



Taroborah Coal Project

Environmental Impact Statement

Section 4.3 – Environmental Values and Management of Impacts – Transport

Prepared for:
Shenhua International Group Pty Ltd



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4.3 TRANSPORT

This section details the proposed use of existing infrastructure to transport the workforce and materials associated with the Project to and from the site, including road, rail, port and air.

A *Transport Impact Assessment* report (AARC 2013) was prepared for the Project to identify the potential impacts of the Project (refer to Appendix 11).

The current condition of the associated road network is described, and proposed Project additions predicted to provide an insight of the potential impacts to the local and regional road network. Impacts and mitigation measures are also described for each mode of transport associated with Project related materials, including road, rail, air and port.

The transport infrastructure considered included:

State Controlled Roads (SCR)

- Capricorn Highway (16A – 16C) – Rockhampton to Alpha;
- Bruce Highway (10A – 10G) – Brisbane to Rockhampton;
- Gateway Arterial Road (U13C); and
- Port of Brisbane Road (904).

Local Road

- Anakie – Sapphire Road.

Rail Networks

- QR National Central Queensland Coal Network – Blackwater System; and
- QR – Central West System.

Airport

- Emerald Airport.

Port Facilities

- Wiggins Island Coal Export Terminal (WICET).

Figure 4.53 illustrates the transport infrastructure associated with the Project.

Two additional local roads traverse portions of the Project site as shown in Figure 4.54. Fork Lagoons Road crosses the Project boundary in the north-eastern corner and exits the Project approximately 6km to the south. Wilga Downs Road enters the Project site in the south-east, running generally north from the Fairbairn State Forest. It traverses the Project site for approximately 1.5km before terminating at the Capricorn Highway. Neither of these roads intercept any Project infrastructure, and are not located above the underground mine workings. There are no plans to use these roads for any Project-related transport, nor are there any proposals required for upgrading, realigning or closing these

roads. They have therefore not been considered further for the purposes of this assessment.

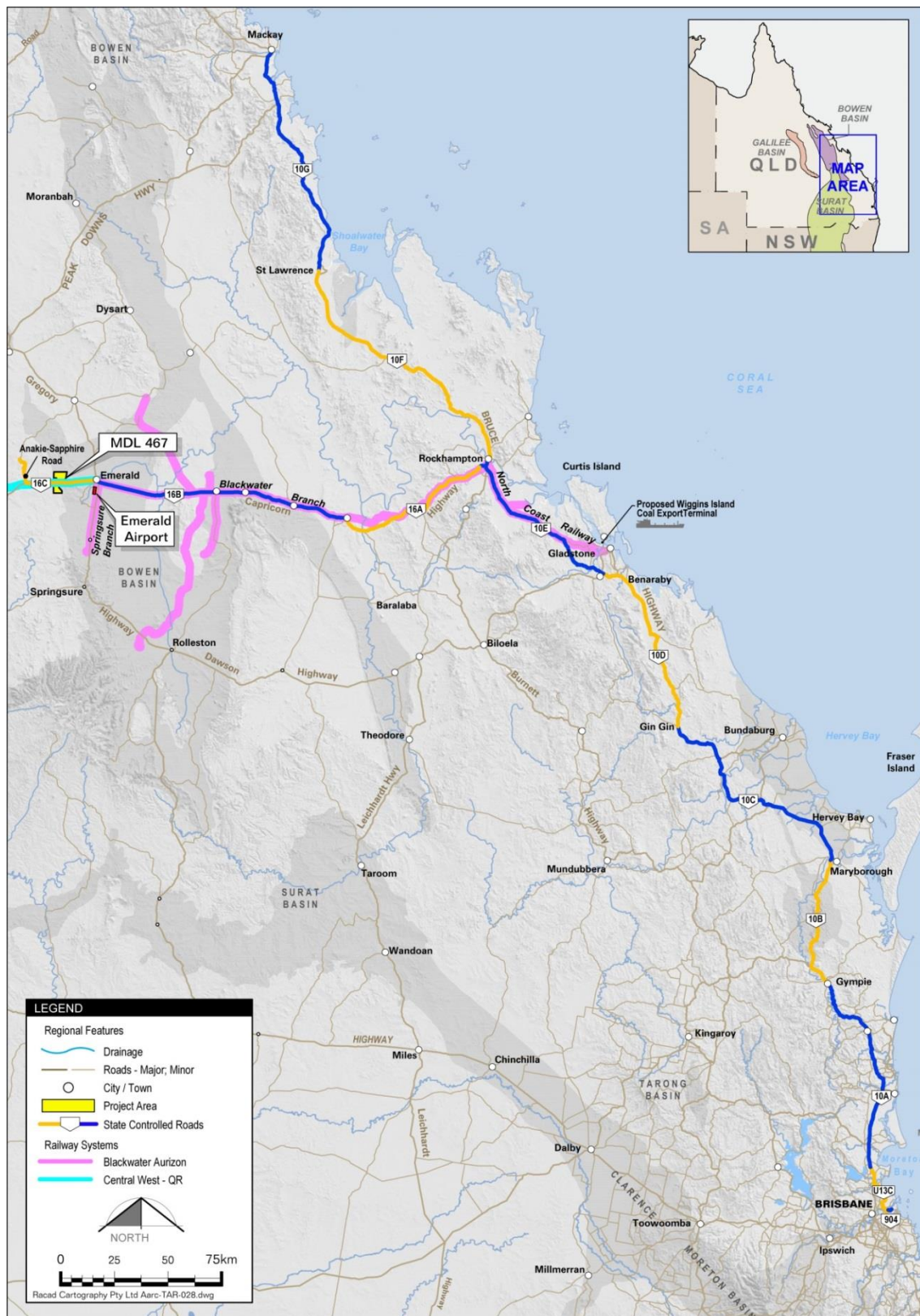


Figure 4.53 Transportation Network Utilised by the Project

4.3.1 Description of Existing Infrastructure And Values

4.3.1.1 Road Infrastructure

Local and regional road networks will be utilised by the Project during the construction and operational phases for the transportation of plant and equipment in addition to fuel deliveries, workforce transportation and waste removal.

Port of Brisbane Road and Gateway Arterial Road

The Queensland Department of Transport and Main Roads (DTMR) has completed the upgrade of the Port of Brisbane Motorway. The \$385 million project has delivered a dual carriageway from the existing Gateway Motorway to the start of Port Drive, ensuring the port has reliable road access. As part of the port's privatisation, Port of Brisbane Pty Ltd (PBPL) is responsible for the final stage of the upgrade, Port Drive, a 3.2 km public road. PBPL is currently working with external parties to conduct traffic counts and modelling, and to undertake engineering design option analysis, which will determine when the Port Drive upgrade is required.

The Port of Brisbane Road (road segment #904) and the Gateway Arterial Road (road segment #U13C) are both State Controlled Roads (SCRs) that link the Port of Brisbane to the Bruce Highway. These two roads will be utilised for road transport of Project materials during both construction and operation phases.

Bruce Highway

The Bruce Highway (M1 from Bald Hills to Cooroy and A1 from Cooroy to Cairns) is a major highway in Queensland. It is approximately 1,700 km long and is sealed for the entire length. The Bruce Highway is a dual carriageway from Brisbane to the northern extent of the Sunshine Coast, with some dual carriageway lengths at Gympie. North of the Sunshine Coast, the Bruce Highway is mostly a single carriageway with overtaking lanes.

The Bruce Highway will be utilised for road transport of materials required for both the construction and operation phases. Segments of the highway assessed during the transport impact study include #10A – 10G, which includes the area between Brisbane and Mackay.

Capricorn Highway

The Capricorn Highway (Highway A4) is located in Central Queensland, and links the city of Rockhampton with western Queensland. The highway is approximately 560 km long and joins the Landsborough Highway at Barcaldine. It runs east / west and traverses the Central Highlands, crossing the Great Dividing Range between Alpha and Jericho. The road is a dual carriageway for much of its length and is speed limited at 100 km/h.

The Capricorn Highway will be the arterial road connecting the Project site and Emerald. It laterally dissects the Project site. The Capricorn Highway will be utilised for both transport of materials and workers throughout the life of the Project. SCR segments potentially impacted by the Project include #16A – 16C.

Anakie-Sapphire Road

The Anakie – Sapphire Road will be used primarily for the haulage of gravel during the opencut and



underground construction phases. This is not a SCR, but a local road managed by the CHRC.

Stock Route Networks

Approximately 72,000 km of Queensland's roads are declared as stock routes. Together with dedicated reserves for travelling stock, stock routes make up 2.6 million ha of the Queensland stock route network (SRN). The SRN is primarily used by the pastoral industry as an alternative to transporting stock by rail or road, and for pasture for emergency agistment or watering and long-term grazing. It is used by utility companies to provide powerlines, pipelines and telecommunications and by the community generally for road transport and recreational purposes. 'Stock routes' are corridors on roads, reserves, pastoral leases and unallocated state lands along which stock are driven on foot. A stock route may be either a road that is declared to be a stock route under the *Land Protection (Pest and Stock Route) Regulation 2003*, or it may simply be any route that has customarily been used for walking stock. Stock routes have no separate title or tenure from the underlying road reserve, and the same roads are used for walking and agisting stock, and vehicular transport. Stock routes are owned by the State, with the Central Highland Regional Council (CHRC) caretaking for the route network in the Central Highlands region.

Figure 4.54 provides the locations of stock routes within and adjacent to the Project site.

While the stock routes are not utilised currently or in the foreseeable future, under the Land Protection (Pest and Stock Route Management) Act 2002 (LP Act), the integrity of stock routes must be maintained to ensure the connectivity and useability of the network.

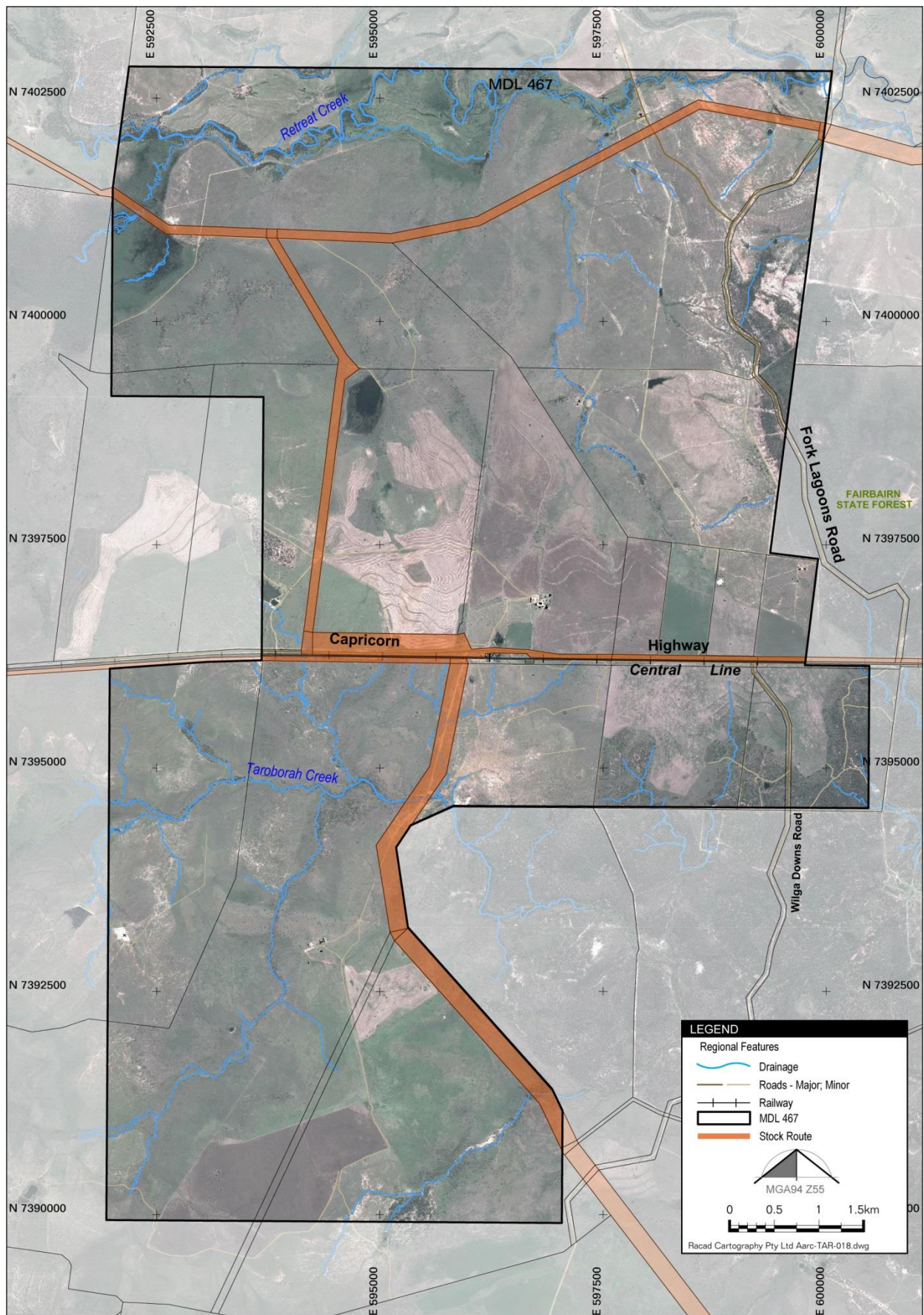


Figure 4.54 Queensland Stock Route Network

4.3.1.2 Rail Infrastructure

Rail traffic for the Project is planned to utilise the existing Queensland Rail (QR) Central West railway system and pass approximately 14 existing level crossings from Nogo Junction (263.3 km) westwards through Emerald to approximately the St Helen's Road Level Crossing (287.7 km), totalling a distance of 24.4 km. From Nogo Junction, product coal will be transported along the Aurizon Blackwater rail system through to the Wiggins Island Coal Export Terminal (WICET) at Gladstone approximately 372 km (refer to Figure 4.53).

Blackwater System

The Blackwater System services the Bowen Basin Coal region and forms part of the privatised Queensland Rail National (now Aurizon). It is the largest of the four coal systems overseen by Aurizon, carrying the second highest tonnage, after the Goonyella system. The Blackwater system covers 985 km of bi-directional track and provides links to the two export terminals at the Port of Gladstone (RG Tanna and Barney Point) and a number of domestic terminals. The Blackwater system runs from Gladstone to Nogo Junction, with spurs servicing mining operations to the north and south of the main trunk line. The section from Gladstone to Burngrove (approximately 13 km west of Blackwater) allows up to 8,300 tonne (t) payload of 100 X 106t wagons (26.6 tonne axle load (TAL)) at a maximum speed of 80 km/h. The section from Burngrove to Nogo Junction currently has a 20 TAL limit.

The Blackwater coal system is a mix of electrified and non-electrified track and because of this, Aurizon operates a combination of electric and diesel locomotives. Aurizon has recently undertaken a \$195 million project to increase capacity and strengthen power supply to the Blackwater Rail System. Work has been conducted on the construction of four electrical feeder stations at Bluff, Wycarbah, Duaringa and Raglan. The upgrades were completed in September 2012, allowing for 33 electric locomotives in operation. The rail system now meets the projected 85 Million tonnes per annum (Mtpa) of coal per year being transported and provides a more reliable power source, thereby reducing impacts on coal transport during electrical outages.

During the 2010 financial year, the Blackwater system transported 54.6 Mt of coal product and serviced a total of 14 mines.

Central West System

The Central West system adjoins the Blackwater System at Nogo Junction and runs from Nogo to Hughenden via Longreach, covering approximately 780 km of track.

The track between Emerald and Longreach consists of a single track with 18 passing loops. The passing loops on this section include Taraborah, Anakie, Withersfield, Willows, Bogantungan, Drummond, Pine Hill, Mamboo, Alpha, Beta, Jericho, Alice, Lochnagar, Barcaldine, Saltern, Deroora, Ilfracombe and Longreach. Track structure is a mix of 20, 30, 41 and 53 kilograms per metre (kg/m) rail on timber, steel and concrete sleepers with some steel interspersed at a rate of one in four on various sections. The maximum speed is 80 km/h and the maximum allowable axle load is 15.75 TAL.

4.3.1.3 Port Infrastructure

The WICET is a port development project being developed by a consortium of existing and potential coal exporters located in Queensland to provide increased long term export coal capacity. The project is being led by WICET Holdings Pty Ltd and its subsidiary, Wiggins Island Coal Export Terminal Pty Ltd, collectively referred to as the WICET Group.



The WICET Group was formed by industry participants to advance the proposal. The terminal will be operated by the Gladstone Ports Corporation Limited.

Gladstone Ports Corporation Limited owns and operates two coal export terminals at Gladstone: the RG Tanna Terminal (nominal capacity of 68 Mtpa) and the Barney Point Terminal (nominal capacity of 7 Mtpa). The WICET will be located at Golding Point, to the west of the existing coal export terminals and will form part of the existing Port of Gladstone.

The terminal is to be built by the WICET Group in stages, with each stage matched to users' requirements for capacity which are backed up by contractual commitments for that capacity. Once it is fully commissioned from Stage 1, it will provide rail unloading, stockpiling and ship loading facilities and also over 80 Mtpa in additional export coal capacity through the Port of Gladstone. Three stages of development are envisaged as shown in Table 4.22.

Table 4.22 Wiggins Island Coal Terminal Capacity Stages

Stage	Capacity Increment (Mtpa)	Capital Cost	Completion Date
Stage 1	27	\$1,360,000,000	2014
Stage 2	25	\$1,450,000,000	2018
Stage 3	To Be Determined	\$1,050,000,000	To Be Determined

Once fully commissioned, the WICET will have the following capacity:

- Total export capacity of around 80 Mtpa;
- Ship load-out at a rate of 8,250 tonnes per hour (tph);
- A total of 12 coal stockpiles, each 18m high for a combined capacity of 1.9 Mt;
- A 5.5 km encased overland conveyor system;
- A 2 km long jetty and conveyor; and
- Ship loader suitable for loading vessels from Handimax size and draft (40,000 deadweight tonnes (dwt)) to vessels of Cape size and draft (up to 220,000 dwt).

The Project has entered into discussions with the WICET consortium in order to negotiate capacity at this port for coal stockpiling, handling and export. It is anticipated that the first load of Project coal will arrive at WICET in 2018 for export.

4.3.1.4 Emerald Airport

The Emerald Airport will be utilised by those members of the workforce who reside outside of the regional area (i.e. Brisbane) and cannot realistically drive to Emerald for their rostered periods on a regular basis. The CHRC owns and operates the Emerald Airport, which is located 6 km south of the Emerald town centre.

The Emerald Airport services approximately 166,000 passengers annually, with a total of 3,126 aircraft



movements (BITRE, 2012). The airport has two runways, a primary asphalt runway of 1,900m in length and a secondary gravel runway of 926m in length. The airport supports regular public transport and closed charter services by Fokker F- 100, Dash 8-400 and ATR-72 aircraft to and from Brisbane operated by Alliance, Qantas Link and Virgin Australia respectively, other closed charters services operated by a number of smaller operators as well as air freight services, general aviation, private and aeromedical operations.

Additional infrastructure at Emerald Airport includes:

- Aircraft maintenance and support facilities;
- Refuelling facilities;
- General Aviation parking apron is available with lighting and aircraft tie down facilities; and
- Freight services.

An upgrade to the Emerald Airport is being undertaken. This upgrade will expand the aerodrome by increasing the number of aircraft bays to support regular public transport and charter, as well as freight and emergency services aircraft, upgrading the cargo bays, a designated bay and a helipad / aeromedical bay for the Royal Flying Doctor Service. In addition, a covered all-weather walkway for passengers is being constructed. In particular, the coal resource sector, which uses this airport as a base for fly-in-fly-out (FIFO) workers, will benefit from more flights and reduced delays to flights. The project has also supported the growth in tourism activity, which will, in turn, support local businesses. The total funding for this Project was \$9,983,974 (DIRD, 2012).

4.3.2 Potential Impacts And Mitigation Measures

4.3.2.1 Road Impacts

Road Upgrades

The following roads will require upgrading prior to the commencement of operations:

- To accommodate Project deliveries and workforce vehicles, the Capricorn Highway will be upgraded with the construction of an entrance to the Project site. The upgrade includes the construction of a T-intersection, with deceleration turning lanes and acceleration lanes allowing traffic from the Project to safely enter and exit the Project site without impeding the flow of traffic on the highway. Road modifications will be facilitated by the DTMR and will be built to State road standards. Figure 4.55 illustrates the preliminarily proposed upgrades to the highway (note final design will be subject to discussion with and approval from DTMR); and
- Secondary Roads – The new access roads within the Project site will be constructed of macadam (compressed stone), suitable for delivery by light vehicles. These roads will provide access to important Project facilities, but with a much lighter and lower traffic flow.

The Capricorn Highway will remain open during upgrade operations. All roads will include drainage that runs off into sedimentation ponds where any silt will be deposited before the water is released to the local drainage system. All of the Project's lay-down and parking areas will be prepared in a similar manner.

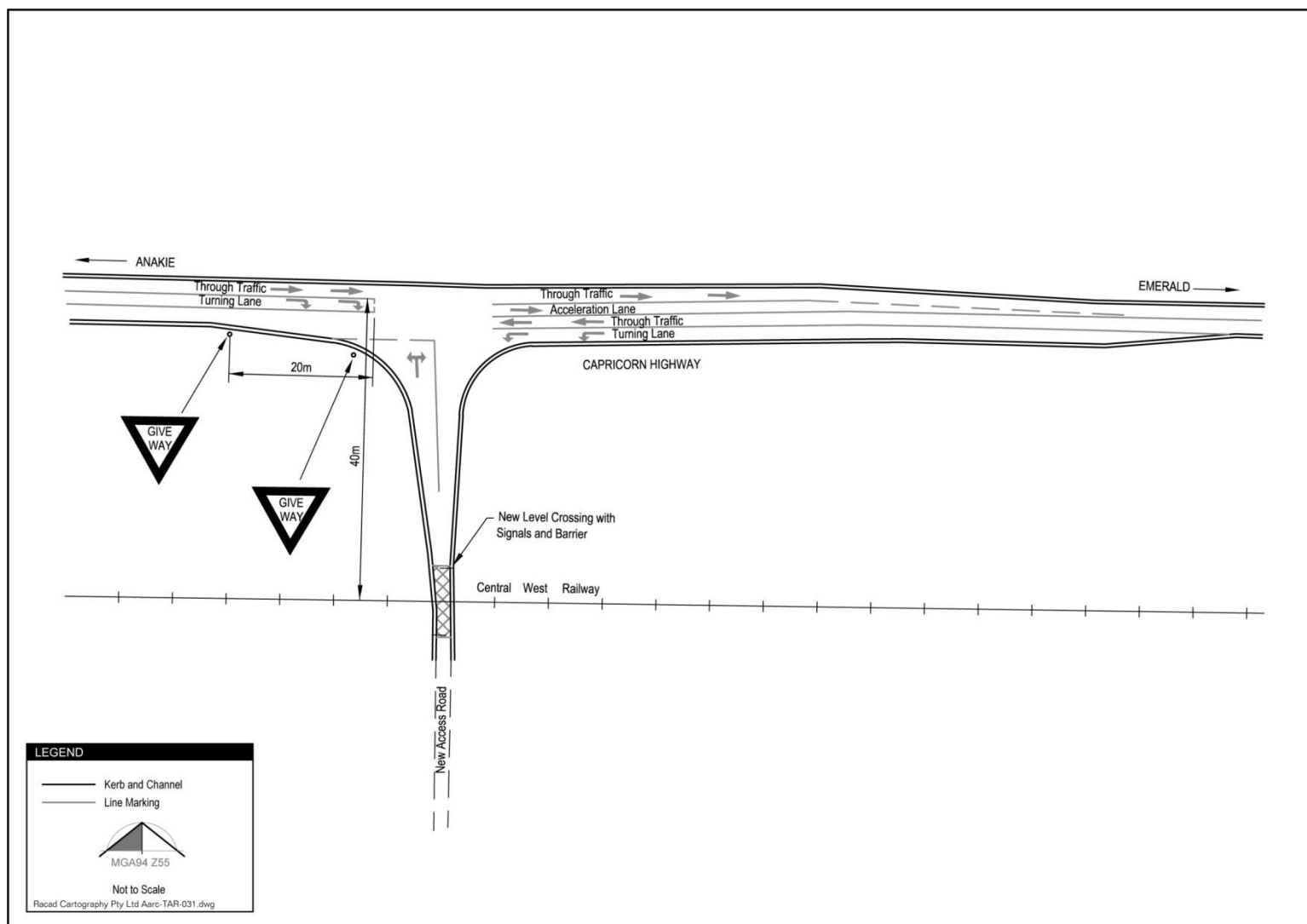


Figure 4.55 Preliminary Design of Capricorn Highway Road Upgrade

Road Closures

The Capricorn Highway may be affected by flyrock exposure during the final 2-3 years of the opencut operation and may require temporary closure for short periods, up to 20 times per year, to maintain a blasting exclusion zone in accordance with the requirements outlined in Australian Standard AS 2187.2 *Explosives – Storage and use Part 2: Use of explosives*.

However, a visual amenity bund will be constructed south of the Capricorn Highway and will extend approximately 5 km west – east. This bund in combination with a blasting depth of approximately 40m below the ground level within the pit will assist to alleviate potential impacts from road closures on the Capricorn Highway.

Stock Routes

A stock route running northward from Lake Maraboon to the Capricorn Highway will need to be relocated approximately 3km to the west in order to accommodate the planned opencut pit and mine surface infrastructure. A route for the relocation has been proposed by Shenhua as shown in Figure 4.56. The route has been preliminarily approved by the DNRm's Senior Lands Officer (Stock Routes), and both the DNRm and the CHRC stock route officer will be consulted in the detailed design stage to ensure the final suitability of the relocated route.

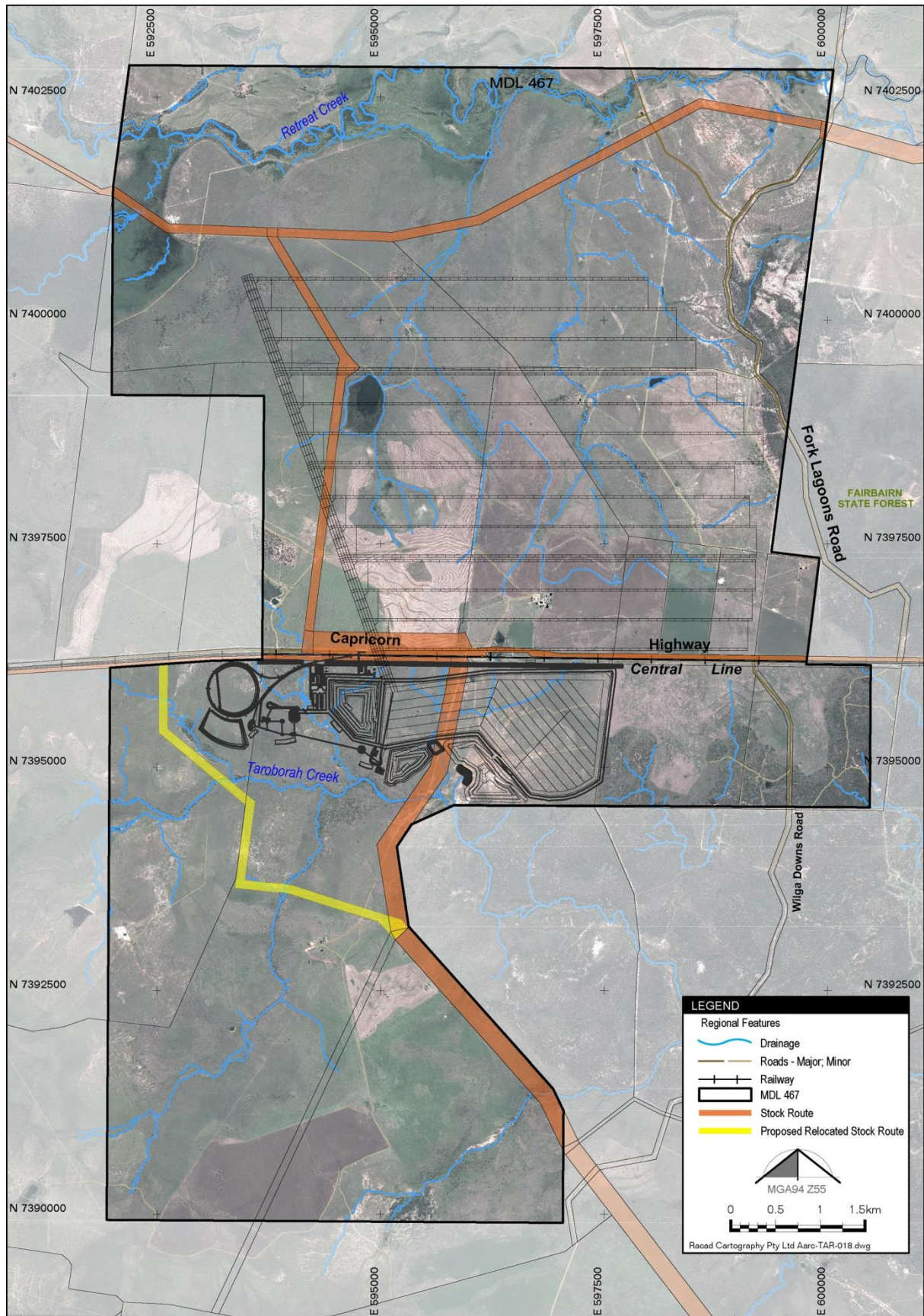


Figure 4.56 Proposed Relocated Stock Route

Anticipated Traffic Volumes

The expected volumes and weights of all Project inputs and outputs including the types of vehicles used and the likely number and timing of trips, during the construction and operational phase of the Project are outlined throughout this section. It should be noted this assessment assumes all material movements to and from the mine site, with the exception of the product coal, will be undertaken via on-road means. The Department of Transport and Main Roads has recently instituted an initiative to increase freight movements via rail, with Emerald targeted as a potential rail freight depot. Should this come to fruition, it is expected that the Project would receive some materials via rail, and therefore, road movements of freight from the coast to Emerald would likely be reduced from that projected in this assessment.

Construction Phase

Construction and mine development activities are planned to occur over a twelve month period, from October 2017 to September 2018. Table 4.23 identifies the anticipated vehicle movements associated with the transportation of plant, equipment and road materials, rail, ballast, steel and concrete etc. during the construction phase of the Project.

Refer to Appendix 11 for standardised loaded and unloaded equivalent standard axles (ESA) values associated with HV transport of materials, plant, supplies and mining fleet that were used during the *Transport Impact Assessment* (AARC 2013).

As shown in Table 4.23, construction equipment will be transported to the Project site from either Gladstone or Mackay. A total of 14 machines will be required for the opencut construction works and seven for the underground works. The majority of the construction fleet will be transported from Mackay via six axle articulated trucks.

Table 4.23 Transport of Construction Materials and Equipment

Material	Weight (t)	Estimated Loads	Vehicle Description	Origin	Total Trips
Opencut Construction					
Excavation and Construction Equipment	695	13	Six Axle Articulated	Mackay	26
		9	B Double	Mackay	18
		3	Six Axle Articulated	Gladstone	6
Diesel Fuel	7,500 kL (6,293t)	150	B Double	Gladstone	300
Imported Gravel	39,500	630	B Double	Sapphire	1,260
Rail, Ballast and Bridge Steel	46,260	22	Six Axle Articulated	Sapphire	44
		449	B Double	Sapphire	898
		274	B Double	Gladstone	548
Buildings, Plant and Services	1,450	50	Six Axle Articulated	Brisbane	100
		25	Six Axle Articulated	Gladstone	50
		25	B Double	Mackay	50
Structural Steel and Equipment	6,300	205	Six Axle Articulated	Brisbane	410
		103	Six Axle Articulated	Gladstone	206
		102	B Double	Mackay	204
Concrete	10,800	600	Four Axle Truck	Emerald	1,200
Excavators, Haul Trucks, Dozers etc.	4,720	11	Four Axle Truck	Brisbane	22
		49	Six Axle Articulated	Brisbane	98
		45	B Double	Mackay	90
		2	B Double	Brisbane	4
		19	Double Road Train	Brisbane	38

Material	Weight (t)	Estimated Loads	Vehicle Description	Origin	Total Trips
Underground Construction					
Construction Equipment	320	5	Six Axle Articulated	Mackay	10
		4		Gladstone	8
Buildings, Plant and Services	1,500	50	Six Axle Articulated	Brisbane	100
		25	Six Axle Articulated	Gladstone	50
		25	B Double	Mackay	50
Concrete	7,300	420	Four Axle Truck	Emerald	840
Structural Steel and Equipment	1,500	50	Six Axle Articulated	Brisbane	100
		25	Six Axle Articulated	Gladstone	50
		25	B Double	Mackay	50
TOTAL	126,637	3,985	-	-	7970

In addition to plant and equipment required for construction, other supplies required during the construction phase include maintenance and miscellaneous supplies, personnel supplies and waste removal. Quantities of these supplies and likely delivery characteristics are detailed in Table 4.24.

Table 4.24 Transport of Additional Construction Supplies

Item	Description	Usage (tpa)	Mass per delivery (t)	Vehicle Type	Loads	Origin	Vehicle Movements
Waste	Domestic Waste, Construction Waste	500	20	Four axle truck	25	Emerald	50
General Supplies	Perishables	125	10	Four axle truck	13	Emerald	26
	Non-Perishables	125	10	Four axle truck	13	Emerald	26
TOTAL	-	750	40	-	51	-	82

Construction Workforce

The construction workforce numbers during both the opencut and underground construction periods are provided in Table 4.25.

Table 4.25 Workforce during Opencut and Underground Construction Periods

Calender Year	OC / UG	Number of Persons
Project Year 0 - 2017	Opencut	150
Project Year 5 - 2022	Underground	100

Construction workforce that do not reside in Emerald are expected to live in rental accommodation, whether hotels, house or accommodation villages. It is anticipated that the construction workforce will operate on a 7 days on, 7 days off, 10 hour shift roster with work occurring 24 hours per day and 7 days per week.

It is envisaged that 25% of the workforce will be sourced from within the local region. An additional 50% of the workforce will be sourced from the Mackay / Rockhampton / Gladstone region. The remaining 25% of the workforce will be from Brisbane. This FIFO workforce will be transported from Brisbane to Emerald by airplane, while the coastal region workforce will likely drive to and from



Emerald. The FIFO workforce will then be transported to their accommodation in Emerald via pre-arranged bus services.

From Emerald, the workforce will be transported along the Capricorn Highway to the Project site, and will be encouraged to utilise bus services. Approximately 75% of the workforce will be bus-in bus-out (BIBO), while 25% are expected to drive-in-drive-out (DIDO) utilising personal vehicles.

It is assumed that return flights will occur approximately every 4 days, with a connecting bus transferring the workforce to the Emerald area. The seating capacity of these services will be adjusted to meet Project demands.

Vehicle movements associated with the transportation of the workforce during the construction period are shown in Table 4.26.

Table 4.26 Workforce Vehicle Movements per Year

Staff Movements	Vehicle	Frequency	Vehicle Movements per year *
Emerald Airport to Emerald Township	Bus	Twice weekly	200
Emerald Airport to Emerald Township	Personal Vehicle	Twice weekly	200
Emerald Township to Project site	Bus	Daily	500
Emerald Township to Project site	Personal Vehicle	Daily	500
Total	-	-	1400

*Assumes an average of 20 working days per month (240 days per year), 50 working weeks in year.

Operational Phase

The opencut production period of the Project is scheduled to commence in 2018 and continue until 2024. The underground mining will commence in 2022 and continue until 2038. Initially, production will commence at a rate of 0.5 Mtpa of product coal before reaching a rate of up to 5.5 Mtpa in Year 8 (2025).

Mining supplies required during the operation of the Project include diesel, bulk ammonium nitrate fuel oil (ANFO) and emulsion, magnetite and flocculent, water treatment and solvents, concrete, gravel and mining consumables. Quantities of these supplies on an annual basis and likely delivery characteristics are detailed in Table 4.27. For the usage, loads and trips columns, maximum figures have been used to indicate the worst case scenario over the life of the Project.

Refer to Appendix 11 for standardised loaded and unloaded ESA values associated with HV transport of materials, plant, supplies and mining fleet that were used during the *Transport Impact Assessment* (AARC 2013).

Table 4.27 Annual Operational Materials Transported

Material	Weight (t)	Estimated Loads	Vehicle Description	Origin	Trips per year
Opencut Operation					
Bulk ANFO and Emulsion	7650	125	B Double	Gladstone	250
Diesel Fuel	17,500 kL (14,683t)	350	B Double	Gladstone	700
Lubricants, Tyres and Machine Parts	10,000	7	Four Axle Truck	Gladstone	14
		8	Four Axle Truck	Mackay	16
		7	Six Axle Articulated	Brisbane	14
		8	B Double	Brisbane	16
Chemicals – Magnetite and Flocculent	350	24	Four Axle Truck	Gladstone	48
Chemicals – Water Treatments and Solvents	15	4	Four Axle Truck	Gladstone	8
Waste Haulage	1,000	100	Four Axle Truck	Emerald	200
Underground Operation					
Diesel Fuel	5,000 kL (4,195t)	100	B Double	Gladstone	200
Consumables – Roof Bolts, Mesh, Stone Dust, Timber, etc.	1,700	25	Six Axle Articulated	Brisbane	50
		13	Six Axle Articulated	Gladstone	26
		12	Six Axle Articulated	Mackay	24
Concrete	1,400	70	Four Axle Truck	Emerald	140
Chemicals – Magnetite and Flocculent	185	6	Four Axle Truck	Gladstone	12
		3	Six Axle Articulated	Gladstone	6
		3	B Double	Gladstone	6
Chemicals – Water Treatment and Solvents	15	4	Four Axle Truck	Gladstone	8
Gravel	1,400	35	B Double	Sapphire	70
Waste Haulage	500	50	Four Axle Truck	Emerald	100
Lubricants, Tyres, Machine Parts, Conveyor Belt	1,000	10	Four Axle Truck	Mackay	20
		10	Four Axle Truck	Gladstone	20
		10	Six Axle Articulated	Brisbane	20
		10	B Double	Brisbane	20
TOTAL	44,093	2,394	-	-	4,788

Note: Assumes an average of 20 working days per month (240 days per year), 50 working weeks in year.

Operational Workforce

Approximately 375 full-time staff will be employed over the life of the mine during both opencut and underground operations, although the maximum at any point in time is expected to be 350. The opencut mine will be in operation for seven years during which time between 58 and 133 staff will be employed.

During production, no camps will be used on site. All operational staff will live in Emerald or the surrounding region. Transport to the mine will be on a BIBO basis via a local bus service, purposely contracted to service the Project's workforce needs.

Following the commencement of the underground mine operation the operational workforce will steadily increase, peaking at approximately 250 staff for the underground operation alone.

It is envisaged that 25% of the workforce will be sourced from within the local region. An additional 50% of the workforce will be sourced from the Mackay / Rockhampton / Gladstone region. The remaining 25% of the workforce will be from Brisbane. This FIFO workforce will be transported from Brisbane to Emerald by airplane, while the coastal workforce will likely drive to and from Emerald for their rostered on period. The FIFO workforce will be transported from the airport to their accommodation facilities in Emerald via pre-arranged bus services.

From Emerald, the workforce will be transported along the Capricorn Highway to the Project site and will be encouraged to utilise bus services provided by the company. Approximately 75% of the workforce will be BIBO, while 25% are expected to use personal vehicles.

Vehicle movements associated with the transportation of the workforce during the various stages of operation period are shown in Table 4.28 and Table 4.29. Transport movements are staged to reflect fluctuating employee numbers as discussed in Section 3.3.5.1.

Table 4.28 Workforce Vehicle Movements per Year 2018 – 2021 and 2034 – 2038

Staff Movements	Vehicle	Frequency	Vehicle Movements per year *
Emerald Airport to Emerald Township	Bus	Twice weekly	200
Emerald Airport to Emerald Township	Personal Vehicle	Twice weekly	200
Emerald Township to Project site	Bus	Daily	500
Emerald Township to Project site	Personal Vehicle	Daily	500
Total	-	-	1400

*Assumes an average of 20 working days per month (240 days per year), 50 working weeks in year.

Refer to Appendix 11 for standardised loaded and unloaded ESA values associated with HV transport of the operational workforce that were used during the *Transport Impact Assessment* (AARC 2013).

Table 4.29 Workforce Vehicle Movements per Years 2019- 2033

Staff Movements	Vehicle	Frequency	Vehicle Movements per year *
Emerald Airport to Emerald Township	Bus	Four return trips weekly	400
Emerald Airport to Emerald Township	Personal Vehicle	Twice weekly	200
Emerald Township to Project site	Bus	Three return trips daily	1,500
Emerald Township to Project site	Personal Vehicle	Daily	480
Total	-	-	2,580

*Assumes an average of 20 working days per month (240 days per year), 50 working weeks in year.

During the ongoing operation, supplies will be needed to service the daily workforce. Quantities of the supplies and likely delivery characteristics are provided in Table 4.30 and Table 4.31.

Table 4.30 Operation Period (2018 – 2021 and 2034 – 2038) Additional Supplies Per Year

Item	Usage (tpa)	Mass per delivery (t)	Vehicle Type	Loads	Origin	Movements
Perishables	125	10	Four axle truck	13	Emerald	26
Non-Perishables	125	10	Four axle truck	13	Emerald	26
TOTAL	250	-	-	26	-	52

Table 4.31 Operation Period (2019- 2033) Additional Supplies Per Year

Item	Usage (tpa)	Mass per delivery (t)	Vehicle Type	Loads	Origin	Movements
Perishables	250	10	Four axle truck	25	Emerald	50
Non-Perishables	250	10	Four axle truck	25	Emerald	50
TOTAL	500	-	-	50	-	100

Refer to Appendix 11 for standardised loaded and unloaded ESA values associated with HV transport of supplies for the operational workforce that were used during the *Transport Impact Assessment* (AARC 2013).

Road Impact Assessment

According to the *Guidelines for Assessment of Road Impacts of Development* (DTMR 2006) (GARID) road impacts of a development are considered significant if the development generates an increase in traffic on SCRs exceeding 5% of existing levels, either measured in terms of average annual daily traffic (AADT) or ESA.

To quantify the level of impact resultant from the construction or operation of the Project, the additional traffic generated by the Project during either the construction or production periods (as previously described) was compared to projected future baseline traffic data (provided in Appendix 11) and are summarised together throughout this section.

Assumptions for the impact assessment include:

- 1) Bulk material ESAs for the opencut construction period are evenly divided over 240 days (late 2017 to late 2018) to account for a 12-month construction period. Underground construction will occur for a total of six months (20 business days per month), or 120 days. Given the compressed construction schedule and vehicle traffic being assessed as AADT, the overall number has been evenly spread over the respective 12 and six month periods. This assumption is considered the best method for the assessment; and
- 2) Loaded ESAs assumes vehicles are of standard loading not higher mass limit (HML) loadings. On average, vehicle will be of standard loading. Any oversize loads will be discounted by equivalent number of undersized loads.

Construction Phase

The projected background AADT levels for Year 0 (2017) are compared to the anticipated Project generated traffic and are detailed Appendix 11. Increases, given as a percentage of Project generated traffic over projected AADT levels for each road segment, are also provided. The results of the Year 0 assessment indicate the following percentage increases:

- SCR Section 16A: Capricorn Highway (Rockhampton to Duaringa) – AADT percentage increases between 0.043% and 0.206%;
- SCR Section 16B: Capricorn Highway (Duaringa - Emerald) – AADT percentage increases between 0.051 % and 0.278%;
- SCR Section 16C: Capricorn Highway (Emerald to Alpha) – AADT percentage increases between 0.000% and 0.871%;
- SCR Section 10C: Bruce Highway (Maryborough to Gin Gin) – AADT percentage increases between 0.017% and 0.046%;
- SCR Section 10D: Bruce Highway (Gin Gin to Bernaraby) - AADT percentage increases between 0.018% and 0.043%;
- SCR Section 10E: Bruce Highway (Benaraby to Rockhampton) – AADT percentage increases between 0.026% and 0.185%;
- SCR Section 10F: Bruce Highway (Rockhampton to St Lawrence) – AADT percentage

increases between 0.003% and 0.039%; and

- SCR Section 10G: Bruce Highway (St Lawrence to Mackay) – AADT percentage increases between 0.003% and 0.037%.

Results indicate there are no segments of road which will experience percentage increases considered significant under the Guidelines (DTMR 2006) during construction.

Production Period

Traffic volumes for Year 1 (2018) and Year 5 (2022) were selected as representative years for analysis during the Traffic Impact Assessment. Year 1 represents the initial opencut production period, while Year 5 represents opencut mining and underground construction simultaneously occurring.

The projected background AADT levels for these production periods were compared to the anticipated Project generated traffic and are detailed in Appendix 11. The results of the assessment indicate the following percentage increases:

Production Year 1

- SCR Section 16A: Capricorn Highway (Rockhampton to Duaringa) – AADT percentage increases between 0.047% and 0.234%;
- SCR Section 16B: Capricorn Highway (Duaringa - Emerald) – AADT percentage increases between 0.000% and 0.768%;
- SCR Section 16C: Capricorn Highway (Emerald to Alpha) – AADT percentage increases between 0.000% and 0.768%;
- SCR Section 10C: Bruce Highway (Maryborough to Gin Gin) – AADT percentage increases between 0.001% and 0.002%;
- SCR Section 10D: Bruce Highway (Gin Gin to Bernaraby) - AADT percentage increases between 0.001% and 0.002%;
- SCR Section 10E: Bruce Highway (Benaraby to Rockhampton) – AADT percentage increases between 0.034% and 0.237%;
- SCR Section 10F: Bruce Highway (Rockhampton to St Lawrence) – AADT percentage increases between 0.000% and 0.002%; and
- SCR Section 10G: Bruce Highway (St Lawrence to Mackay) – AADT percentage increases between 0.000% and 0.001%.

Results indicate no segments of road will experience percentage increases considered significant under the GARID (DTMR 2006) during initial operations.

Production Year 5

- SCR Section 16A: Capricorn Highway (Rockhampton to Duaringa) – AADT percentage increases between 0.0438% and 0.2303%;

- SCR Section 16B: Capricorn Highway (Duaranga - Emerald) – AADT percentage increases between 0.0566% and 0.2916%;
- SCR Section 16C: Capricorn Highway (Emerald to Alpha) – AADT percentage increases between 0.0000% and 0.9588%;
- SCR Section 10C: Bruce Highway (Maryborough to Gin Gin) – AADT percentage increases between 0.0049% and 0.0136%;
- SCR Section 10D: Bruce Highway (Gin Gin to Bernaraby) - AADT percentage increases between 0.0052% and 0.0127%;
- SCR Section 10E: Bruce Highway (Benaraby to Rockhampton) – AADT percentage increases between 0.0324% and 0.2273%;
- SCR Section 10F: Bruce Highway (Rockhampton to St Lawrence) – AADT percentage increases between 0.0008% and 0.0110%; and
- SCR Section 10G: Bruce Highway (St Lawrence to Mackay) – AADT percentage increases between 0.0009% and 0.0105%.

Results indicate no segments of road will experience percentage increases considered significant under the GARID (DTMR 2006) during full production opencut mining operations.

By Year 13 (2030), maximum tonnage of the underground operations is produced and operational deliveries will represent the majority of transport inputs during the production period. The projected future traffic volumes for Year 13 with the development of the Project are compared to projected background levels and are presented in Appendix 11. The results of the assessment indicate the following percentage increases:

Production Year 13

- SCR Section 16A: Capricorn Highway (Rockhampton to Duaringa) – AADT percentage increases between 0.003% and 0.018%;
- SCR Section 16B: Capricorn Highway (Duaranga - Emerald) – AADT percentage increases between 0.004% and 0.022%;
- SCR Section 16C: Capricorn Highway (Emerald to Alpha) – AADT percentage increases between 0.000% and 0.272%;
- SCR Section 10C: Bruce Highway (Maryborough to Gin Gin) – AADT percentage increases between 0.002% and 0.004%;
- SCR Section 10D: Bruce Highway (Gin Gin to Bernaraby) - AADT percentage increases between 0.002% and 0.004%;
- SCR Section 10E: Bruce Highway (Benaraby to Rockhampton) – AADT percentage increases between 0.002% and 0.016%;
- SCR Section 10F: Bruce Highway (Rockhampton to St Lawrence) – AADT percentage

increases between 0.000% and 0.003%; and

- SCR Section 10G: Bruce Highway (St Lawrence to Mackay) – AADT percentage increases between 0.000% and 0.003%.

Results indicate no segments of road will experience percentage increases considered significant under the GARID (DTMR 2006) during full production underground mine operation.

SCR Pavement Impact Assessment

A Pavement Impact Assessment was undertaken to quantify the potential pavement degradation caused by Project HV movements. Light vehicle movements were not considered in the assessment as they typically have negligible pavement impacts. The Pavement Impact Assessment provides a comparison between projected ESAs and total ESAs that can be ascribed to the Project in accordance with GARID (DTMR 2006).

Results of the Pavement Impact Assessment are provided in Appendix 11. Anticipated increases, given as a percentage of Project generated traffic over projected ESA levels, are summarised throughout the following sections.

Construction Phase

The projected background ESA levels for Year 0 (2017) were compared to the anticipated Project generated traffic and are detailed Appendix 11. The results of the Year 0 assessment indicate the following percentage increases:

- SCR Section 16A: Capricorn Highway (Rockhampton to Duaringa) – ESA percentage increases between 0.35% and 1.00%;
- SCR Section 16B: Capricorn Highway (Duaringa - Emerald) – ESA percentage increases between 0.36% and 1.50%;
- SCR Section 16C: Capricorn Highway (Emerald to Alpha) – ESA percentage increases between 0.00% and 3.64%;
- SCR Section 10C: Bruce Highway (Maryborough to Gin Gin) – ESA percentage increases between 0.07% and 0.17%;
- SCR Section 10D: Bruce Highway (Gin Gin to Bernaraby) - ESA percentage increases between 0.07% and 0.17%;
- SCR Section 10E: Bruce Highway (Benaraby to Rockhampton) – ESA percentage increases between 0.25% and 0.63%;
- SCR Section 10F: Bruce Highway (Rockhampton to St Lawrence) – ESA percentage increases between 0.03% and 0.14%; and
- SCR Section 10G: Bruce Highway (St Lawrence to Mackay) – ESA percentage increases between 0.04% and 0.14%.

Results indicate there are no segments of road which will experience percentage increases considered significant under the Guidelines (DTMR 2006) during construction.

Production Phase

ESA volumes for Year 1 (2018) and Year 5 (2022) of the opencut operation were selected as representative years for analysis during the Pavement Impact Assessment. Year 1 represents the initial opencut production period. Year 5 represents opencut mining and underground construction simultaneously occurring.

The projected background ESA levels for these production periods were compared to the anticipated Project generated traffic and are detailed in Appendix 11. The results of the assessment indicate the following percentage increases:

Year 1 (2018)

- SCR Section 16A: Capricorn Highway (Rockhampton to Duaringa) – ESA percentage increases between 0.41% and 1.18%;
- SCR Section 16B: Capricorn Highway (Duaringa - Emerald) – ESA percentage increases between 0.43% and 1.77%;
- SCR Section 16C: Capricorn Highway (Emerald to Alpha) – ESA percentage increases between 0.00% and 3.59%;
- SCR Section 10C: Bruce Highway (Maryborough to Gin Gin) – ESA percentage increases between 0.00% and 0.01%;
- SCR Section 10D: Bruce Highway (Gin Gin to Bernaraby) - ESA percentage increases between 0.00% and 0.01%;
- SCR Section 10E: Bruce Highway (Benaraby to Rockhampton) – ESA percentage increases between 0.34% and 0.83%;
- SCR Section 10F: Bruce Highway (Rockhampton to St Lawrence) – ESA percentage increases between 0.00% and 0.00%; and
- SCR Section 10G: Bruce Highway (St Lawrence to Mackay) – ESA percentage increases between 0.00% and 0.00%.

Year 5 (2022)

- SCR Section 16A: Capricorn Highway (Rockhampton to Duaringa) – ESA percentage increases between 0.37% and 1.15%;
- SCR Section 16B: Capricorn Highway (Duaringa - Emerald) – ESA percentage increases between 0.41% and 1.72%;
- SCR Section 16C: Capricorn Highway (Emerald to Alpha) – ESA percentage increases between 0.00% and 4.06%;
- SCR Section 10C: Bruce Highway (Maryborough to Gin Gin) – ESA percentage increases between 0.02% and 0.05%;
- SCR Section 10D: Bruce Highway (Gin Gin to Bernaraby) - ESA percentage increases



between 0.02% and 0.05%;

- SCR Section 10E: Bruce Highway (Benaraby to Rockhampton) – ESA percentage increases between 0.32% and 0.79%;
- SCR Section 10F: Bruce Highway (Rockhampton to St Lawrence) – ESA percentage increases between 0.01% and 0.04%; and
- SCR Section 10G: Bruce Highway (St Lawrence to Mackay) – ESA percentage increases between 0.01% and 0.04%.

Results indicate there are no segments of road which will experience percentage increases considered significant under the Guidelines (DTMR 2006) during opencut mining production.

By Year 13 (2030), maximum tonnage of the underground operations is produced and operational deliveries will represent the majority of transport inputs during the production period. The projected future traffic volumes for Year 13 with the development of the Project are compared to projected background levels in Appendix 11.

The projected background ESA levels for Year 13 were compared to the anticipated Project generated traffic and are detailed in Appendix 11. The results of the assessment indicate the following percentage increases:

- SCR Section 16A: Capricorn Highway (Rockhampton to Duaringa) – ESA percentage increases between 0.02% and 0.08%;
- SCR Section 16B: Capricorn Highway (Duaringa - Emerald) – ESA percentage increases between 0.03% and 0.12%;
- SCR Section 16C: Capricorn Highway (Emerald to Alpha) – ESA percentage increases between 0.00% and 1.34%;
- SCR Section 10C: Bruce Highway (Maryborough to Gin Gin) – ESA percentage increase of 0.01 %;
- SCR Section 10D: Bruce Highway (Gin Gin to Bernaraby) - ESA percentage increases between 0.01% and 0.02%;
- SCR Section 10E: Bruce Highway (Benaraby to Rockhampton) – ESA percentage increases between 0.02% and 0.05%;
- SCR Section 10F: Bruce Highway (Rockhampton to St Lawrence) – ESA percentage increases between 0.00% and 0.01%; and
- SCR Section 10G: Bruce Highway (St Lawrence to Mackay) – ESA percentage increases between 0.00% and 0.01%.

Results indicate no segments of road will experience percentage increases considered significant under the GARID (DTMR 2006) during underground mining operations.

Local Road and Pavement Impacts

Traffic generated as part of the construction of the Project will impact upon the local road network managed by CHRC, along a section of the Anakie – Sapphire Road, which will intersect the Capricorn Highway to the west of the Project.

Anticipated AADT increases on the local road attributed to the Project are:

- Anakie – Sapphire Road (for haulage of gravel):
 - Year 0 (opencut construction, 2017): AADT – 6.03 trips per day; and
 - Year 13 (underground operation, 2030): AADT – 0.19 trips per day.

Shenhua will engage with CHRC prior to construction to assess the need for a Road Infrastructure Agreement to mitigate impacts of increased heavy vehicle traffic.

4.3.2.2 Spills of Product or Hazardous Materials

Hazardous Materials

The movement of hazardous materials has road safety implications. Spills, whilst infrequent, have potentially serious consequences. Transport of hazardous chemicals associated with the Project will be undertaken in accordance with *The Australian Code for the Transport of Dangerous Goods by Road and Rail 7th Edition* (National Transport Commission 2011) which sets out the requirements for the transport, storage, handling and use of hazardous chemicals in order to minimise the likelihood of accidents and spillages.

Once hazardous materials arrive at the Project site they will be stored in accordance with the relevant Australian Standards to prevent a hazardous chemical spill or emergency event. The following Australian Standards apply to the Project for the correct storage of hazardous materials:

- *AS 3780 – 1994 The storage and handling of corrosive substances* - Provides requirements and recommendations for the storage and handling of corrosive substances;
- *AS 1940 – 2004 The storage and handling of flammable and combustible liquids* - Deals with flammable liquids of dangerous goods Class 3 and combustible liquids. Provides requirements and recommendations that are based on industry best practices; and
- *AS 2187.1 – 1998 Explosives – Storage, transport and use Part 1: Storage* - Provides acceptable requirements to ensure the security and safety of explosives and detonators.

Third party audits will be employed to ensure compliance with legislation and leading practice management procedures in regards to hazardous chemical transportation, waste tracking and chemical storage.

With the correct controls in place, there will be negligible risk to employees, adjacent land users, general public and the environment. While the likelihood of an incident is low, the impact from any potential incident involving dangerous goods and hazardous substances would most likely occur and be contained within the site, where the materials are stored and used.

Spills of hazardous materials will be cleaned up as soon as possible. Where practicable, recovery of spilled materials for re-use is preferable to disposal. Work procedures, safety management systems



and training will address safe work methods and the types of equipment for spills clean-up and re-use / disposal. Specific advice on how to clean up spills safely and selecting appropriate protective equipment and resources will be obtained from the manufacturer's Material Safety Data Sheet (MSDS).

Section 4.13.2.4 of this EIS outlines the requirements of the Emergency Response Plan and a general spillage action plan that may be applied in the event of a hazardous chemical spill that is deemed safe for on-site staff to attend.

Product Spillages

Product coal shall be transported from the Project site by rail to the WICET at Gladstone. Spill management of product coal shall be mitigated in the first instance, at the Project site during loading.

Product coal which is discharged from the CHPP eventually makes its way to the train load out conveyor where it is transferred to the train load out (TLO) facility. The TLO is a flood (or volumetric) loading system with a gate and telescopic chute operated remotely from the load-out control room. The train loading chute ensures that the coal supplied to each wagon is profiled to the correct shape, to reduce the likelihood of any spills.

The TLO will also include a veneering system to provide a sealing layer over the loaded wagon and control dust from coal wagons during transit to port.

4.3.2.3 Driver Fatigue

Driver fatigue for HV operators will be managed through a Fatigue Management Plan developed in accordance with the National Heavy Vehicle Regulator's fatigue management guidelines (NHVR, 2013). This includes the following practices:

- Counting work and rest time;
- Record keeping – including driver work diaries, schedules and rosters, health assessments and fatigue incident records; and
- Risk identification, assessment and control.

Travel time from the Emerald Airport to the site is approximately 25 minutes. Workers will be accommodated in the Emerald Township. The Capricorn Highway will be utilised by workforce personnel at the start and finish of rosters. To reduce vehicles on the road and potential driver fatigue, buses will be utilised to transport the workforce from the Emerald Township to the mine areas. Workforce shifts will be between 10 – 12 hours per day, with sufficient breaks in between shifts.

An inspection of the Capricorn Highway revealed that a number of fatigue measures have already been implemented along this road, including audible edge line delineation along most of the route, "Driver Reviver" signage and regular rest areas.

The following practices will be implemented to ensure driver safety is upheld at all times:

- All personnel who are required to operate and drive company vehicles or equipment shall be in possession of a current valid licence or certificate of competency for that class of vehicle or machinery;
- Personnel are to notify the Site Manager immediately of any changes to the conditions of their



drivers or operation licences (i.e. cancellation, suspension or special conditions);

- Personnel will always drive vehicles at a safe speed for the prevailing road conditions and pay attention to other hazards (vehicles, pedestrians, stock and wildlife, flooded roads);
- Seat belts must always be worn when driving or travelling in vehicles;
- Before commencing a trip in a field vehicle, the driver should conduct an inspection and check tyres, lights, fluids and brakes; and
- A vehicle shall never be employed for any purpose other than its intended use.

4.3.2.4 Public Transport Networks

There are no known public transport services in the area of the Project. Given the nature of the location, there are no identifiable designated cycle ways or pedestrian networks present.

4.3.2.5 Environmental Impacts

The major sources of environmental impacts from the transportation of plant, equipment and products associated with Project include dust and greenhouse gases in addition to noise and vibration. No impacts to watercourses or overland flows are anticipated in direct relation to the transportation arrangements associated with the Project.

Dust and Greenhouse Gases

Operational activities on the Project site represent the majority of dust emission sources, rather than transport activities. Air pollution emission rates were calculated for two modelled scenarios including Year 2 and Year 5, as these years represent the scenarios that are likely to contribute most to dust levels in the surrounding air shed.

The results from the *Air Quality Assessment* (Katestone 2014) are presented in Appendix 15 and Section 4.6. For the majority of dust producing activities, the dust emission rate is dependent on the wind speed, with little or no dust emissions occurring for some activities below a threshold wind speed. Dust emissions generated during the delivery of goods and personnel to and from the Project site are not considered to be significant.

The dust controls that are proposed to be used for product transport include compacting the surface of coal loaded into train wagons and veneering the product to reduce dust impacts along the various rail systems to the WICET.

Greenhouse gases associated with the Project's transport have been assessed in the *Greenhouse Gas Assessment for the Taraborah Coal Project* (Katestone in 2013) presented in Appendix 16 and summarised in Section 4.6.3.

Noise and Vibration

Noise and vibration from the Project was assessed by ASK Consulting Engineers Pty Ltd and details of the impacts and mitigation measures are provided in Appendix 17 and Section 4.7.

During this assessment, the rail noise contribution was considered for trains associated with the Project as they travel along the existing Central West and Blackwater rail systems to the WICET near Gladstone.



It is predicted that the train pass-bys would exceed the QR average maximum A-weighted sound pressure level noise criteria of 87 'A' weighted decibels (dBA) at approximately 40m or less from the railway under neutral meteorological conditions, or approximately 60m or less under adverse meteorological conditions (e.g. downwind). It is predicted that the QR equivalent continuous sound level, (24 hour) noise limit of 65 dBA would be exceeded within 10m or less of the main QR rail line for six train movements per day (i.e. 3 trains both to and from the mine). In summary, QR noise limiting criteria are predicted to be met at approximately 60m or more from the railway lines along the route from the mine to the export terminal, under adverse, neutral and favourable meteorological conditions.

It is anticipated that noise and vibration from increased traffic will not significantly impact the town of Emerald, as the Project is 22 km to the west of town. Increased vehicle activity will occur through sections of the Emerald Township, as the workforce will be accommodated here. However, the traffic increase is not considered to be significant.

4.3.2.6 Rail Impacts and Mitigation

Capacity Contribution

The existing rail traffic on the section of the Central West railway system which shall be utilised by the Project is generally restricted to the bi-weekly passenger service to Longreach, although up to seven x 450m length trains (peak per day) have used the track in the past for cattle and grain haulage. Due to the Project, rail traffic along this system is planned to be increased by an additional three x 1,425m length trains in each direction (total of six per day) (ALCAM 2013). The Blackwater railway system has a higher peak per day usage; therefore the three additional trains per day from the Project will not cause significant impact on this system.

The Central West railway system will be temporarily closed daily from late 2017 to late 2018, with the closures to work around the minimal regular train movements each week.

The rails future capacity considerations and upgrade plans have continued to be developed with the expectation that Shenhua will request line capacity on a contractual basis. As such, it is not expected that additional rail movements generated as a result of Project will negatively impact upon the rail network.

Rail Upgrades

Several railway infrastructure upgrades will be required to facilitate the transport of product coal along the proposed railway route. Infrastructure developments required are described throughout this section and include:

- An upgrade of the current low-grade track to 20 or 26.5 tonne axle load (TAL) between Taraborah and Nogo Junction;
- Strengthening of six minor timber bridges along the Taraborah / Nogo Junction route;
- Track strengthening between Nogo Junction and Burngrove;
- A major upgrade of the Nogo River bridge, in order to achieve 20 TAL and accept wider coal wagons;
- Sub-projects planned along the Blackwater System as part of the Wiggins Island Rail Project (WIRP); and

- Taroborah Train Load Out and Rail Loop Facility.

Figure 4.57 outlines the general location of railway infrastructure upgrades associated with the Project.

Nogoa Junction to Burngrove Rail Upgrade

Current electric traction is limited east of Burngrove. Tonnages west of Burngrove (including from Taroborah) do not justify electrification. Changing traction en route is not operationally viable. The preferred diesel locomotives to be deployed by current rail operators are EDI Rail's GT 42 CU Ace locomotive (i.e. Aurizons 4000/4100 class or PN's 7200 class). These are current generation heavy haul locomotive trains to 20 TAL.

The track east of Nogoa is already 20 TAL capable and services coal haulage from the Minerva mine south of Emerald; however Aurizon would seek some capital contribution towards track strengthening to accommodate any increase in gross tonnages on this section due to coal hauled from Taroborah. The proposed Taroborah train consist of three x 120t locomotives plus 90 x 80t wagons would also trigger a requirement to extend two crossing loops (assumed as Comet and Nogoa) to permit crossing of the longer 90 wagon trains on this section. Depending on any growth of the task, increased gross tonnes will likely trigger the requirement for some track strengthening works (rail, sleepers, ballast, formation strengthening).

Aurizon will be cognisant of its obligations to both existing customers and potential customers that have either existing access entitlements or have formally applied for additional access paths for new mine operations or expansion capacity on the network. To allocate rail capacity for any project, Aurizon will need proof that Port capacity entitlements exist. Aurizon has indicated that rail entitlements are fully committed and aligned to existing Users, including the WICET Stage 1 tonnage entitlements. Any rail commitments would need to align with port entitlements for WICET Stages 2 and 3.

Taroborah to Nogoa Junction Rail Upgrade

The rail network west of Nogoa Junction is owned by the State Government owned QR Limited (QRL). This is an old "developmental railway" with very limited current use, and is of low construction standard and maintained to minimum standards consistent with its current use. The line is to nominal 15.75 TAL, but comprises mostly old 30 kg rail on timber sleepers, not suitable for running significant bulk train operation at that axle load. Current traffic has been limited to light traffic such as the weekly Spirit of the Outback passenger train and sporadic grain and cattle train operations.

The major Nogoa River steel deck bridge is limited to 15.75 TAL, but it would require modification due to clearance requirements for the standard coal wagon door opening mechanism. There are also six minor timber bridges not suited to significant gross tonnages.

The six timber bridges will be replaced and reinforced with concrete box culverts. Major re-railing to eliminate all the old 30 kg/m rail, extensive re-sleepering, increasing the ballast profile, selective capping layer strengthening, replacing some of the mainline crossing loop turnouts, and level crossing upgrades are planned to be undertaken.

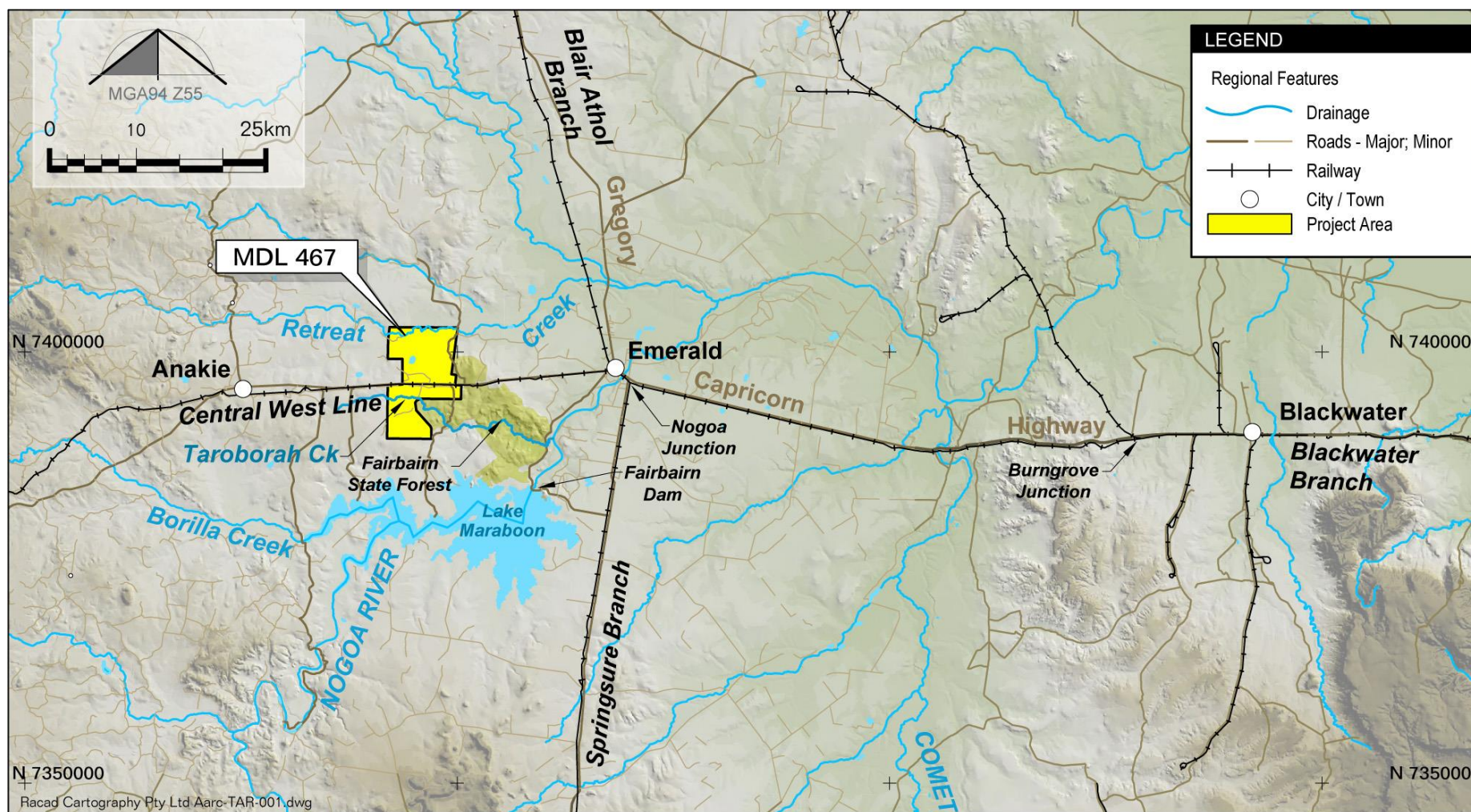


Figure 4.57 Rail Network Upgrades Associated with the Project

Wiggins Island Rail Project

The Wiggins Island Rail Project (WIRP) aims to deliver rail infrastructure to service the WICET and provide a link to mines in the Bowen and Surat Basins. The WIRP involves the construction of new lines and upgrades to existing lines, with two of these sub-projects planned along the Blackwater System including:

- The WICET Stage 1 specific rail infrastructure includes a balloon loop and rail unload pit at the port, the initial rail depot at Aldoga (holding tracks, train provisioning facility), a connecting 3rd track on the North Coast Line, in addition to the above-rail rolling stock servicing depot;
- Stage 2 includes a second rail balloon loop, plus additional holding roads, including duplication of 23.9 km of track between Dingo and Bluff; and
- Stage 3 includes a 3rd rail balloon loop and more holding roads.

All WICET users would need to contribute their respective share of this investment (based primarily on tonnage allocation), with a likely loading on top of the Queensland Competition Authority's mandated weighted average cost of capital for the core rail network. The Shenhua share will depend on its contracted tonnage entitlement and the total contracted tonnage through WICET. The initial Aurizon works and pricing arrangements for Stage 1 have yet to be agreed by the stakeholders.

Taraborah Train Load Out and Rail Loop Facility

In order to transport product coal from the Project site to the Port of Gladstone via rail, a TLO station and rail loop will be constructed in the southern sector of the Project site adjacent to the CPP. The rail infrastructure will be fully signalled and have boom gates. The spur line and balloon loop are mine specific infrastructure and will be directly funded by Shenhua. Aurizon is expected to be prepared to undertake function of "Rail Manager" (covering train operating control and infrastructure maintenance) on a fully commercial basis on behalf of Shenhua. The direct traffic control signalling system will be used on the Shenhua spur line and balloon loop and continue to be used west of Burngrove.

Level Crossing Assessment

ALCAM Assessment

The Australian Level Crossing Assessment Model (ALCAM) was used to assess the current and projected safety of all public level crossings on the Government supported non-commercial rail network in Queensland utilised by the Project.

The full ALCAM report, with an assessment of each crossing and suggested mitigation measures to increase safety, is provided in Appendix A of Appendix 11.

The findings of this assessment indicate 14 crossings (including pedestrian) will be associated with rail traffic for the Project as it utilises the existing QR Central West railway system and existing level crossings from Nogo Junction (263.3 km) westwards through Emerald to approximately the St Helen's Road Level Crossing (287.7 km), totalling a distance of 24.4 km. The Blackwater railway system is not assessed under ALCAM, as it is a privately managed, commercial railway.

During the level crossing risk assessment, a reference score is used that can provide an indicative assessment of the risk relative to the hazard (collision). Following the application of mitigation efforts all train crossings were determined to be well within acceptable safety limits. It is noted that the



crossing within the Project site will not require any safety upgrades to meet the ALCAM reference scores and the Project has committed to the provision of boom gates and automated signals at the newly constructed rail crossing for the TLO and rail loop facility.

Traffic Assessment

An assessment of the operational impacts associated with the rail transport of coal at the three existing railway crossing locations within the township of Emerald has been undertaken (Appendix B to Appendix 11). The assessment consisted of traffic simulation modelling and sensitivity analysis using AIMSUN transport simulation modelling software in order to identify any potential significant congestion impacts as a result of the proposed coal transport rail traffic.

Modelling of the base year 2014 and ten year design horizon year 2024 conditions for each of the following three sites was undertaken:

- Level crossing south of the Capricorn Highway / Gregory Highway intersection
- Level crossing south of the Capricorn Highway / Opal Street intersection
- Level crossing south of the Capricorn Highway / Selma Road intersection

Traffic survey information for the simulation was obtained from DTMR and used as the 2014 base year case, while an moderate to high anticipated growth rate across the Emerald road network of 2.5% p.a. was assumed for the 2024 future year case. While proposed rail traffic is anticipated to occur during times that do not coincide with the peak periods of the existing road network (i.e. off-peak), modelling has been conducted assuming the worst-case AM peak traffic data, the worst-case off-peak traffic data and the worst-case PM peak traffic data scenarios to provide a conservative assessment. Further, the scenarios of no trains, a slowest train speed 40km/h, and a fastest train speed of 60km/h were modelled for each location.

In order to achieve an objective evaluation of the simulation, the results were then assessed against Level of Service (LOS) rating derived from the *RTA Guide to Traffic Generating Developments*. The LOS rating, from A to F, provides a measure of the impact of delay per vehicle across the crossing.

Based on the LOS rating, minimal impact (LOS of A or B) to road traffic will be experienced at all three level crossings in Emerald from the passing of the coal trains operating at a slowest speed of 40km/hour at all times with the exception of projected future morning and evening peak hour traffic at the Gregory Highway crossing and evening peak hour traffic at the Opal Street crossing, when moderate delays (LOS of C) are expected.

A LOS rating of A is considered good operation for a crossing. A LOS rating of B indicates satisfactory operations of the crossing with spare capacity. A LOS rating of C is deemed to be satisfactory under the guidelines, although further study may be required in the future, if the predicted traffic volumes do occur.

Maximum queues at the adjoining Capricorn Highway intersections are such that no disruption to through traffic on the highway is expected with the exception of eastbound traffic through the Opal Street intersection, where the queues waiting to turn south eventually build to the point where they exceed the capacity of the turning lane and block the single lane prior to the turning lane.

It should be noted that the predicted queues at the Opal Street intersection in the future year 2024 scenario are principally attributable to the increase in base load traffic. With the assumed 2.5% annual



growth rate in traffic volumes, the projected year 2024 traffic volumes will exceed the capacity of the current single lane configuration of the Capricorn Highway in terms of vehicles per hour by some 40%, which will cause traffic delays in and of itself. Therefore, it is likely that upgrades to the Capricorn Highway infrastructure in this area will be required in future that will positively affect the queue lengths and delays projected in this assessment.

Despite the somewhat lengthy queues that are projected to eventuate at the Opal Street and Gregory Highway crossings, the modelling indicates the congestion clears within 90 seconds or less following the passing of the train under current intersection configurations, which is considered acceptable and of moderate impact. As suggested above, it is quite possible that upgrades to these intersections to handle the projected increase in future base load vehicle traffic may eventuate regardless of the presence of the coal trains, which would act to lessen the increased rail traffic impact projected in this assessment.

4.3.2.7 Port Impacts and Mitigation

The WICET export opportunity is the preferred port option due to its geographical location, availability of port capacity (with planned future expansions) and connection to a rail infrastructure that is capable of servicing its transport requirements.

WICET is proposed to cater for 27 Mtpa coal handling capacity for the Stage 1 program (estimated for completion in 2014 and fully subscribed), with a total projected capacity of 80 Mtpa. The expansion project will occur in three stages, in alignment with the projected industry handling capacity demand. At full capacity, WICET will duplicate the existing capacity of the Port of Gladstone's RG Tanna Coal Terminal and provide the level of throughput required to meet customer coal export demands from 2014.

Shenhua has entered into discussions with the WICET consortium in order to negotiate space at this port for coal stockpiling, handling and export in Stage 2. It is anticipated that the first batch of Project coal will arrive at WICET in 2018 for export. The WICET facility will have sufficient capacity to handle the Project's coal export quantities of up to 5 Mtpa.

4.3.2.8 Airport

It has been estimated that the Project workforce movements will require approximately 100 return flights between Brisbane and Emerald per annum of Dash 8 or similar capacity aircraft. This equates to two return flights per week, which will accommodate 25% of the proposed maximum workforce. Current services are managed by Qantas Airways Ltd and Virgin Australia Airlines Pty Ltd. The Emerald Airport is not seen as a limitation to the development of the Project, nor will the Project negatively impact upon this facility.

An Emerald Airport Master Plan tender was awarded in late 2012; the final document is still being drafted. The purpose of the Master Plan is to establish a framework for the future planning and development of Emerald Airport to ensure the Central Highlands region achieves its strategic objectives and capitalises on the aeronautical and commercial opportunities provided by the airport. The Master Plan is intended to establish the basis for more detailed studies of design, infrastructure planning, land use planning and environmental impacts required to achieve the strategic direction. The anticipated capacity required to service FIFO operations will be incorporated into future planning for this facility and, as such, the demand created as a result of the Project should not negatively impact on other users or the infrastructure itself.

The Emerald Airport is identified as of state significance under the *State Planning Policy 1/02*:



Development in the Vicinity of Certain Airports and Aviation Facilities (Annexure 1). This Policy aims to provide guidance on decreasing the risk to public safety near the ends of airport runways, avoid any increase in the numbers of people adversely affected by significant aircraft noise and avoid affecting the safety and operational efficiency of airports and aviation facilities. The Emerald Airport is not listed under *Annexure 3 Airport Runways for which a Public Safety Area Applies*. The State Significant listing is based on meeting the following criteria:

- The airport is a key regional hub;
- It is an economic, industry, mining or tourism centre; and
- The airport is likely to influence major growth, environmental or land use decisions.

Potential impacts on air safety, including the raising of landforms or the construction of stacks, flares or lighting within flight paths will not increase due to the Project.

4.3.2.9 Cumulative Impacts

With 47 operating coal mines (as of 2012) (DNRM 2013) in the Bowen Basin, any additional major operations have the potential to impact on the transport network. These additional operations may result in a large increase in road, rail and ship movements on an annual basis. On a cumulative basis, these projects may trigger some of the transport infrastructure maintenance negotiation requirements under the relevant guidelines. Local and State Government agencies identify cumulative impacts on transport facilities and recommend appropriate mitigation measures.

In the future, the Emerald Airport may cater to a larger number of FIFO workforces from existing and proposed developments within the Bowen Basin region. An impact with future developments may be that people living, working or visiting Emerald will perceive the additional aircraft noise as a significant problem and consequently campaign to reduce aircraft operations to reduce noise impacts. Therefore the encroachment by incompatible development may indirectly compromise the future of this airport.

The upgrading of the Central West rail system, including re-railing, re-sleepering, increasing the ballast profile, selective capping layer strengthening, replacing some of the mainline crossing loop turnouts and level crossing upgrades is planned to be undertaken, and will benefit the railway track between Blackwater and Emerald. A safer, higher grade railway track will be in place, which may benefit future coal and mineral projects to the west of Taraborah in the Galilee Basin.