



Baralaba South Project
Environmental Impact Statement

Executive Summary

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ES.0 Executive Summary

This Environmental Impact Statement (EIS) has been prepared for Baralaba South Pty Ltd (the Proponent) for the Baralaba South Project (the Project) to address the requirements of the *Environmental Protection Act 1994* (EP Act). The objective of the EIS is to identify and assess the potential environmental, social, economic and cumulative impacts of the proposed Project, and provide measures to avoid, minimise, mitigate or offset adverse impacts.

The Baralaba South Project was first proposed in 2012 as a 4 million tonnes per annum (Mtpa) run-of-mine (ROM) coal mine. Since that time there have been three changes of ownership and three different approaches to mining. In January 2020, an EIS for a large 5 Mtpa ROM mine was submitted. The Department of Environment and Science (DES) outlined significant community concerns with the proposed plan, particularly around flooding. DES granted Baralaba South Pty Ltd as the new Proponent, a 12-month extension to address these concerns.

The Proponent has since completely revised the Project to be a much smaller mine, located entirely outside the 10% annual exceedance probability (AEP) flood extent. The Project will produce up to approximately 2.5 Mtpa with mining and the final void outside the 0.1% AEP. Additionally, to reduce impacts of the Project on the community and the environment, it will be sequenced with Baralaba North Mine so that it will ramp up production as Baralaba North ramps down – effectively resulting in a continuation of current operations. The Proponent has worked with local communities throughout this time to refine the Project so that it addresses environmental concerns while still supporting economic opportunities and stability.

This EIS is to be assessed under the bilateral assessment agreement (between the State of Queensland and the Commonwealth of Australia). The bilateral assessment agreement provides accreditation of the Queensland processes for assessment of proposed actions that would otherwise be assessed by the Commonwealth Government for approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This EIS addresses the requirements of the Project Terms of Reference and is comprised of a main text report, supported by several attachments and appendices.

The Project is a proposed greenfield metallurgical coal mine located approximately 8 km south of Baralaba and 115 km west of Rockhampton in the lower Bowen Basin region of central Queensland (Figure ES.1 and Figure ES.2). The steel production industry continues to demand high quality metallurgical coal and the Project objective is to develop an open cut, metallurgical coal resource for export of a low volatile pulverised coal injection product to the steel production industry.

The Project will produce up to approximately 2.5 Mtpa of ROM coal. The identified resource supports a mine with an operational life of approximately 23 years optimal mining conditions. Mine life may be influenced by such factors as further resource definition, engineering optimisations, market conditions and environmental factors.

The Project is expected to provide long-term economic benefits to the local community, State and Commonwealth. The benefits for the local community will include employment opportunities and the procurement of local services and support of community initiatives. The peak workforce for the Project is estimated to be 521 and during operations and an additional 268 employees during construction. In the period when Baralaba North Mine is ramping down and Baralaba South Project is in construction and ramping up, there will be a peak combined workforce of approximately 710 for three years. The Project is estimated to provide additional tax revenues of approximately \$62.6 million per annum to the Queensland Government and \$62.6 million per annum to the Australian Government.

ES.1 Project proponent

The Proponent for the Project is Baralaba South Pty Ltd (ACN 603 037 065) (formerly Mount Ramsay Coal Company Pty Ltd and Wonbindi TLO Holdings Pty Limited). The registered address for Baralaba South Pty Ltd is:

Level 20
10 Eagle Street
Brisbane City, Queensland 4000.

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).

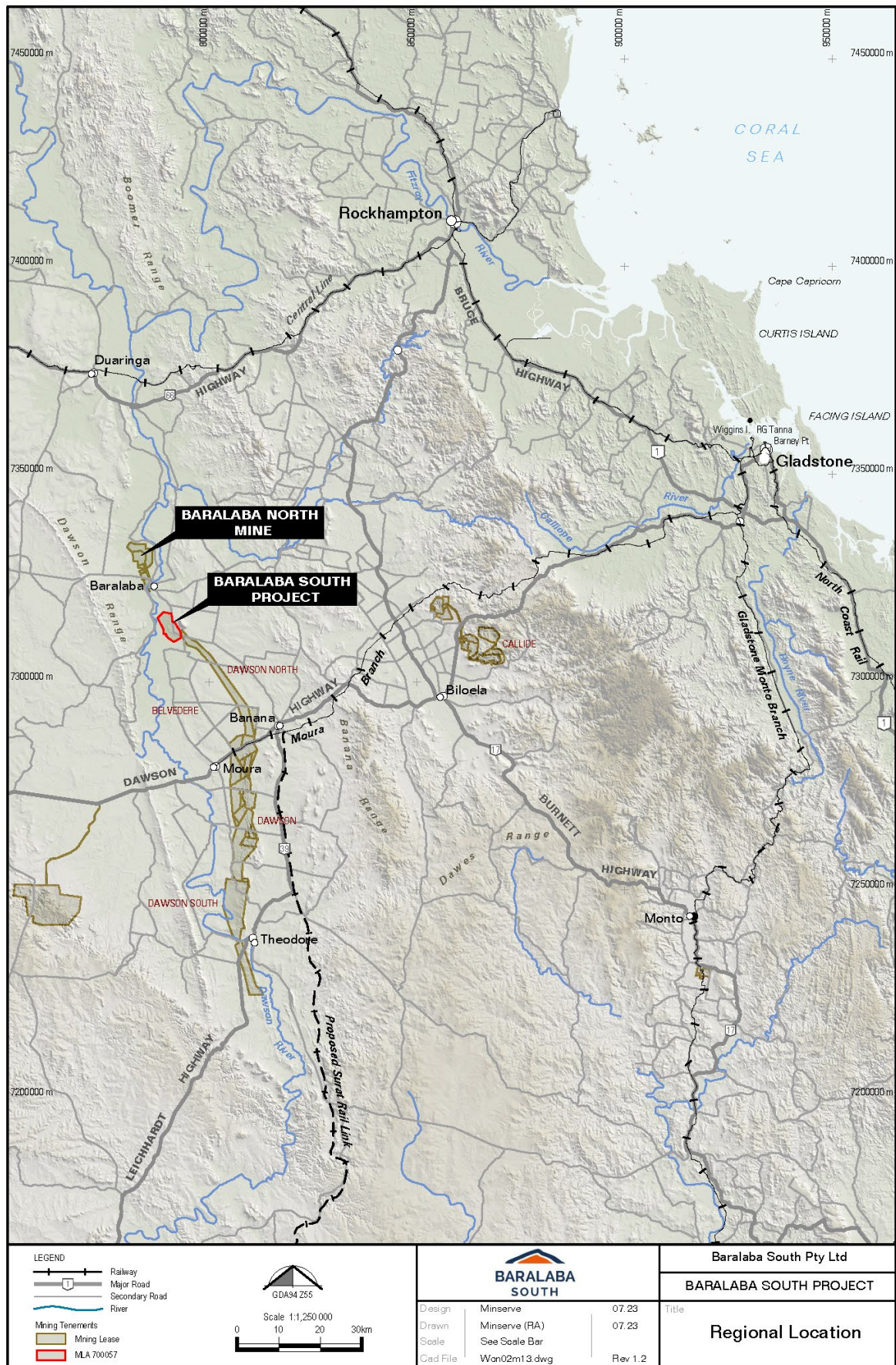


Figure ES.1: Project regional location

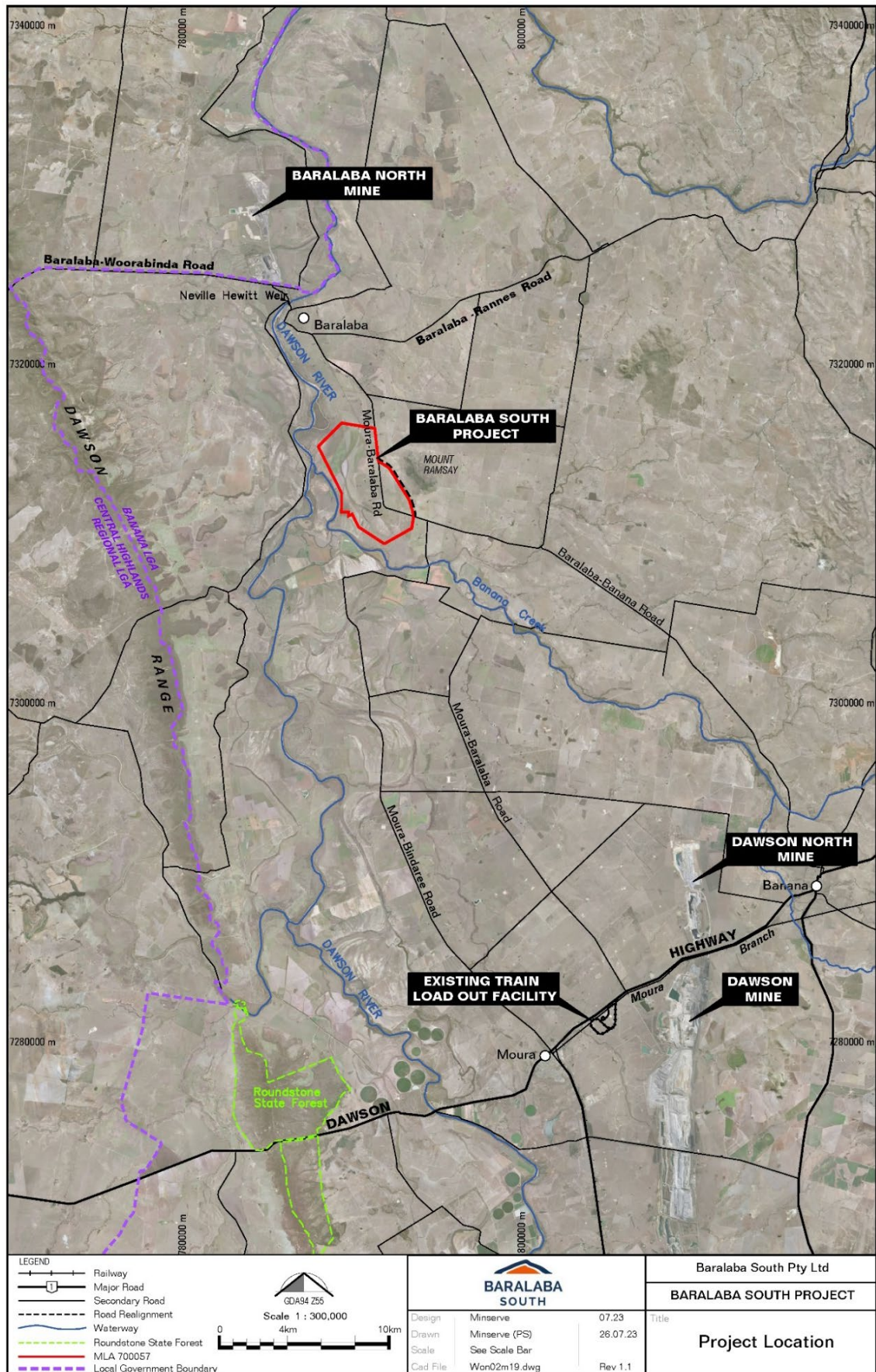


Figure ES.2: Project locality

ES.2 Project summary

The Project will mine approximately 49 Mt of ROM to produce approximately 36 Mt of product coal over the life of the Project. The Project will produce up to approximately 2.5 Mtpa of ROM coal, equivalent to an increase in coal production within the regional catchment of approximately 2.5% compared to current annual production.

The proposed mining activity is to be undertaken within the area of Mining Lease Application (MLA) 700057, which covers a total of 2,214 ha. Overburden and interburden will be disposed of in out-of-pit waste rock emplacements (WRE) located contiguous with the pit excavation; and in-pit WREs as part of ongoing progressive rehabilitation behind the advancing operations.

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

The Project will include the provision of power *via* an electricity transmission line from the Baralaba Substation to the north, as well as the realignment of a 4.5 km section of the Moura-Baralaba Road; part of the Banana Shire Council rural road network - from within the MLA area. The preferred route for the road is directly to the east of the MLA boundary. This route has been selected to minimise impacts to landholders, road users and the environment. The final alignments and approvals of third-party infrastructure will be subject to separate permitting processes under the Queensland *Planning Act 2016*. Road impacts of the Project will be subject to agreements with Banana Shire Council. The water management system for the Project will include water release/extraction infrastructure to the Dawson River.

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).

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

ES.3 Public consultation process

Stakeholder engagement and community consultation was undertaken during the preparation of the EIS consistent with 'Preparing an environmental impact statement: Guideline for Proponents' (Department of State Development, 2015). Extensive consultation occurred throughout 2022/23 to address a range of concerns with the previous project, particularly around the previously proposed Project size, the construction of large flood levee and the impact on flooding that this would have. Through this consultation process, the Proponent has significantly revised the mine plan, reducing it by around 50% in scale and excluding the mine footprint from the 10% AEP flood extent thereby eliminating the need for a flood levee.

Community concerns around economic stability have been addressed by the Project now sequenced to be a continuation of mining at the same level as Baralaba North to replace production as it reaches the end of productive mine life. Additional consultation activities with the local communities has also been conducted as part of the Social Impact Assessment.

Stakeholder and community consultation has been conducted using a variety of consultation mechanisms, including:

- face-to-face or telephone interviews with landholders;
- face-to-face or telephone interviews with community stakeholders;

- online surveys targeting nearby regional communities;
- meetings with Traditional Owners and Indigenous groups;
- email and telephone correspondence with the community and stakeholders;
- 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;
- community workshops; in Baralaba, Moura and Biloela; 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 and Baralaba Coal town office.

The Proponent will continue to consult with stakeholders including relevant government agencies, landholders and the community.

ES.4 Project description

ES.4.1 Construction

Construction and mine development activities required to enable the commencement of the open cut mining operation are planned to occur over a period of approximately 24 months; anticipated to commence within 24 months of approval and grant of the mining lease (ML), Environmental Authority (EA) and all other permit requirements for the Project.

The construction period will involve a civil and earthworks phase which will include the following activities within the mining lease:

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

A conventional Coal Handling and Preparation Plant (CHPP) will be constructed at the Project site for coal washing. Other associated infrastructure will include offices, crib rooms, warehousing, workshops, wash down bay, refuelling facility, and laboratory.

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

ES.4.2 Operations

Year 1 of coal production will commence following the first year of a two-year construction period.

Conventional hydraulic excavators and rear dump trucks will be used in a terrace style mining operation. Terrace mining utilises horizontal mining benches (flitches) that are removed by excavator/truck fleets. Coal and waste are removed as they are encountered, with mining progressing down and across benches. Mining operations will advance from north to south along the strike.

The terrace mining method, with advancing in-pit WREs, is an established mining method. The open cut pit behind the advancing operations will be progressively backfilled and rehabilitated to minimise risks to the environment. Dry disposal of tailings and reject material is proposed within the WREs. Waste will be hauled to the out-of-pit or in-pit WREs while coal will be hauled to the ROM area. Process wastewater will be recovered for recycling through the CHPP.

ES.4.3 Rehabilitation

The natural landscape in the Project area will be altered through the formation of both in-pit and out-of-pit WREs and a final void. Disturbed lands will be returned to a safe and stable landform that does not cause environmental harm and which will sustain an approved post-mining land use. Land disturbed by mining operations will be progressively rehabilitated. All mine infrastructure (including sediment dams, mine affected water dams, clean water dams and supporting pipelines and pumps) will be decommissioned and the areas rehabilitated, unless otherwise required for the post-mining land use.

The Proponent's objective is to reinstate the land to the previous land use; in this case to a predominantly improved pasture grazing land use. The Social Impact Assessment (Appendix S) identified impacts on soil resources 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. While alternative Post-Mining Land Uses (PMLUs) have been assessed, the proposed PMLU was indicated as having long-term and substantial value to the local community. Figure ES.3 illustrates the final landform under an improved pasture grazing PMLU.

A Rehabilitation Monitoring Program will be developed to ensure routine monitoring of rehabilitation is undertaken.

ES.5 Environmental assessment

ES.5.1 Flora and fauna

ES.5.1.1 Terrestrial flora

Results from the terrestrial ecology field surveys indicate the Project area has been largely cleared of native vegetation through historic and ongoing agricultural practices. Larger continuous patches of remnant vegetation occur, both along the Dawson River, Banana Creek and Mount Ramsay.

Regional Ecosystems (REs) within the MLA include:

- RE 11.3.3/a—*Eucalyptus coolabah* woodland on alluvial plains.
- 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.

RE 11.3.3 is listed as 'Of Concern' under the *Vegetation Management Act 1994*. This RE has also been mapped by the Queensland Government as being a high ecological significance (HES) wetland in a wetland protection area.

Two Threatened Ecological Communities (TEC) (Matters of National Environmental Significance [MNES]) under the EPBC Act are also present within the MLA including the Brigalow TEC and Coolibah – Black Box Woodlands TEC. The later corresponds to RE 11.3.3 as described above.

A total of 362 terrestrial flora species, including 56 introduced species, were recorded from the terrestrial ecology study area. Flora surveys identified two threatened flora species (*Xerothamnella herbacea* and *Solanum elachophyllum*) within a small patch of vegetation in the central east of the MLA. *Solanum elachophyllum* is listed as endangered under the *Nature Conservation Act 1992* (NC Act). *Xerothamnella herbacea* is listed as endangered under the EPBC Act and NC Act.

Approximately 10.1 ha of remnant vegetation and up to 5.5 ha of high-value regrowth vegetation will potentially be cleared or disturbed for the Project, some of which provides suitable habitat for threatened species. The maximum estimated clearance requirement would be approximately 90 individuals of *Xerothamnella herbacea*. Approximately 159 individuals of *Solanum elachophyllum* will be disturbed however this is not considered to be a residual significant impact to the species.

Four flora species listed as Weeds of National Significance by the Australian government and as declared species under the Queensland *Biosecurity Act 2014* were recorded from the Project area including Tiger Pear (*Opuntia aurantiaca*), Common Prickly Pear (*Opuntia stricta*), Velvet Prickly Pear (*Opuntia tomentosa*) and Parthenium Weed (*Parthenium hysterophorus*). The Project is unlikely to increase weed populations further.

Several mitigation measures are proposed to minimise impacts from the Project including:

- vegetation clearing protocols;
- progressive rehabilitation;
- weed and pest management; and
- species management program.

Based on the results of the significant impact assessments, biodiversity offsets will be provided for impacts to MNES flora (*Xerothamnella herbacea*) and flora (connectivity area, Matters of State Environmental Significance [MSES]). A Biodiversity Offsets Strategy has been developed to offset significant impacts on MNES flora. Non-remnant regenerating areas that are contained within the MNES offset areas will also provide offsets for Project impacts to MSES connectivity areas required under the *Environmental Offsets Act 2014*.



Figure ES.3: PMLU of improved pasture grazing with natural ecosystem

ES.5.1.2 Terrestrial fauna

Fauna habitats throughout the Project area are noted as typically being in poor to moderate condition, with poorer quality habitat associated with areas of historic clearing, cultivation and cattle grazing resulting in limited habitat connectivity value. A total of 193 terrestrial vertebrate fauna species were recorded during the field surveys, including six introduced species. Native species richness included 13 amphibians, 17 reptiles, 129 birds, 18 micro-bats and 10 mammals.

Three fauna species listed under the EPBC Act at the time of the controlled action decision were identified in the study area during the field surveys, namely the Ornamental Snake, Koala and Squatter Pigeon, all listed as vulnerable. Of these species, the Ornamental Snake was identified within the Project site during the seasonal surveys and the Squatter Pigeon was identified within the electricity transmission line (ETL) study area, while the Koala was identified in the additional investigation area during the 2020 post-wet season survey (Figures 13 to 16). Based on the results of the significant impact assessments, biodiversity offsets will be provided for impacts to MNES fauna, the Ornamental Snake.

Based on a review of database search results and habitat identified in the study area, an assessment of the likelihood of EPBC Act listed threatened species occurring within the Project area has been undertaken. This assessment identified the Koala and the Australian Painted Snipe, as having a moderate likelihood of occurrence within the Project site, water release/extraction infrastructure area and/or ETL study area. Six introduced pest fauna species listed under the *Biosecurity Act 2014 (Qld)* were recorded in the Project area during the field surveys.

Proposed mitigation measures to minimise impacts to the Project include;

- vegetation management protocols;
- progressive rehabilitation;
- weed and pest management; and
- species management program.

ES.5.1.3 Aquatic ecology

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

The waterways within the MLA do not connect to any important breeding, feeding or refuge areas and fish passage is highly limited due to the ephemeral nature of the waterways. A third order, unnamed, ephemeral tributary is within the disturbance footprint of the Project. A diversion drain will be constructed in this area to mitigate some of the potential impact to potential fish passage.

One lacustrine (artificial) wetland and two palustrine wetlands occur within the MLA. Wetlands within the Project area provide some lasting refuge when wet but are poorly connected, with poor to fair habitat conditions based on diversity of instream features and disturbance levels. Dry wetlands provide minimal habitat, except for aquatic flora.

Proposed mitigation measures to minimise impacts of the Project include;

- an Erosion and Sediment Control Plan;
- a Water Management Plan;
- a Surface Water Monitoring Program; and
- a Receiving Environment Monitoring Program.

ES.5.1.4 Groundwater dependent ecosystems

A Groundwater Dependent Ecosystem Assessment was undertaken to survey and assess potential groundwater dependent ecosystems (GDEs) within the study area in accordance with GDE guidelines. Vegetation clearing within the MLA will result in direct impact to 7.2 ha of groundwater dependent vegetation (RE 11.3.3).

Groundwater drawdown associated with Project is not predicted to impact the ecological function of GDEs outside the MLA which utilise and rely upon the perched seasonal groundwater resources as:

- there is low hydraulic connectivity between the sandy lenses and no hydraulic connectivity between the sandy lenses and the regional groundwater table (including potentiometric surfaces of the alluvial aquifer and the Permian coals seams) which will be impacted by mining; and
- there is no causal pathway identified which will affect the recharge of perched aquifer systems, which is controlled by surface flows and subsequent surface water infiltration.

ES.5.1.5 Stygofauna

A low diversity of subterranean ecosystems and groundwater dependent stygofauna exist in the shallow, unconfined alluvial aquifers of the alluvium associated with the Dawson River channel, but are absent from the floodplain. The ecological values associated with stygofauna are low due to the restricted nature of the habitat and the low number of disturbance tolerant species. The alluvial aquifer geology consists of the fine-grained sands and clays which limit or prohibit the occurrence of stygofauna. The Project is not predicted to significantly impact stygofauna due to the alluvium largely being unsaturated within the pit extents and the limited groundwater level drawdown predicted in the shallow groundwater systems.

ES.5.2 Water

The Project is located within the Lower Dawson River Sub-basin—WQ1309 (Lower Dawson Main Channel—Regulated Reaches) of the Fitzroy Basin. The Dawson River is the most significant watercourse in the Project's locality with a catchment of approximately 40,500 km² at the Baralaba township. It is a perennial watercourse which is subject to seasonal flooding. Further downstream the Dawson River flows into the Fitzroy River, which eventually reaches the sea, east of Rockhampton.

ES.5.2.1 Surface water

The Project is located near the confluence of Banana Creek and the Dawson River. Upstream and downstream tributaries of the Dawson River, in the vicinity of the Project, include:

- Banana Creek;
- Shirleys Gully; and
- minor first and second order streams.

Surface water environmental values identified for the Lower Dawson River Sub-basin include aquatic ecosystems, irrigation, farm supply, aquaculture, stock water, human consumption, primary and secondary recreation, visual recreation, drinking water, industrial use and cultural values.

The Neville Hewitt Weir, located approximately 8 km to the north, is one of six weirs that form the Dawson Valley Water Supply Scheme. The Scheme supplies farm irrigation, including cotton, fodder and cereals; urban water supply for Theodore, Moura, Baralaba and Duaranga and industrial water primarily for mining. Banana Shire Council provides potable water to Baralaba township from the Dawson River at Neville Hewitt Weir. The Woorabinda Aboriginal Shire Council also sources water from the Neville Hewitt Weir.

Potential surface water impacts include:

- impacts on stream flow in the Dawson River and Banana Creek due to loss of catchment area or potential groundwater baseflow leakage;
- impacts on environmental values in the Dawson River due to releases of mine affected water;
- impacts on environmental values in the Dawson River due to increased erosion and sediment release to receiving waters;
- impacts on environmental values due to accidental spills of hazardous materials or dangerous goods;
- impacts on regional water availability given the potential requirement to obtain water from external sources to meet Project construction and operational water requirements;
- the potential for mine disturbance and related water management systems to impact on wetlands, including the adjacent HES wetland; and
- the cumulative impact of regional projects on the environmental values of related surface water systems.

The maximum catchment area captured by site storages over the Project life is approximately 966 ha which accounts for approximately 0.024% of contributing catchment at the Dawson River at Beckers gauging station 130322A (40,500 km²) at the Fitzroy River at Riverslea.

The post-mining landform will no longer contribute to the Dawson River catchment and will comprise a total of approximately 1,211 ha of rehabilitated landform, including the final void, or less than 0.024% of the associated Dawson River catchment. The Project has been assessed to be compliant with all environmental flow objectives.

Controlled releases from site will only occur where the storage capacity of the site water management system is exceeded, predicted to be less than 25% of years for a median duration of 5 days and then only in accordance with Fitzroy model release conditions of the EA. Controlled releases would be from the Mine Water Dam at a maximum rate of 43.2 ML/day (500 L/s pumping system) with a release efficiency factor of 90%. Releases only occur when the modelled flow at the Dawson River at Beckers gauging station are greater than 100 m³/s in accordance with the proposed release conditions. Therefore, all release events coincide with medium-high streamflow conditions in the Dawson River. The Dawson River flows above 100 m³/s for approximately 5% of the time or on average, 18 days per year. Releases will only occur when flow at Beckers gauging station is greater than 100 m³/s.

Modelled electrical conductivity within the Dawson River remains significantly below 500 µS/cm during 99% of modelled release events and water quality remains within the range exhibited by the existing conditions. The

release conditions have been designed to ensure release flows are significantly diluted with natural flows in the Dawson River to ensure downstream water quality will not exceed the receiving waterway water quality limits. The proposed release conditions are governed by salinity (measured as electrical conductivity) being the key of-concern surface water quality parameter associated with the Project. The maximum release rate and end of pipe limits provide a minimum 1:200 dilution ratio which ensures the water quality characteristics at the downstream monitoring point do not exceed the receiving waterway release limits

Modelling indicates that sediment dams overtop in 28%–32% of years. The sediment dams have been designed to provide sufficient storage for settlement of suspended solids so that water quality during overtopping events has negligible impact on the water quality in the receiving waterway.

The period of time that the HES wetland experiences dry conditions is predicted to be unchanged. The maximum modelled decrease in surface water level is 0.05 m, and there is predicted to be no decrease in surface water level for 95% of days.

Proposed mitigation measures to minimise impacts of the Project include:

- A water management system has been developed to mitigate adverse environmental impacts on water resources, and infrastructure is planned for the storage and management of several categories of water associated with the Project. Where possible, water stored on site is recycled with a preference for high salinity water to be used ahead of other sources in the process plant.
- The water management system minimises the clean catchment runoff captured by site by diverting clean water around operations.
- Sediment dams will be used to collect runoff from overburden and disturbed areas and to reduce any concentrations of solids prior to release into the receiving environment during rainfall events.
- Controlled release opportunities have been assessed in accordance with the 'Model Water Conditions for Coal Mines in The Fitzroy Basin' (DES, 2013). Controlled releases will only occur when flow in the Dawson River is above the minimum flow threshold of 100 m³/s and when conditions in the receiving waterway allow water quality to be maintained at levels which achieve the determined WQOs.
- A Water Management Plan will be developed for the Project to detail management and monitoring of the water management system.
- A Receiving Environment Monitoring Program (REMP) will be developed for the Project. The aim of the REMP is to monitor and assess the potential impacts of controlled or uncontrolled releases of water and associated contaminants to the environment.

ES.5.2.2 Groundwater

A conceptual hydrogeological model of the groundwater regime at the Project has been developed based on a review of past conceptualisation and site-specific hydrogeological data. There are two main hydrogeological units in the Project area:

- 1) Quaternary alluvial sediments associated with the Dawson River and tributaries; and
- 2) Permian strata that host the Baralaba Coal Measures.

Available information indicates that the alluvium is heterogeneously distributed but often comprises distinct layers of surficial clays, thick sands/gravels and basal sandy clays. Besides the Permian coal measures, alluvium is the main groundwater bearing unit near the Project.

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. 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.

Groundwater flows within the vicinity of the Project are predominantly topographically controlled and occur in a westerly direction from Mount Ramsay to the Dawson River, along Banana Creek towards the confluence of Banana Creek and the Dawson River and then northward along the Dawson River.

Alluvium groundwater samples are generally fresh. However, quality varies depending on the influence of and proximity to the Dawson River, with those sites close to the river having fresher water quality (e.g. 300 $\mu\text{S}/\text{cm}$ to 700 $\mu\text{S}/\text{cm}$) and those at greater distance showing elevated salinity (e.g. 15,000 $\mu\text{S}/\text{cm}$ to 38,000 $\mu\text{S}/\text{cm}$). These values are reflective of the underlying Permian coal measures and evapo-concentration effects of salts (i.e. elevated sodium and chloride). The pH values for the alluvial bores were slightly acidic, typically ranging from pH 6.0 to 6.9.

Field data indicate water quality in the Permian coal measures is brackish (e.g. with EC typically ranging from 15,000 $\mu\text{S}/\text{cm}$ to 38,000 $\mu\text{S}/\text{cm}$).

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. Three private landholder bore users have been identified within 5 km of the Project.

The potential impacts of the Project on groundwater resources include:

- changes to the hydraulic properties of the backfilled mine extents due to replacement with heterogeneously layered, higher permeability waste rock;
- the operational pit and final void tending to act as a localised hydraulic sink, drawing down groundwater from the more saline Permian coal-bearing strata;
- the exercise of underground water rights with an average ranging 0.4 to 0.75 ML/day for the operational life of the mine; and
- leakage from the Dawson River surficial geology to the void.

Groundwater modelling for the Project predicts groundwater inflows to range up to 1.5 ML/day (peaking in Year 23), with an average of 0.3 (5th percentile) to 0.75 ML/day (95th percentile) for the operational life of the mine. The predicted total volume of the Project open cut inflow is 2,250 to 6,900 ML for the proposed life of the mine (median estimate 3,700 ML).

Groundwater drawdown is predicted to be limited in the shallow groundwater systems and largely contained within the Permian and alluvium measures, where it extends to the west or south-west of the open cut pit and to the west towards Banana Creek. Water table drawdown is focused on the Project open cut with a 1 m cone of depression essentially contained within the northern and eastern boundaries of the MLA, and extending beyond the MLA boundary to the west by up to 800 m (50th percentile) to 1,200 m (95th percentile), and further to the south by 3.5-4.5 km, along the strike of the coal seams. The 5th percentile estimate of drawdown is almost completely contained within the MLA boundary.

The Project will have a negligible impact on groundwater levels or groundwater yield at the Riverland and Webb landholder bores. The maximum predicted drawdown of 0.15-0.7 m at the Ross Bore during mining would be similar to natural variation in the recorded groundwater table. The predicted groundwater drawdown would incidentally transfer directly to some, albeit immeasurable, leakage from the Dawson River (upstream of the Neville Hewitt Weir) to the surficial geology by up to approximately 0.2 ML/day. When compared to the average surface water flows in the Dawson River for the past five years (and recently prescribed passing flow conditions for the Dawson River), this equates to less than a 0.01% reduction in the catchment area of the Dawson River at the Beckers gauging station (upstream of the Neville Hewitt Weir), which will not result in a substantial reduction in flow in the river, and will not impact on compliance with the environmental flow objectives for the river (Appendix C, Flood Impact Assessment).

There is not expected to be any measurable change in the quality of groundwater as a consequence of mining. 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.

Proposed mitigation measures to minimise impacts of the Project include;

- the continuation of the groundwater monitoring program to assess the groundwater levels and quality against changes predicted to occur as a result of mining operations;
- monitoring of groundwater pit inflow during the open cut mining operational phase;
- periodic (e.g. seasonal/quarterly or less frequently if otherwise agreed) water level monitoring at priority private landholder bores in the vicinity of the Project during the operational life of the mine; and
- development of an annual groundwater report to identify potential impacts and validate the findings of the groundwater model.

ES.5.2.3 Flooding

The 2.5 Mtpa ROM coal mine plan is associated with a lower flood risk profile when compared with the previous 5 Mtpa ROM coal plan. Mining activities associated with the Project have the potential to impact on flooding behaviour in areas adjacent to, upstream and downstream of the Project. To mitigate this, mining activities are located outside the 0.1% AEP flood plain. The rehabilitated final landform is predominantly outside the 0.1% AEP extent and is not predicted to have a material influence on flooding.

The Flood Impact Assessment presents the current flood risk and impacts for a range of AEP events including: 20%, 10%, 2%, 1% and 0.1%. Flood mapping for peak flood depth, velocity and flood inundation duration for the existing case (i.e. current situation without the Project) and the potential impacts from the Project (mine developed case) is provided in the EIS.

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

The Flood Impact Assessment of the Project indicates that:

- There is no change in flood depth in flood events up to and including the 10% AEP since the Project footprint is located outside of the 10% AEP Existing Case flood extent.
- Changes in flow velocity up to and including the 1% AEP event are predicted to be within 0.1 m/s to 0.3 m/s adjacent to the northern out-of-pit dump and will be contained within the MLA boundary. There are negligible changes to peak flood velocity outside of the Project's MLA boundary.
- There is negligible change to peak flow rates at the Beckers gauging station downstream of the Project for all flood events up to the 1% AEP event and no change in the flood peak travel time from the Bindaree (130374A) gauging station to the Beckers (130322A) gauging station for all flood events up to the 1% AEP event
- There is negligible change to peak flow rates at the Beckers gauging station downstream of the Project for all flood events up to the 1% AEP event.
- There is no change in the flood peak travel time from the Bindaree (130374A) gauging station to the Beckers (130322A) gauging station for all flood events up to the 1% AEP event.
- The Project will cause a small (less than 10 mm) reduction in peak flood levels in the Dawson River channel and on the eastern floodplain downstream of the Project MLA in a 1% AEP flood event. This is due to the Project directing slightly more flood waters in larger flood events to the western floodplain and anabranch.
- There is no change in peak flood levels at the Baralaba township greater than 0.001 m for flood events up to the 1% AEP event.
- The impacts to flood timing and travel times relative to the magnitude of the flood events are very minor.

Flood immunity is a key consideration in the final landform and current mine plan. The plan has been optimised to minimise adverse flooding impacts in the Dawson River and Banana Creek, and the adjoining floodplain areas by being outside the 10% AEP with mining and the final void outside the 0.1% AEP extent..

Post-mining, the final landform design will include an earthen bund on the southwestern corner of the final void that will act as a permanent feature of the landscape and will provide Probable Maximum Flood (PMF) design event protection to the final void.

ES.5.3 Geomorphology

A Geomorphic Impact Assessment was undertaken to assess the potential for the final mine landform to affect the geomorphological behaviour of the Dawson River and Banana Creek channels and floodplain. The assessment concluded there would be no material geomorphological impacts on the Dawson River and Banana Creek channels and floodplains associated with the Project.

ES.5.4 Air quality

The existing air quality is representative of rural regional areas, being influenced by sporadic traffic on unsealed roads as well as bushfires, controlled burning and dust from agriculture.

Modelling of dust emissions from the Project was undertaken for three operational scenarios, which were selected to represent worst-case conditions: these being Year 1, Year 3, and Year 11 of the Project schedule. Predicted Total Suspended Particulate Concentrations, Annual Average PM₁₀, Maximum 24 hr PM_{2.5}, Annual Average PM_{2.5} and Deposited Dust, for all sensitive receivers outside the MLA are predicted to experience levels within the air quality objectives for the years assessed.

No exceedances at sensitive receptors locations outside the mining lease boundary exceedances are predicted to occur for any of the assessed size fractions (TSP, PM₁₀ and PM_{2.5}). The cumulative levels including background at all sensitive receptors outside the MLA boundary are within the guideline of 120 mg/m²/day.

Modelling of dust emissions for the TLO were undertaken under the maximum cumulative throughput scenario of 2.5 Mtpa. Predicted suspended particulate concentrations, including background, are predicted to be within the relevant criteria at the sensitive receiver locations.

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

Mitigation measures to further reduce the impacts at the mine site will be managed through the implementation of an Air Quality Management Plan. Mitigation and management measures are summarised as follows:

- watering and regular maintenance of haul roads;
- watering of other trafficked areas;
- use of gravel, sheeting or surfactants on haul roads;
- where required and practical, use water sprays on the equipment;
- drilling and blasting operation to include properly fitted and undamaged shrouds on drills, dust extraction for drill rigs and blasting during daytime hours only;
- personnel training;
- monitor and modify mining operations as required in order to achieve compliance with applicable air quality objectives at the nearest privately owned sensitive receptor (SR);
- material drop heights during loading and unloading are to be reduced as far as practical.;
- blasting controls put in place to avoid dust blowing towards SRs; and

- minimise exposed areas as much as practicable by completing rehabilitation as soon as possible after activities has ceased.

Mitigation measures to be employed at the TLO include:

- water sprays to be used on coal stockpiles to minimise dozing emissions and wind erosion;
- water sprays to be used at the unloading hopper;
- water sprays and variable height radial stacker to be used to load stockpiles;
- under-stockpile chute (reclaim tunnel) to be used to unload stockpiles;
- water sprays and chute to be used for conveyor transfer; and
- roads to be paved, where practicable.

An Air Quality Monitoring Program will be developed and implemented to ensure compliance with the Project objectives. With the implementation of the above management measures and monitoring, air quality levels at nearby SRs are predicted to remain below the relevant criteria during all stages of the Project.

ES.5.5 Noise and vibration

The existing background noise environment surrounding the Project can be characterised as quiet ambient noise levels predominantly influenced by natural sources (birds, wind in trees), farm related sources (farm machinery, livestock, dogs) and community related noise (passing traffic).

A Noise and Vibration Assessment was conducted to identify key sources of noise and vibration emissions from the construction and operational activities associated with the Project. Potential noise impacts have been assessed for the Years 1, 3 and 11. These scenarios have been selected to represent a range of mine noise levels associated with operations over the entire mine life. Modelling indicated that no exceedances are predicted for sensitive receivers outside of the MLA except for Receptor 9 where the Proponent will seek to complete a compensation agreement such that it is no longer considered a sensitive receptor.

The blasting assessment predicts that ground vibration would not exceed the objective of 5 mm/s at distances greater than 1 km. The airblast overpressure assessment predicts that airblast levels will meet the Project objective at distances greater than 1.3 km. Impacts from blasting are not anticipated to have impacts on surrounding infrastructure including the Benleith Water Scheme.

The changes in noise levels due to haulage operations of Baralaba North Mine and the Project under peak operating conditions are predicted to comply with the objective of less than a 3 dB noise increase at all sensitive receivers outside the MLA. The Proponent also proposes to reach agreement with Receptor 9 as the land parcel partially underlies the MLA. Noise modelling scenarios capture the worse-case traffic scenario, including both Baralaba North Mine and Baralaba South Mines simultaneously operating at peak production.

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

A noise monitoring program will be developed and implemented to conduct noise validation monitoring at sensitive receivers of interest and monitoring on a complaint basis. All noise monitoring will be conducted in accordance with relevant acoustic guidelines and standards.

The Project will develop a Noise and Blasting Management Plan to monitor the airblast overpressure and blast vibration levels during all blast events to ensure blasting criteria are met at all sensitive receivers.

ES.5.6 Transport

Road transportation is expected to be the primary mode of transport associated with Project activities and will include transportation of materials and equipment for construction and maintenance, removal of waste products and mobilisation of Project personnel. Product coal for the Project will be transported via the Moura-Baralaba Road approximately 40 km to the existing TLO facility located to the east of Moura, along a portion of the existing Baralaba North Mine haul route. The Project will require the realignment of an approximate 4.5 km section of Moura-Baralaba Road which is currently located within the MLA. This section of road is proposed to be relocated immediately east of the MLA boundary.

The key roads in the vicinity of the Project site are the: Leichhardt Highway, Baralaba-Rannes Road, Wooroonah Road, Moura-Baralaba Road (also known as Theodore-Baralaba Road), Fitzroy Development Road, Baralaba-Woorabinda Road, Dawson Highway and Baralaba-Banana Road. The primary access to the Project will be via a proposed mine access road off the realigned Moura-Baralaba Road. This access will be used by personnel, equipment, material deliveries, and mine haulage vehicles.

A Traffic Impact Assessment concluded that peak traffic demands will occur in the first three Project years (2029 to 2031) as the mine transitions from Baralaba North to Baralaba South. The Project routes including the Moura-Baralaba Road (the key haulage route) is expected to have significant spare capacity to cater for the Project proposed traffic movements. Turn warrant assessment and Signalised and Unsignalised Intersection Design and Research Aid (SIDRA) intersection modelling and assessment demonstrated that existing intersections were suitable for transition of haulage between the Baralaba accommodation camp, the proposed Project and the existing TLO facility near Moura.

No intersection upgrades or additional mitigation measures are considered necessary for the Project.

The realignment of Moura-Baralaba Road will be subject to separate approval from the Banana Shire Council. The Project will work with the required authorities to provide safe public traffic movement for road vehicles to ensure minimum disruption to existing patterns of movements while the new section of road is being constructed. Additionally, the intersection of the proposed mine access road with the realigned Moura-Baralaba Road will be designed and constructed in accordance with 'Guide to Road Design Part 4A: Unsignalised and Signalised Intersections' (Austroads, 2010a).

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

ES.5.7 Land

The Project is located adjacent to the eastern floodplain of the Dawson River near the confluence of Banana Creek and the Dawson River and is in close proximity to the Dawson River channel. The region in the vicinity of the Project is dominated by the Dawson River Valley and is characterised by undulating to level plains with some low rolling hills between the main river valleys. Mount Ramsay, which lies to the east of the MLA is the most significant topographical feature near the Project, occurring as a single sharp rise to 430 m AHD.

Current local land use is predominantly rural though several other coal mining operations exist in the region. Uses of the land underlying the Project area or surrounding area include:

- cattle grazing;
- stud farming;
- dryland and irrigated cropping; and
- improved pastures for grazing.

Crops are predominantly forage crops with cotton and wheat produced on an opportunistic basis. Irrigation has also been established on land to the west of the Project.

The Project area is partially overlaid by the strategic cropping land (SCL) trigger area. An assessment of strategic cropping land criteria verified a total of 1,102 ha of land within the MLA as SCL. Only 556 ha are within the Project's disturbance footprint.

Several mitigation and management measures have been developed to reduce or avoid impacts to local land values arising from Project disturbance, including:

- erosion and sediment controls to minimise erosion;
- the implementation of a land disturbance permit system to control and limit land clearing to the minimum amount required for the operation of the Project; and
- the development and implementation of a topsoil management plan to direct removal, replacement and stockpiling and promote direct placement of topsoil where possible to preserve the seed bank and reduce erosion.

ES.5.8 Cultural heritage

ES.5.8.1 Indigenous cultural heritage

The Project is located wholly within the Gaangalu Nation People (QC2012/009) registered native title claim area. Under sections 15 and 23C of the *Native Title Act 1993*, native title has been extinguished over all lots within the Project operational area due to freehold grants.

A Cultural Heritage Investigation and Management Agreement was entered into between the Gangulu People (QUD6144/98) and Baralaba South Pty Ltd (formerly Cockatoo Coal Limited) on 10 October 2012. This agreement covers the area of the Project and was approved as a Cultural Heritage Management Plan (CHMP) on 16 October 2012. As a related body corporate of Baralaba Coal Company Pty Ltd, Baralaba South intends to implement the CHMP in carrying out the Project.

ES.5.8.2 Non-indigenous cultural heritage

Of the potential cultural heritage sites identified, three are considered to have low local heritage significance (Dawson Valley Railway, Dovedale Homestead Complex, and survey tree) and one is considered to have moderate local heritage significance (telephone line). No sites are considered to meet the threshold for state heritage listing. The recording of these sites has been undertaken by cultural heritage experts.

ES.5.9 Social environment

Potential impacts of the Project on the social values of the local and regional communities have been identified through direct engagement with potentially affected stakeholders and an analysis of potential impacts against the attributes of the existing social environment.

Stakeholder engagement and community consultation undertaken for the Project has included both targeted consultation for the Social Impact Assessment (SIA), as well as extensive public consultation for the EIS by the Proponent.

- Potential social impacts of the Project as perceived by the community include (Appendix S, Social Impact Assessment). The Project is likely to sustain or increase the population during construction and operation. This increase has the potential to benefit community vitality through:
 - an increase in demand for social services (e.g. emergency services, health services, education, childcare and community services) and infrastructure (e.g. roads);
 - an increase in demand for rental properties;
 - an increase in property prices; and
 - an increase in the non-resident proportion of the population—the capacity to meet the accommodation needs of the non-resident workforce is considered high.

- The creation of employment opportunities in the construction, operations and post-mining phases of the Project, as well as training opportunities, including for Indigenous people.
- The creation of opportunities for local and regional businesses and services through supply opportunities and expenditure.

Potential impacts to the community also include;

- Potential impacts on the community's surroundings, health and wellbeing, such as potential Project impacts on water resources/flooding, agricultural land, amenity (e.g. dust, noise, blasting and lighting), road safety and the proposed post-mining land use; and.
- The potential for workplace health and safety incidents.

Draft Social Impact Management Plans (SIMPs) have been developed for the Project and outline the mitigation and enhancement measures that will be implemented for the Project, namely:

- Community and Stakeholder Engagement Plan—to facilitate engagement, consultation and collaboration with stakeholders, (Appendix T).
- Draft Community Health and Wellbeing Plan—to provide processes and strategies to avoid or mitigate adverse social impacts and capitalise on opportunities to improve the health and wellbeing of local and regional communities, (Appendix U).
- Draft Housing and Accommodation Plan—to provide strategies to meet the accommodation requirements of the Project and to monitor the impact that workforce influx has on the real estate market, (Appendix V).
- Draft Workforce Management Plan—to prioritise recruitment of workers from local and regional communities and workers who will live in regional communities, reduce the proportion of workers engaged in fly-in, fly-out (FIFO) arrangements, and support the health and wellbeing of the Project workforce, (Appendix W).
- Draft Local Business and Industry Procurement Plan—to maximise opportunities for local businesses to provide goods and services to the Project (Appendix X).

Implementation of the social management measures will be monitored throughout the Project life. Performance indicators have been developed for each management plan/strategy/policy in consultation with stakeholders.

ES.5.10 Economic environment

The Project will contribute to economic growth through increased industry output and Gross Regional Product (GRP) during construction and operation (i.e. production), as well as decommissioning and rehabilitation; flowing from both direct and indirect impacts. At its peak, the Project is estimated to result in an increase in GRP of 0.5% compared to what would be expected to occur without the Project.

The Project will increase employment and household incomes during construction, operation and decommissioning / rehabilitation compared to what would occur without the Project, flowing from both direct and indirect impacts. Including both direct and flow-on (supply chain) impacts, the Project is expected to provide up to 268 jobs during construction and up to 521 jobs during operations.

Overall, the Project is estimated to deliver an annual average of:

- \$68.7 million in additional revenue to the Australian Government, through personal income tax, fringe benefits tax, company tax and GST, compared to what would occur without the Project.
- \$62.6 million in additional revenue to the Queensland Government compared to what would occur without the Project, primarily through royalty payments.

These additional revenues can be used by government to provide additional infrastructure and services to support businesses and households throughout Australia.

ES.5.11 Hazards and safety

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

The following processes and measures will be implemented in addition to expected and standard controls to reduce the risk of impacts associated with Class III identified risks on health, safety and the environment associated with the Project:

- Fatigue management/fitness for work, alcohol and drug testing, and road safety awareness training will be conducted for workers to minimise risks associated with heavy and light vehicle traffic.
- Occupational health and safety performance is to be closely monitored and assessed and, where required, individual issue specific risk assessments will be undertaken to identify fit-for-purpose safety initiatives.
- Routine watering or surface treatment of haul roads, scheduling of blasting operations and reactive dust control measures will be utilised to manage dust impacts to sensitive receptors.

ES.6 General environmental management commitments

Key environmental management measures to be implemented for the Project include:

- progressive rehabilitation of the Project site to result in a final landform that is stable, safe, non-polluting and able to sustain post-mining land use of equal or improved value;
- biodiversity offsets for significant residual impacts to identified MNES and MSES;
- operation of a Project water management system to sustain local and regional water resources and water quality values;
- construction of minor earth works and drainage including a final landform bund to the south of the final void for additional PMF flood immunity (additional to the 0.1% AEP immunity) to the void post-mining; and
- operation of proactive and reactive air quality monitoring and management systems to ensure compliance is met at sensitive receivers.

Further to the above, the Proponent has committed to the preparation and implementation of plans, programs and strategies to minimise impacts to environmental values. The following plans have been prepared and are included in this EIS:

- Draft Progressive Rehabilitation and Closure Plan (Appendix AA);
- Biodiversity Offset Strategy (Appendix J);
- Air Quality Management Plan (Appendix M);
- Community and Stakeholder Engagement Plan (Appendix T);
- Draft Workforce Management Plan (Appendix W);
- Draft Housing and Accommodation Plan (Appendix V);
- Draft Local Business and Industry Procurement Plan (Appendix X); and
- Draft Community Health and Wellbeing Plan (Appendix U).

The following plans are to be prepared for the Project;

- Topsoil Management Plan;

- Rehabilitation Monitoring Program;
- Erosion and Sediment Control Plan;
- Water Management Plan;
- Receiving Environment Monitoring Program;
- Species Management Program;
- Weed and Pest Management Plan;
- Emergency Response Plan;
- Contaminated Land Register and Map;
- Decarbonisation Strategy;
- Noise and Blasting Management Plan;
- Road Use Management Plan;
- Mineral Waste Management Plan;
- Non-mineral Waste Management Plan;
- Cultural Heritage Management Plan; and
- Safety and Health Management System.