment surface treatment will utilise topsoil, grass seed and hydro mulch, if required.

3.5.4.5 Final void

Design

The mine planning progression for the Project will result in the southern extents of the mining pit remaining as a final void. Highwall slope design for the Project is limited by the interaction of undercutting shears and faults in the underlying geology (Cartledge 2023). A kinematic and slope stability analysis was undertaken for the Project and the following design recommendations proposed:

- 30 m bench height;
- 65° bench angle; and
- 15 m wide berms.

The surface area of the final void has been minimised as far as practical, while maximising the area capable of being rehabilitated to a grazing landscape. A conceptual analysis of blasting and reshaping the highwall was undertaken which indicated that reshaping of the highwall to a slope of approximately 25% would result in a 14% loss of grazing productivity, future resource and an increase in-pit lake surface area (Figure 35).

It is noted that geotechnical investigations will be refined during the mining phase based on operational experience and collated data. Current advice for the final void is that overall slope gradients at closure should be at approximately 40° and 32° for highwalls and low walls respectively (Cartledge 2023). The final residual void design will adopt recommendations to ensure that it remains geotechnically stable following closure. The proposed final void design parameters are outlined in Table 13.

Upon completion of final void earthworks in a given area, a survey will be undertaken by an AQP to confirm that the area has been shaped in accordance with completion criteria.

The final void will be left in a geotechnically stable condition. A final landform bund will be constructed along the crest of the final void to prevent vehicular access. Fencing may also be used to restrict further access to the final void by unauthorised people, wildlife and/or stock.

Table 13: Projected final void landform design

Feature	Approximate footprint area (ha)	Approximate depth (mAHD)	Overall maximum slope (degrees)	Approximate overall maximum slope length (m)
Post-mining landform below pre-existing natural topography (low wall)	46.4[2]	<100	40°	340
Highwall	37[1]	30-90[2]	32°	340
Void floor	7	-205	n/a	n/a
Anticipated pit lake[1]	89	32	n/a	n/a

Notes: [1] water containment area at equilibrium
[2] to pit lake equilibrium water level

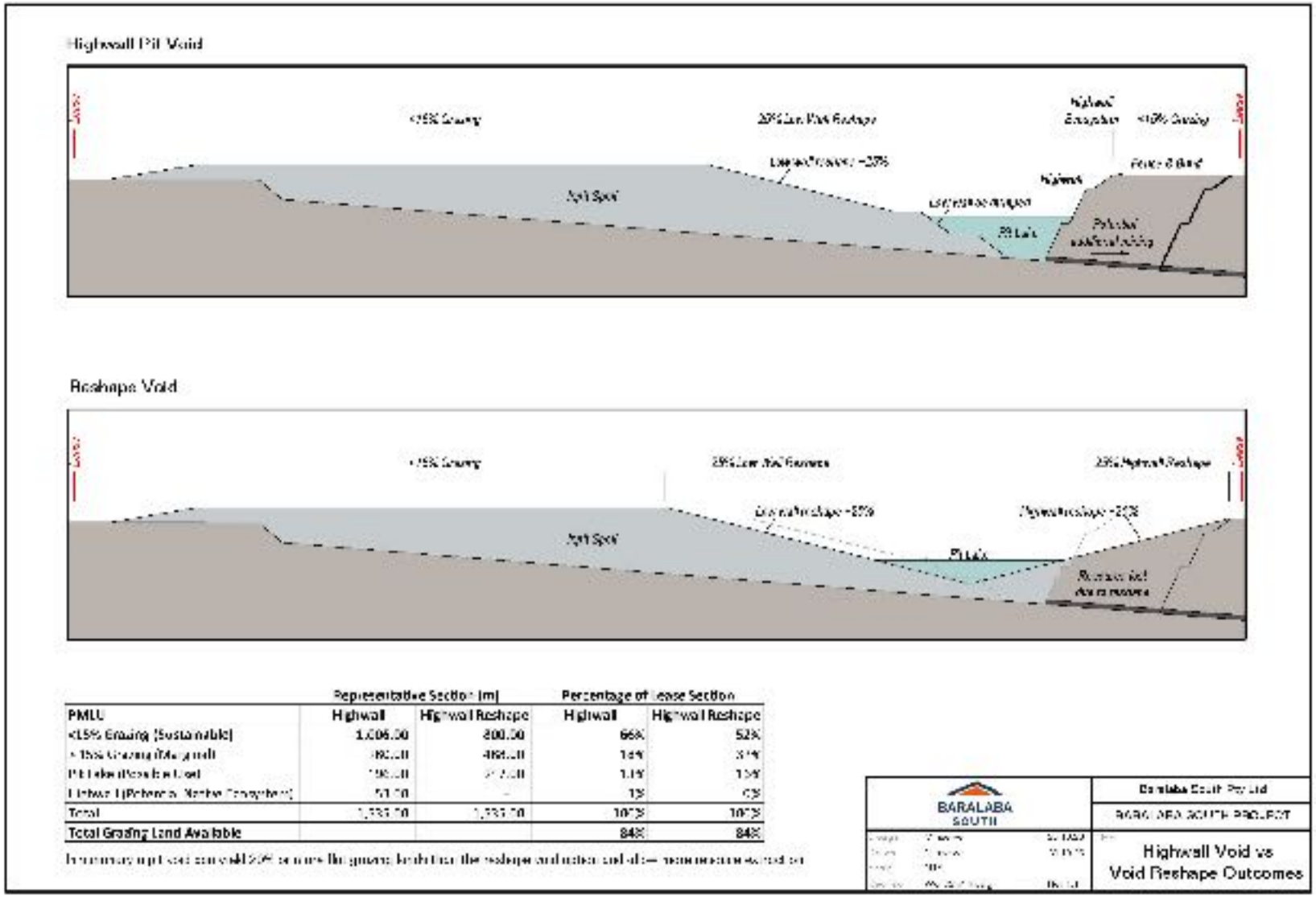

Figure 35: Highwall reshape analysis

Predicted long-term void stability

Slope design for the final void has been informed by a geotechnical prefeasibility study which recommended that during operations, design parameters should not exceed 45° slope, 15 m bench height, and a 5 m berm for alluvium, and a 50° slope, 20 m bench height and 10 m berm for weathered Permian slopes. Highwall slope design is limited by undercutting shears and faults in the geology and, for stability, operational benches will not exceed an overall angle of 40° (Cartledge 2023).

The slopes developed for the final design are less than those recommended for stability during operations and are consistent with the design criteria utilised at Baralaba Central Mine which has a similar geology.

3.5.4.6 Quality assurance / quality control of the final landform

Quality assurance and quality control activities are included at various stages of the rehabilitation process. These typically include:

- ground survey control of authorised disturbance footprints, waste rock emplacement footprints and elevations, and the locations of water management system components;
- sampling and analysis of placed topsoil for agronomic; and
- requirements for seed certification.

Rehabilitation activities will be carried out in accordance with the applicable methods described in this document and records maintained to demonstrate achievement of rehabilitation milestones. The Monitoring and Maintenance Program (section 3.7) has been developed to ensure that rehabilitation progresses towards achievement of milestone criteria and ultimately relinquishment. Regular rehabilitation monitoring will allow for timely identification of the need for corrective action or maintenance work, and changes to the rehabilitation strategy based on past rehabilitation successes and failures, and as new information becomes available.

3.5.4.7 Methodology to verify predicted success of final landform design

The rehabilitation methodologies described for the Project are designed with consideration of site characteristics, the recommendations of technical studies, relevant guidelines, and industry research. Rehabilitation activities will be closely monitored in accordance with the monitoring and management program described in section 3.7. Repair and maintenance activities will be carried out promptly where required. Rehabilitation strategies will be continually refined as the outcomes of earlier rehabilitation events are monitored and evaluated.

3.5.5 Hydrology

3.5.5.1 Operational water management

During the mining operation, water will be managed in accordance with a mine water management system, premised on classifying and separating water based on the anticipated water quality and catchment the water comes into contact with. Project water management infrastructure includes dams, sediments ponds and diversion channels. The water management strategy involves the following key strategies:

- The diversion of clean catchment water around mine infrastructure and disturbed land using diversion drains, minimising the catchment areas reporting to the pit and site water storages.
- water is captured on-site as:
    - ‘mine affected’ water, water that has interacted with mine activity areas and is stored in dedicated storages for re-use on-site;

  - ‘sediment’ water, runoff from disturbed landforms including WREs, cleared areas and areas where revegetation has not yet established which is captured in sediment dams;
  - ‘raw water’, water that is supplied from external groundwater or surface water sources including water supply from streamflow harvesting from the Saxby River and the raw water dam; and
  - ‘clean water’, water that is captured from undisturbed areas or areas where revegetation has established;
- the Project will preferentially use water mine affected water and sediment water for operational water demands; and
- progressive rehabilitation / stabilisation on-site to reduce the generation of sediment water.

A schematic of the operational water management system is provided in Figure 36.

Mine water storages will contain surface water runoff and groundwater collected within the mining pit, recycled water from the coal wash plant, runoff from the MIA and excess water in the reject material drying cells.

Sediment dams are proposed as the primary mechanism to manage runoff from overburden and disturbed areas, which may have elevated concentrations of suspended solids. Water stored in the sediment dams is expected to contain elevated concentrations of suspended solids only following rainfall events. Seepage from these structures is not expected to contain dissolved concentrations of contaminants that could have a significant impact to the receiving groundwater or surface water environment (Appendix E, Engeny 2023a). Overflows from the sediment dams are not expected to contain concentrations of contaminants that could have a significant impact to the receiving environment.

Diversion of clean catchment to clean water storages will reduce the harvest of clean runoff in the mine water management system. Two clean catchment diversions located on the eastern side of the MLA are proposed and will direct runoff from a sub-catchment of Mount Ramsay around the Project. A third clean water channel is proposed to divert water in Tributary 8 around the proposed out-of-pit dump to ensure the drainage path is unaffected by the Project.

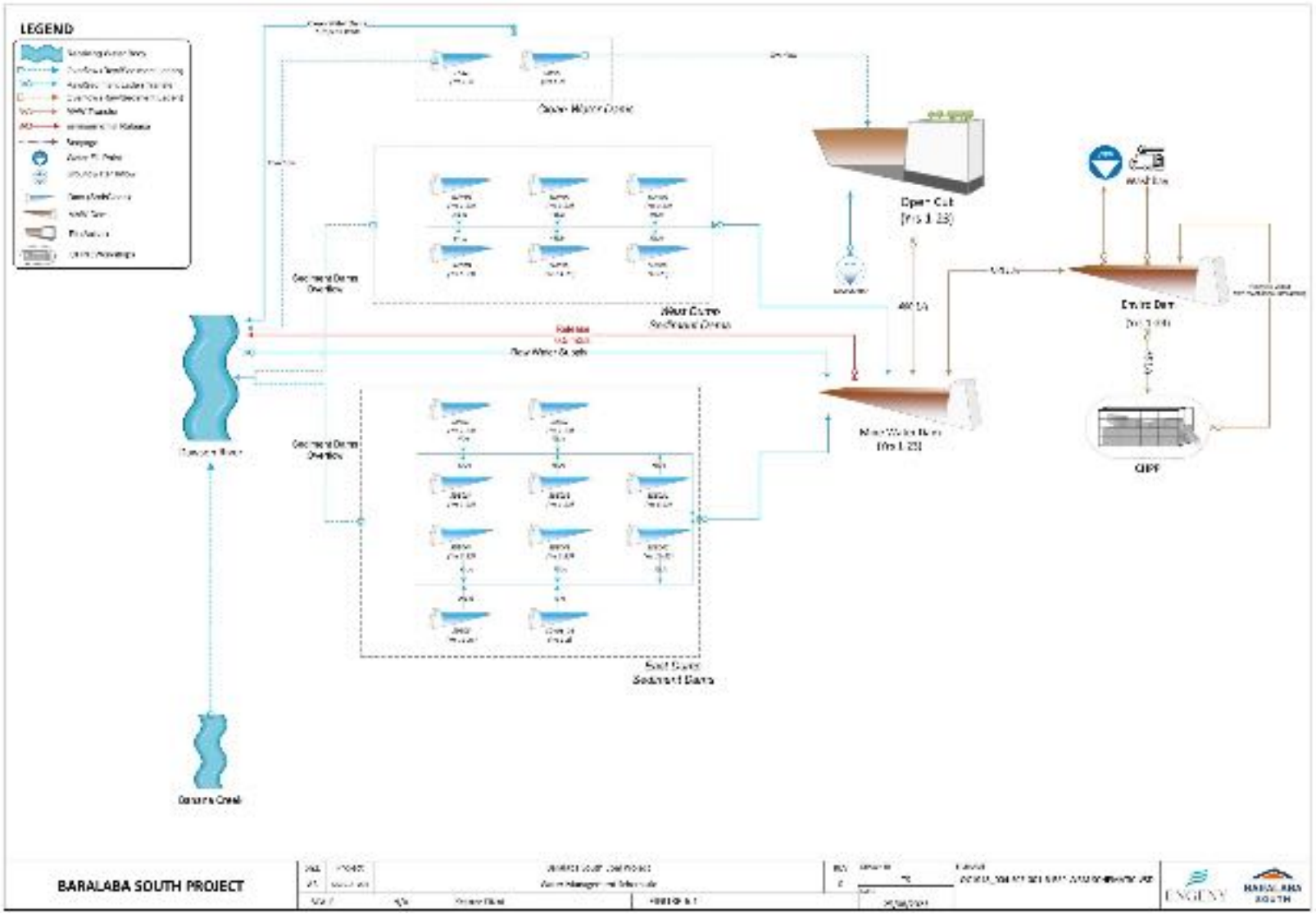

Figure 36: Operational mine water management schematic

3.5.5.2 Closure water management

All water management infrastructure will be removed and rehabilitated to the PMLU of cattle grazing following the cessation of mining activities, with the exception of the clean water diversion drains and the drainage channel. The clean water diversion drain will be retained in the final landform and is further described in section 3.5.4. The final landform bund will be constructed at the end of mining to provide PMF flood immunity to the final void.

To ensure water quality (salinity) in the final void is able to sustain the proposed PMLU, a catchment area of 721 ha of clean water (including 300 ha of waste rock emplacement) will be diverted into the void through modification of the waste rock emplacement surface to increase rainfall infiltration and seepage through the backfilled void. Clean water on the surface of the waste rock emplacement will be captured through final grading of the landform and targeted infiltration areas consisting of a rock surface layer. Similar drainage processes can be observed in natural landforms, where exposed rock drainages are formed on steeper hills and outcrops.

The final landform catchment is shown in Figure 37 and the final void water balance including catchment scenario assessment is provided in section 3.5.9.

3.5.5.3 Catchment reduction

The final landform will result in a 0.02% reduction of catchment to the Dawson River at the Beckers gauging station. The loss of catchment will not result in any measurable reduction in flow in the river, and will not impact on compliance with the Environmental Flow Objectives for the river (Appendix E, Engeny 2023a). It is predicted that the final landform will not impact the timing of flows at Beckers gauging station.

Modelling indicates that there is a negligible reduction in mean annual flow adjacent to the Project area, this value decreasing with increasing distance downstream. This is not expected to result in impacts to the existing Dawson River channel morphology or riparian vegetation. There will be no discernible impact to the aquatic ecosystems of the Dawson River.

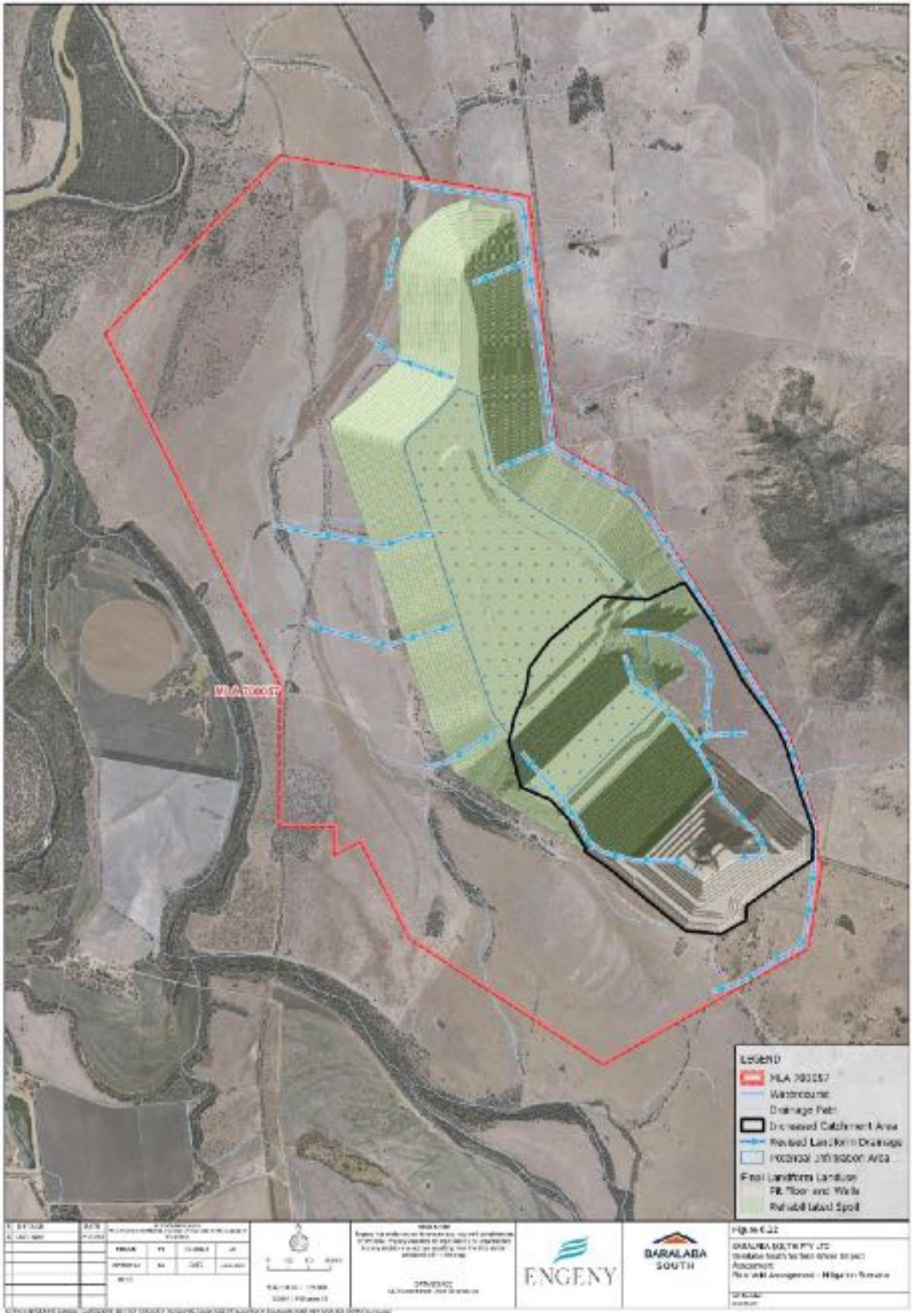

Figure 37: Final landform catchment

Figure 38: 0.1% AEP flood extent and the mine developed case

3.5.5.4 Flooding

The Project is located on the eastern floodplain of the Dawson River, near the confluence of Banana Creek and the Dawson River. The Dawson River is laterally active, subject to seasonal flooding and has a lower floodplain extending 1.5–3 km on either side of the river channel.

The final landform is predominately located outside the 0.1% AEP flood extent (Figure 38).

Waste rock placement in the first year of mining will provide PMF flood protection to mine operations. The final landform bund and earthen embankments adjacent the final void will be constructed and will provide PMF flood protection to the final void in the final landform.

The flood modelling assessment undertaken by Engeny (2023b) modelled flood level afflux, flood velocity, flood inundation duration, and stream power and shear stress for the existing case and final landform, for rainfall events ranging from 20%–0.1% AEP, as well as the PMF case. Figure 39 and Figure 40 show the depth of local flooding under post-closure conditions for the 1% AEP and PMF respectively. The final landform will redirect floodwater along the north-western corner of the mine footprint and the final landform bund, resulting in changes in flood characteristics being isolated to the north and west of the Project (Figure 41).

A summary of the potential impacts of the Project on the flooding characteristics of the site are described below:

- The final void is situated outside the 0.1% AEP flood extent.
- There is no flood depth, flood velocity, peak flow rate or travel time, inundation duration or stream power and bed shear stress impacts from the 20% and 10% AEP flood events.
- For the 2% AEP and 1% AEP flood events, an increase in flood depth of up to 200 mm is predicted in isolated areas between the Project site, the Dawson River and Banana Creek channel.
- There are no flood velocity changes greater than 0.1 m/s outside the MLA boundary, with isolated changes in peak flood velocity changes greater than 0.1 m/s localised to areas immediately adjacent the final landform in a 2% and 1% AEP event.
- The Project will have negligible impact on peak flow rates and travel time upstream or downstream of the Project and will not impact flood inundation duration times up to and including the 1% AEP event.
- Negligible impacts to the HES wetland situated within and adjacent the western MLA boundary as a result of flooding is predicted.
- The Project will not cause any material change in the morphology of the river channel, sediment transport characteristics or erosion potential.
- The final landform will provide PMF flood immunity to the void.

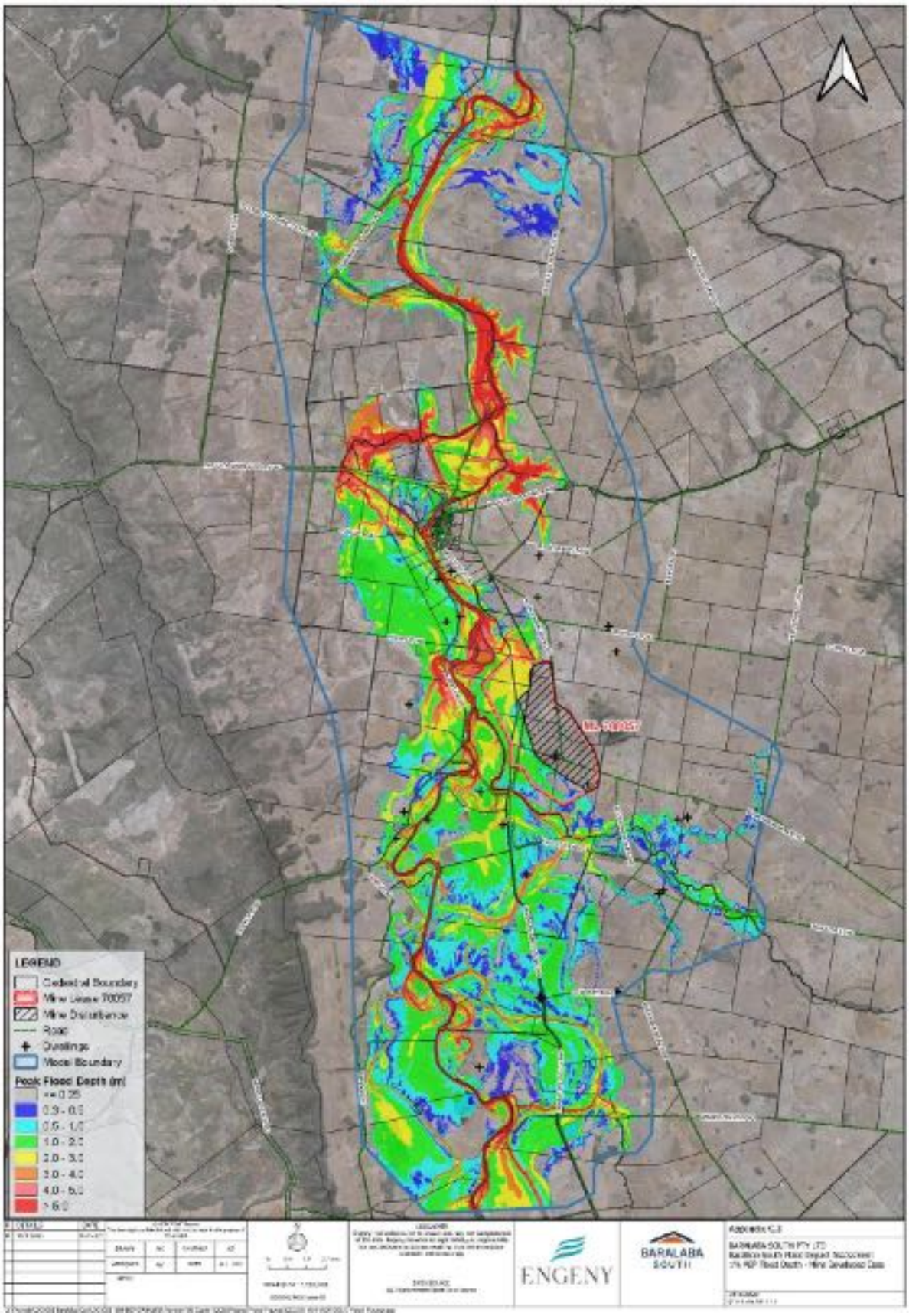

Figure 39: 1% AEP flood depth (post-mining landform)

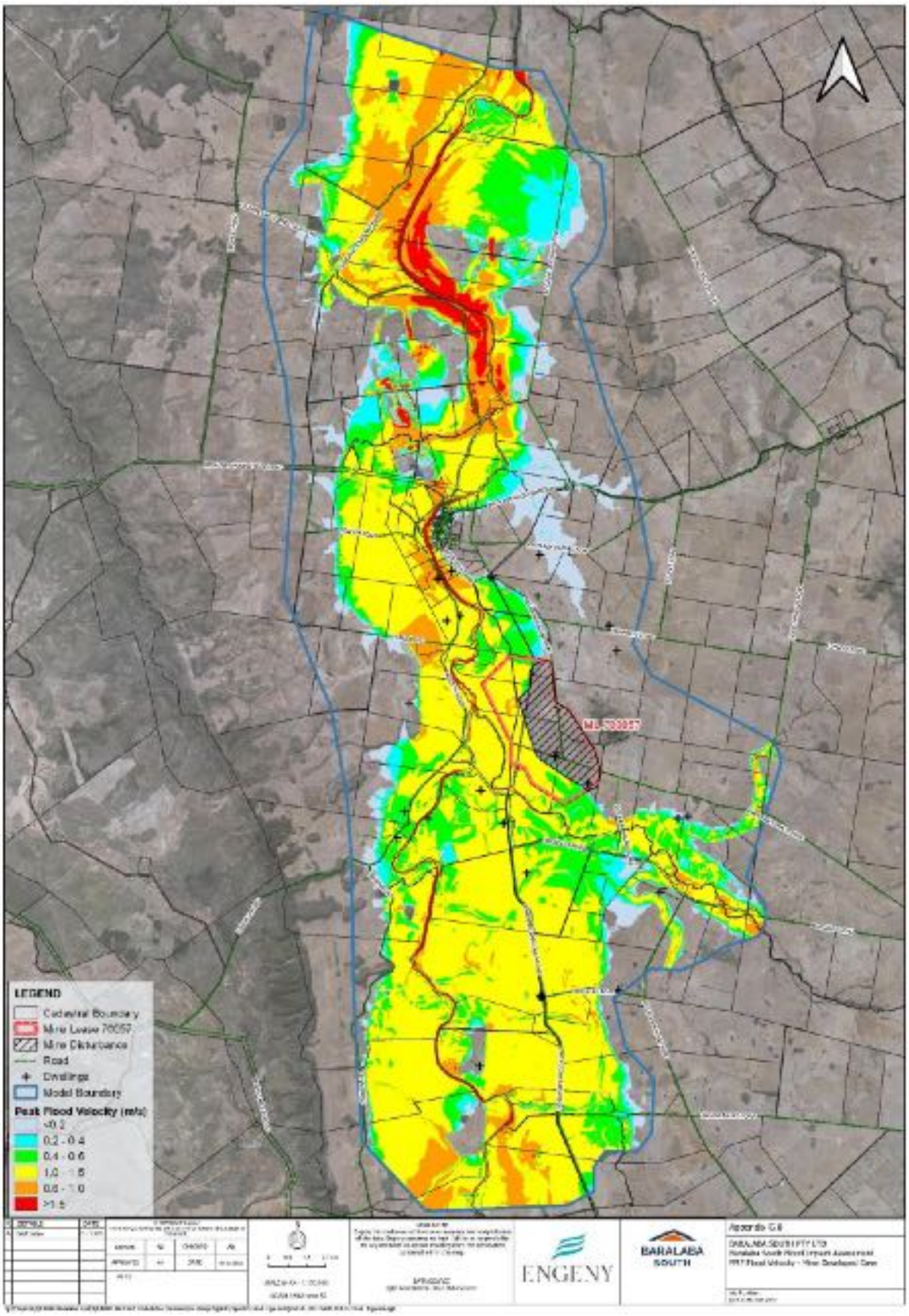

Figure 40: PMF peak flood depth (post-mining landform)

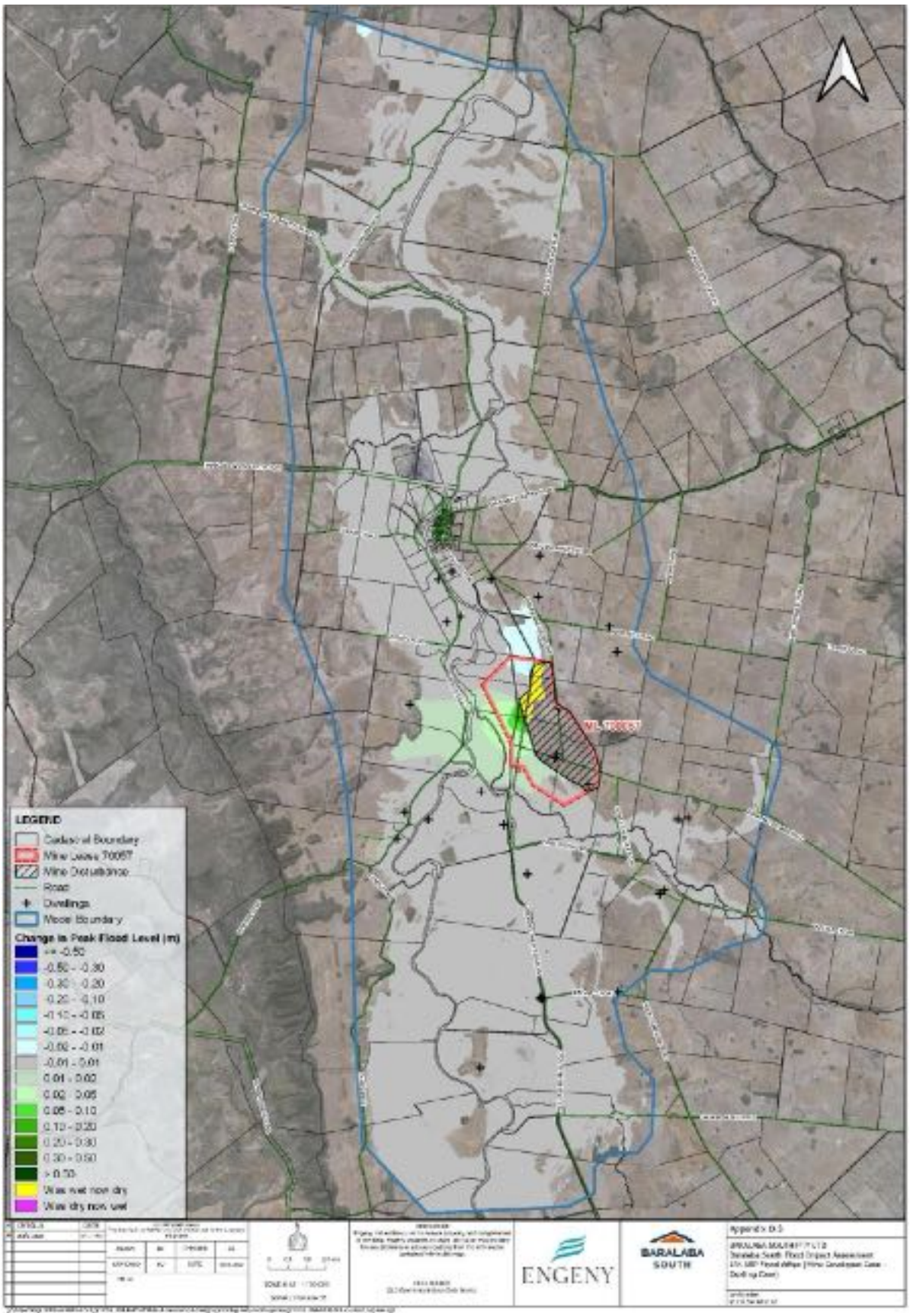

Figure 41: Change in 1% AEP flood depth (existing case – post-mining landform)

3.5.6 Hydrogeology

A conceptual hydrogeological model has been developed for the Project by Watershed HydroGeo (2023). The model has been developed based on a review of past conceptualised and site-specific hydrogeological data (Hydrosimulations 2021; SKM 2014; HydroSimulations 2014; SLR 2019) studies.

The partial backfilling of the open cut pit with waste rock may change the hydraulic properties within the mined extent. Waste rock is of higher permeability compared to the heterogeneously layered rock (alluvium, colluvium, and Permo-Triassic Coal Measures), which would result in enhanced filtration / recharge and potential reductions in localised hydraulic gradients within the waste rock material.

There would be no decline in groundwater levels in the hydrogeological units that constitute the Great Artesian Basin.

Post-mining, the final void would act as a localised hydraulic sink, drawing in groundwater from the more saline Permian strata. Water levels within the void are predicted to recover at approximately 40 m below pre-mining levels. Residual groundwater drawdown of 1 m extends east and 3 km south/south-east of the pit extent.

The predicted equilibrium groundwater inflows to the final void reduce to approximately 0.2 ML/d after several decades post-mining. The corresponding leakage from the Dawson River at post-closure equilibrium is predicted to steadily reduce to be less than 0.13 ML/d which, when compared to the passing flow condition prescribed for the Dawson River of 1,469 ML/day, is less than 0.01%. Leakage from Banana Creek, which only flows following rainfall, is negligible.

Post-mining void recovery is described in section 3.5.9.2.

Impacts on existing groundwater users

The groundwater model predicts the potential groundwater level impacts to the four registered groundwater bores located in the vicinity of the Project. There is no predicted impact at the Riverland 1, Riverland 2 and Webb bores. There is negligible impact on groundwater level/yield at Ross Bore, located 500 m east of the MLA, however, the predicted drawdown is within the natural variation reported for the groundwater table.

Impacts to groundwater dependent ecosystems

A groundwater dependent ecosystem assessment has been undertaken by 3D Environmental (Appendix E) and identified that groundwater dependency within the MLA and adjacent areas is associated with the Dawson River floodplain and is controlled by small discontinuous lenses of sand that are distributed sporadically throughout the heavy clay soils that otherwise characterise the floodplain sediments. On a seasonal basis, the sandy lenses support fresh groundwater resources that are perched above and disconnected from the regional groundwater table. Recharge of the sandy lenses occurs during surface water infiltration associated with overbank flow and intense rainfall events.

Groundwater drawdown associated with mining void inflows is not predicted to impact the ecological function of the GDEs outside the MLA which utilise and rely upon the perched seasonal groundwater resources. There will only be a negligible increase in leakage from Banana Creek due to depressurisation and drainage towards the void (3D Environmental 2023, Appendix E).

The risk of impact to the groundwater dependent ecosystems within influence of the Project is assessed as ‘low’ to ‘insignificant’ (3D Environmental 2023, Appendix E).

Impacts to stygofauna

The Project is not predicted to significantly impact stygofauna due to the alluvium largely being unsaturated within the pit extent and the limited groundwater level drawdown predicted in the shallow groundwater systems. Groundwater level drawdown is largely contained within the Permian coal measures, within which no stygofauna had been recorded during either the 2012 or 2017-19 sampling programs.

Impacts to groundwater quality

There is not expected to be any measurable change in the quality of groundwater as a consequence of the Project. The localised hydraulic sink that will form as mining develops will minimise the potential migration of saline or poorer quality groundwater from within the open cut pit to other areas. Consequently, there will be negligible impacts on groundwater quality in aquifers or surface water quality in downstream waters due to interaction with groundwater.

Runoff and enhanced infiltration / recharge across or within the backfilled waste rock and out-of-pit emplacements is likely to generate neutral to alkaline pH levels, low salinity, and low soluble metal/metalloid concentrations from surface runoff and seepage following surface exposure. Runoff is likely to be less saline than the naturally occurring groundwaters associated with the Permo-Triassic sediments in the area, and is therefore not considered a risk to local groundwater exceeding water quality objectives.

Cumulative impacts

The potential impacts of the Project on groundwater resources have been assessed with regard to the cumulative impacts of the Baralaba North Mine. Consistent with the cumulative modelling and assessments conducted for the BNCOP numerical groundwater model (HydroSimulations 2014), the results demonstrate there is unlikely to be any interference between the Project and the Baralaba North Mine operations to the north. Thus, the predicted cumulative drawdown impacts at private landholder bores, springs, wetlands, groundwater dependent ecosystems and on stygofauna are equivalent to the Project alone.

It has been demonstrated that the predicted baseflow impacts / leakage in the Dawson River downstream of the Neville-Hewitt Weir, given the existence of the Baralaba North Mine, is negligible.

Groundwater level drawdown is not predicted to extend into PLA 1048 and ATP 2027 (held by Westside Mungi Pty Limited). There are no active wells within 30 km and pilot test wells indicate drawdown would be limited to within approximately 1 km of any well. Therefore, any cumulative impacts with activities associated with PLA 1048 and ATP and the Project, is unlikely.

3.5.7 Waste characterisation

A geochemical assessment of potential waste rock materials including the overburden, interburden (waste rock) and potential coal rejects (coal seam roof, floor, and parting) was undertaken (Appendix E, Terrenus Earth Sciences 2023).

3.5.7.1 Waste rock

The Project is predicted to generate an estimated 636 Mbcm of waste rock material over the life of the Project. Waste rock material is expected to be overwhelmingly non-acid forming with an excess acid neutralising capacity and has a negligible risk of developing acid conditions. Given a median EC1:5 value of 302 µS/cm and a 90th percentile value of 505 µS/cm, waste rock is expected to generate a low to medium-low salinity surface runoff/seepage following surface exposure. The total sulphur concentration of potential waste rock is very low, with 92% of all waste rock samples having a total sulphur concentration below 0.1%. Waste rock materials are classified as non-acid forming with a negligible median maximum potential acidity of less than 1 gH_2SO_4/t.

Where highly sodic and dispersive waste rock is unable to be selectively handled / buried, the geochemical assessment recommends that landforms should be constructed with short and low (shallow) slopes (indicatively slopes less than 18% and less than 200 m long) and progressively rehabilitated to minimise erosion. The out-of-pit waste rock emplacement is designed with typical slopes of 9°.

Uncontrolled release of seepage is not expected to occur. Seepage is expected to be of low salinity and neutral to alkaline pH, and as such, will be much less saline than other contributors to groundwater inflow (Appendix E, Terrenus Earth Sciences 2023). It is not expected that seepage from WREs will cause any additional impacts to water quality in the receiving environment.

Surface runoff and seepage from rehabilitated areas will be monitored for water quality parameters including pH, electrical conductivity, major anions, major cations, total dissolved solids, and soluble metals/metalloids as per the water quality monitoring program described in section 3.7.8.

With the implementation of the proposed management and mitigation measures, waste rock materials are regarding as posing a low risk of environmental harm.

3.5.7.2 Coal rejects

Potential coal reject material is expected to generate pH neutral to alkaline, low salinity surface runoff and seepage following surface exposure. Approximately 64% of potential coal reject samples are classified as non-acid forming, and about 10% are classified as potentially acid forming (PAF), with a 'low' to 'moderate' capacity to generate significant acidity. PAF reject materials will be placed within waste rock in out-of-pit emplacement areas, and/or placed in recently completed pit workings (within in-pit emplacement areas). Coal reject identified as PAF will be covered by a minimum of 5 m final thickness of waste rock and will not report to the final landform surfaces.

No separate tailings disposal facility is proposed for the Project. A total of approximately 14 Mt (ROM) (9 Mbcm) of reject material will be generated over the life of the mine—this is equivalent to approximately 1% of the total amount of the mineral wastes to be managed by volume. Rejects will comprise coarse and fine rejects and dewatered fines all reporting to a rejects stockpile for inclusion in waste rock emplacements.

The proposed operational management of coal reject material is not expected to create an environmental risk at closure.

3.5.8 Soil and capping material assessment

Soil from clearing activities for the infrastructure corridor, MIA, open cut pit and waste rock emplacements will generate stripped topsoil able to be used in rehabilitation works. Soil studies conducted for the Project have concluded that topsoils reclaimed from site are suitable for use as plant growth medium for rehabilitation. The soils to be reclaimed for use in rehabilitation topsoiling activities are of high pH and low salinity, are non-sodic, have a variable potential to supply nutrients and range from moderate to high erodibility. A significant majority of topsoil reclaimed for use in the final landform will originate from the Langley SMU, which was assessed as the highest quality topsoil on-site. Some topsoil was identified as having alkaline pH likely requiring fertiliser to compensate for high pH and nitrogen deficiency. Dispersive soils can be treated with gypsum to reduce erosion risk. Prior to topsoil application and seeding in rehabilitation areas, soil nutrient status will be confirmed to identify potential limitations to revegetation success and amelioration methods required.

Subsoils on the Project site that have dispersive, alkaline, and saline properties will be considered unsuitable for use as growing medium. Where subsoil is stripped for the pit, it will be stockpiled for use in rehabilitating the in-pit and out-of-pit WREs. Gypsum may be added to mitigate dispersive properties. Waste rock will be covered with a layer of topsoil approximately 0.2 m thick to provide a growing medium for vegetation.

Based on a minimum recommended topsoil respreading depth of 0.20 m, a topsoil volume of up to approximately 2,675,000 m^3 will be required for rehabilitation efforts over the life of the Project. The soil balance assessment indicates that sufficient topsoil material will be available for rehabilitation efforts, with approximately 5,508,450 m^3 of suitable, recoverable topsoil available.

Topsoil stripping depths and amounts are presented in Table 14.

Table 14: Estimated topsoil volumes available for rehabilitation

Soil management unit	Surface area to be disturbed (ha)	Stripping depth (m)	Estimated volume of recoverable topsoil (m^3)
Isaac	0	0.1-0.15	0
Langley	184	0.1-0.2	184,000-368,000
Bluchers	7	0.1-0.15	7,000-10,500
Stephens	4	0.1-0.15	3,500-5,500
Tralee	35	0.05-0.15	17,500-52,500
Greycliffe	155	0.1-0.2	155,500-310,500
Thalberg	827	00.1-0.65	826,500-5,374,000
Total	**1,211**		**1,194,000-6,120,500**

Topsoil management

To maximise topsoil resources and minimise resource loss due to wastage or deterioration, the following measures will be used:

- Stockpiles will not be located in the flooding zone of drainage lines or areas subject to high winds.
- Long-term stockpiles will be located outside of the active mine path and will be strategically located to assist the sequence of future rehabilitation.
- Topsoil materials will be stored separately from subsoils.
- The height of stockpiles will be minimised. Topsoil will be respread on surfaces to be rehabilitated as soon as possible to benefit from the viability of the topsoil seed bank.
- Stockpile locations will be surveyed, and recorded in a topsoil inventory.
- Topsoil resources will be delineated based on the soil assessments already undertaken, and operational experience.
- A topsoil stockpiling plan will be developed that optimises the placement of topsoil stockpiles to avoid rehandling and that nominates stockpile design parameters including height (typically up to 3 m) and batter angles (no greater than 1 in 3), as well as information on applicable construction practices.
- Revegetation of stockpiles will be undertaken to assist in stabilisation and erosion control.
- Erosion and sediment control methods to be used for areas stripped of topsoil, topsoil stockpiles (including revegetation where warranted) and areas where topsoil is being and has been reapplied, to minimise topsoil loss.
- A topsoil inventory will be maintained for the life of the Project to account for the volumes and locations of topsoil to be progressively stripped, stockpiled, and reapplied. The topsoil inventory will assist in the early identification of potential issues, such as soil balance deficits or poorer quality soils, enabling remedial actions to be planned in advance of mining operations.

3.5.9 Final void

3.5.9.1 Final void hydrology

A final void hydrology model was developed by Engeny (2023a) considering final void inflows (catchment runoff, direct rainfall, and groundwater) and outflows (evaporation). The catchment area of the final void will be defined by the surrounding landform, as shown on Figure 37. Final void water behaviour (final void water level and salinity) has been modelled as part of the Surface Water Impact Assessment (Appendix E, Engeny 2023a) for a 500-year forecast using the final void water balance model for a 'base case' scenario and a 'water quality mitigation' scenario. The 'base case' scenario includes the final landform catchment area of approximately 220 ha, while for the 'water quality mitigation' scenario, the catchment area is increased to approximately 720 ha by increasing the catchment area of the rehabilitated final landform reporting to the void, as well as directing the north-east catchment diversions to the final void.

The model results indicate that:

- For the 'water quality mitigation' scenario, the final void water level is expected to approach an equilibrium level of 32 mAHD after approximately 325 years (Figure 42).
- For the base case scenario, the final void water level is anticipated to approach an equilibrium level of -50 mAHD after approximately 200 years (Figure 42).
- For the 'water quality mitigation scenario', the final landform design pit crest level of 93 mAHD provides a freeboard allowance of 55 m, indicating no risk of overtopping to the receiving environment.
- Continued accumulation of salt is expected to occur as a result of runoff and groundwater ingress combined with evaporative concentration. The final void assessment assumed a constant salt load to the void. This is a conservative estimate, as modelling does not include the decay rate associated with the amount of salt likely to report to the pit areas over time.
- In the proposed final void arrangement, there are no salt outflows, and therefore, modelling indicates pit lake water quality remaining brackish (5,650 mg/L TDS) in the clean catchment scenario 500 years from cessation of mining under the 'water quality mitigation' scenario.
- Under all climate change scenarios, the pit lake level is more than 64 m below the pit crest and will remain as a groundwater sink. The associated risk of contaminant release and environmental harm is insignificant.
- Under all climate change scenarios using the 2090 projections, salinity within the void is predicted to increase due to increased evaporation rates (Figure 43).

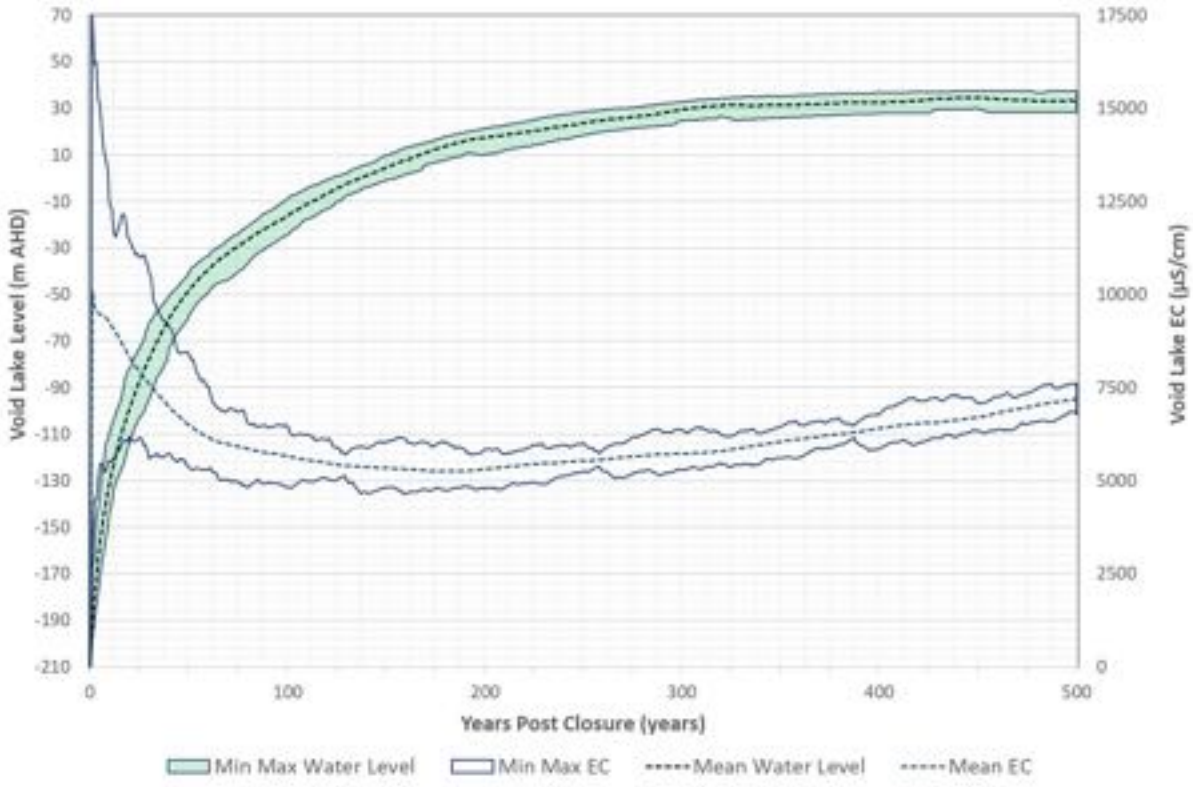

Figure 42: Final void water level – water mitigation scenario

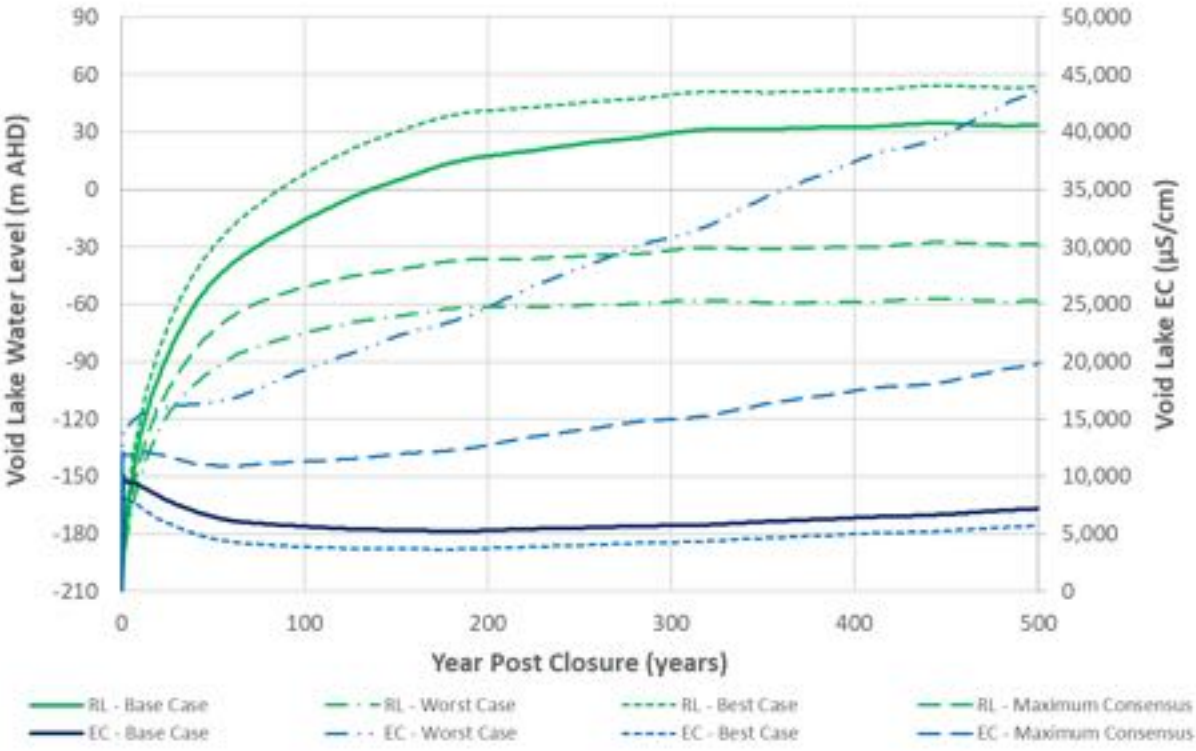

Figure 43: Final void water level – water mitigation scenario: climate change sensitivity analysis

3.5.9.2 Final void groundwater recovery

Simulation of the recovery of void lake water levels has been based on transient lake recovery levels provided by WaterShed HydroGeo (2023). To establish the post-mining equilibrium target groundwater levels in the Project numerical groundwater model, the transient constant head package was used, with the final void lake stage level target set at approximately 32 mAHD. Post-mining recovery has been conservatively simulated without partial backfilling. The post-mining recovery model was then run, and results presented to the year 2,500.

There is predicted to be significant recovery of groundwater levels at the backfilled (northern end) of the Project, nearest the Dawson River and Banana Creek confluence. Groundwater levels are predicted to rise to less than 10 m residual drawdown, and up to 5 m residual drawdown at the northernmost extent of the backfilled pit, when compared to the pre-mine standing groundwater level. Recovery is relatively quick (in the order of a decade) due to the enhanced recharge rates through the backfilled waste rock at the northern end of the Project.

In the Project final void, lake water levels are predicted to recover to about 40 m below pre-mining standing water levels, with the void remaining as a sink. The continued residual take of water from the Permian strata means that there remains a residual long-term drawdown.

3.5.9.3 Flooding

A small portion of the Project is located on the eastern floodplain of the Dawson River, the northern waste rock emplacement, earthen embankment and the final landform bund will mitigate flood flows from entering the void in the rehabilitated landform.

3.5.10 General rehabilitation practice

The rehabilitation practices used at any mining site inevitably evolve as a result of increasing knowledge gained from experience in the following areas:

- early rehabilitation successes and failures;
- weather, subsoils, soils, local flora and fauna and revegetation species; and
- site preparation, seeding practices, the maintenance and repair of previously rehabilitated areas and/or local agricultural practices.

The rehabilitation practices outlined in the following subsections should be interpreted as the general method that will be used, but which is likely to evolve and develop as knowledge is gained from further rehabilitation activities.

While rehabilitation objectives, performance indicators and completion criteria for the Project are detailed at sections 3.5.1 to 3.5.3, from the perspective of operational rehabilitation planning and practice, the following overarching principles are considered key:

- Ensuring that reshaped areas proposed for rehabilitation meet the required landform design principles, that prepared areas meet the rehabilitation design specification for the area, and that local site drainage has been considered and surrounding areas graded to mitigate any rainfall runoff from adjacent areas to run-on to prepared rehabilitation areas.
- Topdressing materials, final surface preparation methods and soil amelioration activities have the objective of supporting vegetative growth.
- Revegetation species selection, seeding and/or planting methods, and fertiliser applications target rapid vegetative ground cover effective at mitigating soil erosion, during the period of initial revegetation when areas are most at risk.
- Ongoing monitoring and maintenance are used both to assess rehabilitated area performance against completion criteria as well as to feedback to, and update rehabilitation practices; and to identify

maintenance or modification requirements such that rehabilitation areas are proceeding along a trajectory towards the designated PMLU.

Erosion management is a key rehabilitation consideration for the Project due to the presence of some dispersive soils and waste rock material. Erosion potential will be managed through a combination of landform design, placement of material, soil ameliorants and vegetation.

There will be circumstances when rehabilitation practices outside of those discussed within this PRC Plan are utilised. For example, discrete areas of steeper slopes, rehabilitation failures or other scenarios that may necessitate more intensive rehabilitation practices. These circumstances will be identified, assessed and rehabilitation activities planned as required.

3.5.10.1 Waste rock emplacement

Given the low geochemical risk associated with waste rock materials and resulting low risk arising from any seepage through the structure, the top surfaces of the WREs are proposed to be internally drained with occasional clay-lined water storages constructed in areas proposed for a grazing PMLU. This will reduce the total volume of stormwater runoff draining via rehabilitated slopes. Surface drainage from long regraded rehabilitation slopes is intended to be managed with the limited use of contour banks by targeting sufficient surface roughness through contour cultivation and good vegetation cover.

Prior to dumping waste rock, adequate floor preparation is necessary to avoid dump foundation failures. Weak formations will be removed (i.e., topsoils) and surface grading carried out. Where possible, free-draining, and good quality waste rocks (non-carbonaceous interburden units) will be placed on the bottom of the WRE (Appendix E, Terrenus 2023).

3.5.10.2 Coal rejects

Coal rejects will be covered by a minimum of 5 m final thickness of waste rock and will not be positioned proximate to the final landform surface. The proposed management of coal rejects is not expected to create an environmental risk at closure.

3.5.10.3 Final landform bund

The final landform bund will be constructed using non-dispersive, low permeable engineered fill from the box cut or won from borrow pits on-site. The batters and surrounding disturbed areas will be revegetated with grasses to stabilise the structure and prevent generation of sediment-laden runoff.

3.5.10.4 Final void

Free dig excavation is anticipated for the alluvial cover sediments using hydraulic excavator equipment. Drill and blast methods will be required for excavation of weathered and fresh rock. For final walls, a combination of pre-splitting and trim blasting will be utilised as required to mitigate damage and achieve the required slope angles. Pre-splitting allows for isolated rock to be blasted from the surrounding rock mass using lightly charged, closely spaced holes to fracture a plane along a required design profile. Trim blasting is used to achieve a smooth wall with minimum overbreak using a light charge and a well distributed row of holes along the final excavation line. Alternative blasting techniques may be trialled once initial mining is being undertaken, within interim walls.

Depressurisation of slopes will be undertaken as required, in the form of vertical drains using production sized drilling rigs. At each berm the following will be considered:

- vertical drillholes to intersect the Sub Dirty coal seam underlying bench and final pit floor. In areas above the Sub Dirty outcrop in the footwall, a minimum 30 m drilled depth will be used;
- vertical holes drilled at 15 m horizontal centres across each berm, spacing may differ depending on flow rates; and

- berms designed so that surface water cannot pond for long periods of time.

For retained highwall or low wall slopes or where interspersed parcels of native vegetation are proposed for visual relief or other purposes, direct seeding of a mixture of endemic native species will be undertaken. Selected flora species will be used with the intention of providing a suitable food source and shelter for native fauna.

3.5.10.5 Surface preparation

The final landform will be reshaped and profiled according to the final landform design and specifications. The approach to surface preparation will involve:

- Identification of the topsoil resource to be utilised for a given rehabilitation area, and the carrying out composite soil sampling and agronomic laboratory analyses. Topsoil will be sourced predominantly from the Langley SMU, which was identified as the highest quality topsoil on-site.
- Determination and procurement of type and quantity of ameliorants that would be beneficial for the topsoil resource (if needed).
- Topsoil should be placed by scraper; or alternatively to the profiled slope and spread by dozer or grader to achieve the desired thickness of 0.2 m (+/- 0.1 m).
- Following spreading of topsoil, the dump surface should be ripped (dozer or grader) to a depth of between 0.04–0.05 m with a distance between rip lines of approximately 1 m, to encourage infiltration of water for plant growth.
- Seeding of topsoil will occur as soon as possible to encourage plant growth and prevent soil loss by erosion.

3.5.10.6 Topsoil

Stripped topsoil will either be directly placed on rehabilitation areas (where practicable) or stockpiled. Where possible, stripped topsoil will be stockpiled to prevent mixing of different SMUs, and stockpiles will, have a maximum average height of 3 m to allow oxygen to diffuse through the stockpile; maintaining the viability of seed and micro-organisms.

3.5.10.7 Growth media and ameliorants

Topsoils are generally suitable for supporting plant growth; however, some topsoils were identified as having alkaline pH with dispersive properties (e.g., Thalberg), likely requiring ameliorants to compensate for high pH and nitrogen deficiency. Prior to topsoil application and seeding in rehabilitation areas, soil nutrient status will be confirmed, and fertiliser applied at recommended rates. Dispersive soils will be treated with gypsum to reduce erosion risk.

3.5.10.8 Revegetation

The primary objective of the revegetation plan is to reinstate self-sustaining vegetation communities suitable for the target improved pastures for grazing and natural ecosystem PMLU. Plant species have been selected with the aim of restoring grazing land and to provide a source of nutrients and carbon input to the pit lake. The introduction of carbon and nutrients to the pit lake catchment will assist in the ecological progression of the lake (Lund and Blanchette 2021).

Rehabilitation areas will be revegetated once final surface preparation works have been completed. It is possible that some regeneration may occur from seed stock retained in respread topsoil, however, this is not a reliable method of revegetation. Individual native shrubs and trees will propagate from the natural seedbank and adjacent undisturbed areas, these trees will be retained as shade vegetation.

For the PMLU of improved pastures for grazing, direct seeding of selected pasture species will be conducted. A provisional seed selection for a grazing PMLU has been developed based on terrestrial field surveys for the Project EIS which indicated that the species listed in Table 15 were prevalent in the ground layer of cleared areas and are utilised by cattle. Recommended seed sowing rates have been selected based on recommendations from the Department of Agriculture and Fisheries (2017), relevant guidelines (DAFF 2013, Australian Government 2016) and seeding rates utilised at the Baralaba North Mine. A total target seeding rate of 10–20 kg/ha will be utilised. Higher seeding rates, or oversowing, may be utilised for steeper slopes to aid in erosion protection and seed bank development.

Final seed selection and seeding rates will be based on recommendations by local agronomists, species composition pre-mining, species composition of pasture in surrounding areas (analogue sites), the outcomes of rehabilitation monitoring and trials and the availability of seed at the time of planting.

Table 15: Provisional species list and sowing rates for a PMLU of improved pasture grazing

Species	**Preliminary sowing rates (kg/ha)**
Buffel grass (*Cenchrus ciliaris*)	4
Purpletop Rhodes grass (*Chloris inflata*)	4
Green Panic (*Megathyrus maximus var.publigumis*)	4
Mitchell Grass (*Astrebla species*)	4
Forest Bluegrass (*Bothriochloa bladhii*)	2
Green couch (*Cynodon dactylon*)	4
Queensland Bluegrass *(Dichanthium sericeum)*	2
Native Sensitive Plant (Neptunia gracilis)	2
Rhyncho (Rhynchosia minima)	2
Woolly Glycine (Glycine tomentella)	2
Desmanthus (Desmanthus spp)	2
Phasey Bean (*Macroptilium lathyroides*)	2
Cover crop (e.g., *Sorghum arudinaceum)*	6
Total minimum sowing rate (excluding cover crop)	**10–20**

For retained highwall slopes or where interspersed parcels of native vegetation are proposed for cattle shade (in grazing areas), visual relief or other purposes, direct seeding of a mixture of endemic native species will be undertaken. Selected flora species will be used with the intention of providing a suitable food source and shelter for native fauna. Endemic and native flora species, as shown in Table 16, have been determined based on the pre-mining ecological flora surveys and are, therefore, considered an appropriate selection for initial revegetation efforts. A minimum total target seeding rate of 10–20 kg/ha of seed mix will be utilised. Preliminary seeding rates have been developed based on recommendations from relevant guidelines (Australian Government 2016) and seeding rates utilised at the Baralaba North Mine. Final seed selection and seeding rates will be based on recommendations by local agronomists, species composition pre-mining, species composition of pasture in surrounding areas (analogue sites), the outcomes of rehabilitation monitoring and trials and the availability of seed at the time of planting.

For large areas that require revegetation, particularly on sloped landforms, a fast-establishing sterile annual cover crop will be included in the seed mix. The cover crop will help rapidly establish ground cover and minimise topsoil loss. This approach will also help suppress weed colonisation and aid the re-establishment of integral biological and nutrient cycling that naturally occur in soil, creating a favourable micro-environment for the germination and emergence of native seed species. This should also provide a rapid ground cover and assist in achieving soil stabilisation.

Seed stocks will be checked for viability upon purchase and seeded as soon as possible. Seeds may be spread by hand, tractor or aerially. Hand seeding is suitable for small areas up to 5 ha, tractor with a rear spreader attached is more suitable for larger areas. Aerial seeding may be used on long or steep slopes (i.e. highwall). Seeds should not be buried over 5–10 mm in depth in the soil.

Seeding will generally be undertaken immediately prior to the onset of the wet season, to give seed the best chance of striking. Periods of heavy rainfall or periods of rainfall deficiencies (e.g., winter) will be avoided.

Monitoring of rehabilitated areas will commence at the wet season following rehabilitation works and will be carried out in conjunction with the Monitoring and Maintenance Program provided in Table 21.

Table 16: Provisional species list and sowing rates for native ecosystem establishment

Scientific name	Common name	Minimum sowing rates (kg/ha)
Trees (minimum of four species for to be used in native ecosystem areas for cattle shade)		
Acacia rhodoxylon	Rosewood	0.25
Acacia harpophylla	Brigalow	1
Acacia salicina	Sally Wattle	0.25
Corymbia tessellaris	Carbeen	0.1
Eucalyptus coolabah	Coolabah	0.1
Eucalyptus populnea	Poplar Box	0.1
Eucalyptus tereticornis	Queensland Blue Gum	0.1
Lysiphyllum carronii	Red-flowered Bauhinia	1
Shrubs (minimum of four species to be used)		
Alphitonia excelsa	Red Ash	0.25
Petalostigma pubescens	Quinine Bush	0.5
Eremophila mitchellii	False Sandalwood	0.2
Carissa ovata	Currant Bush	0.4
Acacia excelsa	Ironwood	0.25
Atalaya hemiglauca	Whitewood	0.4
Breynia oblongifolia	Coffee Bush	0.4
Alstonia constricta	Bitterbark	0.25
Eleocharis pallens	Pale Spike-sedge	0.4

Scientific name	Common name	Minimum sowing rates (kg/ha)
Groundcover (minimum of four species)		
Themeda triandra	Kangaroo Grass	3
Heteropogon contortus	Black Speargrass	3
Bothriochloa decipiens	Pitted Bluegrass	2
Cynodon dactylon var. dactylon	Couch Grass	6
Lomandra multiflora	Many-flowered Mat Rush	2
Lomandra filiformis	Wattle Mat Rush	2
Neptunia gracilis	Native Sensitive Plant	1
Total minimum sowing rate		**10**

3.5.10.9 Built infrastructure

The majority of surface infrastructure is required up until the cessation of mining activities life. At this time all remaining infrastructure will removed, except for infrastructure that is subject to an agreement with the post-mining landholder that they will accept liability for that infrastructure.

Hydrocarbons (petrol, diesel, oils, greases, degreasers and kerosene), explosives, chemicals and liquid and non-liquid wastes unused at the completion of mining will be returned to the supplier in accordance with relevant safety and handling procedures. Hydrocarbon and chemical storages will be designed, operated, and maintained at the Project in accordance with relevant Australian Standards and are therefore considered to have minimal potential for impact requiring significant remediation. Where remediation, identified during a contaminated land assessment, is required, these works will be completed in accordance with the recommendation of an appropriately qualified person, and may include in situ remediation. In situ remediation will likely involve the removal of the affected soil, which is then buried in the pit. Underlying soil is tested to ensure all contaminated soil has been removed. With the location of contaminated soil and remediation activities recorded internally.

Where infrastructure is not required by the post-mining landholder, it will be decommissioned in line with the following processes:

- Disconnect and isolate all services (power/communications).
- Remove all surface services/infrastructure (e.g. power/communications lines and pipelines).
- All concrete slabs/footings will be removed to a depth below surface of at least 1 m.
- Removal of contaminated material/other actions as determined by the contaminated land assessment.
- Removal of sediment from the base of all water storages. Excavated materials will be placed in the void.
- Removal of constructed walls and backfilling of all storages, where the finished surface will be at the approximate natural ground level, with no ability to retain water. The final surface will be topsoiled, and seeded.
- Roads covered in 200 mm of gravel/crushed rock will have the gravel removed before being graded and seeded with pasture.
- Salinity testing will be completed on the haul roads, to ensure no residual contamination from haul road dust suppression. Haul roads will then be ripped, shaped and seed with pasture seeds.
- Earthen laydown yards will be ripped, topsoiled to a depth of 200 mm and seeded to pasture or native vegetation, depending on location.

Water storages will be decommissioned and rehabilitated to the final PMLU unless, after consultation with the underlying landowner, infrastructure is identified as having a beneficial use and should be retained. At this time, a written agreement will be entered into with the underlying landowner that transfers liability for the structure and its use to the landowner.

Water infrastructure not being retained will be dewatered, and sediment and embankments removed. Rehabilitation and treatment of water infrastructure will vary depending on the extent of disturbance or contamination present from mining activities in conjunction with the desired outcome (e.g., retain or remove). Where installed, dam liners will be removed and appropriately disposed of, and any contaminated soils will be treated and/or removed where necessary. Dams will be backfilled, reprofiled and seeded with a pasture seed mix suitable for grazing.

3.5.10.10 Contaminated land assessment

A contaminated land assessment will be undertaken by a suitably qualified person confirming the land does not present an unacceptable risk to proposed future land uses or the environment. Any identified contaminated material incompatible with the proposed PMLU will be either treated in situ or on-site, confined by burial, or removed, transported to an approved landfill for disposal or alternatively risk assessed and listed on the environmental management register.

3.6 Risk assessment

3.6.1 Risk assessment requirements

A risk assessment has been carried out in accordance with the following standards:

- AS/NZS ISO 31000:2018 Risk management - guidelines; and
- HB203:2012 Managing environment-related risk.

3.6.2 Risk assessment process

Any risk assessment needs to be undertaken with consideration of the scope, context, and criteria relevant to the assessment. For this risk assessment, the following scope and purpose was discussed and agreed to:

> *The purpose of this risk analysis is to identify the risks of a stable condition for land not being achieved for the agreed PMLUs nominated, and the approach to be taken to manage and minimise the risks identified.*

For this risk assessment, risk scenarios (or 'threats') were identified and considered for each rehabilitation area associated with the Project. The causes attributable to each risk scenario were documented as well as the potential impacts. Existing controls were noted, defined as those reasonably expected to be in place for a Project of this nature and having appropriate and contemporary management systems. Each risk scenario was then assessed with respect to health, safety, the environment, and compliance against the risk assessment schema outlined in section 3.6.3.

3.6.3 Risk assessment schema

Risks specific to the rehabilitation of the Baralaba South Project were classified using the risk classification schema which is described below. The risk assessment schema used is comparable to those used widely within the mining industry and comprises the following components:

- a likelihood classification descriptors table (Table 17); and
- a consequence classification descriptors table (Table 18) intended to guide a consistent assessment of consequence.

Following a consensus determination of likelihood and consequence, the risk level was determined using the matrix shown in

Table 19. For any risks classified as 'significant' or above, mitigation and management measures were identified and documented. Mitigation and management measures were also documented for some lower-level risks.

Table 17: Likelihood of exposure to the hazard

Level of Risk Probability	Descriptive Guidance	Probability	Frequency
Almost Certain	The event is expected to occur in most circumstances	Higher than 80%	The event and consequence are expected to occur at least once per year
Likely	The event will probably occur in most circumstances	From 33% up to 80%	The event and consequence are expected to occur at least once in 1 to 3 years
Possible	The event could occur at some time	From 5% up to 33%	The event and consequence are expected to occur at least once in 3 to 20 years
Unlikely	Not expected but the event may occur at some time in the future	From 1% up to 5%	The event and consequence are expected to occur at least once in 20 to 100 years
Rare	The event may occur only in exceptional circumstances	Less than 1%	The event and consequence are expected to occur less than once in every 100 years

Table 18: Consequence classification descriptors

Severity level	Consequence		
	Human injury	Natural environment	Community/cultural heritage
Very High (VH)	Multiple fatalities, significant irreversible impairment to multiple persons	Very serious, long-term environmental impairment of ecosystem functions	N/A
High (H)	Single fatality, significant irreversible impairment to a person	Very serious, long-term environmental impairment of ecosystem functions	Ongoing serious social issues. Significant damage to structures/items of cultural significance
Moderate (M)	Significant reversible impairment to one or more persons (lost time injury, disabling injury)	Serious medium-term environmental effects	Ongoing serious social issues. Significant damage to structures/items of cultural significance
Low (L)	Reversible impairment requiring medical treatment (medical treatment injury)	Moderate, short-term effects but not affecting ecosystem functions	Ongoing social issues. Permanent damage to items of cultural significance
Very Low (VL)	No treatment or first aid treatment	Negligible/minor effects on biological or physical environment	Minor medium-term social impacts on local population. Mostly repairable

Table 19: Risk level classification matrix

Likelihood	Consequence				
	Very Low (VL)	**Low (L)**	**Moderate (M)**	**High (H)**	**Very High (VH)**
Almost Certain (AC)	II	III	IV	IV	IV
Likely (L)	II	III	III	IV	IV
Possible (P)	I	II	III	IV	IV
Unlikely (U)	I	I	II	III	IV
Rare (R)	I	I	II	III	III

3.6.4 Risk assessment outcomes and management

A total of 41 risk scenarios or hazards were identified during the risk assessment process. Any identified Class III risks were then reassessed to identify any additional controls that could be introduced to lower the risk ranking.

No Class IV risks were identified. One Class III 'safety' risk was identified associated with access to the residual void. The higher classification was applied due to the inherent risk associated with the consequence associated with the hazard despite adequate controls applied.

Twenty Class II risks were identified and have been classified into the following categories:

- 'sustainable PMLU' (6), relating to the inherent risk of pests, weeds, reduced groundcover and availability of suitable topsoil resources to achieve a land suitability Class IV classification;
- 'erosional risk' (7), relating to landform stability and consequences of ongoing erosion if adequate groundcover is not achieved;
- 'safety' (3), relating to safety and hazards exceeding that of surrounding unmined areas;
- 'geochemical risk' (2), relating to the inherent consequence the release of water to the environment; and
- 'geotechnical risk' (2), relating to the inherent consequence of slope failure.

A total of 20 Class I risks were identified.

The final outcomes of the risk assessment are detailed in Table 20, which provides a summary of the risk classifications made by the general rehabilitation area. Risks associated with the Project have been considered in the rehabilitation management and monitoring methodology used to inform the completion criteria and PRCP schedule. The detailed risk assessment outcomes are included at Appendix F.

Table 20: Risk assessment outcomes

Rehabilitation area	**Risk level**				
	Class I	**Class II**	**Class III**	**Class IV**	**Total**
Elevated landforms	6	9	0	0	**15**
Residual void (high wall, water containment area and low wall adjacent the water containment area)	5	4	1	0	**10**
Infrastructure and minor disturbance areas	9	3	0	0	**12**
Drainage channel	0	4	0	0	**4**

3.7 Monitoring and maintenance

For the purposes of developing the rehabilitation schedule, nine rehabilitation milestones have been proposed as being applicable for the Project.

With respect to determining the achievement of rehabilitation milestones, a clear definition of milestone criteria have been developed for each rehabilitation milestone. Assessment of rehabilitation against the milestone criteria will be incorporated into the ongoing environmental management of the Project.

The completion criteria for each PMLU will be used as the milestone criteria for the final milestone in the proposed schedule, which shows achievement of the PMLU to a stable condition at surrender. When the final rehabilitation milestone applicable to the rehabilitation area is deemed to be satisfied, a final rehabilitation assessment will be undertaken before an application for either progressive certification or an ML surrender application is made.

Monitoring of grazing PMLU will be assessed against:

- analogue monitoring locations;
- the milestone criteria for RM6 (Table 10), which is based on standard methods for assessing pasture condition consistent with industry guidelines; and
- the land suitability assessment criteria for RM6, which was developed from baseline soil and land suitability assessments and industry guidelines for Class 4 land suitability criteria (DME 1995).

Monitoring of natural ecosystem – habitat and ecosystem services PMLU will be assessed against the milestone criteria for RM7 (Table 10). Milestone criteria nominated for this PMLU have been developed based on geological and geotechnical information, fauna use and risk to the receiving environment.

Monitoring of a pit lake PMLU will be assessed against the milestone criteria for RM8 (Table 10). Milestone criteria nominated for this PMLU have been informed by geological and geotechnical information, fauna use, research into PMLUs, baseline surveys and risks to the receiving environment.

A summary of the monitoring measures to be used to determine the achievement of each rehabilitation and management milestone is provided in Table 21 and described further in the subsequent subsections. Determination of the boundary of an area reaching a given rehabilitation milestone at a given point in time, will utilise standard survey techniques, including land-based survey and airborne survey at an appropriate frequency – nominally annually – to achieve satisfactory geolocation of areas.

Table 21: Rehabilitation monitoring and management program

Milestone reference	Relevant milestone criteria	Monitoring methodology	Timing / Frequency	Applicable RA
RM1: Infrastructure decommissioning and removal	• All non-required services disconnected and removed. • All concrete, bitumen and gravel removed. • All pipelines drained and removed. • All fencing that is not part of the PMLU removed • All buildings demolished and/or removed. • All machinery and equipment removed. • All surface water drainage infrastructure that is not retained in the final landform removed. • All rubbish removed and scrap metal collected. All infrastructure that is to remain will be subject to a written agreement transferring ownership and liability.	• Visual inspection following decommissioning and removal • Records maintained including dates and activity(ies) undertaken	Following decommissioning and removal activities.	RA3 RA4 RA5
RM2: Management of contaminated land status	• Contaminated land assessment for all areas that are identified as containing a source of contamination, undertaken by an AQP, have been carried out • Records of contaminated material in situ remediation, removal, transportation, approved landfill acceptance.	• Per legislated requirements; by an AQP	Following decommissioning and removal activities.	RA1 RA2 RA3 RA4

Milestone reference	Relevant milestone criteria	Monitoring methodology	Timing / Frequency	Applicable RA
RM3: Landform development (reshaping/push to void/ profiling/ cleaning/ clearing)	**Landform development works** • Bulk earthworks completed and either ground survey or Lidar demonstrates the finished slopes conform to the final landform design and drainage plan for each sub-area • Clean water dams and mine affected dams to be decommissioned and back filled. No ponding of water after rainfall or excess moisture retention observed during rehabilitation monitoring activities. • Geotechnical assessment by an AQP confirming that long-term geotechnical stability has been achieved for each relevant landform • Temporary/permanent perimeter fencing, signage etc. to make the working pit safe. • Final void and bunding is assessed by an AQP to be geotechnically stable	• Records maintained containing date and activities undertaken • 'As-constructed' survey plan showing conformance to landform design criteria • GIS shapefile created for areas that have been shaped • AQP geotechnical assessment	Following completion of bulk earthworks	RA1 RA2 RA3 RA4
	Landform constructed to the following design parameters, where relevant: • RA1 slopes ≤ 9° • Contour banks installed as required • Final landform bund has a crest elevation equal to the PMF flood height plus a design freeboard allowance • Final void highwalls (RA2a and RA2b) have slope gradients ≤ 40°; and • Final void low wall (RA2a) has slope gradients ≤ 32°	• Ground survey, LiDAR survey, slope assessment and DEM modelling post-construction works	Following completion of bulk earthworks	RA1 RA2a RA2b RA3

Milestone reference	Relevant milestone criteria	Monitoring methodology	Timing / Frequency	Applicable RA
RM4: Surface preparation (topdressing, contour ripping, soil amelioration)	• Prior to each rehabilitation event, soil health and suitability assessed by an AQP and either confirmed as suitable or amelioration recommendation(s) made • Ameliorants and mitigation measures have been undertaken as per agronomist recommendations • Topsoil placement, and evidence indicating achievement of a target depth of 0.2 m (+/- 0.05 m) • Ripping undertaken to approximately 0.4 m	• Record of ameliorants application across reshaped areas to be maintained and to include types, rates, and timing of applications • Record of topsoil placement across reshaped areas. Records to include source, analysis results and pre-treatments applied • GIS record of topsoil placement • Spot checking of topsoil application depths • Record of contour ripping activities (date, depth, space, machinery) to be maintained.	Prior to each RM4 rehabilitation event. During / following the application of ameliorants. During / at the completion of topsoil placement. During / at the completion of ripping activities.	RA1 RA3 RA4 RA5
RM5: Revegetation (seeding and/or replanting)	Seeding of rehabilitation areas using a selection of the recommended species from the PRC Plan species lists. • **Grazing PMLU** (comprising a minimum of 25% (by weight) native species; a minimum of 3 x 3P species and a total minimum sowing rate 10 kg/ha): • **Natural ecosystem** – habitat and ecosystem services PMLU – (minimum of four groundcover species):	Records of: • seeding and planting rate/densities • agronomist recommendations • date of seeding. seeding species mix, seeding rate, pure live seed content, supplier, supply date and seed storage conditions. • GIS files of seeding areas	During revegetation works.	RA1 RA3 RA4 RA5

Milestone reference	Relevant milestone criteria	Monitoring methodology	Timing / Frequency	Applicable RA
RM6: Achievement of surface requirements (grazing PMLU) to a stable and sustainable condition	• For slopes ≤ 5°, rehabilitation polygons have a median fractional vegetation cover greater than the first quartile of reference polygons for at least 85% of all sample times, as determined using the satellite-derived fractional vegetation cover method • Weed cover is ≤ 10% live groundcover (excluding exotic pasture grasses) • Soil health assessment confirms no significant soil chemical impediments to vegetation growth • Grazing land meets Class 4 land suitability for grazing • No evidence of erosion classified as 'Severe' • No active erosion present as demonstrated by no increase in erosion ratings for three consecutive monitoring events • Water quality from direct rainfall runoff from rehabilitated waste rock (RA1 only) has a pH in the range 6.5–9.0 (median), and acceptable EC • Landform is assessed by an AQP as being geotechnically stable defined as a low likelihood of mass failure impacting surrounding rehabilitation area • Hazard and Safety Assessment completed by an AQP demonstrates hazards in rehabilitation areas are consistent with the type and severity of hazards typical of neighbouring equivalent land use. Remaining hazards are low risk with no significant increase in risk expected over time	• FVC determinations between rehabilitated and reference areas • Species inventory (including weed species), richness, and percentage ground cover to be recorded at revegetation monitoring sites • Soil sampling and analysis • AQP land suitability assessments (at appropriate frequencies) • Erosion monitoring at rehabilitation sites (incl. general observations) • Surface water quality monitoring at appropriate water quality monitoring locations • AQP geotechnical assessment confirming long-term geotechnical stability (at appropriate frequencies) • AQP hazards assessment (at appropriate frequencies)	Typically annually, following establishment period, with reviews of frequency undertaken progressively as rehabilitation areas age; or as appropriate Minimum of 3 transects per landform type (slope, flat SMU, inundation areas) per RA	RA1 RA3 RA4 RA5

Milestone reference	Relevant milestone criteria	Monitoring methodology	Timing / Frequency	Applicable RA
RM7: Achievement of natural ecosystem PMLU to a stable and sustainable condition	• A geotechnical assessment has been completed by an AQP stating that the final void is safe and stable and meets design criteria • Safety bund setback distance is in accordance with calculated geotechnical factor of safety • Safety bund constructed of competent rock and to a geometry that prevents traversing by vehicles. • Perimeter fencing and signage erected to prevent access to humans and cattle. • Demonstration by an AQP that the final landform provides PMF flood immunity to the final void	• Records (photographic, spatial) retained of safety barrier construction, signage • AQP geotechnical assessment • Final AQP assessment of void PMF immunity • Visual assessment (spotting, scats, and tracks) of fauna usage of highwalls • Groundwater water quality monitoring	Typically prior to milestone completion date	RA2a
RM8: Achievement of surface requirements (pit lake PMLU) to stable and sustainable condition	• Predictive modelling undertaken by an AQP, confirming that the voids will remain as a groundwater sink and that there is no risk of contaminant release to surface or groundwaters post-mining • Water quality monitoring of the pit lake demonstrates that measured salinity is consistent with predictive modelling undertaken by AQP, where salinity is ≤ 10,000 µs/cm • Evidence of fauna usage from the environmental monitoring program	• AQP geotechnical assessment completed for the final landform. • Groundwater and surface water balance assessment undertaken • Void water quality monitoring • Groundwater water quality monitoring • Aquatic ecosystem assessment of void water body • Visual assessment (spotting, scats, and tracks) of fauna usage of highwalls	Prior to milestone completion date	RA2b

Milestone reference	Relevant milestone criteria	Monitoring methodology	Timing / Frequency	Applicable RA
RM9: Achievement of drainage channel PMLU to stable and sustainable condition	• Construction of the drainage channel meets design specifications in particular: o Drain longitudinal grade of approximately 0.05% o Maximum drain depth of 0.2 m o Maximum channel width of 10 m • Observational data from monitoring indicates that the drainage channel is not a barrier to stream flow during a high flow event	• Design certification • Monitoring of the drainage channel • AQP geotechnical assessment completed	Prior to construction Prior to completion date	RA6
RM10: The infrastructure to be retained meets the conditions of the signed agreement with Baralaba South	• Monitoring has been undertaken in accordance with the signed agreement and all retained infrastructure is in accordance with the signed agreement • Final landholder accepts responsibility for infrastructure in accordance with a formal written agreement	• Signed landholder agreements and relevant monitoring records	• Prior to completion date	RA7

3.7.1 Annual rehabilitation monitoring

Rehabilitation will be monitored typically on an annual basis, with the survey period occurring post wet season, as monitoring at this time allows for more accurate identification of the species present and a clearer understanding of species richness on-site. Where sufficient data is acquired that demonstrates that rehabilitation is clearly on a trajectory to achieve milestone criteria, the frequency of monitoring will be reviewed and amended as appropriate.

The rehabilitation monitoring program aims to achieve data collection at sufficient spatial and temporal resolution to ensure statistically valid results. The following methods are employed at each monitoring site and described in detail in the following sections:

- permanent vegetation monitoring transects (fractional vegetation cover and species richness);
- photographic monitoring;
- erosion monitoring;
- topsoil characterisation; and
- water quality monitoring.

In conjunction with walking between transects, rehabilitation areas will be visually assessed to identify signs of fauna utilisation, noticeable issues such as erosion, vegetation cover deficiencies, or weed and / or pest infestations. Satellite imagery technology may also be employed. These observations will be incorporated with the results of each rehabilitation progress report.

3.7.2 Analogue sites

Pasture and native vegetation analogue or reference transects should provide sufficient replication to allow for statistical testing that is rigorous enough to determine differences between a reference site and rehabilitation values and demonstrate achievement of completion criteria. It is generally recommended that a minimum of three transects be established within each representative reference modified pasture grazing area for a grazing PMLU. The frequency and timing of monitoring of reference sites is to coincide with monitoring of rehabilitation areas. Where possible, reference sites should be chosen that replicate the anticipated slopes of rehabilitated areas. Results from reference sites will be used to compare and assess monitoring results obtained from rehabilitated site transects. Analogue sites will be recorded as GIS files, for replication.

3.7.3 Permanent vegetation monitoring transects

Monitoring across permanent vegetation transects involves the collection of quantitative data on-ground cover composition, species richness, woody stem density, and canopy cover. Monitoring sites will be placed at random within newly established rehabilitation polygons, at a density of approximately one site per 10 ha. At each monitoring site a 50 m tape is used to establish a transect and observations/measurements taken every 5 m on either side of the transect, thereby representing a plot size of 50 m x 10 m. A star picket is installed at each end point of the transect, to consistently and precisely identify the permanent transect location. Photographic records and GPS locations for all monitoring sites and observed issues will be maintained in an appropriate database. To monitor revegetation progress, the data for each vegetation scenario is averaged across monitoring sites established in similar timeframes and compared to the corresponding milestone and completion criteria.

Across each transect, groundcover, species richness, woody stem and canopy cover will be monitored. The survey methodologies outlined below have been adapted from the Queensland Herbarium survey technique 'Methodology for Surveying and Mapping of Regional Ecosystems and Vegetation Communities in Queensland' (Neldner *et al.* 2022) and the 'Method for the Establishment and Survey of Reference Sites for BioCondition' (Eyre *et al.* 2017).

3.7.3.1 Species richness

Species richness is recorded within ten 1 m x 1 m quadrats placed on alternating sides every 5 m along a 50 m transect, commencing at 0 m and finishing at 45 m (see Figure 44). The surveyor walks along each side of the 50 m transect centreline and records all trees, shrubs, forbs/other species and grasses occurring within 5 m either side of the centreline. Live plant species are classified into one of the following six groups for reporting purposes:

- native pasture grasses;
- exotic pasture grasses;
- non-pasture grasses;
- forb and other non-grass species;
- shrubs; and
- restricted invasive plants as listed in the *Biosecurity Act 2014* (QLD).

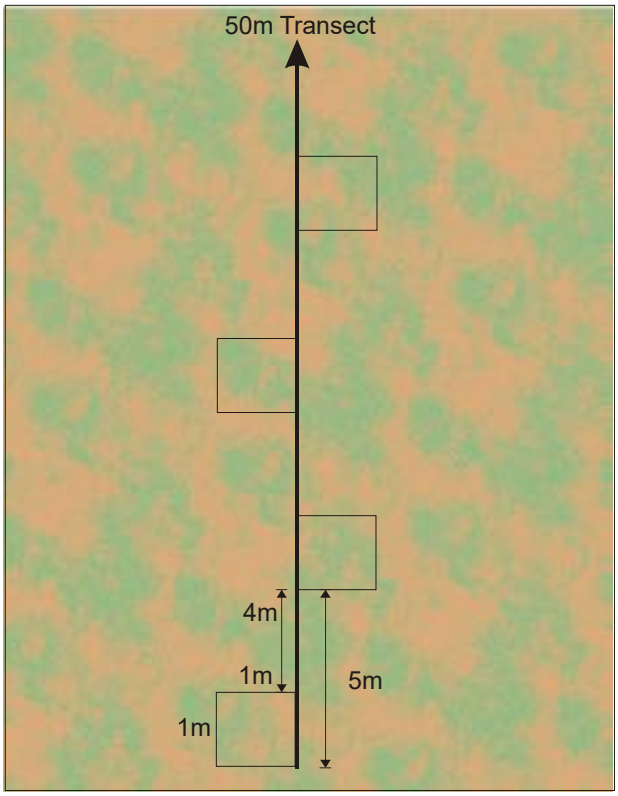

Figure 44: Ground cover percentage sampling

3.7.3.2 Pasture productivity

In order to assess the quantity of pasture available for grazing, a calculation of herbage mass is to be conducted at each site. Herbage mass refers to the total amount of pasture present; including both green and dead material and is expressed as kg of dry matter (DM) per ha (kgDM/ha). Every 5 m along the 50 m monitoring transect a pasture meter will be used to provide a measure of kgDM/ha for that site. These observations are then averaged to provide an estimate of the mean quantity of dry matter. This method is a non-destructive measure. The plate meter uses a weighted disc to assess the settled height above ground to pasture mass beneath the disc. The disc is gently lowered onto the pasture after the central rod is placed on the ground surface. The height of the disc is recorded after approximately 5 to 10 seconds of settling time.

Alternatively, once a scale has been measured and implemented, sites can also be matched to the photo standards published by Future Beef which provides an estimate of pasture productivity.

3.7.3.3 Satellite-derived fractional cover

Most erosion on rehabilitated WREs occurs during vegetation establishment (Carroll *et al.* 2000). Establishment and maintenance of functional vegetation cover is essential. Sustained high levels of fractional vegetation cover are essential to the safety, stability, non-polluting and sustainability (protection of limited topsoil) of post-mining landforms. This cover must be tolerant of drought, maintain the required level of effective cover and provide a beneficial PMLU that can be quantified. The erosion stability assessment confirms fractional vegetation cover of 75% or greater for maximum slopes (measured in between contour banks) of less than 234 m or 60% for maximum slopes (measured in between contour banks) of less than 117 m should result in an erosionally stable landform.

Fractional vegetation cover can be derived from operational satellite imagery by spectral unmixing when calibrated using field or extremely high-resolution imagery. The Project proposes to apply satellite based FVC to monitor rehabilitation progress against vegetation cover criteria for grazing PMLU areas. The fractional cover model will use the Landsat JRSRP v1 algorithm but apply local site calibration using extremely high-resolution orthophotos or published field methods (Muir *et al.* 2011) to directly calibrate coincident satellite imagery. It is proposed to update fractional cover algorithms to maintain best scientific practice against published methods.

Green and non-photosynthetic vegetation cover within one metre of the surface is functional in preventing erosion. Green fractional vegetation cover forms a small component of fractional vegetation cover for coal waste rock rehabilitation under permanent dryland conditions. Non-photosynthetic grass material is the dominant cover source for soil and waste rock at the end of the dry season. Confirming that functional protection in maintained is essential to demonstrating safe, stable, and sustainable rehabilitation.

A remote sensed FVC analysis allows monitoring of all rehabilitated pasture compared to approximately 1% of the area assessed by transects. Further, satellite imagery can sustain monitoring at better than seasonal intervals. Fractional cover is defined as that fraction of a satellite imagery pixel condition across three ground cover classes being:

1) photosynthetic vegetation;

2) non-photosynthetic vegetation; and

3) bare ground.

A median value of FVC can be determined for all satellite imagery pixels within a defined polygon area (or set of combined polygons). Subject to certain limitations, a median FVC value can be determined for polygons enclosing a rehabilitation area which is then able to be compared with polygons enclosing a reference/analogue area that is representative of unmined land having similar landform, land cover and land use.

Satellite-derived indices will be reported annually based on one imagery acquisition per calendar month. Except where cloud cover or cloud shadow occlude the study area in a calendar month, imagery of the study area and acquisition metadata are assessed.

FVC is reported in graphical form with median and interquartile ranges for each rehabilitation polygon and combined reference area polygons. In addition, dates and duration of failure to achieve the target are reported in tabular form with mapping information for sources of non-compliance.

Source data

Satellite imagery from the Sentinel 2 global earth observation mission acquires imagery on a 5–12 day interval at wavelengths between 400-2,500 nm with a common spatial resolution of 20 m. Spectral end members are developed using calibration data collected in the field to calculate the spectral profiles of

green, non-photosynthetic and bare ground. The algorithm then performs a pixel unmixing process to calculate the contributing fraction of each cover class. Field calibration and validation are required to be re-established if a significant disturbance occurs (e.g. fire/drought).

Calibration and validation

Calibration and validation of FVC is to be conducted every five years, in wet season and in dry season, at fixed transect monitoring sites using either (a) point intercept transects per Muir *et al.* (2011) modified to 50 m or (b) sub-10 cm UAV imagery captured as pixel (20m x 20m) blocks. ISODATA clustering and supervised spectral class assignment provide FVC where UAV imagery is available.

The proposed method does not rely on vegetation indices. Fractional cover will be reported as green, non-photosynthetic and bare fractions. Calibration data for the proposed fractional vegetation cover model is collected using UAV imagery with an average ground sample distance less than 5 cm which is then segmented into 20 m x 20 m grids in line with Sentinel-2 imagery collected within the same period. Segments are then selected for processing based on initial visual inspection, ensuring that samples are selected in such a way that sufficient variability is incorporated into the calibration data. The cropped segments are then clustered using the 'iso cluster' function in ArcGIS and then classified into fractional vegetation classes. Both the iso cluster and the collected image are visually inspected, and a percentage composition is assigned for each fractional vegetation class, namely: photosynthetic vegetation, non-photosynthetic vegetation, and bare soil. This process is then repeated for all selected segments until sufficient training and validation material has been collected.

The calibration of satellite imagery is conducted in line with the 'seasonal fractional cover - Landsat, JRSRP algorithm, Australia coverage', with reference to the papers and datasets described in the metadata. Per the methodology described in Scarth *et al.* (2012), an unmixed linear model was used in determining fractional vegetation cover from Sentinel-2 imagery. Image derived endmembers were calculated from the collected training data using the 'classical' model for deriving endmembers. Consider an equation where a multispectral signal x with b spectral bands modelled as a linear function of the c groundcover proportions f, such that:

$$x_k = M^T f_k + \epsilon \quad (1)$$

where x_k is a $b \times 1$ vector representing the observed signal over b band for the kth sample; f_k is a $c \times 1$ vector containing FVC values (0-1) obtained from the kth sample of the reference data, and M is a $c \times b$ matrix with rows representing the endmember spectra for each cover class ($c = 3$). To calculate endmember spectra based on a complete set of reference data across n sites, both x_k and f_k can be expressed as a matrix, where:

$$X = [x_1, x_2, \dots, x_k \dots, x_n]^T,$$

and

$$F = [f_1, f_2, \dots, f_k, \dots, f_n]^T.$$

Substituting these matrices into Eq. 1 gives:

$$X = FM \quad (2)$$

Scarth *et al.* (2012) derived M using an 'inverse operator' method. This method provides the ability to incorporate non-linearity constraints into the model, allowing X to be an independent variable. However, using the 'inverse operator' method requires a significant quantity of data that can accurately describe the heterogeneity of the site. While there is generally sufficient spatial data available for this method, the temporal changes across the site cannot be adequately modelled from a single date. Therefore, a direct inversion method can be adopted.

Where the field observations are treated as the independent variable and the satellite spectral data as the dependent variable, the spectral endmembers can be derived from the following equation:

$$M = (F^T F)^{-1} F^T X \quad (3)$$

From the value of M calculated from Eq. 3, Eq. 2 can be rearranged to calculate FVC:

$$F = X(M^T M)^{-1} M^T$$

Limitations

Currently, this method is only to be utilised for relatively low slopes (i.e., not defined waste emplacement batter slopes).

Rehabilitation area polygons should be:

- selected with a sufficient buffer to exclude edge effects compromising the outcome; and
- selected to exclude engineered structures, e.g., internal drainage basins and spine drains.

Reference areas should be:

- areas having the same target land use as the rehabilitation area;
- the equivalent extent in hectares to target rehabilitation polygon areas; and
- a selection of at least four non-contiguous polygons.

3.7.4 Photographic monitoring

Photographic monitoring at monitoring sites shows a visual comparison over time of the vegetation, ground cover, erosion and general appearance of each monitoring site. The process consists of taking one photograph from the start of the transect (0 m) facing towards the end of the transect, and another from the end of the transect (50 m) facing towards the beginning.

3.7.5 Fauna observations

Observations of any fauna species or indicators of fauna presence (e.g., scats, tracks, or other signs of fauna activity) within or in the vicinity of the rehabilitation areas will be noted as part of rehabilitation monitoring.

3.7.6 Topsoil characterisation

Topsoil sampling is not considered to be an annual requirement of the rehabilitation monitoring program. It is, however, to be undertaken prior to use in rehabilitation and thereafter at a frequency determine by rehabilitation performance or where nutrient addition or other amelioration is being considered. Soil analyses can be useful to monitor development of the soil profile or to address any deficiencies in the chemical composition of the soil that may be detrimental to vegetation health.

Soil monitoring involves the collection of topsoil samples from a maximum depth of 10 cm to obtain quantitative data on the chemical and physical properties of soil. Soil sampling methodology has been adapted from 'Monitoring and Sampling Manual: Environmental Protection (Water) Policy 2009' (DES 2018). Soil sampling is conducted by collecting approximately 200 g samples with a clean non-metallic shovel and bucket every 10 m along the 50 m permanent vegetation monitoring transects. The first sample is collected at 0 m. The five samples are then mixed in the bucket. The final 200 g of soil sample is taken from the mix and placed into a plastic sample bag. Samples are sent to a NATA certified laboratory for full suite analysis of

topsoil indicators of soil nutrition and chemistry. Chemical and physical parameters that should be measured are outlined in Table 22. Soil moisture content is measured usually for analytical interpretive purposes.

Table 22: Chemical and physical parameters for topsoil testing

Soil analytes	
Physical Parameters	Moisture Content
	Organic Matter (Organic Carbon)
	Soil Particle Density (Gravel/Clay/Silt/Coarse Sand/Fine Sand)
General Soil Characteristics Exchangeable Cations	pH Value
	Electrical Conductivity @ 25°C
	Chloride
	Exchangeable Calcium
	Exchangeable Magnesium
	Exchangeable Potassium
	Exchangeable Sodium
	Cation Exchange Capacity
	Exchangeable Sodium Percent (ESP)
	Calcium/Magnesium Ratio
Exchangeable N_2, P	Nitrite + Nitrate as N (Sol.)
	Bicarbonate Ext. P (Colwell)
	Bicarbonate Ext. K (Colwell)

3.7.7 Erosion monitoring

An erosion monitoring methodology has been developed by experienced AARC ecologists with consideration to relevant guidelines and research (Neldner *et al*. 2019, Eyre *et al*. 2017 and DSITI 2015). Erosion at survey sites is monitored through visual assessment over time. Assessment is undertaken by traversing the 50 m transect on foot and recording the number and average depth of any erosion features or rill lines. However, the placement of the permanent transects is unlikely to adequately capture the level of erosion across the entire rehabilitation landform, and observations during the surveys are therefore also undertaken to provide a more complete assessment.

Classification of observations will be undertaken using the criteria outlined in Table 23. The overall classification of the erosion on each transect is determined by the higher classification attributed to either the number of rills, or the average depth. This is to recognise that while a transect may present only one or two rills, if such rills are recorded as being 25 cm deep, it will lead to a classification of 'Moderate' erosion.

The following information is recorded at each site:

- GPS reading of location;
- general description of type of erosion (gully [> 30 cm], rill line [< 30 cm]) and possible causes;
- depth of erosion;

- width of erosion;
- length of erosion;
- where eroded material is being deposited; and
- whether the erosion line is stabilised by vegetation.

Some erosion is expected in the first years due to an absence of vegetation and the frequency and severity of storm events. Therefore, erosional stability will be assessed from year four following seeding/planting. Monitoring will commence in the first year and the first three years will represent landform establishment.

Table 23: Erosion classification

Erosion classification	Minor	Moderate	Severe
Sheet erosion	Shallow soil deposits downslope	Partial exposure of roots; moderate soil deposits downslope, etc.	Loss of surface horizon; root exposure, etc.
Rill/gully erosion	< 15 rills and < 0.3m deep	15-30 rills and < 0.3m deep	> 30 rills and/or any > 0.3m deep.
Tunnel erosion	Absent	Absent	Present
Mass movement	Absent	Absent	Present

3.7.8 Surface water monitoring

Surface water quality monitoring will be undertaken in accordance with the surface water monitoring program for the Project. Water quality monitoring will be undertaken using a combination of laboratory and in situ analysis by trained personnel and in accordance with the Queensland 'Monitoring and Sampling Manual' (DES 2018). Water quality parameters to be sampled include pH (field), EC (field) and sulphate and will be assessed against milestone criteria.

Grab samples at all water monitoring sites are collected at a depth of 10 cm to 20 cm where sufficient water is available. Two water samples, one total (unfiltered) and one dissolved (field filtered) are collected at each site.

Monitoring will be undertaken at background (i.e., control) sites located upstream of the release point on the Dawson River and along Banana Creek. These sites are located outside the immediate zone of influence of the release location. Monitoring will also be undertaken at impact sites located downstream and within the potential zone of influence including downstream locations at the Dawson River and Banana Creek.

Proposed water quality monitoring locations are summarised in Table 24 and shown in Figure 45. Dawson River at Beckers and Dawson River at Baralaba are existing points monitored by the Department of Resources and Baralaba North Mine respectively. The remaining locations are proposed to be monitored by Baralaba South. Coordinates for the release location RP1 will be defined once detailed design of the structure has been completed.

Additional or alternative monitoring locations (e.g., other water storages on-site and/or surrounding environmental features) will be developed as part of site-specific plans as required.

Table 24: Proposed water quality monitoring locations

Monitoring location (ID)	Easting (GDA94)	Northing (GDA94)
Upstream Banana Creek	149.897	- 24.3091
Upstream Dawson River	149.74	-24.3254
MP1 Banana Creek	149.844	-24.2763
Release location	TBC	TBC
Downstream Dawson River	149.819	-24.2081
Dawson River at Baralaba DR1 (Baralaba North Mine SWMP)	149.805	-24.1825
Dawson River at Beckers (130322A)	149.822	-24.0873

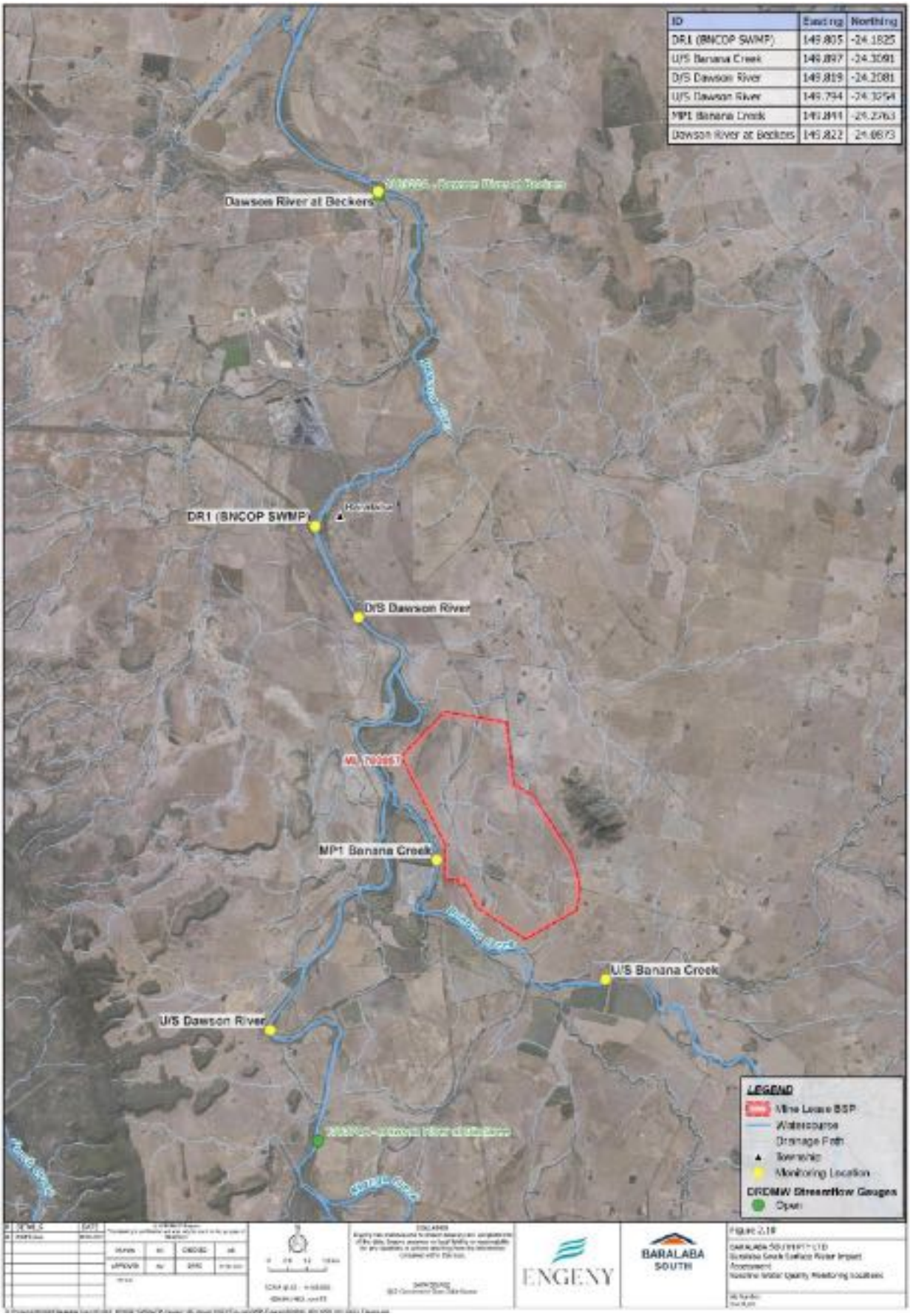

Figure 45: Proposed surface water monitoring locations

3.7.9 Groundwater monitoring

Groundwater quality monitoring for the Project will continue to be undertaken for pH (field), EC (lab) and sulphate at the locations listed in Table 25 and shown on Figure 16 until the natural ecosystem – habitat and ecosystem services and pit lake PMLU is achieved. Groundwater quality monitoring will be assessed against milestone criteria, using groundwater data reported at reference monitoring sites. Groundwater monitoring will be undertaken by a competent person and will be in accordance with the latest edition of the administering authorities water quality sampling manual.

Table 25: Proposed bore monitoring network

Bore Id	Easting	Northing	Ground level (mAHD)	Water level monitoring	Water quality
A-PB1	789621	7310598	90.4	Quarterly	-
A-PB2	791931	7309808	91.5	Quarterly	-
A-OB1	787440	7314586	88.9	Daily	Quarterly field water quality and annual full suite of water quality
A-OB2	787802	7314105	88.3	Daily	Quarterly field water quality and annual full suite of water quality
A-OB3	788393	7314309	87.9	Quarterly	Quarterly field water quality and annual full suite of water quality
A-OB4*	789290	7314733	87.5	Quarterly	-
A-OB6	791402	7309557	91.4	Daily	Quarterly field water quality and annual full suite of water quality
A-OB7	791935	7309829	91.7	Daily	Quarterly field water quality and annual full suite of water quality
A-OB8	792501	7310136	91.4	Daily	Quarterly field water quality and annual full suite of water quality
A-OB10*	789247	7313094	87.5	Daily	-
A-OB11	787270	7313771	86.2	Daily	Quarterly field water quality and annual full suite of water quality
A-OB12	787220	7313767	87.2	Daily	Quarterly field water quality and annual full suite of water quality
P-PB1	787805	7314101	88.3	Quarterly	Quarterly field water quality and annual full suite of water quality
P-OB1	788477	7316388	87.4	Quarterly	Quarterly field water quality and annual full suite of water quality

Bore Id	Easting	Northing	Ground level (mAHD)	Water level monitoring	Water quality
P-OB2	793140	7311758	105.3	Quarterly	Quarterly field water quality and annual full suite of water quality
P-OB3*	789939	7312422	89.6	Quarterly	-
P-OB4*	789205	7314695	87.1	Quarterly	-
P-OB5	792626	7310218	91.4	Quarterly	Quarterly field water quality and annual full suite of water quality
P-VWP1	787442	7314568	89.0	Daily – bore equipped with level logger/VWP	-
P-VWP2	787789	7314089	88.5	Daily – bore equipped with level logger/VWP	-
P-VWP3	791922	7309816	91.6	Daily – bore equipped with level logger/VWP	-
P-VWP4	790829	7315606	101.0	Daily – bore equipped with level logger/VWP	-
P-VWP5	789621	7310598	90.4	Daily – bore equipped with level logger/VWP	-
Proposed 1	788477	7316388	87.4	Quarterly	Quarterly field water quality and annual full suite of water quality
Proposed 2	789319	7312065	TBC	Quarterly	Quarterly field water quality and annual full suite of water quality

3.7.10 Final void ecosystem monitoring

Final void ecosystem monitoring will be used as a tool to assist in determining the achievement of land with a target PMLU of natural ecosystem. A suite of water quality parameters and fauna observations will be sampled quarterly, as the void begins filling, for a period of 25 years. It is expected that as research progresses, sampling measures and parameters may change, and the below methodology is preliminary based on current research (Blanchette and Lund 2021).

3.7.10.1 Fauna observations

Observations of any fauna species or indicators of fauna presence (e.g., scats, tracks, or other signs of fauna activity) within or in the vicinity of the rehabilitation areas will be noted. Macroinvertebrate and diatom assemblages will be sampled from the littoral areas.

3.7.10.2 Water quality, level, and stratification

Seepage from backfilled waste rock will report to the final void. Monitoring of water quality parameters in the void will provide an indication of any unpredicted acid mine drainage, in addition to surface water quality monitoring described in section 3.7.8.

Water quality analysis methods have been adapted from Blanchette and Lund (2021). A combination of in situ and laboratory analysis will be undertaken of final void water from both the bottom (approximately 0.5 m above the bottom surface sediments) and the surface.

In situ water parameters including depth, pH dissolved oxygen, electrical conductivity, oxidation-reduction potential, turbidity, and chlorophyll 'a' will be sampled at a minimum of three locations across the void from the bottom and surface of water.

Water samples for water quality (one sample) and microbe analysis/phytoplankton identification (one sample) will be collected at the location of the *in situ* measurements using the appropriate equipment for the site (e.g., hand, pump, Kemmerer bottle). Water quality samples will be sent to the laboratory for analysis of pH, EC, total dissolved solids, major ions, metals, and metalloids. Microbes will be collected, and laboratory DNA analysis will be utilised for identification purposes. Phytoplankton will be collected and identified in the laboratory to the genus level.

Once water levels exceed 5 m, stratification data can be collected. Measurements of water levels, light, temperature, conductivity, and dissolved oxygen will be undertaken at the deepest water point using data logger technology.

3.7.11 Maintenance

Rehabilitation indicators and visual observations will be used to identify any aspects of the rehabilitated areas that may be of concern or suggest rehabilitated land is not on a trajectory of meeting the required completion criteria. These may include:

- evidence of active erosion;
- inadequate vegetation cover or growth;
- invasive weed or pest species;
- soil dispersion / instability; and
- soil infertility.

Following the annual monitoring process, areas of rehabilitation will be assessed for maintenance requirements. An annual visual inspection of all rehabilitated areas will be undertaken to provide an overview of the status of the rehabilitation and identify any noticeable issues such as erosion or inadequate vegetation cover or growth. This information, along with monitoring results, will be used to inform the maintenance schedule.

Maintenance may include repairing areas of excessive soil erosion or undertaking supplementary plantings or seeding to increase floristic diversity and cover to assist in achieving completion criteria.

If issues re-occur, an investigation will be carried out to determine the reason and allow for remediation. Modification of rehabilitation methods and specifications may be required, and rehabilitation and maintenance planning updated accordingly.

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Appendix A. Rehabilitation Schedule

Post-mining land use										
Rehabilitation area	RA1									
Relevant activities	In-pit and out-of-pit waste rock emplacements and earthen embankment and final landform bund									
Total size of rehabilitation area (ha)	796.5									
Commencement of first milestone: RM2	10/12/Year6									
PMLU	Improved grazing pasture – low intensity cattle grazing									
Date area is available	10/12/Year 6	10/12/Year 11	10/12/Year 14	10/12/Year 19	10/12/Year 23	10/12/Year 24				
Cumulative area	158	339	394	441	503	796.5				
Milestone completed by	10/12/Year 11	10/12/Year 14	10/12/Year 19	10/12/Year 23	10/12/Year 24	10/12/Year 28	10/12/Year 33	10/12/Year 38	10/12/Year 40	
Milestone reference	**Cumulative area achieved (ha)**									
RM2	158	339	394	441	503	796.5	796.5			
RM3	158	339	394	441	441	796.5	796.5			
RM4	158	158	394	441	441	796.5	796.5			
RM5	158	158	339	339	339	441	441	796.5		
RM6				339	339	394	394	441	796.5	

Post-mining land use											
Rehabilitation area	RA2a										
Relevant activities	Highwall of the final void remaining from open cut disturbance after reshaping to the final landform										
Total size of rehabilitation area (ha)	35.6										
Commencement of first milestone: RM3	10/12/Year 24										
PMLU	Highwall 'natural' ecosystem - Habitat and ecosystem services										
Date area is available	10/12/Year 24										
Cumulative area	35.6										
Milestone completed by	10/12/Year 26	10/12/Year 36									
Milestone reference	**Cumulative area achieved (ha)**										
RM3	35.6										
RM7		35.6									

Post-mining land use											
Rehabilitation area	RA2b										
Relevant activities	Water containment area (pit lake) at equilibrium, portion of regraded low wall adjacent the water containment area										
Total size of rehabilitation area (ha)	111.5										
Commencement of first milestone: RM3	10/12/Year 24										
PMLU	Pit lake ecosystem										
Date area is available	10/12/Year 24										
Cumulative area	111.5										
Milestone completed by	10/12/Year 26	10/12/Year 51									
Milestone reference	**Cumulative area achieved (ha)**										
RM3	111.5										
RM8		111.5									

Post-mining land use											
Rehabilitation area	RA3										
Relevant activities	Mine water dams, raw water dams, sediment dams, drains and off lease water release/extraction infrastructure										
Total size of rehabilitation area (ha)	79.9										
Commencement of first milestone: RM1	10/12/Year 24										
PMLU	Improved grazing pasture – low intensity cattle grazing										
Date area is available	10/12/Year 24										
Cumulative area	79.9										
Milestone completed by	10/12/Year 28	10/12/Year 33	10/12/Year 40								
Milestone reference	**Cumulative area achieved (ha)**										
RM1	79.9										
RM2	79.9										
RM3	79.9										
RM4		79.9									
RM5		79.9									
RM6			79.9								

Post-mining land use

Rehabilitation area	RA4										
Relevant activities	Mine infrastructure area and internal access roads including haul roads on natural ground										
Total size of rehabilitation area (ha)	39.6										
Commencement of first milestone: RM1	10/12/Year 24										
PMLU	Improved grazing pasture – low intensity cattle grazing										
Date area is available	10/12/Year 24										
Cumulative area	39.6										
Milestone completed by	10/12/Year 28	10/12/Year 33	10/12/Year 39								
Milestone reference	**Cumulative area achieved (ha)**										
RM1	39.6										
RM2	39.6										
RM3	39.6										
RM4		39.6									
RM5			39.6								
RM6											

Post-mining land use											
Rehabilitation area	RA5										
Relevant activities	Disturbance associated with topsoil stockpiles on natural ground, minor disturbance from other approved disturbance activities resulting in compacted land requiring rehabilitation										
Total size of rehabilitation area (ha)	150.5										
Commencement of first milestone: RM2	10/12/Year 24										
PMLU	Improved grazing pasture – low intensity cattle grazing										
Date area is available	10/12/Year 24										
Cumulative area	150.5										
Milestone completed by	10/12/Year 28	10/12/Year 37									
Milestone reference	**Cumulative area achieved (ha)**										
RM2	150.5										
RM4	150.5										
RM5	150.5										
RM6		150.5									

Post-mining land use											
Rehabilitation area	RA6										
Relevant activities	Permanent drainage channel for fish passage										
Total size of rehabilitation area (ha)	0.4										
Commencement of first milestone: RM9	10/12/Year 1										
PMLU	Permanent drainage channel for fish passage										
Date area is available	10/12/Year 1										
Cumulative area	0.4										
Milestone completed by	10/12/Year 4										
Milestone reference	**Cumulative area achieved (ha)**										
RM0	0.04										

Appendix B. PRC Plan Reference Map


N
LEGEND
MLA 700057
Road
Waterway
Third-party infrastructure
Moura-Baralaba Road Realignment
ETL Option 1 and Mine Substation
Mine Site ETL
Rehabilitation Area
RA1
RA2a
RA2b
RA3
RA4
RA5
RA6
Rehabilitation Area Reference Map
Baralaba South Project
Client
Baralaba South Pty Ltd
Author
AARC Brisbane
Date
23-11-2023
Version
1.0
CRS
GDA2020 / MGA zone 55
Scale
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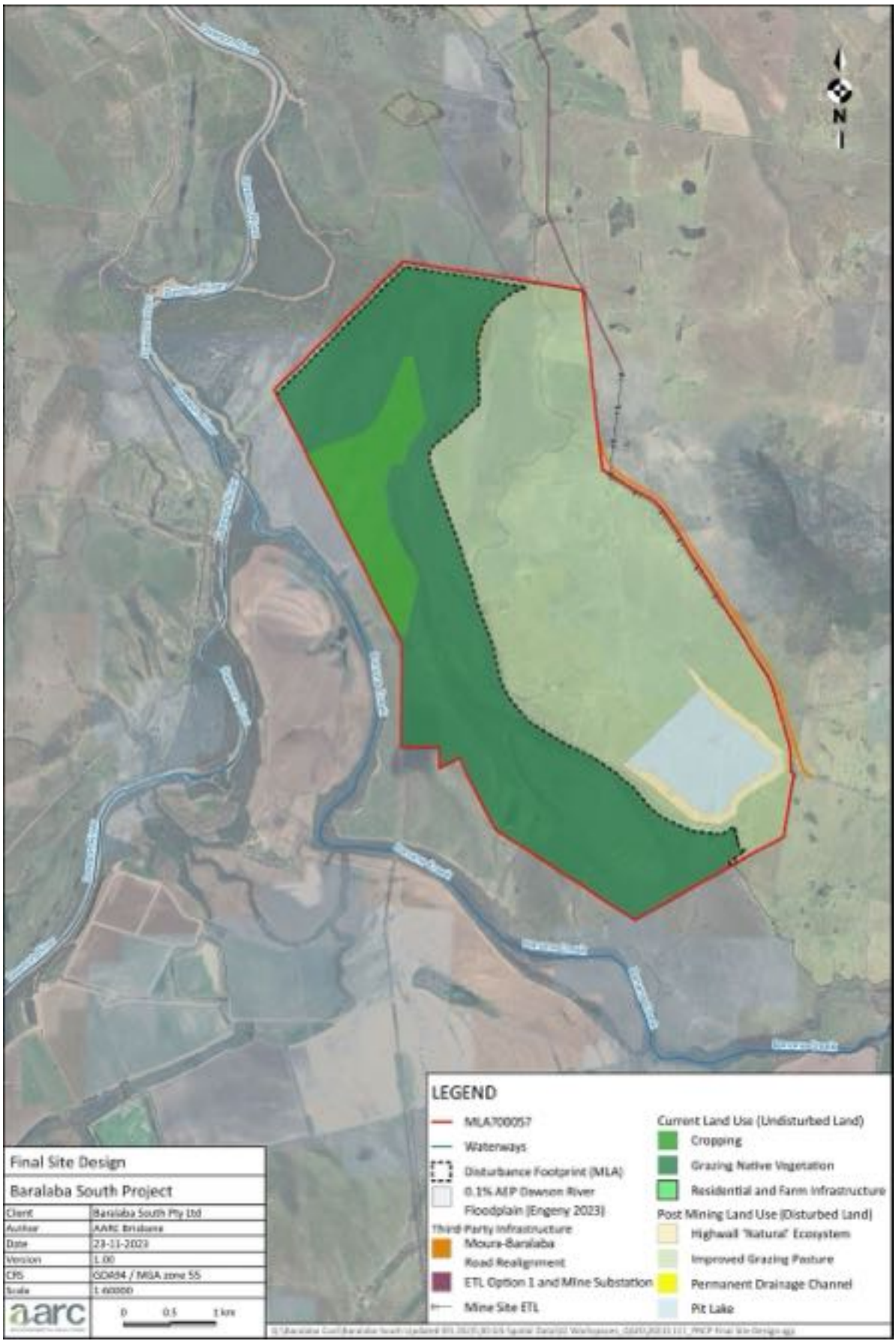
BARALABA SOUTH


N
LEGEND
MLA700057
Waterways
Disturbance Footprint (MLA)
0.1% AEP Dawson River Floodplain (Engeny 2023)
Third Party Infrastructure
Moura-Baralaba Road Realignment
ETL Option 1 and Mine Substation
Mine Site ETL
Current Land Use (Undisturbed Land)
Cropping
Grazing Native Vegetation
Residential and Farm Infrastructure
Post Mining Land Use (Disturbed Land)
Highwall 'Natural' Ecosystem
Improved Grazing Pasture
Permanent Drainage Channel
Pit Lake
Final Site Design
Baralaba South Project
Client
Baralaba South Pty Ltd
Author
AARC Brisbane
Date
23-11-2023
Version
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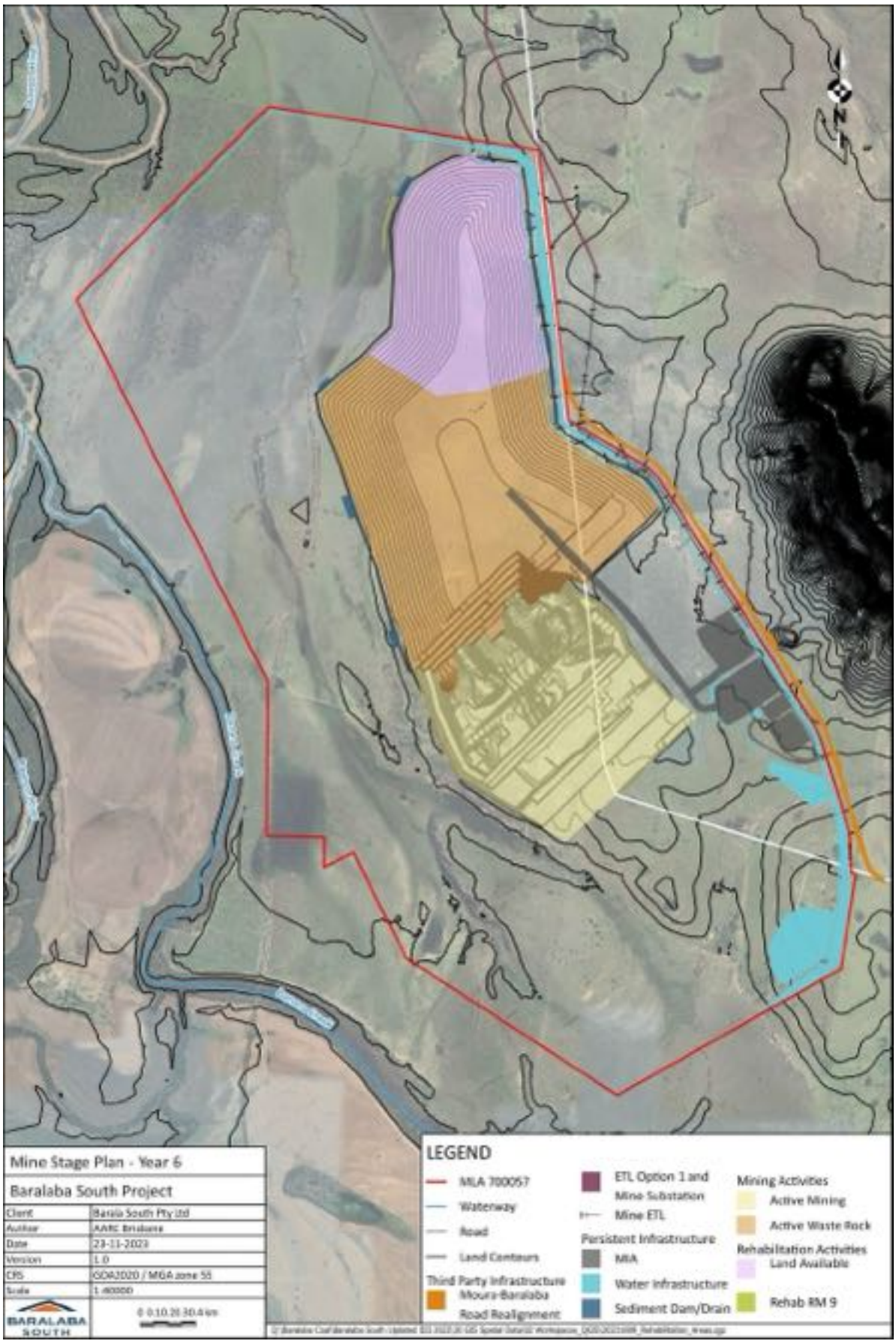
Appendix C. Schedule stage plans


Mine Stage Plan - Year 6
Baralaba South Project
Client
Baralaba South Pty Ltd
Author
AARC Brisbane
Date
23-11-2023
Version
1.0
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GDA2020 / MGA zone 55
Scale
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BARALABA SOUTH
LEGEND
MLA 700057
Waterway
Road
Land Contours
Third Party Infrastructure
Moura-Baralaba Road Realignment
ETL Option 1 and Mine Substation
Mine ETL
Persistent Infrastructure
MIA
Water Infrastructure
Sediment Dam/Drain
Mining Activities
Active Mining
Active Waste Rock
Rehabilitation Activities
Land Available
Rehab RM 9


LEGEND
MLA 700057
Waterway
Road
Land Contours
Third Party Infrastructure
Moura-Baralaba
Road Realignment
ETL Option 1 and
Mine Substation
Mine ETL
Persistent Infrastructure
MIA
Water Infrastructure
Sediment Dam/Drain
Mining Activities
Active Mining
Active Waste Rock
Rehabilitation Activities
Land Available
Rehab RM 5
Rehab RM 9
Mine Stage Plan - Year 11
Baralaba South Project
Client
Baralaba South Pty Ltd
Author
AARC Brisbane
Date
23-11-2023
Version
1.0
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Scale
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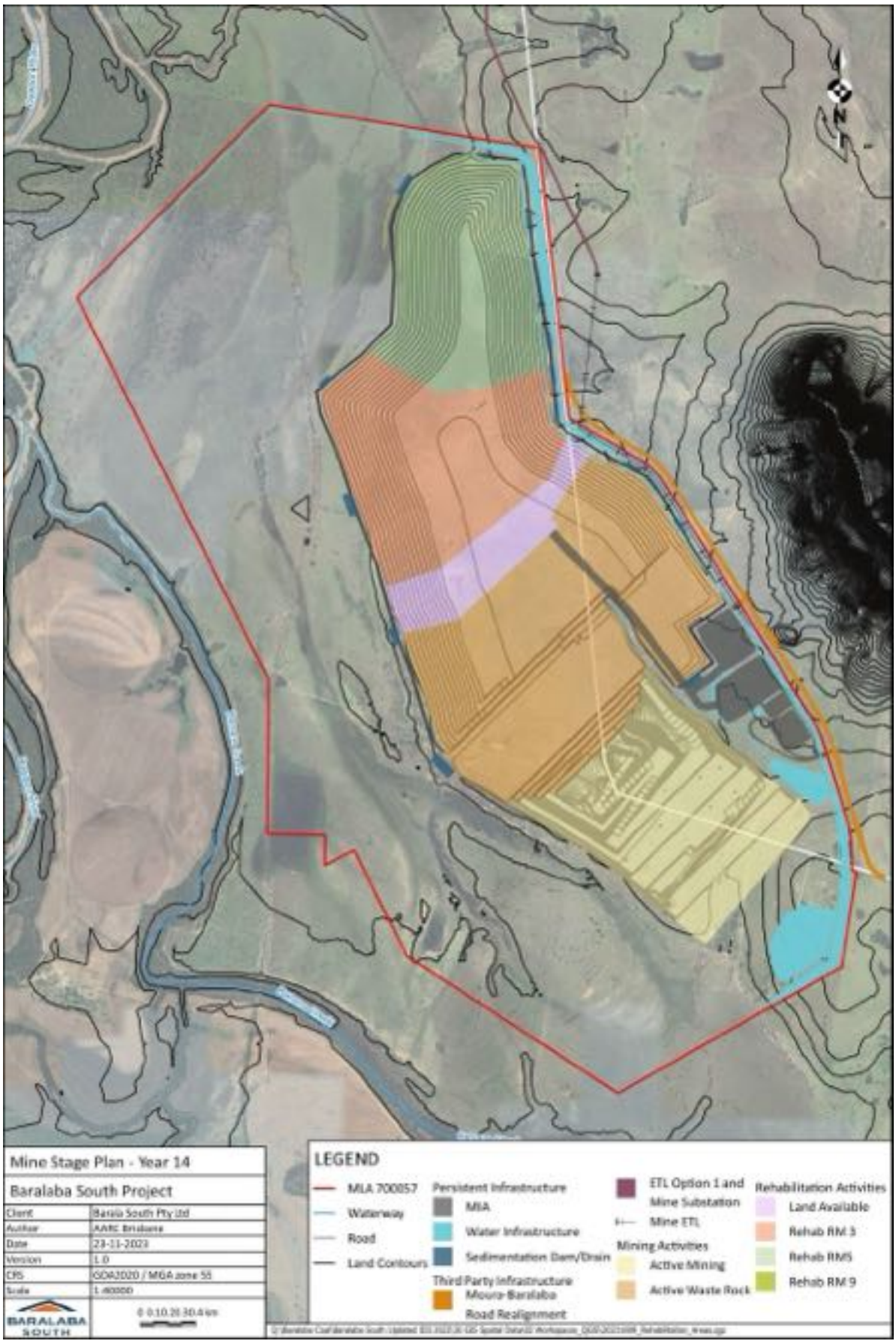
BARALABA SOUTH


Mine Stage Plan - Year 14
Baralaba South Project
Client
Baralaba South Pty Ltd
Author
AARC Brisbane
Date
23-11-2023
Version
1.0
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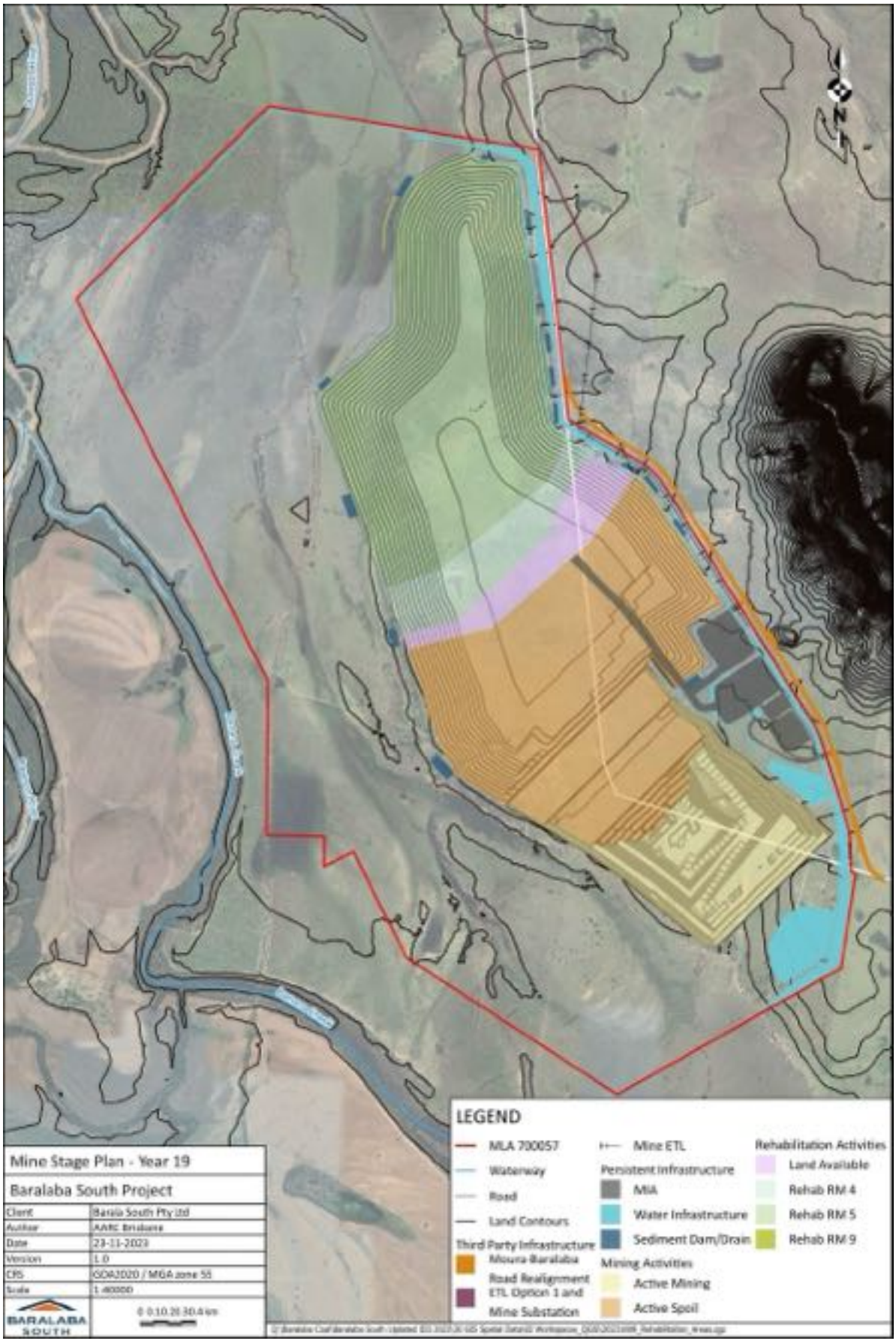
BARALABA SOUTH
LEGEND
MLA 700057
Waterway
Road
Land Contours
Persistent Infrastructure
MIA
Water Infrastructure
Sedimentation Dam/Drain
Third Party Infrastructure
Moura-Baralaba Road Realignment
ETL Option 1 and Mine Substation
Mine ETL
Mining Activities
Active Mining
Active Waste Rock
Rehabilitation Activities
Land Available
Rehab RM 3
Rehab RM5
Rehab RM 9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Land Contours
Third Party Infrastructure
Moura-Baralaba
Road Realignment
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Persistent Infrastructure
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Water Infrastructure
Sediment Dam/Drain
Mining Activities
Active Mining
Active Spoil
Rehabilitation Activities
Land Available
Rehab RM 4
Rehab RM 5
Rehab RM 9
Mine Stage Plan - Year 19
Baralaba South Project
Client
Baralaba South Pty Ltd
Author
AARC Brisbane
Date
23-11-2023
Version
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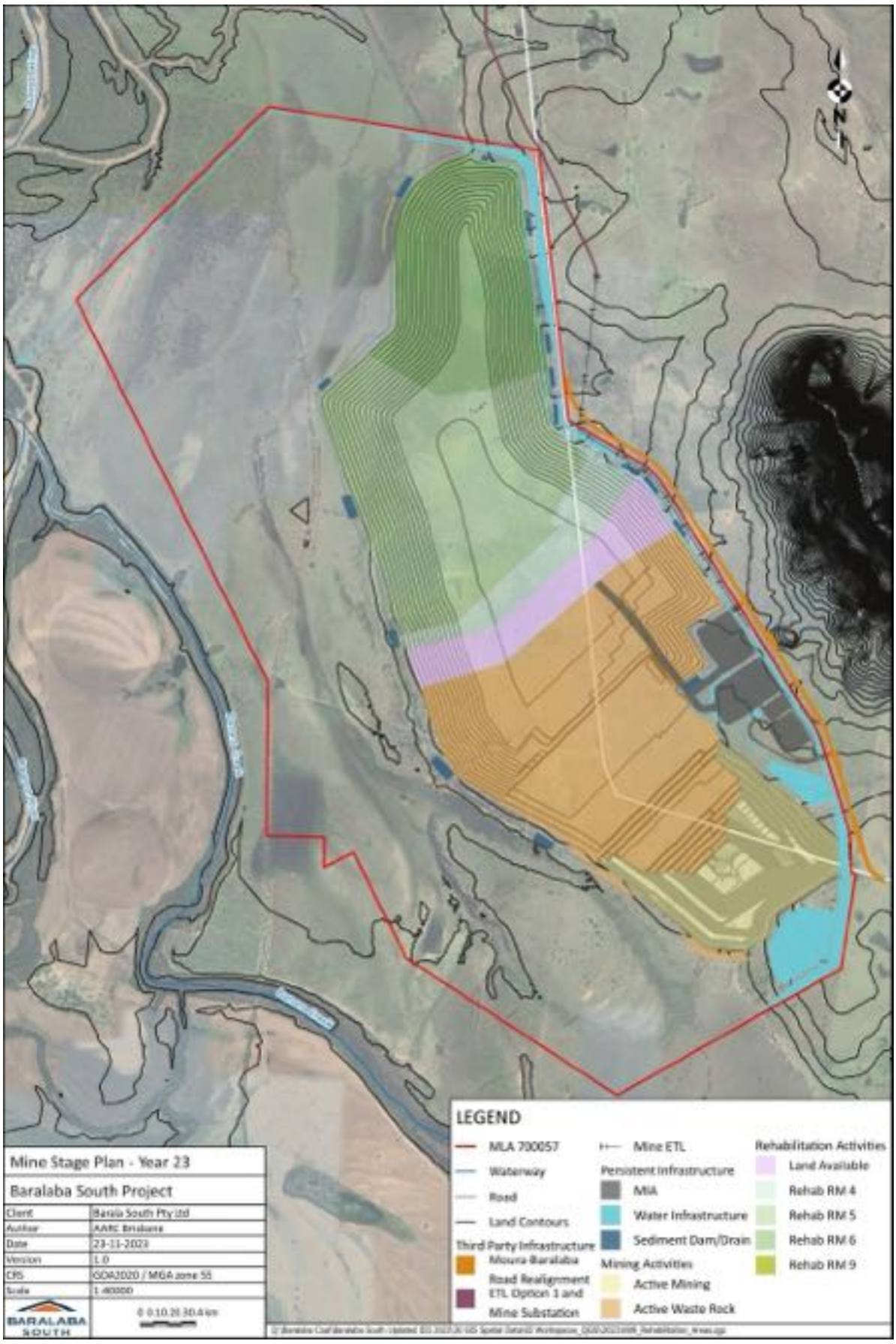
BARALABA SOUTH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Water Infrastructure
Sediment Dam/Drain
Mining Activities
Active Mining
Active Waste Rock
Rehabilitation Activities
Land Available
Rehab RM 4
Rehab RM 5
Rehab RM 6
Rehab RM 9
Mine Stage Plan - Year 23
Baralaba South Project
Client
Baralaba South Pty Ltd
Author
AARC Brisbane
Date
23-11-2023
Version
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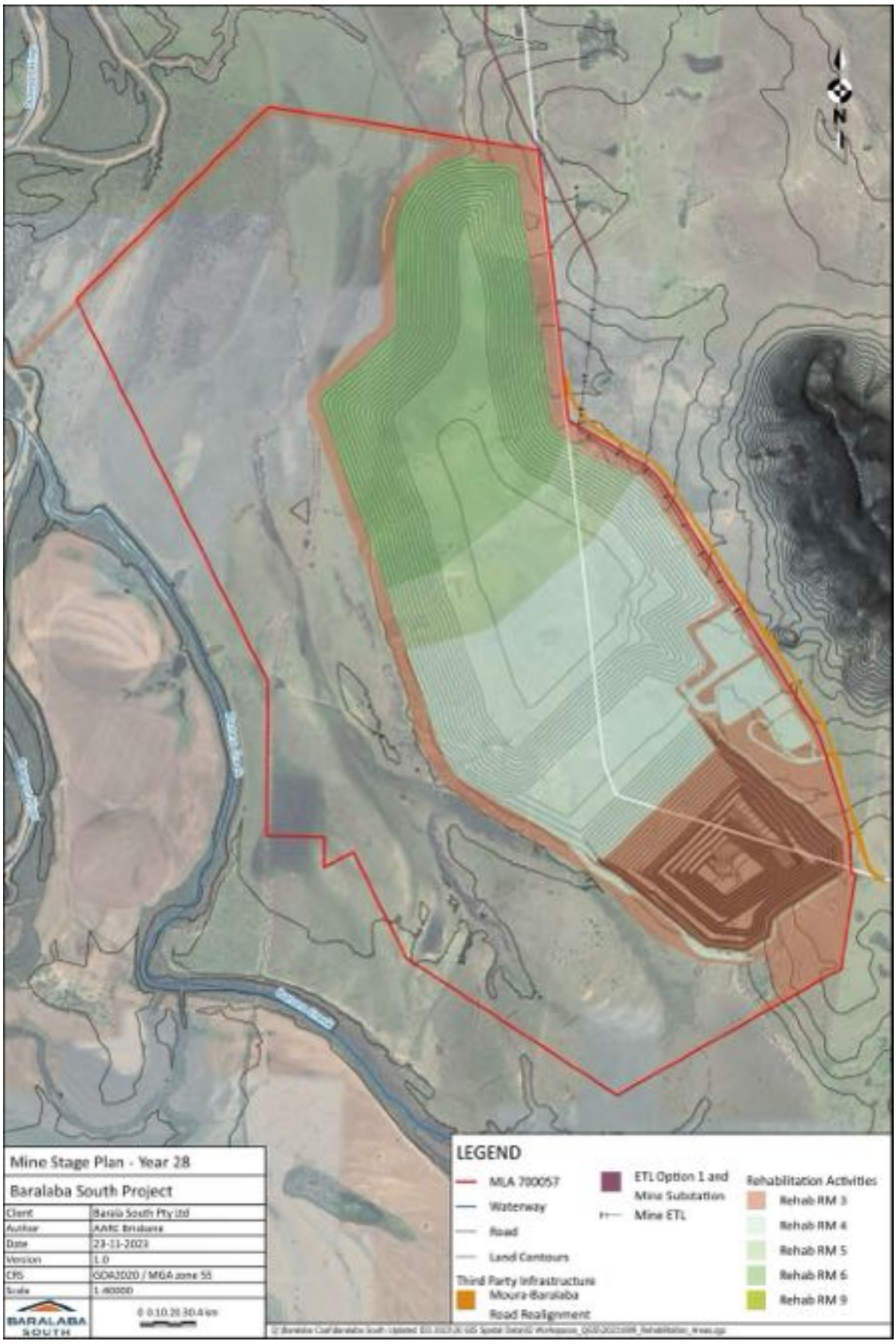
BARALABA SOUTH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Baralaba South Project
Client
Baralaba South Pty Ltd
Author
AARC Brisbane
Date
23-11-2023
Version
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Waterway
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Land Contours
Third Party Infrastructure
Moura-Baralaba Road Realignment
ETL Option 1 and Mine Substation
Mine ETL
Rehabilitation Activities
Rehab RM 3
Rehab RM 4
Rehab RM 5
Rehab RM 6
Rehab RM 9

Appendix D. Community & Stakeholder Engagement Plan

[refer Baralaba South Project EIS, Appendix T, Draft Community Stakeholder Engagement Plan]

Appendix E. Provided technical studies

3D Environmental Landscape & Vegetation Science (3D Environmental) 2023, Baralaba South Project Groundwater Dependent Ecosystem Assessment, prepared for Baralaba South Pty Ltd.

Cartledge Mining and Geotechnics (Cartledge 2023), *Baralaba South Geotechnical Assessment,* prepared for Baralaba South Pty Ltd, Brisbane, QLD.

Ecological Service Professionals Pty Ltd (ESP) 2023, Aquatic Ecology Assessment Report, prepared for Baralaba South Pty Ltd.

Eco Solutions & Management (EcoSM) 2023, Baralaba South Project Terrestrial Ecology Assessment, prepared for Baralaba South Pty Ltd.

Think Business 2023a, Social Impact Assessment Baralaba South Project, prepared for Baralaba South Pty Ltd.

Engeny 2023a, Baralaba South Project Surface Water Impact Assessment, prepared for Baralaba South Pty Ltd.

Engeny 2023b, Baralaba South Project Flood Impact Assessment, prepared for Baralaba South Pty Ltd.

Environmental Earth Sciences (EES) 2023, Soil and Land Suitability Assessment: Baralaba South Project, prepared for Baralaba South Pty Ltd.

Stygoecologia 2019, Baralaba South Project Stygofauna Assessment, prepared for Mount Ramsay Coal Company Pty Ltd (renamed Baralaba South Pty Ltd).

Terrenus Earth Sciences 2023, Geochemical Assessment of Potential Spoil and Coal Reject Materials: Baralaba South Project, prepared for Baralaba South Pty Ltd.

Watershed HydroGeo Pty Ltd 2023, Groundwater Modelling and Assessment, prepared for the Baralaba South Project, Watershed HydroGeo, Sydney.

Appendix F. Rehabilitation Risk Assessment

Risk Description				Evaluation				Rating			
Risk Scenario/Threat Title	Causes (Triggers / Indicators)	Impacts (Consequences)	Controls	Likelihood - Prob.	Safety	Environment	Compliance	Safety	Environment	Compliance	Final Risk Rating
Elevated landforms											
Safe											
Surface roughness (rockiness, depressions) in excess of that expected for the PMLU	Erosion gullies etc due to some dispersive subsoils/ topsoils, inadequate surface preparation, localised settlement	Safety hazard for personnel, stock and wildlife	Surface preparation measures (initial), maintenance controls (pre-closure), rehabilitation monitoring and assessment, undertake repairs and maintenance as required.	R	L			I			I
Slope steepness in excess of that expected for the PMLU	Landform not constructed to design	Safety hazard for personnel, stock and wildlife	Landform design appropriate to PMLU, waste rock emplacements and slope survey controls, reshaping according to design criteria. Certification by a suitably qualified expert that the final landform is stable and constructed according to design criteria.	U	L	L		I	I		I
Rehabilitation landform results in safety hazards exceeding those found in the surrounding unmined areas	Inadequate surface preparation, localised settlement, erosion gullies. Failure to meet Grazing Land Suitability Class 4	Safety hazard for personnel, stock and wildlife	Surface preparation measures (initial), monitoring, maintenance controls (pre-closure). Landform to be assessed for geotechnical stability, as constructed design certification of landforms. Crop cover included into the seed mix to provide for rapid establishment of vegetation cover.	U		M			II		II
Stable - geotechnical risk											
Significant slope failure	Landform not constructed to design, excessive slope steepness, physical material properties, inadequate drainage controls, adverse rainfall event	Localised land impacts and downstream water quality impacts	Slope moderation, maximum slopes subject to engineered design, provision of adequate drainage infrastructure, rapid revegetation, rehabilitation monitoring and assessment, undertake repairs and maintenance as required.	R	M			II			II
Stable - erosional risk											
Initial/ongoing gully, pipe and/or sheet erosion of rehabilitated areas	Dispersive topsoils and subsoils, adverse weather events	Localised land impacts and downstream water quality impacts	Landform design moderating slope, adequate/effective subsoil and topsoil amelioration, prompt revegetation establishment, revegetation monitoring, revegetation maintenance and repairs as required, modify revegetation methods and techniques to improve the likelihood of rehabilitation succession rehabilitated slopes when required, sediment controls during establishment.	U	M	M		II	II		II
Initial/ongoing gully, pipe and/or sheet erosion of rehabilitated areas	Inadequate rehabilitation drainage capacity and/or design	Localised land impacts and downstream water quality impacts	Drainage network design with acceptable design standards for drainage structures, avoidance of flow concentration, sub-catchment delineation, sufficient water storage structures, engineered flow channels, effective revegetation techniques, rehabilitation monitoring and management as required, regular review (typically annual) of water management design parameters, monitoring of the draining network performance, prompt remediation and causal feedback look to water management system review.	U		M			II		II
Initial/ongoing gully, pipe and/or sheet erosion of rehabilitated areas	Adverse climatic events and/or climatic sequences beyond design capacity	Localised land impacts and downstream water quality impacts	Downstream sedimentation controls, prompt revegetation, regular (typically annual) review of water management design parameters, monitoring of drainage network performance, undertake repairs and maintenance, prompt remediation and causal feedback loop to water management system review.	U		M			II		II

Risk Description				Evaluation					Rating		
Risk Scenario/Threat Title	Causes (Triggers / Indicators)	Impacts (Consequences)	Controls	Likelihood - Prob.	Safety	Environment	Compliance	Safety	Environment	Compliance	Final Risk Rating
Initial/ongoing gully, pipe and/or sheet erosion of rehabilitated areas (medium-long term risk)	Rehabilitation failure/ vegetation disease/loss, climatic events (drought), other	Localised land impacts and downstream water quality impacts	Landform design moderating slope, adequate/effective subsoil and topsoil amelioration, prompt revegetation establishment, revegetation monitoring and assessment, modify rehabilitation methods and techniques to improve the likelihood of revegetation success on rehabilitated slopes, undertake repairs and maintenance as required.	U		M			II		II
Non-polluting - geochemical risk											
Acid and saline drainage generation	Adverse waste rock geochemistry	Revegetation performance impacts, downstream receiving environment water quality and dependent ecosystem impacts	Confirmed non-NAPP materials and low risk of saline drainage. Routine confirmatory geochemical testing, regular water quality monitoring and assessment.	U		L			I		I
Impacts to groundwater	Adverse waste rock geochemistry	Groundwater impacts (incl. GDEs)	Negative NAPP materials and low risk of saline drainage. Routine confirmatory geochemical testing, regular water quality monitoring and assessment.	U		L			I		I
Highly saline or sediment-laden run-off or seepage from rehabilitated areas	Rehabilitation failure/ vegetation disease/loss, climatic events, other	Localised land impacts, downstream water quality and drainage system impacts	Sequencing of rehabilitation upslope so that new rehabilitation drains to established areas. Regular water quality monitoring pH: 6.5-8.5 (median)	U		L			I		I
Non-polluting - other environmental harm											
Not applicable											
Sustainable - PMLU											
Insufficient pasture density/diversity and recruitment	Weather, poor soil characteristics, poor management practices impacting germination, vegetation establishment and PMLU density metrics, and shortage of topsoil resources	Insufficient pasture productivity	Improving rehabilitation methodologies, rehabilitation trials rehabilitation area monitoring and assessment, undertake repairs and maintenance works as required.	P		L			II		II
Pests and weeds	Poor local, regional or site property management practices.	Increased risk of not achieving designated PMLU	Pest and weed management practices, monitoring programs to allow early detection and management	P		L			II		II
Insufficient quality topsoil resources onsite available to undertake rehabilitation activities	Insufficient management of topsoil resources	Increased risk of not achieving PMLU	Implementation of topsoil management plan, annual review of topsoil inventory.	R		L			I		I
Unable to achieve characteristics to classify as Land suitability Class IV	Weather, poor soil characteristics, poor management practices impacting germination, vegetation establishment and PMLU density/diversity metrics	Failure to achieve rehabilitation completion criteria targets	Management and maintenance activities, rehabilitation performance monitoring	U		M			II		II

Risk Description				Evaluation				Rating			
Risk Scenario/Threat Title	Causes (Triggers / Indicators)	Impacts (Consequences)	Controls	Likelihood - Prob.	Safety	Environment	Compliance	Safety	Environment	Compliance	Final Risk Rating
Residual void (high wall, low wall and water contaiment area)											
Safe											
Slope steepness in excess of that expected for the PMLU	Landform not constructed to design	Safety hazard for personnel, stock and wildlife	Landform design appropriate to PMLU, waste rock dump and slope survey controls, reshaping to design criteria. Certification by a suitably qualified expert that the final landform is stable and constructed according to design criteria.	U	L			I			I
Highwall access	Insufficient warnings, barriers preventing access to hazardous areas, fencing/bunding breaks, unauthorised access	Potential to fall into the void resulting in safety hazard for personnel, stock and wildlife	Exclusion fencing and suitable signage at an FOS distance to be determined by a geotechnical expert prior to the cessation of mining activities to be established around the highwall, low wall, and end walls.	U	H			III			III
Stable - geotechnical risk											
Final void highwalls and low walls subject to significant slope failure	Excessive slope steepness, physical material properties, poor drainage, adverse rainfall event	Localised land impacts, increase in void catchment area/change in water balance, and potential to increase flooding risks.	Slope moderation, final landform, maximum slopes subject to engineered design, assessment of construction materials by a suitably qualified person, provision of adequate drainage infrastructure, geotechnical assessment undertaken at closure. Certification by a suitably qualified expert that the final landform is stable and constructed according to design criteria.	U	M	L		II	I		II
Stable - erosional risk											
Extreme erosion potential from batters or exposed faces (tertiary)	Erosional instability resulting from improper drainage at the top of the void.	Localised land impacts, increase in void catchment area/change in water balance	Construction of landforms to be in accordance with engineered designed (e.g. slope design).	U		L			I		I
Non-polluting - geochemical risk											
High salinity	Leaching of salts contained in overburden materials to the pit lake and concentration of salts by evaporation	Groundwater impacts (incl. GDEs), downstream water quality impacts, failure to achieve PMLU of pit lake	Low salinity overburden materials, anticipated groundwater seepage to void, no seepage of void water into the groundwater system. Final void hydrological assessment has been undertaken. Monitoring of pit lake water quality and stratification to be undertaken and assessed against model predictions. Ongoing monitoring of water quality.	P		L			II		II
Release of void water to the environment	Pit overtopping, connection from floodwaters, groundwater table rises and connects to Permian aquifers causing saline pollution.	Groundwater impacts (incl. GDEs), downstream water quality impacts,	Long term groundwater modelling and final void water balance confirms the final void will remain as a sink in perpetuity. Void is located outside PMF elevation level. Final void design minimises void size and catchment area.	R	M	M		II	II		II

Risk Description				Evaluation Rating							
Risk Scenario/Threat Title	Causes (Triggers / Indicators)	Impacts (Consequences)	Controls	Likelihood - Prob.	Safety	Environment	Compliance	Safety	Environment	Compliance	Final Risk Rating
Sustainable - PMLU											
Insufficient density/diversity of vegetation on the low wall adjacent the water containment area	Weather, poor soil characteristics and slopes impacting germination, vegetation establishment and PMLU density/diversity metrics	Insufficient habitat; habitat unsuitable for native fauna; insufficient carbon input in the final void catchment	Improving native rehabilitation methodologies, trial activities, management and maintenance activities, rehabilitation performance monitoring, review of drainage network performance following wet weather events.	P		L			II		II
Pests and weeds	Poor local, regional or site property management practices.	Increased risk of not achieving designated PMLU	Pest and weed management practices, monitoring programs to allow early detection and management.	U		L			I		I
Slope steepness in excess of that expected for the PMLU	Landform not constructed to design parameters	Insufficient fauna use of habitat	Slopes to be design in accordance with landform design criteria, monitoring of fauna usage of high walls.	U		L			I		I
Insufficient usage of the final void ecosystem	Water quality not as predicted, poor carbon catchment into the void	Insufficient fauna use of habitat	Low walls to be rehabilitated with native vegetation. Residual void water modelling will be updated following the cessation of mining activities	U		L			I		I
Infrastructure & minor disturbance areas											
Safe											
Surface roughness (rockiness, depressions) in excess of that expected for the PMLU	Erosion gullies etc due to some dispersive subsoils/ topsoils, inadequate surface preparation, localised settlement	Safety hazard for personnel, stock and wildlife	Surface preparation measures (initial), monitoring, maintenance controls (pre-closure), risk assess controls when designed and placed and modify as required, post-closure monitoring.	P	L			II			II
Infrastructure not suitably decommissioned to a safe landform	Inadequate removal of equipment, remediation of foundations and contaminated areas, surface preparation Failure to meet Grazing Land Suitability Class 4	Safety hazard for personnel, stock and wildlife	Decommissioning management, adequate contaminated land investigations, surface preparation measures (initial), monitoring, maintenance controls (pre-closure)	U		L			I		I
Stable - geotechnical risk											
Not applicable											

Risk Description				Evaluation Rating							
Risk Scenario/Threat Title	Causes (Triggers / Indicators)	Impacts (Consequences)	Controls	Likelihood - Prob.	Safety	Environment	Compliance	Safety	Environment	Compliance	Final Risk Rating
Stable - erosional risk											
Gully and rill erosion	Not constructed to design, adverse rainfall event	Localised land impacts and downstream water quality impacts Safety hazard for stock and wildlife.	Surface preparation measures (initial), monitoring, maintenance controls (pre-closure)	P		L			II		II
Gully and rill erosion	Inadequate rehabilitation drainage capacity and/or design	Localised land impacts and downstream water quality impacts	Downstream sedimentation controls, revegetation, rehabilitation and water quality monitoring, maintenance and repair activities as required.	U		L			I		I
Initial/ongoing gully, pipe and/or sheet erosion of rehabilitated areas (medium-long term risk)	Rehabilitation failure/ revegetation disease, climatic events	Localised land impacts and downstream water quality impacts	Landform design similar contour to surrounding environment, adequate/effective subsoil and topsoil amelioration, prompt revegetation establishment, revegetation monitoring and management as required.	U		L			I		I
Non-polluting - geochemical risk											
Acid and saline drainage generation	Adverse waste rock geochemistry	Revegetation performance impacts, downstream receiving environment water quality and dependent ecosystem impacts	Confirmed non-NAPP materials and low risk of saline drainage. Routine confirmatory geochemical testing, regular water quality monitoring and assessment.	U		L			I		I
Impacts to groundwater	Adverse waste rock geochemistry	Groundwater impacts (incl. GDEs)	Negative NAPP materials and low risk of saline drainage. Routine confirmatory geochemical testing, regular water quality monitoring and assessment.	U		L			I		I
Non-polluting - other environmental harm											
Contaminated soils and/or run-off	Inadequate decommissioning works, improper contaminated land clean up	Localised land impacts and downstream water quality impacts	Contaminated land assessment, existing onsite spill management. Hazardous materials are stored onsite in accordance with AS1940	U		L			I		I

Risk Description				Evaluation				Rating			
Risk Scenario/Threat Title	Causes (Triggers / Indicators)	Impacts (Consequences)	Controls	Likelihood - Prob.	Safety	Environment	Compliance	Safety	Environment	Compliance	Final Risk Rating
Sustainable - PMLU											
Insufficient density/diversity of vegetation in grazing PMLU	Adverse weather, poor soil characteristics and slopes impacting germination, vegetation establishment and PMLU density/diversity metrics	Reduced pasture production due to unsuitable conditions	Topsoil amelioration, improving rehabilitation methodologies, seeding rates to be finalised with local agronomists prior to seeding, sowing of seeds not to be undertaken in adverse weather conditions management and maintenance activities, rehabilitation performance monitoring and assessment, undertake repairs and improvement works as required.	U		L			I		I
Pests and weeds	Poor local, regional or site property management practices.	Increased risk of not achieving designated PMLU	Pest and weed management practices, monitoring programs to allow early detection and management	U		L			I		I
Unable to achieve characteristics to classify as Land suitability Class IV	Weather, poor soil characteristics, poor management practices impacting germination, vegetation establishment and PMLU density/diversity metrics	Failure to achieve rehabilitation completion criteria targets	Management and maintenance activities, rehabilitation performance monitoring	U		L			I		I
Insufficient quality topsoil resources onsite available to undertake rehabilitation activities	Insufficient management of topsoil resources	Increased risk of not achieving PMLU	Implementation of topsoil management plan, annual review of topsoil inventory.	P		L			II		II
Drainage channel for fish passage											
Safe											
Upstream flood impacts	Drainage channel not constructed to design	Increased changes in flood regimes	Drainage channel has been designed to represent existing conditions. Monitoring of the drainage channel will provide for opportunity for reparation activities with advice from a AQP. Certified design and as constructed design requirements included as a rehabilitation milestone.	U		M			II		II
Stable - erosional risk											
Erosion and sediment transport downstream	Drainage channel not constructed to design	Changes to geomorphology and flow velocities within Tributary 8	Drainage channel has been designed to represent existing conditions. Monitoring of the drainage channel will provide for opportunity for reparation activities with advice from an AQP. Certified design and as constructed design requirements included as a rehabilitation milestone.	P		L			II		II
Erosive forces against the waste rock dump	Drainage channel not constructed to design	Drainage channel design failure may cause water to pool and erosive forces act against the final landform.	Drainage channel has been designed to represent existing conditions. Certified design and as constructed design requirements included as a rehabilitation milestone.	U		M			II		II
Sustainable - PMLU											
Slope steepness in excess of that expected for the PMLU	Not constructed to design	Increased risk to creating a barrier for fish passage at Tributary 8	Drainage channel has been designed to represent existing conditions. Monitoring of the drainage channel will provide for opportunity for reparation activities with advice from an AQP	U		M			II		II
End of record								9	36	0	41